Differentiating with Technology

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Abstract

There are many challenges for teachers today. One of the most difficult challenges for diligent teachers is reaching the needs of an increasingly diverse student population. In order for teachers to reach ALL students, teachers must begin where students are, which means recognizing individual differences. Differentiated instruction (DI) with the use of technology offers the opportunity for teachers to engage students in different modalities, while also varying the rate of instruction, complexity levels, and teaching strategies to engage and challenge students. Differentiated instruction also allows teachers to begin to think and work "smarter" and more efficiently rather than trying to work harder to meet the needs of such a diverse student population.

Keywords
Differentiated instruction, technology, learning disabilities

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What is Differentiated Instruction?

Today's teacher, faced with an "alphabet soup" of instructional practices such as DI, UBD, UDL, etc., is often confused by and dismayed with the complexity of teaching. Whereas Understanding by Design (UBD) addresses the question of "what to teach," and Universal Design for Learning (UDL) stresses the creation of uniform teaching strategies much like universal design in architecture, differentiated instruction looks at the reasons behind curriculum decisions. DI focuses on best practice, but it acknowledges the many variables that create the diversity in today's classroom (Hanson & Ahron, 2008). These factors can render even the most well designed curriculum ineffective. DI is really just a common sense approach to planning instruction.

Effective teachers have always differentiated instruction in many ways. In this article, I will use DI to mean simply responsive teaching whereby the teacher understands the needs his students and tailors instruction to their specific needs. Tomlinson (2005) refers to DI within the context of the content, process, and product of instruction. According to Tomlinson, the depth or complexity of the knowledge-base a student will explore becomes the "content." The way in which a student gains access to knowledge is the "process," and the assessment of the student's knowledge of a subject is the "product" of learning. This article will consider strategies for using technology to simplify and enhance differentiation of instruction to meet the ever-increasing diversity of today's classroom.

Why Differentiate?

Using DI as a primary strategy for planning instruction reveals the hidden obstacles within the learning environment. One of the many benefits of planning DI is that it allows, even requires, teachers to become more intimately aware of the needs and strengths of individual students. Attending to the teacher-student relationship can energize instruction. Additionally, paying attention to the learning environment creates a better context for teaching. In addition, attending to student readiness to learn allows for academic growth by meeting students' needs and giving them the much needed pre-requisite skills and the knowledge required to master content.

Why use technology to differentiate?

The use of technology in special education encompasses a wide range of applications (e.g., assistive technology, adaptive technology, and the basic use of computers for instruction). The use of technology in DI for the purpose of this discussion will be limited to computer use for word processing, the internet, and certain stand-alone programs for skill development. The plethora of research on the achievement gap for students suggests there are still wide gaps in student experience and ability in all segments of education including differing age groups (Mead, 2008), gender (Louie & Ehrlich, 2008; Ma, X., 2008; Tang & Neber, 2008),

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socio-economic status (Lubienski, 2008; Walker-Dalhouse & Risko, 2008), gifted and talented learners (Loveless, 2008), cultural and racial groups (Robertson, 2008; Sampson and Legazpi, 1999), and students with disabilities (Hitchcock, 2001; Nolet & McLaughlin, 2000). Technology offers many tools to help teachers decrease the gaps in reading, math, social studies and science. Using websites such as *Natural Reader* (http:www.naturalreaders.com/index.htm) allows classroom computers to read texts from any application aloud. Another example of technology that can be applied to reading instruction is "*It Can Say*," (http://itcansay.com/?page=reader), a program that pronounces specific words and reads texts out loud. A third site, *Free Dictionary* (http://www.thefreedictionary.com) facilitates independent work by providing definitions and pronunciations of unfamiliar vocabulary words. The computer-based format can be motivating for students and can also allow them to make connections between different academic areas. A corollary benefit is that it allows students to develop expertise in the area of technology, which can be helpful in other facets of their lives. Attending to student readiness by using technology for differentiating instruction allows for academic growth, enlists student motivation, and enables teachers to attend to the student learning profiles in various ways so that students acquire knowledge in a variety of mediums. Using technology to differentiate learning allows teachers to begin to be "smarter" rather than working harder because it often decreases the amount of time required by teachers to create differentiated content. In addition, the use of technology can create an environment in which active engagement leads to on-task students. On-task and engaged students can be expected to learn more.

How can I as a classroom teacher differentiate?

Setting up a classroom that supports differentiation may seem like a challenge, but it can also be an opportunity to increase learning. The greatest obstacle for most teachers seems to be classroom management. Many of these concerns can be addressed with the following step-by-step directions.

First, create an environment (both in the physical layout of the classroom and in instructional design) that facilitates a multilevel community. A multilevel community reflects the belief that student autonomy and student values are central to learning. For a visual example of this type of classroom, check out the *In Time* website, http://www.intime.uni.edu.

Second, modeling independent learning skills and strategies by using technology specific for each student will facilitate independent learning, and support student goal setting. The use of positive behavior support (PBS) allows for the manipulation of antecedent behaviors that in turn diminish triggers for unacceptable behaviors. PBS allows students who exhibit maladaptive behaviors to increase appropriate social interactions. (Raymond, 2008).

Third, thinking about and planning uses of technology in the classroom (e.g., emails, blogs, and websites) is essential for building an efficient classroom environment. Time is an important resource for teachers.

How do I get started?

Remember *curriculum* comes first. As with all good teaching, knowing the students and curriculum is central to successful teaching. Using technology must start with knowledge of what types of technology are available and how these might connect to the curriculum. Technology for technology's sake is not effective teaching.

Content

When considering content (see Table 1), the use of a web quest can be very helpful. When teaching literacy and higher order thinking skills, it is often helpful to tailor content to student interests. Web quests and internet scavenger hunts can both engage student in research based on their interests and their strengths.

Table 1

Differentiating with Technology

Content	Process	Product
Web Quests	Software	Rubrics http://rubistar.4teachers.org
Internet Scavenger Hunt	PowerPoint for presentations, book reports, language experience, etc	Create, customize, and share learning activities www.quia.com
Excel	Web 2.0 Tools: Blogs, Podcasts, Wikis and more	Digital Portfolios for writing
www.funbrain.com	www.graphic.org/goindex.html	Building Vocabulary have students use the thesaurus to replace overused words
e-pals www.epals.com	Practice Vocabulary words by typing (words art is fun and makes cool flashcards)	Digital pictures for artifacts
Questioning strategies www.questioning.org	Visual images of vocabulary http://www.scrapblog.com	Word Processors for spell checking

In teaching mathematics, teachers can use Excel to teach basic graphing and statistics skills. Conveniently, this software is available in most classrooms. In addition, there are also many websites designed to be "kid-friendly." For example, "funbrain," http://www.funbrain.com allows students to practice skills within the con-

text of a computer. The teacher can use websites like "epals," (http://www.epals.com) to connect with diverse cultures and students from the global community. .

For teachers, there are websites such as: (http://cte.udel.edu/TAbook/question.html, http://www.fno.org/toolbox.html, and http://changingminds.org/techniques/questioning/socratic_questions.htm) that help teachers vary their question-asking strategies. Use of such websites may allow for differentiating the difficulty of each question based on the needs of the individual students.

Process

There are many opportunities to differentiate the process of teaching with technology. One of the most common is *Power Point*. This production software provides a good option especially for teaching students with visual learning styles. *Power Point* also offers great ways for students to present their book reports and to incorporate images into their schoolwork.

Other technology for differentiation of process includes: Web 2.0 Tools, Blogs, Podcasts, and Wikis. *Internet 4 Classrooms (*http://www.internet4classrooms.com/web2.html), offers great suggestions and easy-to-follow instructions. Web 2.0 (http://www.go2web20.net/) illustrates the ways in which the internet can be used to create an interactive instructional atmosphere. Wikis can be used in many ways to create powerful and dynamic learning environments. The collaborative encyclopedia, Wikipedia is one of the best-known examples of the wiki format. According to the Wikipedia site, http://en.wikipedia.org/wiki/Wiki. A wiki is a page or collection of webpages designed to enable anyone who accesses them to contribute or modify content, using a simplified markup language. Wikis are often used to create collaborative websites.

"The potential for using blogs is limited only by the imagination and creativity of its users."

Blogs, short for "web logs," can be used for a range of educational projects from simply posting a classroom notice board and resource center, to hosting student work, to global collaboration projects. The potential for using blogs is limited only by the imagination and creativity of its users. Blogs not only provide a place for the author to write, they also invite other readers to comment on what has been said. Blogs can also include links to websites, other blogs, news articles, or even pictures. Blog writers can also "tag" their entries with keywords. For example, if a teacher writes a blog entry about the book the class is reading he can "tag" it with identifiers such as the author's name or subject matter. Instead of simply using the internet for reading information or to look something up on the web, blogs allow for interaction as people write and react.

Finally, "podcasts" are a series of audio or video digital media files that are distributed over the internet by syndicated download. This downloaded information goes through web feeds to portable media players and personal computers. According to information from "podcastalley," (http://www.podcastalley.com/what_is_a_podcast.php), what makes podcasting special is that it allows individuals to publish (podcast) video or audio files, that interested listeners can subscribe to. Before podcasting you could record video and

audio and put it on your website, but now people can automatically receive newly posted information, without having to go to a specific site to download it.

Graphic organizers or mind-mapping can also be used to help differentiate instruction with technology. The website (http://www.graphic.org/goindex.html) helps create and utilize graphic organizers. Graphic organizers offer the opportunity to differentiate for visual learners as the content and concepts are being taught.

A quick and easy way to differentiate for learning style differences and accommodate students with specific learning needs is to allow students to practice vocabulary words by typing. There are also great websites like "Read Please,"(http://www.readplease.com) that allow student to check their work by having the website read it back to them. This requires turning off the spell check on the computer. Differentiating the process of teaching vocabulary words can be done with visual images of the vocabulary. The website, "Scrap Blog," (http://www.scrapblog.com) allows teachers to create or locate images for students.

Product

Differentiating the products that students use to show mastery of content knowledge or skills can greatly be enhanced with the use of technology. Rubrics and rubric development websites such as "Rubistar," (http://rubistar.4teachers.org) offer teachers tools to differentiate instruction based on specific goals and objectives for each student in the class. A rubric is any established set of statements (criteria) that clearly, precisely, accurately, and thoroughly describes the varying or developmental levels that may exist in a student's work. Rubrics also provide valuable information for guiding or coaching student to their desired level of performance. Technology offers the ability to create, customize, and share learning activities via websites like Quia Web (http://www.quia.com/web), one of the world's most popular educational technology web sites. It pioneered the "create-your-own" account concept, giving instructors the ability to create customized educational software online, built around their own course materials and made available to students over the internet.

Digital writing portfolios are an excellent way to differentiate instruction for the needs of students at varying levels. In addition, they allow students to build independent writing skills by using tools such as spell-check and a thesaurus.

Conclusion

In an era of high-stakes testing and accountability contemporary teachers are faced with ever more demands and still limited time and resources. Fortunately, technological advances allow teachers to tailor curricula to individual students quickly and effectively. Technological resources ranging from Excel to *Powerpoint* to word-processing systems with in-built spell-check and thesaurus features motivate students while allowing them to work more independently and to acquire valuable real-world skills. The best news is that these important technological resources are already widely available to teachers. It's just a matter of harnessing the potential we already have in our classrooms.

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