

Symposium Session:

Teaching and Assessing 21st Century Skills: Preparing Students to Succeed in Postsecondary Education, the Workplace, and the Global Community

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Division H (Research, Evaluation, and Assessment in Schools)

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Papers/Presenters

1. *Assessment of 21st Century Skills: the Current Landscape*

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2. *21st Century Skills: What Can Be Measured?*

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3. *Action/Practitioner Research: An Innovative Approach to Exploring Skills Integration in Teaching and Learning*

Eliza Fabillar, Education Development Center, 55 Chapel Street, Newton, MA 02458, efabillar@edc.org; Lynelle Kreider, La Academia, 30 N. Ann Street, Lancaster, PA, 17602, blkreider@yahoo.com,

4. *Principled Assessments of 21st Century Skills across Disciplines in a Community College Curriculum*

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5. *Changing Practice: Educative Curriculum as a Tool for Teachers to Learn to Integrate Content and 21st Century Skills*

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Abstract

A growing national consensus demands that students go beyond mastering discrete content areas. Students must be able to make connections across subjects; take a global perspective; and apply skills in critical thinking and communication across academic disciplines. The challenge lies in effectively teaching these skills (often referred to as 21st century skills), and creating assessment tools that can meaningfully measure their growth. This panel brings together researchers and educators who are exploring programs that seek to improve student achievement by connecting learning across disciplines and teaching 21st century skills. Panelists will specifically address the benefits and challenges of conducting research and evaluation around these key skills, illustrating the value of multiple methodological approaches to interdisciplinary research focused on teaching and learning.

Framework

The election of President Barack Obama and his call for changes in American education that will prepare students for the 21st century have fanned the flames of the curriculum wars once again. After an emphasis on a “return to ‘the basics’” under former President George W. Bush, the new administration appears to promote incorporating 21st century skills into American classrooms. Critics have begun to push back and insist that content is sufficient and that this focus on 21st century skills will derail the effort to boost academic achievement in the United States. These critics suggest either that the 21st century skills are insignificant (ignoring the important metacognitive skills—such as critical thinking and problem-solving—that should be included in this group of skills and characterizing them as “soft” skills) or that teaching 21st century skills will detract from teaching basic content knowledge. The reality is, however, that while these skills cannot and should not be taught without content (as critics contend), teaching content alone is not sufficient. In fact, there is increasing evidence that teaching core academic subjects is not enough to prepare students to succeed in our increasingly interconnected and complex world. While students need to strengthen their understanding of academic content, they also need to know how to apply key knowledge and skills across the curriculum and make meaningful links between disciplines. For example, Nel Noddings (2008) argues that “students [need] opportunities to think and to make an effort to connect one subject area to other subject areas in the curriculum and to everyday life ... [and] the interdisciplinary demands of the future are moving away from a narrow disciplinary emphasis” (p. 9).

With the focus of the No Child Left Behind legislation on strengthening academic learning and measuring that learning through standardized tests, policymakers and educators have focused on a narrow definition of what matters for students to learn for the last eight years. As Gary Hoachlander (2005) points out, “Standardized tests . . . assess very narrow definitions of academic achievement. For the most part, they do not measure students’ diagnostic abilities, capacities for bringing interdisciplinary knowledge to bear on complex problems, understanding of systems, or facility in applying abstract knowledge and academic skills to authentic, real-life situations” (p. 38). The students who are most hurt by this focus on basics and standardized tests are

the poor, who tend to receive more rote learning to begin with, while children in wealthier districts continue to receive a richer educational experience that includes learning key 21st century skills.

Among the recurrent themes in recent calls for transforming high school education are the need to connect rigorous academic learning to skill development in critical thinking, problem-solving, teamwork, communication, creativity, and information technology. While these skills are called 21st century skills (though the definition of the 21st century skills is itself debated), they are mostly not new skills but rather the kinds of skills that the most educated in our society have always possessed (Rotherham, 2008). What is new about these skills is the demand that all students learn them and learn them to complement learning content. Consequently, there is a crucial need for reform efforts to help educators bridge academic content with intellectual competencies that are relevant to postsecondary education and careers. The call for new forms of curricula and assessments that address 21st century skills clearly challenges the narrow focus on basic academic competency and high-stakes standardized testing that has characterized federal education policy for the last eight years.

Moreover, the teaching and assessment of 21st century skills demand innovative approaches to teaching and learning. Building upon Lee Shulman's (1987) formulation of "pedagogical content knowledge" and extending it to the notion of teachers integrating key skills into their pedagogy calls for multiple research models that explore teacher practice. What are the essential qualities of teacher knowledge required for skill integration in teaching? What do teachers need to know and be able to do in order to teach 21st century skills effectively in their discipline or within interdisciplinary courses? Teachers find it challenging to teach critical thinking in whatever discipline they practice and rarely do they provide opportunities for students to apply these skills across subject areas. It is important that research efforts examine how educators enact inquiry-based instructional approaches to engage students in learning and applying 21st century skills and advance their intellectual growth across academic disciplines.

The Panel

This panel will address one of the most pressing educational problems by providing innovative perspectives on the following questions:

- What do we mean by “21st century skills”?
- Why should we teach these metacognitive skills?
- How do we teach the 21st century skills?
- How do we measure students’ learning of 21st century skills?
- What is the role of researchers and the education reform movement in enacting a broader vision for 21st century education that emphasizes student development and application of key metacognitive skills across academic disciplines?
- How can interdisciplinary research and evaluation models that assess 21st century skills inform educational policy and practice?

The panelists in this symposium have been developing and investigating innovative curricula and assessments that incorporate 21st century skills in improvements to teaching and learning. The symposium will explore the benefits and challenges of teaching 21st century skills in the classroom and developing assessment tools that can meaningfully measure the growth and development of these skills.

The goal of this session is twofold: to use our experiences to open up the discussion for producing further research around teaching and assessing 21st century skills and to provide guidance for policymakers to formulate a broader agenda for advancing student learning in the 21st century.

Learning (and Learning to Teach) 21st Century Skills: Ford Partnership for Advanced Studies (Ford PAS)

Educational change has at least three components: adoption of new/revised materials, use of new teaching approaches, and change in beliefs about how/what to teach (Fullan, 2001). In order for teachers to learn to change their practice, they must engage in professional development that is sustained, collaborative, and connected to their actual classroom practice (Darling-Hammond and McLaughlin, 1995; Bransford, Brown, and Cocking, 2000; Putnam and Borko, 2000). Thus, change takes time and

needs to disrupt teachers' beliefs about teaching and learning and provide opportunities for teachers build new ideas about teaching and learning in their own contexts. Teachers need to engage in activities as learners and reflect on their experience in order to change their beliefs and practices (Guskey, 1997, 1999; Sparks, 1994, 1995).

The purpose of the Ford PAS curriculum is to engage students in their academic work through the use of real-world contexts and to build essential skills such as problem-solving, critical thinking, media and technology literacy, and the so-called "soft" skills such as communication and teamwork. The curriculum provides contexts in which students can be engaged, and then explicitly teaches them the academic concepts and 21st century skills necessary to solve problems and make decisions that are similar to those they will face in higher education and the workplace. While the Ford PAS approach to learning may require students to shift how and what they learn, teaching such a curriculum also requires many teachers to shift their pedagogical practices and sometimes even their ideas about the purposes of education.

So, while professional development is important in all professions to renew and update skills and knowledge, because the Ford PAS curriculum is innovative in its content and approach to teaching and learning, professional development for Ford PAS educators is especially important. Thus the Ford PAS program includes a professional development component. Participants of Ford PAS professional development events engage in hands-on sessions and discussions about the Ford PAS approaches to teaching and learning in the context of Ford PAS curriculum activities. They also connect new ideas and techniques to their own unique contexts throughout these events and on an ongoing basis through networking with other educators in the Ford PAS community.

Even with professional development, however, some teachers may struggle to integrate the inquiry- and project-based approach into their teaching. The developers of this curriculum had considered this during the development of the materials and developed the materials at a level of detail that was meant to demonstrate for teachers how to make such changes to their practice. Teacher information includes lessons that integrate academic content and real-world applications, and explicitly teach 21st century skills. These curriculum materials, then, are not only meant to be used to educate

students, but they are also meant to be educative for teachers—demonstrating how to put into practice the core principles of teaching and learning of this program.

The Ford PAS program has recently begun an external evaluation that will provide information both on how schools use the program, which has a flexible design and therefore can be implemented differently depending on school contexts and needs, and on student outcomes. However, some classroom observations by Ford PAS staff and pilot test feedback have indicated that the fidelity of implementation to the pedagogical approach of the program (particularly the inquiry- and project-based work) may vary greatly, thus leading the program staff to consider the importance of carefully assessing the program implementation and outcomes. Both the external evaluator and the two other research projects that will be discussed in this panel are part of a larger attempt to understand the implementation and impact of the Ford PAS program.

Presenter #1: Assessment of 21st Century Skills: The Current Landscape

Over the past two decades assessment has become an essential component of educational practice. In U.S. schools, large-scale, summative assessments are the norm. Policy makers view such assessments as powerful levers for influencing what happens in schools and classrooms. With the passage of the No Child Left Behind legislation in January 2002, testing has become not only more routine, but also increasingly high-stakes and focused on core content domains.

However, in recent years, educators, policy makers, and business leaders in the U.S. have questioned whether the current design of assessment systems focuses too much on measuring students' ability to recall discrete facts at the cost of not adequately measuring students' ability to engage in complex thinking. The end result is a widening gap between the knowledge and skills students are acquiring in schools and the knowledge and skills needed to succeed in the increasingly global, technology infused workplace.

There is widespread recognition that measuring what students know is a field that requires further study and innovation (National Research Council, 2001a). Standardized tests capture only a portion of the skills and knowledge that students need to know. In an ideal world, assessments would both offer teachers ongoing diagnostic

information that could be used to develop students' learning over time and provide summative outcomes that could determine students' progress relative to peers in other contexts.

This presentation will focus on recent work commissioned by the Partnership for 21st Century Skills to undertake a review of educational assessments that support 21st century learning, both in the U.S. and abroad. This presentation will describe the key findings and implications of the review, describing current activities, promising assessments, and strategic recommendations for current and future efforts to develop 21st century learning assessments.

Presenter #2: 21st Century Skills: What can be measured?

The educational measurement problem is one that has been with us a long time and has been subject to all the buffeting factors that are prevalent in education—curricular ebb and flow, pedagogical skirmishes, and political positioning. The title of this session is adapted from a book, written years ago by a reading education expert, Roger Farr. Some years later, this panelist published a book with the title *Assessment Alternatives for Diverse Classrooms*. Now we find ourselves in the 21st century, and the dilemma of finding or developing outcome measures that will provide valid and reliable means for assessing what students learn from innovative and rigorous, inquiry-based curricular programs is even more pressing. This presentation is about a search for such outcome measures to use in a national, quasi-experimental study of such a curriculum. The curriculum Ford Partnership for Advanced Studies (Ford PAS), was designed with four “learning pillars” as a basis—constructs that correspond to the essential skills identified by the Partnership for 21st Century Skills: critical thinking, problem-solving, teamwork, and communication. While a substantial amount of anecdotal evidence has been gathered over about the last five years to demonstrate the positive effects of the program on student learning, no systematic investigation of the program had been conducted prior to the launch of this study.

MPR researchers explored assessments that were available and conducted exploratory research to determine how well aligned they were with the Ford PAS curriculum and with what was identified as specific learning outcomes by the designers

and by teachers and administrators implementing the program. This presentation highlights the process of identifying constructs, reviewing existing instruments or research on development, and piloting measures in a range of sites throughout the U.S. The objective of the presentation is to answer one of the questions outlined for this panel: the role of researchers in enacting a broader vision for 21st century education that emphasizes student development and application of key skills across disciplines.

Presenter #3: Action/Practitioner Research: An Innovative Approach to Exploring Skills Integration in Teaching and Learning

I have become more aware of what skills (communication, critical thinking, problem solving) my students need to gain, as well as why they need to gain those skills. This awareness calls me to allow the students to drive the lessons through the questions and interests that arise ... I became more aware of how I responded to student inquiries. My teaching has changed in the last few weeks. I am now more prepared to help guide my students to new understandings through effective questions, scaffolding, and modeling techniques.

—Lynelle Kreider

La Academia, in collaboration with Education Development Center (EDC), is conducting an action/practitioner qualitative research project that began in Spring 2008 and involves an eighteen-month research cycle. Based on the premise that educators can play an integral role in the creation and use of knowledge in the field and that schools can function as centers of inquiry, the research stems from the practitioners' questions and challenges.

Lynelle Kreider, an English teacher, developed research questions around the teaching and learning of 21st century skills. Lynelle is exploring her professional growth in understanding and implementing an inquiry-based approach in her classroom and how it can foster the teaching of 21st century skills. At the same time, Lynelle is examining the impact of a curriculum intervention on student learning. More specifically, she has focused on how or if students have gained skills in critical thinking and communication through implementation of an interdisciplinary curriculum and changes in her pedagogical strategies.

The role of EDC is twofold. EDC collaborates with the practitioners at La Academia in the research process, including providing support in honing the research questions, developing assessment tools, videotaping classrooms, and creating video analysis questions and protocols, among other tasks. The second role that EDC plays is in examining the experiences of practitioners, exploring questions such as, how does participation in action research affect educators' instructional practices; and how does action research affect educators' understanding of 21st century skills? This presentation will focus on the action research process and the preliminary findings on the impact of skills integration in teaching and learning.

Presenter #4: Principled Assessments of 21st Century Skills across Disciplines in a Community College Curriculum

SRI's team of educational researchers, assessment specialists, and community college practitioners, funded by the National Science Foundation's Advanced Technological Education program, is designing, implementing, and testing instructional and assessment materials focused on teaching 21st century skills. The project has developed more than a dozen Web-based workplace scenarios (<http://elc.fhda.edu/>) that educators in seven different disciplines may use to develop students' skill of applying content knowledge and skills to solving real world problems.

To develop assessments, the SRI team has employed the principles of evidence-centered design. This approach connects and coordinates three core elements—cognition, observation, and interpretation—into a coherent assessment argument that specifies the knowledge to be measured and the forms of evidence that demonstrate such knowledge (Pellegrino, Chudowsky, & Glaser, 2001). The team developed design patterns, the initial product created when using the evidence-centered assessment design system called Principled Assessments for Design in Inquiry (PADI) (Mislevy & Haertel, 2006). A design pattern may be used to produce a set of assessments for either formative or summative classroom use.

This presentation will share the lessons we have learned about assessing 21st century skills and relate these lessons to the larger themes of this symposium: the school-to-work learning gap, interdisciplinary insights, and broader definitions of school

learning outcomes. Our lessons have emerged through the evidence-centered methodology for designing, developing, and validating assessment tasks.

The insights we plan to share include the following findings:

- School-to-work learning gap: Scenario-based curricula give students an opportunity to learn a distinct set of 21st century skills such as research, analysis, and problem solving.
- Interdisciplinary insights: Scenario-based curricula across disciplines share a focus on these 21st century skills that are similar in many ways across disciplines, but also vary by dimensions unique to each discipline.
- Definitions of learning outcomes: 21st century learning outcomes are conceptually akin to what cognitive psychologists call schematic or strategic knowledge, which are deeper forms of knowledge that may be transferred to other domains (Bransford, Brown, & Cocking, 2000; Shavelson, Ruiz-Primo, Li, & Ayala, 2003).

Presenter #5: Changing Practice: Educative Curriculum as a Tool for Teachers to Learn to Integrate Content and 21st Century Skills

In 1916, John Dewey wrote in *Democracy and Education*, “Education through occupations . . . combines within itself more of the factors conducive to learning than any other method.” For many students, perhaps most, the world of work brings meaning and understanding to even the most complicated academic concepts and skills.

This mixed methods study focuses on the use of a curriculum that strives to make connections between academic content and the world of work while building essential 21st century skills.

Classroom observations have indicated that the fidelity of implementation to the pedagogical approach of the curriculum varies. Many of these teachers adopt the materials without adopting the pedagogical principles that are the core of the program. The pedagogy of the curriculum derives primarily from the work of educators such as Dewey, who saw engagement in real-world work as a means to teach students the content and skills they would need in the workplace.

Even with professional development, traditional teachers seem to struggle to implement the inquiry-based approach and integrate the teaching of 21st century skills into the teaching of academic content. The design of this curriculum involves a level of detail that demonstrates for teachers how to make such changes to their practice. These curriculum materials, then, are not only meant to be used to educate students, but they are also meant to be educative for teachers.

This mixed method study seeks to understand how teacher knowledge, teacher beliefs, and classroom practices affect how teachers interact with new curriculum within their classrooms. The quantitative portion of this study will use data from a national survey being conducted by the external evaluator of the curriculum. These data will both provide a basis for selecting participants in the qualitative portion of the study and will allow qualitative results to be considered more generally. The qualitative portion of this study will be essential to understanding teachers' beliefs and how they relate to teachers' classroom practice. Some researchers have suggested that qualitative research is more likely to capture the complexity of beliefs than large-scale surveys and the relationship between beliefs and classroom practice.

References

- Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.). (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academy Press.
- Darling-Hammond, L., & McLaughlin, M. W. (1995, April). Policies that support professional development in an era of reform. *Phi Delta Kappan*, 76(8), 597–604.
- Diana, T. J. (2005). *A study of the influence of a researched-based rationale on science teachers' beliefs and practices across key stages of teacher development*. Syracuse University, Syracuse, NY.
- Fullan, M. (2001). *The new meaning of educational change* (3rd ed.). New York: Teachers College Press.

- Guskey, T. R. (1997). Research needs to link professional development and student learning. *Journal of Staff Development*, 18(2), 36–40.
- Guskey, T. R. (1999). Moving from means to ends. *Journal of Staff Development*, 20(1), 48.
- Hoachlander, G. (2007, April). New rigor for career education. *Educational Leadership*, 64(7), 34–35.
- Messick, S. (1989). Validity. In R.L. Linn (Ed.), *Educational Measurement* (3rd edition, pp. 13-103). New York: American Council on Education and Macmillan.
- Mislevy, R. J., & Haertel, G. D. (2006). Implications for evidence-centered design for educational assessment. *Educational Measurement: Issues and Practice*, 25(4), 6-20.
- Noddings, N. (2008, February). All our students thinking. *Educational Leadership*, 65(5), 8–13.
- Partnership for 21st Century Skills. (2006). *21st Century Skills and High School Reform: Results that matter*. Retrieved March 13, 2008 from:
http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=204&Itemid=114
- Partnership for 21st Century Skills. (2005). *Assessment of 21st Century Skills: The Current Landscape*. Retrieved March 13, 2008 from:
http://www.21stcenturyskills.org/index.php?option=com_content&task=view&id=131&Itemid=103
- Pellegrino, J. W., Chudowsky, N., & Glaser, R. (2001). *Knowing what students know: The science and design of educational assessment*. Washington, DC: National Academy Press.
- Putnam, R., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher*, 29(1), 4–15.
- Rotherham, A.J. (2008, December 15). 21st-century skills are not a new education trend but could be a fad. *U.S. News & World Report*.

- Shavelson, R., Ruiz-Primo, M. A., Li, M., & Ayala, C. C. (2003, August). *Evaluating new approaches to assessing learning* (Report 388). University of Los Angeles, CA: National Center for Research on Evaluation, Standards and Student Testing and Center for the Study of Evaluation.
- Shulman, L.S. (1987). *Knowledge and teaching: Foundations of the new reform*. Cambridge, MA: Harvard Educational Review.
- Sparks, D. (1994). A paradigm shift in staff development. *Journal of Staff Development*, 15(4), 26–29.
- Wiggins, G. & McTighe, J. (1998) *Understanding by Design*. Alexandria, VA: Association for Supervision and Curriculum Development.