

## INTRODUCTION

---

The purpose of *Differentiating Instruction with Technology in Middle School Classrooms* is to help you strengthen your teaching skills by adding technology tools to differentiated instructional strategies. As with most other endeavors, you'll probably find that the key to using technology with differentiated instruction is to move slowly.

You can try out as many or as few strategies in this book as you wish. Some strategies or activities require more preparation time than others, and some will be a more natural fit with your style of teaching. All chapters contain a variety of resources based on the topic at hand. These resources provide extra examples and ideas for trying out the activities in your own classroom. Throughout the chapters various strategies are explored in detail, and a glossary of strategies is also provided in Appendix A.

Here's a caveat from your authors. Although all websites in this book were tested prior to publication, websites change their addresses frequently. If you find that a link does not work, try searching on the title provided before each URL listing. In other words, if the link for the Center for Applied Research in Educational Technology (CARET) doesn't work, try searching on "Center for Applied Research in Educational Technology" or "CARET". You should be able to find the site without too much of a struggle.

In Chapter 1, we talk about technology's big picture, explaining what newer research has to say about modern skills, technology integration and the impact of technology on student learning. Because of their busy schedules, classroom teachers are not always aware of important research studies or best practices. However, we strongly believe that educators must embrace current research data so that they can begin to modify their instructional strategies in order to reach more students, improve student learning and become stronger teachers. Thus, we include several examples of recent studies in one convenient place.

In Chapter 2, we provide an overview of differentiated instruction traits and elements; discuss the complexity of the teenage brain and how understanding middle school students' emotional, physical and intellectual development can lead to more effective teaching; and share insights on how to create an encouraging, exciting learning environment for this

challenging age group. The authors rely on their experience as students, teachers and parents, as both authors were once students, Grace is a former middle school teacher, and Stephanie is the parent of a current middle school student. We believe that knowing what the research shows about middle school minds, bodies and emotions is essential to fostering positive learning environments. In other words, teachers must know how their students function to work with them in the best possible ways.

In addition, we realise that readers typically are well-grounded in either technology integration or in differentiated instruction but not usually in both. We think that these “twin” introductory chapters may help readers get up to speed in either or both fields.

We explain how to use the emerging Web 2.0 technologies and other tech tools in Chapter 3. The remaining chapters are devoted to demonstrating how to use technology to differentiate instructional strategies in middle school core and encore subjects and how to use technology to assess learning.

We’ve always liked books that feature overviews and “contents-at-a-glance” so we provide a snapshot of this book’s chapters in Table I.1 (pp. 4–5).

## Technology in Motion

We like to use a metaphor we call “Technology in Motion” (Fig. I.1) and because many of us are better at understanding pictures than words, the pinwheel illustrates four influential forces that produce energy and excitement about learning in our schools when they are in place and balanced

Imagine a pinwheel – the kind you used when you were a young child. Physicists tell us that the shape of the pinwheel captures wind in a way that makes the pinwheel spin. Moving air is converted to rotating energy in the pinwheel. Air that moves fast has more energy and causes the pinwheel to spin more quickly.

In our technology in motion pinwheel metaphor, each blade depicts a force or influence we see in education right now: 21st Century Skills and ISTE NETS, technology and learning research, differentiated instruction, and Web 2.0 tools and emerging technologies. When all four blades are equally weighted, the pinwheel spins properly, reflecting a cutting-edge position. If a blade is missing or incomplete, the pinwheel spins more slowly, if at all.

## What Does the Research Mean to Middle School Teachers?

We are reminded of some past conversations with school administrators who say they will embrace technology once they know it improves student learning. We say schools cannot wait for longitudinal data because, in the meantime, we are losing our students due to the preponderance of familiar but outdated instructional strategies that do not align with real-world work. The real world uses technology every day. Big corporations and small businesses use technology to plan, learn, communicate, assess and produce. It is time for schools to embrace technology – wisely selecting the most effective tools, content, products and processes it has to offer.

We realise that the research and skills sets we share in this chapter reveal challenges and opportunities for teachers. At the same time, we know that students are eager to learn with technology and want to “power up” when they go to school. We know this is true because we have used technology in our own teaching for many years and have observed students of all ages in numerous settings using technology. We have taught educators and K–16 students how to use software and web tools, how to produce products, and how to conduct research. In almost every instance, students’ eagerness to learn and work with tech overshadows any fear of making mistakes.

In nearly every classroom, students enjoy helping each other figure out problems and, if allowed, are happy to show teachers how to use technology. Talk about problem solving! Students are natural tech problem solvers. Many teachers tend to disregard technology and learning research data. Some may fear changing their teaching techniques or hesitate to appear less than competent to students, some may not have time to study the data, and many others simply lack tech experience or work in districts so strapped for funds that the available technology is inadequate or unreliable. We understand all of these feelings and constraints – that’s why we’ve written this book. As more teachers become comfortable using tech tools and experience how much prep time it can save them and how excited their students are to use tech in class, we believe they will encourage administrators to increase technology integration at all grade levels.

## Summary

Studies show that technology is a highly motivating, interactive tool that can be used to personalise students’ instruction according to their learning styles, interests and readiness. Web resources and multimedia software greatly expand learning options and provide information access far beyond schools’ textbooks and media centres. Technology can help teachers shape and deliver instruction to meet the needs of all students, assist in the improvement of students’ thinking skills, provide research and presentation products, and improve communication.

Web 2.0 is grounded in constructivism in which students create, produce, and have responsibility for their own learning. The role of the teacher shifts to facilitator/manager, rather than the only keeper of knowledge. This is a major cultural change for teachers, who may find themselves in the position of knowing less about technology than many of their students and feel uncomfortable about using technology when they didn't grow up with it or use it in college. Yet as *The Partnership for 21st Century Skills* (2002) states,

Today's education system faces irrelevance unless we bridge the gap between how students live and how they learn. When students use 21st century technologies, they are able to meet their intrinsic needs to form communities, ask questions, and earn audience and attention. Today's students will spend their adult lives in a multitasking, technology-driven, diverse world, and they must arrive equipped to do so.

## Safety Concerns

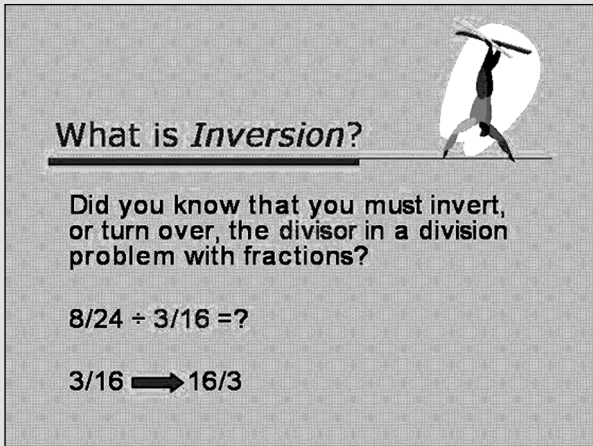
Although Web 2.0 changes teaching and learning by opening up new frontiers, it also brings the need for greater monitoring of student access, activities, and projects. Educators must emphasise acceptable use of the Internet and Internet safety as well as teach it. One of the most exciting aspects of the Web 2.0 technologies is that many of the tools are free as well as collaborative. Free and collaborative makes for compelling economics in financially strapped districts. At the same time, throwing caution to the wind and opening the doors wide open to Web 2.0 is sheer stupidity. Schools are legally bound by the Children's Internet Protection Act (CIPA) to protect students ([www.fcc.gov/cgb/consumerfacts/cipa.html](http://www.fcc.gov/cgb/consumerfacts/cipa.html)).

Despite the fact that school districts uphold the law, passed in 2000, by using content filters and other means to protect students, no system is perfect. Inappropriate content still slips through. And students who are smarter than the filters can find ways around blocked sites to access inappropriate content.

So how do you deal with the equation of free + collaborative + safety concerns? We find the best way is also another equation: acceptable use policies + curriculum content that educates staff and students about keeping safe online + filtering + parental involvement = safe Web 2.0 schools.

Organisations, such as CyberSmart, GetNetWise, NetSmartz, Web Wise Kids and Wired-Kids have superb resources for helping you and your students learn about Internet safety.

A great starting point for in-class tasks is the free CyberSmart curriculum ([www.cybersmartcurriculum.org](http://www.cybersmartcurriculum.org)). Here you will find lesson plans and activities, printable posters, family letters in PDF format that outline what students will be studying about cyber safety in class and what families can do together to reinforce learning, and many excellent resources organised by topic. Each lesson includes an overview, lesson objectives, related ISTE standards, websites to preview for use with your students, online resources, activity sheets, plans and teaching instructions, and extension activities.



**What is *Inversion*?**

Did you know that you must invert, or turn over, the divisor in a division problem with fractions?

$$8/24 \div 3/16 = ?$$

$$3/16 \longrightarrow 16/3$$

**FIGURE 5.1** ■ A PowerPoint slide created with the included equation editor.

**PowerPoint’s Equation Editor**

PowerPoint includes the Microsoft Equation Editor, which allows you to insert an equation into a presentation. To use the equation editor, click on Insert and then Object. Select Microsoft Equation 3.0 when it asks you to choose the Object type.

1. On the View menu, point to Toolbars, and then click Customise.
2. Click the Commands tab, and in the Categories list, click Insert.
3. In the Commands box, click Equation Editor, and then drag it from the Commands box to a gray area within any toolbar. Then click Close.
4. Click the new toolbar button to install and display the Equation Editor.
5. In the Equation Editor, use the buttons and menus to type your equation.
6. To return to Microsoft PowerPoint, on the File menu in Equation Editor, click Exit and Return to Presentation.

The equation appears on your slide.

**Maths Night.** Parents, siblings, and friends can “meet the authors” of the Webbes as they share their artefacts and maybe even autograph copies and shake hands.

**Review stations/Review resources.** You and your class may use Webbes as a basis for review activities. You may create questionnaires, review sheets, and/or worksheets that refer to Webbes for additional help. Check out RealeBooks.com ([www.realebooks.com](http://www.realebooks.com)), a fantastic online resource to produce a web-based version of a Webbe.

## Problem Solving Within/Outside the Classroom via Blogging

As is the case with other Web 2.0 tools, educators and parents seem to be divided into opposite camps: those totally for or those completely against blogging. Those who are anti-blogging are most concerned about safety, which is a legitimate concern. Those who are pro-blogging claim that blogging helps students with writing and processing skills. Moreover, they contend that blogging is an everyday reality of our pre-teens’ lives; so it is useless to ignore it or pretend it does not exist.