WILLIAM & MARY
CHARTERED 1693

Training & Technical Assistance Center

P.O. Box 8795
Williamsburg, VA 23187-8795

Planning for Technology Integration to Meet the Needs of Diverse Learners Considerations Packet

For more information contact:

E-mail: ttacwm@wm.edu

Phone: 757-221-6000 or 800-323-4489

Website: http://education.wm.edu/centers/ttac/index.php

Between 2002 and 2008, the United States Department of Education committed an average of 487 million dollars per year to educational technology integration to improve student achievement (Enhancing Education Through Technology (ed-tech) State Program, 2008). As a result, most teachers are being directed to incorporate technology into their lessons; for some, technology integration is even a part of the criteria for their annual observations and evaluations.

In 2005, roughly 86% of U.S. teachers said computer technology has changed the way they teach to some extent, and more than half (55%) said it impacted their instruction "a great deal," according to a survey commissioned by CDW-G, provider of technology solutions for business, government and education. Unfortunately, these same teachers report no significant increases in the amount of training they received since 2004 (Ascione, 2005). In comparison, today's American teenagers are utilizing the interactive capabilities of the Internet as they create and share their own media creations. Fully half of all teens and 57% of teens who use the Internet may be considered "content creators." That is, they have created a blog or webpage; posted original artwork, photography, stories or videos online; or remixed online content into their own new creations (Lenhart & Madden, 2005).

"Are we preparing our students for our past or their future?" is a question commonly heard at conferences and in discussions addressing the future of technology integration. While such questions are valid and raise important issues surrounding the direction of technology use in the classroom, the process of technology integration itself has received much less attention. How should teachers plan for technology use? How can teachers meet the needs of diverse learners with technology? These types of questions need to be answered before we can begin preparing our students for their future, a future that inevitably will be heavily dependent on use of technology.

Instructional Approaches

The students populating U.S. classrooms today are highly diverse. They come from different cultures and have different learning styles and learning needs. In addition, at any given time, these students may demonstrate differing levels of academic readiness in various subjects (Tomlinson, 2001). The 1997 reauthorization of the Individuals with Disabilities Act (IDEA) and the No Child Left Behind Act of 2001 require that special education students participate and progress in the general education curriculum with measurably improved performance (Rose, Meyer, & Hitchcock, 2005). These requirements call for new approaches to ensure their success in the classroom. Two instructional approaches for meeting the needs and advancing the performance of such a diverse group of learners are (a) differentiation and (b) universal design for learning (UDL).

Differentiation. "In a differentiated classroom, the teacher proactively plans and carries out varied instructional approaches to content, process, and product in anticipation of and response to student differences in readiness, interest, and learning needs" (Tomlinson, 2001, p. 7). Differentiation requires teachers to consistently assess their students to determine their performance level and how they learn best. Teachers use flexible groupings with multiple approaches to accessing and demonstrating learning within a clear and coherent curriculum. The tasks for all students are respectful and challenging, but not frustrating.

Regarding technology integration, differentiation provides a structure within which technology may be used to help students:

- Access the content
- Interact with the content
- Make sense of new ideas and information
- Demonstrate their learning through product development

Universal design for learning. UDL "provides a blueprint for creating flexible goals, methods, materials, and assessments that meet the needs of diverse learners" (Rose et al., 2005, p. 3). UDL acknowledges that not all learners learn in the same ways based on brain research on how and where different students process the same information. The brain research has pinpointed three networks that are part of the learning process. "The recognition networks are specialized to receive and analyze information (the what of learning). The strategic networks are specialized to plan and execute actions (the how of learning). The affective networks are specialized to evaluate and set priorities (the why of learning). In recognizing these differences in students, the goal of UDL is to provide content in a manner that is accessible by all students" (Rose et al., 2005, p. 106).

As part of meeting the different needs of all students, UDL recognizes the potential of digital media and technology to create a universally designed curriculum that offers:

- Multiple means of representation to acquire information and knowledge
- Multiple means of action and expression to provide alternatives for traditional ways of demonstrating knowledge, and
- Multiple means of engagement to motivate, engage and challenge learners (Rose et al., 2005)

Using this framework, all students can access the curriculum in the ways in which they learn best. Teachers in turn use flexible groupings to provide support as needed and to improve participation among all students.

Planning for Technology Integration

While differentiation and UDL both provide a philosophical approach to using technology in a way that provides access to the curriculum and best meets the needs of diverse learners, neither approach provides a specified, applied framework for teacher planning.

Harris (2005) posed three main questions for teachers to address when planning for technology integration in their lessons:

1. **Feasibility test:** Will this learning activity, project, or unit idea work given the technological, interpersonal, logistical, and contextual factors currently operating in your particular learning environment?
2. **Appropriateness test:** Is this learning activity appropriate for your students given what you know about their learning needs and preferences? Is it appropriate for you as a teacher targeting specific curriculum knowl**edge and skills?**
3. **Relative advantage test:** Can the same learning outcomes be accomplished as well or better using more readily available and easy-to-use tools and resources?

While these questions are helpful in considering the relative **advantages of availa**b**le technologies, they do** not provide a specific approach to guide instructional planning supported by technology that is matched to outcomes and students' learning needs.

Harris and Hofer's Activity-Types Planning Approach

Studies on teacher planning have shown that effective planning revolves around carefully constructing learning activities to achieve specific goals and outcomes. The increased emphasis on technology integration has left teachers typically focusing on the technology in their planning, rather than on the curriculum and their instructional goals. This results in the technology driving rather than enhancing or supporting instruction.

Harris and Hofer (2009) proposed a planning approach for technology-based instruction that stays focused on learning goals and activities, while providing a framework for matching available technologies with specific learning activities. They address five basic instructional decisions in planning a particular learning event.

1. **Choose *learning goals***
    - By starting with the learning goal, the focus stays on student learning. In many schools this may be based on one or more particular curriculum standards.

2. **Make practical *pedagogical decisions*** about the nature of the learning experience
    - Pedagogical decisions will vary based on the learning goal, desired outcomes, teaching style, and the way the students learn best. Creating the best environment and instructional conditions for teachers and students is critical to achieving positive outcomes. Examples of pedagogical decisions include:
        - Does the lesson need to be more teacher- or student-centered?
        - Do students need to work independently, in small groups or a large group?
        - How much prior knowledge do students have and/or need?
        - How long do I have to teach this content? 1 day, 1 week?
        - Do students need more structure or less structure?
        - What level of knowledge do students need to attain? Surface knowledge or deep understanding?

3. **Select and sequence appropriate *activity types*** to form the learning experience. Currently, six taxonomies of learning activity types for K-6 literacy, mathematics, science, secondary English language arts, social studies, and world languages have been compiled by Harris and Hofer on their Activity Types Wiki (see http://activitytypes.wmwikis.net/), and more taxonomies are being developed. Each taxonomy contains categories of learning activity types, which are broken into specific activity types, along with a list of suggested technologies. The activity-type decisions are based on the learning goals and the content and pedagogical design of the lesson.

    The pedagogical decisions will help to narrow the types of activities from which to choose. For example, the K-6 Literacy Taxonomy includes two categories, reading and writing. The reading category is divided into six categories of learning-activity types:

        - Pre-Reading Activities
        - During-Reading Activities
        - Post-Reading Activities
        - Vocabulary Activities
        - Comprehension Activities
        - Fluency Activities

These subcategories contain lists of more specific activities that encourage different depths of learning and different levels of teacher and student interaction. For example, the Fluency Activity-Type subcategory contains the following activities:

- Model Fluent Reading
- Choral Reading
- Paired Reading
- Repeated Reading
- Reader's Theater
- Radio Reading
- Recitation
- Drama
- Storytelling
- Debate

To view all of the activity types for all content areas, visit http://activitytypes.wmwikis.net/

4. **Select formative and summative *assessment strategies*** that will reveal what and how well students are learning:
    - How will you know that students have achieved the desired outcomes and met the learning goals? What will the assessment look like (e.g., a test, a product)? What sorts of formative assessments will you use to gauge student learning throughout the lesson? Ongoing assessment will help to ensure the success of the students.
    - How will the students know what is expected of them? Using rubrics for projects and papers can help students know what to do and become more reflective about their work.

5. **Select *tools and resources*** that will best help students to benefit from the learning experience being planned:
    - Each activity type includes a list of example technologies that may be used to support a specific activity. As teachers select and design the activity types that support their learning goals and pedagogy, they can also begin considering the technologies that match and further support those goals.
    - Select technologies that provide a relative advantage for the lesson. By matching the technology to the learning goals, pedagogical approach, activities and assessment, the technology becomes a seamless support of the lesson instead of the focus. The Activity Types Wiki (http://activitytypes.wmwikis.net/) provides examples of technologies that may be used for a particular activity type.

By staying focused on the content and learning goals and activities, teachers can select technology that is feasible and appropriate, and provides a relative advantage for their lesson. Examples of this planning process are provided in Appendices A and B.

Choosing the tools and resources that best support the learning experience can be difficult. For teachers who are not familiar with available technologies, the Activity Types Wiki can be extremely helpful as it provides technology suggestions and options that support particular activities. Teachers who are more familiar with available technologies will also find it useful as it will be easier to match

technologies to their goals and activities. However, they must be careful to think about the learning goals first rather than the technologies with which they are most comfortable.

Harris and Hofer's activity-types planning approach offers greater opportunities for more authentic learning of technology. When educators are shown how to use a particular tool without the context of learning goals and activities, most forget or don't use what they have been shown. On the other hand, when teachers select technology that enhances the learning in their classrooms, they are more likely to fully learn and apply it, and retain the skills over time.

Conclusion

When teacher planning begins with a focus on learning goals and meeting the needs of all students in their classrooms, their lessons are more likely to be effective. While teachers have historically planned their lessons around specific learning activities, the demand for technology integration has typically led teachers to focus on the technological tools and resources being used. Unfortunately, when technology, instead of learning goals, is the basis of a lesson, learning outcomes are less likely to be achieved.

The technology integration planning approach designed by Harris and Hofer begins by focusing on the learning goals and making pedagogical decisions. Choosing technological tools and resources last keeps the focus on learning and helps teachers choose technologies that support and enhance learning for their students.

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This *Considerations Packet* was prepared by Fritz Geissler on March 2010.

Appendix A
Planning Example: Language Arts

Learning Goals:
Standard 6.6: The student will write narratives, descriptions and explanations.

a) Use a variety of planning strategies to generate and organize ideas.
b) Establish central idea, organization, elaboration, and unity.
c) Select vocabulary and information to enhance the central idea, tone, and voice.
d) Expand and embed ideas by using modifiers, standard coordination, and subordination incomplete sentences.
e) Revise writing for clarity.

Standard 6.7: The students will edit writing for correct grammar, capitalizations, punctuation, spelling, and sentence structure.

a) Use a variety of graphic organizers, including sentence diagrams, to analyze and improve sentence formation and paragraph structure.
b) Use subject-verb agreement with intervening phrases and clauses.
c) Use pronoun-antecedent agreement to include indefinite pronouns.
d) Maintain consistent tense inflections across paragraphs.
e) Choose adverbs to describe verbs, adjectives, and other adverbs.
f) Use correct spelling for frequently used words.

Pedagogy:
Teacher A: Teacher-centered, individualized learning that is highly structured. Students need more individual help in connecting brainstorming to their written product and editing their writing.

Teacher B: Student-centered, partner work, where the teacher facilitates student learning. Students don't need as much support in connecting brainstorming to their written product and have displayed good editing skills.

Activity Types: (http://activitytypes.wmwikis.net/file/view/K-6LiteracyLearningATs-Feb09.pdf)
Teacher A: Brainstorming, outlining, drafting/composing, conferencing, revising, editing, all writing conventions activities, and narratives.

Teacher B: Brainstorming, outlining, drafting/composing, revising, editing, responding, conferencing, evaluating, all writing conventions activity types, and narratives.

Assessment Strategies:
Teacher A: Teacher creates a rubric and shares it with the class. Teachers and students use this rubric to evaluate student writing at each teacher-student conference to guide the student toward success.

Teacher B: Teacher creates a rubric and shares it with the class. Students use the rubric in providing their partners with feedback and edits to guide the student toward success.

Selecting Tools/Resources:
Teacher A: In looking at the Activity Types Wiki, the teacher decides to have students use a word processor to create their writing. Students will print out their work and bring it to the teacher-student writing conferences, then make the edits on the word processing documents. For the brainstorming

activity, the teacher decides to use an interactive whiteboard to model how to brainstorm ideas and connect them to the outline and written product.

Teacher B: In looking at the Activity Types Wiki, the teacher decides to have students use wikis to create their writing and assigns each student a partner. Partners are given access to each other's wikis to provide feedback and suggest edits in the writing. The teacher has access to all wikis and can provide feedback as needed to facilitate learning and editing. For the brainstorming activity, the students use a concept mapping software that also assists in outlining. The students have prior knowledge and use of the software, and will save their work where the teacher can see it.

Appendix B
Planning Example: Math

Learning Goals:
Standard 6.4: The student will compare and order whole numbers, fractions, and decimals, using concrete materials, drawings or pictures, and mathematical symbols.

Pedagogy:
Teacher A: Teacher-centered, individualized learning that is highly structured. Students need more direct instruction, manipulatives, and individual assistance.

Teacher B: Student-centered, partner work where the teacher facilitates student learning. Students learn more independently and through exploration.

Activity Types: (http://activitytypes.wmwikis.net/file/view/MathLearningATs-Feb09.pdf)

Teacher A: Attend to a Demonstration, Discuss, Understand or Define a problem, Do Computation, Do Drill and Practice, Compare and Contrast, Take a test.

Teacher B: Attend to a Demonstration, Discuss, Understand or Define a problem, Solve a Puzzle, Categorize, Create a process, Compare and Contrast, Apply a Representation, Take a test.

Assessment Strategies:
Teacher A: Teacher creates an end-of-unit test to assess student mastery of the concepts. Throughout the unit, the teacher provides feedback on classwork/homework and determines where students need additional assistance.

Teacher B: Teacher creates a rubric for students to use in designing a project (in pairs) to create a process and apply a representation to represent mastery of the concepts. Teacher also creates an end-of-unit test to assess students mastery of applying the concepts.

Selecting Tools/Resources:
Teacher A: In looking at the activity types, the teacher uses an interactive whiteboard to provide direct instruction. The teacher facilitates discussion of the concept and uses charts and online manipulatives to teach the concept. Students use online sites to practice their skills. Students use manipulatives on the interactive whiteboard and/or online to compare and contrast whole numbers, fractions, and decimals.

Teacher B: In looking at the activity types, the teacher begins by using a video to introduce the concepts followed by a demonstration on the interactive whiteboard. The teacher facilitates a discussion about the concepts and introduces the rubric. Students use presentation software to create their own process and representation of comparing and contrasting whole numbers, fractions, and decimals. The students meet with the teacher throughout the process of creating the product. Students use online software/widgets/tools to explore the concepts.