



Guiding Principle 2: Instruction must be rigorous and relevant.

To understand the world in which we live, there are certain things we all must learn. Each school subject is made up of a core of essential knowledge that is deep, rich, and vital. Every student, regardless of age or ability, must be taught this essential knowledge. What students learn is fundamentally connected to how they learn, and successful instruction blends the content of a discipline with processes of an engaging learning environment that changes to meet the dynamic needs of all students.

Research Summary

Instruction should connect directly to students' lives and must deeply engage them with the content in order for students to be better prepared for college and careers. To succeed in postsecondary education and in a 21st century economy, students must be afforded opportunities to practice higher-order thinking skills, such as how to analyze an argument, weigh evidence, recognize bias (their own and others' bias), distinguish fact from opinion, balance competing principles, work collaboratively with others, and be able to communicate clearly what they understand (Wagner, 2006). In order to accomplish these goals, instruction must be rigorous and meaningful.

The definition of *rigor* varies greatly in both research and practice. Bower and Powers (2009) conducted a study to determine the essential components of rigor. They defined *rigor* through their research as "how the standard curriculum is delivered within the classroom to ensure students are not only successful on standardized assessments but also able to apply this knowledge to new situations both within the classroom and in the real world." They also identified higher-order thinking and real-world application as two critical aspects of rigor, suggesting that it is not enough for students to know how to memorize information and perform on multiple-choice and short-answer tests. Students must have deep and rich content knowledge, but rigor also includes the ability to apply that knowledge in authentic ways.

Teaching and learning approaches that involve students collaborating on projects that culminate with a product or presentation are a way to bring rigor into the classroom. Students can take on real problems, use what they know and research to come up with real solutions to real problems. They must engage with their subject and with their peers.

In August 2010, the Institutes of Education Sciences reported the results of a randomized control trial showing that a problem-based curriculum boosted high school students' knowledge of economics. This research suggests that students using this learning system and its variants score similarly on standardized tests as students who follow more traditional classroom practices. The research also suggests that students learning through problem-solving and projects are more adept at applying what they know and are more deeply engaged.

The notion of a meaningful curriculum is not a new one. John Dewey (1990), writing in 1902, called for a curriculum that involves a critical but balanced understanding of the culture and the prior knowledge of each child in order to extend learning. According to Spillane (2000), presenting content in more authentic ways—disciplinary and other real-world contexts—has become a central theme of current reform movements. Schools should be places where "the work students are asked to do [is] work worth doing" (Darling-Hammond, 2006, p. 21). Research collected by the International Center for Leadership in Education shows that "students understand and retain knowledge best when they have applied it in a practical, relevant setting" (Daggett, 2005, p. 2). A skilled 21st century educator helps students master learning targets and standards using purposefully crafted lessons and teaches with appropriate instructional strategies incorporated. The students understand why they are learning particular skills and content and are engaged in learning opportunities that allow them to use their inquiry skills, creativity, and critical thinking to solve problems.

According to Brown, Collins, and Duguid (1989), instruction connected to individual contexts has been found to have a significant impact on learning. Research conducted by Sanbonmatsu, Shavitt, and Sherman (1991) and Petty and Cacioppo (1984) also contends that student learning is directly influenced by how well it is connected to a context. Much of this research began with the analysis of how people learn when they find the ideas significant to their own world. It begins to show the importance of connecting content and instruction to the world of the students. Weaver and Cottrell (1988) point out that how content is presented can affect how students retain it. They state instruction that connects the content to the students' lives and experiences helps students to internalize meaning. Sass (1989) and Keller (1987) suggest



that if teachers can make the content familiar to the students and link it to what they are familiar with, students' learning will increase. Shulman and Luechauer (1993) contend that these connections must be done by engaging students with rigorous content in interactive learning environments.

Higher-Order Thinking

Higher-order thinking, according to Newmann (1990), “challenges the student to interpret, analyze, or manipulate information” (p. 45). This definition suggests that instruction must be designed to engage students through multiple levels in order for them to gain a better understanding of the content. An analysis of the research by Lewis and Smith (1993) led to their definition of *higher-order thinking*: “when a person takes new information and information stored in memory and interrelates and/or rearranges and extends this information to achieve a purpose or find possible answers in perplexing situations” (p. 44). This definition emphasizes the level of complexity necessary to help students reach a deeper and higher level of understanding of the content. Shulman (1987) points out teachers will need an in-depth knowledge of their content to be able to fit these types of strategies to their instruction.

Real-World Application

VanOers and Wardekker (1999) indicate that connecting instruction to real-world applications gives meaning to learning, makes it practical, and can help to develop connections with the greater community. Incorporating real-world examples becomes more authentic to students because they will be able to connect the learning to the bigger picture rather than just the classroom. Newmann and Wehlage (1993) describe the three criteria developed by Archbald and Newmann (1988) for this type of authentic learning: “Students construct meaning and produce knowledge, students use disciplined inquiry to construct meaning, and students aim their work toward production of discourse, products, and performances that have value or meaning beyond success in school” (p. 8) These criteria, when reflected upon by teachers, can be a useful tool to ensure that instruction is authentic and engaging for all students.

Authentic Learning

Authentic learning builds on the concept of “learning by doing” to increase a student's engagement. To succeed, this method needs to have meaning or value to the student, embody in-depth learning in the

subject and allow the student to use what he or she learned to produce something new and innovative (Lemke & Coughlin, 2009). For example, in project-based learning, students collaborate to create their own projects that demonstrate their knowledge (Bell, 2010). Students start by developing a question that will guide their work. The teacher acts as the supervisor. The goal is greater understanding of the topic, deeper learning, higher-level reading, and increased motivation (Bell, 2010). Research has shown that students who engage in project-based learning outscore their traditionally educated peers in standardized testing (Bell, 2010).

Constructivist learning is also a way to bring authenticity to the classroom. Richard Mayer (2004) defines constructivist learning as an “active process in which learners are active sense makers who seek to build coherent and organized knowledge.” Students co-construct their learning, with the teacher serving as a guide or facilitator (oftentimes using technology as a facilitating tool). The teacher doesn't function in a purely didactic manner. Neo and Neo (2009) state that constructivism helps students develop problem-solving skills, critical thinking and creative skills and apply them in meaningful ways. Inquiry-based instruction, a type of constructivist learning, has students identify real world problems and then pose and find answers to their own questions. A study by Minner, Levy and Century (2010) has shown this method can improve student performance. They found inquiry-based instruction has a larger impact (approximately 25-30% higher) on a student's initial understanding and retention of content than any other variable.

Another form of authentic learning involves video simulated learning or gaming. Research has shown that video games can provide a rich learning context by fostering creative thinking. The games can show players how to manage complex problems and how their decisions can affect the outcome (Sharritt, 2008). This form of learning also can engage students in collaboration and interaction with peers.

Multimodal Instruction

Multimodal teaching leverages various presentation formats—such as printed material, videos, PowerPoints, and computers—to appeal to different learning styles (Birch, 2009; Moreno & Mayer, 2007). It accommodates a more diverse curriculum and can provide a more engaging and interactive learning environment (Birch, 2009). According to research, an effective way of learning is by utilizing different modalities within the classroom, which can help students understand difficult concepts—therefore improving how they learn (Moreno & Mayer, 2007).



An example of multimodal learning that incorporates technology is digital storytelling. Digital storytelling is the practice of telling stories by using technology tools (e.g., digital cameras, authoring tools, computers) to create multimedia stories (Sadik, 2008). Researchers have found that using this form of learning facilitates student engagement, deep learning, project-based learning, and effective integration of technology into instruction (Sadik, 2008).

Probing Questions

- Research emphasizes the need for higher-order thinking embedded in instructional practice. How might you learn to incorporate higher-order thinking strategies into your practice?
- The research also suggests the need to connect learning experiences to the real world of the students. How can you use real-world examples in your practice to better engage students in their learning?

Resources

The Rigor/Relevance Framework created by Daggett (2005) is a useful tool to create units, lessons, and assessments that ask students to engage with content at a higher, deeper level. The model and examples are available on the following website: <http://www.leadered.com/rrr.html>.

Newmann's Authentic Intellectual Work Framework (Newmann, Secada & Wehlage, 1995) gives teachers the tools to analyze instructional practices and student work in regard to indicators of rigor. The research and tools are available at the Center for Authentic Intellectual Work website: <http://centerforaiw.com/>.

References

Archbald, D., & Newmann, F. M. (1988). *Beyond standardized testing: Assessing authentic academic achievement in the secondary school*. Reston, VA: National Association of Secondary School Principals.

Bell, S. (2010). Project-based learning for the 21st century: Skills for the future. *The Clearing House*, 83, 39–43.

Birch, D. (2009). PowerPoint with audio: A breeze to enhance the student learning experience. *E-Journal of Business Education & Scholarship of Teaching*, 3(1), 36–42.

Bower, H. A., & Powers, J. D. (2009, Fall). What is rigor? A qualitative analysis of one school's definition. *Academic Leadership Live: The Online Journal*, 7(4). Retrieved June 3, 2011, from http://www.academicleadership.org/article/What_is_Rigor_A_Qualitative_Analysis_of_One_School_s_Definition

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32–42.

Daggett, W. R. (2005). *Achieving academic excellence through rigor and relevance*. Rexford, NY: International Center for Leadership in Education.

Darling-Hammond, L. (2006). Securing the right to learn: Policy and practice for powerful teaching and learning. *Educational Researcher*, 35(7), 13–24.

Dewey, J. (1990). *School and society [and] The child and the curriculum*. Chicago: University of Chicago Press.

Finkelstein, Neal, Thomas Hanson, Chun-Wei Huang, Becca Hirschman, and Min Huang. (2010). Effects of problem based economics on high school economics instruction." *Institute For Education Sciences*. West Ed.

Keller, J. M. (1987). Strategies for stimulating the motivation to learn. *Performance & Instruction*, 26(8), 1–7.

Lemke, C., & Coughlin, E. (2009, September). The change agents: Technology is empowering 21st century students in four key ways. *Educational Leadership*, 67(1), 54–59.

Lewis, A., & Smith, D. (1993). Defining higher order thinking. *Theory Into Practice*, 32(3), 131–137.

Mayer, R. E. (2004). *Should There Be a Three-Strikes Rule Against Pure Discovery Learning? The Case for Guided Methods of Instruction*. *American Psychologist*, 59(1), 14–19.



Minner, Daphne D., Abigail Jurist Levy, and Jeanne Century. "Inquiry-Based Science Instruction—What Is It and Does It Matter? Results from a Research Synthesis Years 1984 to 2002." *JOURNAL OF RESEARCH IN SCIENCE TEACHING* 47.4 (April 2010): 474-96.

Moreno, R., & Mayer, R. (2007). *Interactive multimodal learning environments* [Special issue on interactive learning environment-contemporary issues and trends]. *Educational Psychology Review*, 19, 309–326.

Neo, M. & Neo, T.K. (2009). *Engaging students in multimedia-mediated Constructivist learning-Students' perceptions*. *Educational Technology & Society*, 12(2), 254-266.

Newmann, F. M. (1990). Higher order thinking in teaching social studies: A rationale for the assessment of classroom thoughtfulness. *Journal of Curriculum Studies*, 22(2), 41–56.

Newmann, F. M., Secada, W. G., & Wehlage, G. G. (1995). *A guide to authentic instruction and assessment: Vision, standards, and scoring*. Madison, WI: Wisconsin Center for Education Research.

Newmann, F. M., & Wehlage, G. G. (1993, April). Five standards of authentic instruction. *Educational Leadership*, 50(7), 8–12.

Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46(1), 69–81.

Sadik, A. (2008). Digital storytelling: A meaningful technology-integrated approach for engaged student learning. *Educational Technology Research & Development*, 56, 487–506.

Sanbonmatsu, D. M., Shavitt, S., & Sherman, S. J. (1991). The role of personal relevance in the formation of distinctiveness-based illusory correlations. *Personality and Social Psychology Bulletin*, 17(2), 124–132.

Sass, E. J. (1989). Motivation in the college classroom: What students tell us. *Teaching of Psychology*, 16(2), 86–88.

Sharritt, M. J. (2008). Forms of learning in collaborative video game play. *Research and Practice in Technology Enhanced Learning*, 3(2), 97–138.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1–22.

Shulman, G., & Luechauer, D. (1993). The empowering educator: A CQI approach to classroom leadership. In D. L. Hubbard (Ed.), *Continuous quality improvement: Making the transition to education* (pp. 424–453). Maryville, MO: Prescott.

Spillane, J. P. (2000). A fifth-grade teacher's reconstruction of mathematics and literacy teaching: Exploring interactions among identity, learning, and subject matter. *Elementary School Journal*, 100(4), 307–330.

VanOers, B., & Wardekker, K. (1999). On becoming an authentic learner: Semiotic activity in the early grades. *Journal of Curriculum Studies*, 31(2), 229–249.

Wagner, T. (2006, January 11). Rigor on trial [Commentary]. *Education Week*, 25(18), 28–29. Retrieved June 3, 2011, from <http://www.edweek.org/ew/articles/2006/01/11/18wagner.h25.html?tkn=NXVFUJgch3u9KNoYbF2gM%2BinCPa3hvbWkj&print=1>

Weaver, R. L., & Cottrell, H. W. (1988). Motivating students: Stimulating and sustaining student effort. *College Student Journal*, 22, 22–32.

Wentling, R. M., & Waight, C. L. (2001). Initiative that assist and barriers that hinder the successful transition of minority youth into the workplace in the USA. *Journal of Education and Work*, 14(1), 71–89.