Redesigning Teaching and Learning:

A New Approach to High School Graduation by Portfolio

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ABSTRACT

The Envision Schools Charter Management Organization and the Stanford University School Redesign Network have collaborated to design a set of performance-based assessments for high school students that are both rigorous and credible, and are designed to build students' college and career readiness skills. This paper examines how the implementation of an alternative assessment system, one that de-emphasizes basic skills testing and promotes deep learning and engagement in performance tasks, influences the way teachers think about teaching and learning and their teaching practice, as well as students' learning experiences and feelings of preparation for college-level work. Findings from surveys of students, 11 student case studies, and interviews with teachers over two years of implementation are reported. In addition, initial data from the Envision Schools Graduate Follow-up Study, which follows graduates into their first and second years of college are reported. High college enrollment and persistence rates provide initial evidence that the Envision Schools model of curriculum, instruction, and assessment can successfully prepare students for the college experience.

I. Introduction

In the last decade, the testing and accountability movement in the United States has moved toward a model of basic-skills testing that has been found to promote "teaching to the lowest denominator" and to push lower achieving students out of high school, rather than helping them complete high school successfully (Darling-Hammond, 2006; Heilig & Darling-Hammond, 2008). Research has failed to show that these accountability measures have served to close the achievement gap across ethnic and socio-economic lines (see e.g., Lee, 2006; Clotfelter, Ladd, & Vigdor, 2006). There is an extensive literature supporting the idea that how you assess student achievement drives the way teachers teach and what students learn (e.g., Black & Wiliam, 1998; Thompson, 2001; Stiggins, 2002). Based on this research, schools engaged in school restructuring and school reform have looked for alternative ways of measuring student achievement that would challenge teachers and students alike to produce work that demonstrates more than "minimum competencies". However, until now, efforts to implement such alternative assessment strategies on a wide scale have not met with much acceptance due to questions about the credibility and validity of these assessments. In addition, little research examines the impacts of alternative assessment strategies on teaching and on student learning and college success.

In this context, the Envision Schools Charter Management Organization (San Francisco Bay Area) and the Stanford University School Redesign Network have collaborated to design a set of performance-based assessments for high school students that are both rigorous and credible. This performance assessment system utilizes multiple sources of evidence of student learning and achievement to make graduation decisions. These performance-based tasks are scored using content-specific rubrics that were designed by assessment specialists and content-area experts in consultation with teachers. Assessment criteria were designed to reflect national curriculum frameworks and validated standards for college readiness. The "proficient" levels on the rubrics are written to signal readiness to graduate from high school and readiness for college-level work. Student work that has been "certified" as meeting standards of "proficiency" on the rubrics are collected in a graduation portfolio, and are presented in the student's graduation portfolio defense in the senior year.

The purpose of this research is to examine how the implementation of an alternative assessment system, one that de-emphasizes basic skills testing and promotes deep learning and engagement in performance tasks, influences the way teachers think about teaching and learning

and their teaching practice, as well as students' learning experiences and feelings of preparation for college-level work. By evaluating the impacts of this alternative assessment approach and investigating the conditions under which these assessments can have a positive impact, we hope to shed new light on the role of assessment in teaching and learning and the extent to which the type of assessments used to measure student achievement can influence student outcomes. This new knowledge will inform school, district, and state policymakers who are reconsidering their approaches to assessment, and provide them with the understandings needed to implement a performance-based assessment system successfully.

II. Background on Envision Schools

Envision Schools is a non-profit charter management organization that supports the development of small, college preparatory high schools serving diverse populations of students with a mission to transform students' lives "*especially those who are first in their family to attend college – by preparing them for success in college and in life.*" Six years old, Envision Schools currently has four schools in the Bay Area[1] serving a racially and economically diverse student population. While each school has distinct student populations reflecting its local context, the aggregate student population across the four schools is comprised of 27% African-American, 27% Hispanic/Latino, 23% Caucasian, 13% "Other", 9% Asian, and 1% Native American students, 70% students qualifying for Free and Reduced Lunch, and more than 70% first-generation college bound (FGCB) students.

Envision Schools employs an instructional model comprised of several critical elements that are intertwined and mutually supportive by design.

Expectations. All students are expected to graduate from an Envision School prepared to succeed in college and in life. Students take one set of rigorous courses that ensure they are college eligible[2] and ready for college upon graduation from high school.

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[1] Schools include: City Arts & Technology High School (CAT) in San Francisco, Metropolitan Arts & Technology High School (Metro) in San Francisco, Envision Academy of Arts & Technology in Oakland, and Impact Academy of Arts & Technology in Hayward, CA. Their first school, Marin School of Arts & Technology (MSAT) in Novato, CA, closed in 2007 (after losing a battle to secure an adequate facility). Envision Schools has replicated itself with Envision Schools Colorado, opening its first school in Denver with 250 students (Grades 6 and 9) in 2009-2010. Additional information on the Envision Schools model can be found at http://www.envisonschools.org.

[2] All students take college preparatory curriculum to qualify them for University of California and California State University admission eligibility.

21st Century Leadership Skills. Students learn six key skills to be successful in college and beyond. They include: thinking critically, communicating effectively, managing projects, expressing oneself creatively, collaborating effectively, and solving problems resourcefully. Students are asked to demonstrate their Leadership Skills throughout their four years at an Envision School and directly apply these skills in a Workplace Learning Experience in both their junior and senior years.

Personalization. Each Envision School has fewer than 500 students and classes with teacher-to-student ratios of 1:25. Each student has an advisor who is the main point of contact for the students and parents and who is intentional about building a community within their Advisory and across the school. Most teachers loop with their students (stay with their students over four years), so they know their students and can chart their personal and academic growth over time. Weekly "community meetings" bring faculty and students together to celebrate points of pride and address community concerns.

Project Based Learning. Project based learning is the heart of the student learning experience in Envision Schools. Throughout the school year interdisciplinary teams of teachers design themed projects for small groups of students to work on for 6 to 10 weeks. Large-scale projects culminate in public exhibitions where students present the learning achieved to an audience of peers, teachers, parents, scholars and community members. Exhibitions take a number of forms, including digital art works, videos, performances and multimedia presentations. Most of the projects are comprised of complex and authentic tasks based on challenging problems or questions. Students work daily on something that will culminate into a polished project that involves student input, sustained inquiry, revisions, and rehearsals. One example is student-led Socratic seminars and student-produced iMovies addressing the question, "How Does Climate Change Affect Industrialization Today?" after students explored climate, energy transfer and biomes in science, and the history of industrialization in specific developed and developing countries.[3]

Art and Technology. Students use tools to research and interpret the world, and express their understanding in sophisticated and technologically savvy ways. All students have multiple art and technology experiences in both required and elective classes, and the arts and digital

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[3] Additional examples of Envision projects can be found at http://www.envisionprojects.org.

technology are integrated across all curricular areas. Student inquiry results in public service announcements, podcasts, websites, documentaries, and musical creations rich in content and self-expression.

Assessment System. Envision Schools' standards de-emphasize single standardized multiple choice tests and seat time, and emphasize student growth toward mastery of the key content and skills in each of the six core disciplines. Succinct and focused on key disciplinary skills, subject-specific performance outcomes and analytic rubrics enable teachers to evaluate what a graduate knows so as to inform teaching practice across Envision Schools. Over a period of three years, together with content area experts and assessment specialists from the Stanford School Redesign Network, teachers in the schools built and piloted performance outcomes and common scoring rubrics (used across all courses within a specific content area) across six disciplines:

- English language arts literary/textual analysis
- History-social science investigation
- Scientific inquiry and Scientific literacy
- Mathematics problem-solving
- Creative expression (Visual and Performing Arts)
- World languages

The performance outcomes are designed to drive the design of rigorous projects and performance assessments, lead teachers to align instruction and design scaffolding to help students achieve these valued outcomes, and provide a clear set of expectations for students' performance-based work. The subject-specific performance outcomes and rubrics were designed for tasks that are meant to engage students in the real work of scientists, historians, artists, mathematicians, researchers and analysts, as well as demonstrate proficiency in world language, oral presentation, and the use of multi-media technologies. The kinds of skills that students are expected to master at the "proficient" level (showing that they are ready for college level work) are quite ambitious and challenging, and were written with the intent to move student learning and teachers' instructional practice forward. For example, the history/social science investigation was designed to measure students' performance of "historical thinking" skills (See Wineburg, 1999), such as evaluating the credibility and validity of sources, analyzing the perspectives and historical contexts of sources, and using evidence to build and defend an argument.

Certified artifacts (those scored as "proficient" overall on the subject-specific rubrics) are compiled in a student's Graduation Portfolio whose outcomes set a public standard of performance for both teachers and students. The process of preparing the portfolio fosters a culture of reflection around rigorous content. Students are required to write substantive reflections for each work artifact that address both the work and the process of completing it, including obstacles they may have overcome and areas of growth they need to address as they move on to college and life. Students' work is valued beyond the worth of "points" or "percentages" since they are responsible for products that have concrete deadlines and real audiences.

Finally, all students are required to formally defend their Graduation Portfolio to a committee of faculty, peers and mentors in an individualized presentation of learning that provides evidence of 21st Century Leadership Skills, and demonstrates how his or her work meets the school's criteria for graduation while supporting his or her personal and professional goals.

Adult Learning and Organizational Learning. The key to consistent student learning and growth is having high quality teachers and school leaders with demonstrated commitment to young people, strong knowledge of their content area and effective pedagogy who are engaging one another about how to improve their instruction and student outcomes. At Envision Schools, adult learning mirrors and drives the student learning since teachers work closely with their peers to create meaningful projects. Because the system connects performance outcomes with descriptive, open-ended academic tasks, there is a flexibility in design that allows for multiple entry points for students, teacher creativity, and freedom to respond to students needs.

A culture of examining student work and teacher practice is supported through the use of protocols and regular exhibitions of student work. Besides the three to four weeks of professional development days in the summer and throughout the school year, teachers meet between five and seven hours weekly during regular working hours to develop curriculum and instruction. Furthermore, most teachers receive one-on-one coaching with peers or instructional coaches.

Student Outcomes. In Envision's first senior class, 90% of the students graduated in four years, whereas the graduation rate from the local community was 77% and the national average is about 70%. Furthermore, 100% of our graduates met University of California eligibility requirements (compares to 25% statewide). Of those seniors, 68% were accepted to at least one four-year college (95% of all students applying to a four-year college), and students are attending

institutions of higher learning that include: Stanford, UC Santa Cruz, UCLA, UC Davis, Wake Forest. More information on student outcomes from the first year of data collection for the Graduate Follow-Up Study is reported later in this paper.

III. Theoretical Framework

Rationale for performance-based assessment. As our body of knowledge continues to expand, it is becoming impossible for individuals to keep up with the vast amount of information available even in a single field. This trend, along with technological progress, has transformed the labor demands of the world economy. According to the New Commission on the Skills of the American Workforce,

> *The core problem is that our education and training systems were built for another era, an era in which most workers needed only rudimentary education...[The world of the future is] a world in which routine work is largely done by machines...in which line workers who cannot contribute to the design of the products they are fabricating may be as obsolete as the last model of that product* (2007, p. 7).

These economic trends and the training needed for the new workforce require that school systems shift from a fact-oriented curriculum to one that emphasizes problem solving and innovation (Herman, 1992). This is at odds with the current state of the U.S. education system.

A growing number of business and education leaders have begun to recognize the importance of the kinds of assessments that are used to evaluate student learning. Fadel, Honey, and Pasnik (2007), for example, have suggested that the workplace of the 21st century will require "new ways to get work done, solve problems, or create new knowledge", and that how we assess students will need to be largely performance-based in order to evaluate how well students are able to apply content knowledge to critical-thinking, problem-solving, and analytical tasks. Likewise, David Conley, in his book, *College Knowledge* (2005), reports that higher education faculty valued "habits of mind" even more than content knowledge, including the ability to think critically and analytically, to independently draw inferences and reach conclusions, and to solve problems.

More than standardized tests of content knowledge, performance-based tasks are able to measure students' habits of mind. Performance-based assessments require students to use high level thinking to perform, create, or produce something with transferable real-world application. Research has also shown that they provide useful information about student performance to

students, parents, teachers, principals, and policy-makers. Research on thinking and learning processes also shows that performance-based assessments propel education systems in a direction that corresponds with how individuals actually learn.

Practitioner Support for Performance-Based Assessment. Educators who have worked in systems that use performance-based assessments report that the assessments have a positive impact on instructional practice and provide valuable information. In a study of the Kentucky Instructional Results System (KIRIS), which assessed student progress through a combination of open-ended response and multiple choice items, portfolios, and performance events, almost 90% of principals and 77% of teachers reported that the assessments were useful for judging the effectiveness of schools. Even more important, the assessments contributed to improved instructional practices: "40% of teachers reported that the open-response items and portfolios have a great deal of positive effect on instruction, and virtually none reported that about multiple-choice items" (Matthews, 1995, p. 11). A report on the Maryland School Performance Assessment Program (MSPAP), another performance-based assessment program, found a similar effect as "98% of school principals felt MSPAP has a positive effect on instruction" (Koretz et al., 1996, p. 29). Recent experience makes it clear that performance-based assessment provides a means to assess higher order skills and helps teachers and principals support students in developing a deeper understanding of content (Vogler, 2002).

Research Support for Performance-Based Assessment. Research over the years has shown that how student learning is assessed can play an important role in a student's overall learning. As Resnick and Klopfer (1989) point out, content and process are inextricably linked, making it extremely important to assess students in meaningful ways if they are to master the content (Herman, 1992). Cognitive psychologists studying how individuals learn have come to an understanding that "mere acquisition of knowledge and skills does not make people into competent thinkers or problem solvers. To know something is not just to passively receive information, but to interpret it and incorporate it; meaningful learning is reflective, constructive and self-regulated (Wittrock, 1991, Bransford and Vye, 1989, Marzano et al., 1988, Davis et al., 1990)" (Herman, 1992, p. 15). An exclusive reliance on multiple-choice tests that primarily measure basic skills and discrete knowledge, and neglect complex thinking and problem solving, is not consistent with what the field knows about the kinds of assessments that promote student learning.

Performance-based assessments are consistent with modern learning theories and also help teachers employ what the profession considers to be best practices. A report on the MSPAP (1996) found that in implementing performance-based assessment, teachers changed their instructional practice to emphasize cooperative work, focus more on writing, problem-solving and real-world hands-on activities, and de-emphasize rote learning and teaching. A study of the Massachusetts Comprehensive Assessment System found that after moving to a performance assessment, instructional practices began to correspond more with those deemed as best practices (Vogler, 2002). Teachers also report that the open discussion of performance standards and the professional development received around scoring the assessments were powerful professional development experiences.

Assessment FOR learning. Several other features of this research study design and analysis are informed by the literature on formative assessment. Black and Wiliam (1998a) surveyed several hundred empirical articles concerned with classroom formative assessment and reported consistent learning gains for students when teachers used assessment practices that supported learning. A summary of their conclusions (1998b) indicates that research clearly supports formative assessment as an essential feature of classroom practice in order to support students toward desired learning goals.

The research literature on student learning opportunities identifies several key aspects of practice that can lead to improved student learning, understanding, or achievement: providing formative or diagnostic information to teachers and students; providing clear expectations and goals for learning; creating coherence between assessment and curriculum; and supporting metacognitive practices. The National Research Council (2001) explicates a vision of classroom-based assessment that is so tightly intertwined with instruction that separating the two is not possible. Research on classroom-based assessment suggests some specific aspects of instructional design that are tightly linked to student learning and achievement. Research suggests that greater student learning and higher task performance are achieved by providing task-oriented feedback to students (Butler, 1987; Crooks, 1988) and by eliciting information from students through assignments and discussion as a means of gauging where students are in their progress toward a goal (Duschl & Gitomer, 1997). Thus, teacher feedback in a variety of formats (oral and written) plays an important formative role in student learning. Research on learning also suggests that understanding is strengthened when the learner is asked to take an

active part in determining what he or she understands and how he or she came to that understanding (National Research Council, 2000). Typical classroom practices that attend to metacognition include rehearsal and repetition. Less typical but research-proven effective methods for aiding in the transfer of learning to new situations include self-assessment, reflection on one's own progress and determining what needs further improvement, and activities geared toward allowing students to make sense of concepts or new information through talk or writing (Palincsar & Brown, 1984; Scardamalia, Bereiter, & Steinbach, 1984; White & Frederiksen, 1998). Thus, providing opportunities for students to peer- or self-assess their work prior to submitting it for teacher evaluation (Schunk, 1996) is also a potential element of formative assessment practice.

Finally, making the goals for student learning and performance explicit is a fundamental premise of national and local work on setting standards within disciplinary areas. At the classroom level, the extent to which the teacher sets clear learning and performance goals (long term and short term) or engages students in the process of setting such goals is paramount to assessing effectively what the students have learned and where the students need continued work and support (Stiggins, 1994; Wiggins & McTighe, 1998).

To understand how the Envision performance assessment system can be a formative experience for students, we surveyed and interviewed students and teachers about their experiences with the performance tasks (projects), exhibitions, and the graduation portfolio. Specifically, we looked for elements of formative classroom assessment practices in the ways that teachers describe their implementation of these tasks in their classes (e.g., the alignment of tasks with clear content standards or performance standards; the kinds of scaffolds, monitoring, and feedback that is provided to students). We also examine how students describe the kinds of preparation teachers provided for completing these tasks (including opportunities for formative feedback, self- and peer-assessment, having a clear understanding of the goals and performance expectations on these performance tasks, and reflection on their learning processes).

Research on performance-based assessment. Performance assessments have often been criticized in the psychometric literature as having major threats to construct validity (construct under-representation and construct-irrelevant variance) (Messick, 1996). In addition, psychometricians warn against the use of performance assessments for large-scale high-stakes assessment programs because of their lack of generalizability and validity (Haertel, 1999). At the

same time, Haertel points out that these weaknesses do not detract from their value for instructional purposes. Linn, Baker, & Dunbar (1991) suggest that the criteria used to establish the validity of performance assessments should be expanded. These criteria might include *consequential validity*: the intended and unintended effects of assessments on the ways teachers and students spend their time and think about the goals of education; *cognitive complexity*: whether performance-based assessments place a greater emphasis on problem solving, comprehension, critical thinking, reasoning, and meta-cognitive processes; *content quality*: whether the content represents the best current understanding of the field, vetted by subject matter experts in content and design; and *meaningfulness:* whether problems provide worthwhile educational experiences.

However, few empirical studies have examined the impacts of performance-based assessments on teachers' instructional practices and student learning. Most of the literature on performance-based tasks and project-based learning, which have been in common use during the last 15 years in many alternative and progressive school settings, has taken for granted that these forms of assessment promote student learning, without systematic investigation of these impacts. Much of this literature is focused on advocating for these forms of assessment, rather than critically examining the conditions under which these performance assessments can promote student learning and positively influence teachers' professional practice. Four empirical research studies that were found in a thorough search of the peer-reviewed literature are reviewed below.

The New Standards Project (NSP) in the 1990s provided an opportunity to examine these very questions. In an attempt to create "tests worth teaching to," the NSP, a consortium of 17 states and seven urban districts attempted to create an assessment system consisting of performance examinations, projects, and portfolios that could be implemented on a wide scale. Murphy, Bergamini, & Rooney (1997) examined the impact of the English language arts Field-Trial Portfolio on the curriculum in the classrooms of two experienced teachers. Findings from interviews, classroom discussions, and classroom observations showed that the field-trial did little to change the curriculum or methods of these two teachers in the three core areas, reading, writing, and the combined area of speaking and listening. In addition, students in these classes struggled to find pieces of writing that "fit" the criteria rather than engaging in thoughtful self-evaluation. However, these findings are limited by small sample size and the focus on

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experienced teachers who may have been less flexible in their willingness to adapt what they were doing to the new curriculum.

Fuchs and colleagues (1999) asked the following questions about classroom-based performance assessment-driven instruction in mathematics: (a) How does classroom-based performance assessment (PA)-driven instruction affect teachers' knowledge about what PA is, teachers' knowledge about how PA might enhance instructional decisions, and teachers' reports of changes in their curricular focus? (b) What is the nature of teachers' mathematics instructional plans when they use classroom PA? and (c) Does teachers' use of classroom-based PA-driven instruction enhance students' mathematical problem solving? They found that teacher instruction showed small but generally positive gains. In the PA group, the workshop, administration of PAs, and collegial meetings increased the teachers' knowledge about PA, improved their understanding of how PA might enhance their mathematics instruction, and prompted teachers to shift their emphasis away from basic, isolated, routine content toward problem solving. Teachers' self-reports suggested that PA teachers planned "approximately one of every four activities focused on developing student problem solving; about one of every two activities was devoted to helping students demonstrate their problem-solving capacity; and the remaining activities concerned the development of routine skills that might be necessary for application during problem solving" (632). In addition, based on performance assessments that were administered by a research assistant three times during the investigation, the changes in students' ability to problem-solve depended on if they were below, at, or above grade level. Students above grade level improved on all measures; PA students at grade level improved on two of three measures; and PA students below grade level improved on only one dimension (communicative value) of one measure. These results raise questions about equity when using PA-driven instruction. The authors suggest that more intensive professional development is needed in order to improve gains for all students.

Shepard and colleagues (1995) conducted a year-long project to help 13 third-grade classrooms in a working/middle class neighborhood outside of Denver begin to use performance assessments as a part of regular instruction in reading and mathematics. The group of researchers worked with volunteer teams of teachers to develop performance assessments. Achievement results on the Maryland School Performance Assessment Program were compared to the performance of third grade students in the same schools the year before and to third-grade

performance in matched control schools. They found that students made small gains in mathematics achievement and no gains in reading achievement when they participated in a curriculum based around performance assessments. The minimal changes could be attributed to slow growth in teachers' thinking and changes in instruction. They concluded that performance assessments do not automatically improve student learning, but that performance assessments do allow more students to develop conceptual understandings usually demonstrated by the most able students. They also concluded that to implement performance assessments, schools need to focus on sustained professional development.

Similarly, Cohen & Hill (2000) found that the successful implementation of a reform-oriented mathematics curriculum in California required not only the alignment of assessments and texts with curriculum, but also the provision of professional development opportunities. Their study drew from a 1994 survey of 595 elementary school teachers and student CLAS (California Learning Assessment System) scores. The teacher survey examined teachers' familiarity with the reform ideas underlying the CLAS, their opportunities to learn about improved mathematics instruction, and their mathematics teaching. Cohen and Hill concluded that professional learning opportunities must be grounded in the new assessments and/or curricula in order to positively affect student learning. Thus, in this study of performance assessments and student learning, one of the critical questions we asked of teachers was what professional development opportunities supported their development and successful implementation of performance assessments.

IV. Methods and Data Sources

This study explores two primary research questions:

1) What are students learning from the process of completing performance-based assessments?

2) How have teachers' experiences with implementing performance-based assessments in their classes influenced their ways of thinking about their teaching, their instructional practice, and their perceptions of student learning?

To address the first research question above, we utilized two strategies:

A) System-wide survey of students, in which we asked students to rate the value of a variety of classroom experiences that helped them to be academically successful, including their experiences with performance tasks and exhibitions.

B) In each year of data collection (2007 and 2008), we conducted case studies of five or six high school seniors in the graduating classes at two Envision high schools (11 students in total). We observed the students' oral defenses of their graduation portfolios, and interviewed them following their defenses.

The second research question was addressed through focus groups with all "Upper Division" (11th and 12th grade) teachers in one school (2007) and individual interviews of several Upper Division teachers in a second school (2008), and is supplemented with results from a Buck Institute for Education 2007 survey study (Ravitz, 2008) that included Envision teachers and compares the responses of Envision teachers with those of a comparison group.

Last, we provide a preview of a graduate follow-up study begun in the fall of 2008 to examine college enrollment, retention, and academic performance of Envision Schools graduates from the classes of 2007 through 2009. We report preliminary data on college enrollment and persistence, as well as data from student focus groups conducted in January 2009.

V. Findings

Research Question 1: *What are students learning from the process of completing performance-based assessments?*

1. Findings from Student Survey

Students perceive clear benefits from performance-based assessments. In general, students feel more confident and prepared both academically as well as in other domains. Results from the system-wide survey of students (across three Envision schools, grades 9-11, with a 45% response rate in 2007 and 38% in 2008) indicate some of the important ways in which students overall felt that they had learned from their experiences with performance-based assessments. For example, in the area of academic skills, over 80% of the respondents agreed that working on projects and sharing their work in public exhibitions improved their academic abilities. The area where students felt most improved was in their ability to think critically about ideas, problems,

and current events. Other skill areas that students felt were strengthened by performance tasks included: working cooperatively with others and taking leadership roles when necessary, communicating their ideas effectively and persuasively, approaching complex problems from multiple angles, citing evidence to support their ideas, and analyzing information and data in a logical way.

In addition to perceiving improved skills and increased confidence, 84% of the respondents agreed or strongly agreed that working on performance tasks made them feel better prepared for college and to be successful in the workplace. On average, more than 80% of respondents also agreed or strongly agreed that working on performance-based tasks helped them feel that they were gaining useful and important knowledge and skills and that they were learning something that they would remember even after leaving high school.

2. Findings from Student Case Studies

The Sample. Of the 11 case study students, six students had at least one parent with a 4-year degree, and three students reported that both parents graduated with a college degree. Students in the group come from diverse socio-economic and ethnic backgrounds: African-American, Latino, Asian, Caucasian, and Native American. Five out of the 11 students were male, and six were female.

Feelings about Being Prepared for College. Most of the students report feeling prepared for college by their high school experiences and readily draw on evidence supporting their claims. They consistently call out the following: 1) high expectations of high school work; 2) demanding interdisciplinary projects; 3) student exhibitions; 4) leadership skills; 5) regular reflection; 6) a rigorous process of compiling and defending their graduation portfolio work, 7) workplace learning experiences (WLEs); and 8) other experiences outside of school. One student shares:

> *It's rigorous, challenging at your own level - high achieving and lower achieving students are well served. You can get as much help as you need. The community and small classes – we've talked about that before. The [project based learning] allows you to go deeper, and it's more meaningful than taking it from a lecture. Not that we don't have lecture – we do. Everything is relevant to the real world. There is a reason for doing stuff... it applies to real life challenges, college, and the working world.* (Emily, 2007)

Students' Perceptions of College Readiness. Most students express confidence that they have been challenged appropriately to prepare them for college level work. They articulate how important reflection has been, both within and across tasks, in preparing them as lifelong learners; and they repeatedly refer to the 21st Century "leadership skills" as essential supports to their college and workplace learning. Furthermore, the students affirm that it is *both* the relevance of the work and the supportive personal and academic relationships that motivate them to engage in deeply challenging work, and they consider their successful completion and defense of their graduation portfolio as a capstone to their high school experience.

Academic Rigor. The theme of academic rigor permeates students' descriptions of their high school experience, though some students articulate more sophisticated understandings of their academic challenge than others. As one student puts it, "at our school we don't have Ds...We have higher standards and we have to think more than other schools." (Jessica, 2008). Beyond that, nearly every student describes specific projects that required him or her to acquire, apply, and present deep content knowledge in ways that pushed his or her thinking and motivated them to do excellent work. As one student relates, "In real life, you don't have classes… I think [project-based learning] is really preparing students to be life-long learners in non-classroom environments." (Ben, 2007)

The "State of the World: 1914" project is repeatedly cited as a challenging project where students wrote individual research papers about the political, social, or economic effects of industrialization for a particular country, then worked with 3 to 5 other students to synthesize their ideas in a succinct video documentary, and presented their learning in a dramatic performance on exhibition night. The "Great Debate" required student teams to research both sides of an issue such as "Should people give up individual rights for the good of the whole?" in preparation for a live debate. A coin toss determined the side of the debate each team would argue and prompted them to plunge into opening arguments, rebuttal and closing remarks.

Many students describe how much work goes into a presentation or project, but one student reflects how the hard work throughout a project is what yields a successful exhibition product. "Most of my effort goes into the pre-exhibition stuff… critical thinking, analysis and synthesis. The visuals are really nice at the end, but you have to work really hard from the beginning to do a good content piece." (Ben, 2007). Part of that hard work is a disciplined, time-consuming cycle

of revision designed to elevate students' drafts to polished works. One student outlines the process:

> *With all the revisions and everything, it probably took a couple of months. Writing the initial paper it probably took 2-3 weeks of research… And we had to revise it. I think I revised it three times until I got to proficient. And the revisions – there were long breaks between the revisions. It took a while to get it really proficient.* (Violet, 2008)

Motivation to Engage in Challenging Work. So, what motivates students to engage in the challenging work? One student shares how his approach to school work was transformed when he encountered project-based work that was more meaningful to him: "I used to do what was the bare minimum to get an A [when I was in middle school]. Here… I didn't just want to get a good grade, I wanted to do something that was impressive, that I was proud of, that other people would like, that was creative. So I would stay up pretty late to make something perfect, not something that was just good enough." (Ben, 2007) For many of the students, academic pride grows as the audience for their academic work expands, while others key into the personal accomplishment of particular tasks and reflect more on their own sense of gratification. Alex shares: "My papers are my most prized possession at the school. I have a lot of faith in my writing at this school." (Alex, 2007)

All the students articulated that teachers assign projects relevant to the students' lives to help them learn deeply and authentically. For Melanie, understanding a purpose for the projects is important, as is making a personal connection to the work. One project in particular stood out to her as important – a project called "Immigrant Song". For this particular project, Melanie interviewed her mother, who is an immigrant, and turned the interview data into a monologue she performed. The process made her feel closer to her mother and gave her a sense of satisfaction and achievement. She prepared for this project for approximately one month, which included going to an off-campus writer's workshop for help with creating the monologue. She describes this project as more of a growth experience than a classroom assignment. Melanie feels a personal connection to the project and an ability to exercise her creativity to make the project relevant to her own life. Furthermore, this contributes to her understanding of education as something personal and not just a matter of passing or failing.

Another student sums up projects slightly differently:

I feel they're really trying to get us to learn different things, whether it be [the project] Immigrant Song, or [the] debate that we had, or our Holocaust exhibition. Those different things really take us out into the world [to] really see what people really think, and also experience ourselves of how we think based on what their experiences are. (Ricardo, 2008)

As stated in the above quote, project-based learning was relevant to Ricardo's life and allowed him an experience of the self. Additionally, Ricardo's idea of these projects "[taking him] out into the world", "to see what people think" and "experience [himself]" speaks to this idea of relevance for him. Ricardo makes connections between the project and his own life, which provides learning authenticity, legitimacy and pride.

And then there is the "fun factor":

And secondly, for me and many of my peers, it's much more fun and exciting to work on these cool projects where you use art and technology, and that excitement about the art and technology is good in and of itself, but perhaps more importantly, makes you more receptive to the core academics that could be seen as boring without that as the [basis]. (Ben, 2007)

Relationships. In addition to relevance, the case studies reveal students consistently recognize and value the role that strong, trusting relationships play in creating a supportive school culture that helped them grow both emotionally and academically. In fact, the strong sense of community – described as "welcoming", "warm", "family", and "close-knit" – is what most students express as the thing they like most about their school.

Initially drawn to the small size of the school and the small class sizes, students expand on how being in a small learning community translated into specific supports to them. Several students highlight the importance of being known and feeling safe in asking questions or revealing their lack of understanding. Others expand on how knowing everyone in their class helped them grow, and teachers who knew them well were better able to support them personally and challenge them academically. "I'm very glad that I came to this school. I feel like it was a very unique experience. And I thought that the whole community building – that really helped me with compassion and empathy and stuff. Because I knew all my classmates really well, I was able to relate to them better…" (Violet, 2008). Through cohort grouping and myriad group projects, students reveal they learn not only about how to work with others but also how to learn from others. Specifically, students describe how learning to "collaborate successfully" (an

explicit 21ˢᵗ Century Leadership Skill) will serve them well in college and the workplace, and a few of the students explicitly value the peer feedback they relied on to improve their work. Students view one another as resources, "Since we are one big community, everyone knows that if somebody understands something, word gets out about who understands that, and we all learn off of one person and it starts spreading out." (Jessica, 2008).

Every student describes his or her teachers as committed and caring, and praises the amount of time and effort teachers and staff avail themselves to helping him or her. One student describes, "The teachers. They really help you when you need help. Even when you don't ask them, they look for you. 'Are you OK? Are you on track?'" (Jessica, 2008). Another states, "My teachers know me well, [and they] push me to do well and to be myself." (Miles, 2007)

Students recall that they are asked to do things that are challenging or uncomfortable, but they are asked to take on these challenges, such as public speaking or difficult written reflection and analysis, in a safe environment. One student reflects that while teachers are, "brutally honest with the feedback" she understands their desire for her to do well. She discusses the care of the teachers by saying that "they're willing to be mean to see us succeed." As another student puts it, "I learned that the teachers here wanted to help me as a person too, not just my [with] academics. So they made things a lot harder for me in my junior year, pushed me to work harder and get As for my own personal learning." (Miles, 2007) One female student contrasts her experience at her Envision School where she felt she could "ask questions without feeling stupid" with her experience in a school she attended for a month when her family relocated temporarily to support another family member: "There were 35 people in a classroom and it was packed – some sitting on the side, some at desks. Teachers never knew me by name. It was not personable… Being at [my Envision School] in a small environment, I have gotten used to getting personal attention." (Fiona, 2008)

Cumulative Effects of Projects and Presentations. The cumulative effect of projects and exhibitions, along with other class-based presentations, is clear to most of the students. For example, Alex states:

> *I've done two major exhibitions a year, that usually encompassed two or three classes. So that's already eight major presentations that I've presented in front of groups of 100 plus people. There are countless presentations that I've done in front of peers. I probably did 15 a semester or something like that… I've presented a lot in front of my peers. I've*

definitely gotten better over the years. When I came in, I could not have held my own with a group. (Alex, 2007)

Students map back to experiences that help them be successful on these projects, and they cite several things, including: working with different people every year, getting frequent positive and constructive (peer) feedback and explicit practice with the leadership skills. "[It] adds up and helps you to grow and change." (Anthony, 2007). Several of the leadership skills are developed in seminar-style discussions, a hallmark of Envision Schools classrooms, and students communicate their belief that they will be able to "hold their own" in college seminar classes (Miles, 2007). Other students refer to the demands of multi-tasking and managing projects well: "Inside of class, they really helped you with managing your things and making the most out of your time. And of course, if you did all those things, it really helped you out in the long run." (Allison, 2007).

Another student shares her views of projects and her sense that they serve students well in preparing for college:

> *The projects have been rigorous. Getting a diverse project base in government, literature, science, math – they have all been extremely different and they are strong projects. I don't know what college is like yet, but from what I have heard we're doing rigorous stuff that people did not do in high school to be ready. My peers in other schools do not know about exhibitions. We're very different. Opening up a textbook is not going to get you anywhere unless you know how you are as a learner, how you can dissect things without the guides in a textbook. I think the projects will help us.* (Fiona, 2008)

Alignment to State Standards. Most students report teachers only rarely explicitly call out specific state content standards and nobody indicated that their teachers focused on them. Our case study students present a wide range of awareness about the state tests and state content standards, from, "I don't even know what that is" (Alex, 2007) to students being quite aware of state tests and feeling prepared to take them. "If we had one of those tests coming up, the teachers would kind of tell us what would be on it. Or 'remember when we learned about this, this might be on it', or 'it might be in this kind of format'. That kind of thing. We felt prepared." (Allison, 2007). Furthermore, students trust that their teachers are knowledgeable about the standards and are embedding the content standards in the projects they design for students: "I guess we basically trusted them to cover what the state wanted us to learn. Our teachers obviously know." (Allison, 2007) Students report varied levels of feeling prepared for the end-

of-course exams, from feeling most prepared for the ELA and science exams and least prepared for the math, science and history exams. One student illuminates how her history coursework was misaligned to the history exams: "STAR tests – sometimes did not feel prepared to take those tests. Like the history tests – we did not focus on specific dates and specific events. Taking the SAT IIs – I took the US History – I didn't know any of it." (Violet, 2008)

While Envision Schools expects teachers to develop projects and performance assessment tasks aligned to state content standards, some teachers struggle in navigating what they experience as three layers of standards: graduation portfolio standards, leadership skill standards, and state content standards. From the students' experiences, it is clear that teachers focus more on developing provocative, relevant driving questions than following specific California content standards. Students do not seem troubled by the fact that their schools do not focus on the state standards over the graduation portfolio.

Experiences Outside of School. More than half of the students, when asked, describe an experience outside of school that has helped them get prepared for college. For some students, it is a sports activity, and for others it is work. One insightful student shares that his ability to connect his life outside of school with his school life has helped him be successful and better prepared for college because he is able to get academic support from a broad group of friends. (Anthony, 2007). For the most part, students who had taken a college course (either on-line or in-person), or had some college orientation experience, claim those experiences were confidence-boosters for college success:

> *I don't think it's going to be too much of a shock because I've taken college classes, and I have friends who have taken college classes, and friends who are in college. It's probably going to be a lot more stressful just in terms of the workload and how rigorous it is. But I'm ready for it.* (Allison, 2007)

Workplace Learning Experiences. At Envision Schools, something that levels the playing field for students is called the Workplace Learning Experience (WLE). It is a required internship for juniors and seniors for one day/week for roughly 10 weeks and provides all students access to a workplace mentor and an experience that builds college-career connections for students. Students use the WLE to explore potential careers and they report many positive outcomes that they connect to college success. Students acknowledge that their workplace experiences have helped them to "behave more like an adult" (Alex, 2007) or "be more mature" (Allison, 2007)

and changed their orientation to the rest of the world: "WLE experiences helped me think of the work world with less fear. Learning how to handle yourself on a whole new level as a professional is different. How you speak to others, how you sit in your chair…" (Emily, 2007)

The expectations and rigor of the workplace helped many students take their academic work more seriously while simultaneously inspiring students to or dissuading students from particular careers. For example, through her experience working at a campus radio station, Violet (2008) developed a professional goal to run her own radio station.

Culminating with the Graduation Portfolio. For four years, students engage in work that helps them acquire particular knowledge and skills, but in their junior and senior years they compile their graduation portfolio. Students describe the graduation portfolio requirement as one that forced them to both produce and reflect on their best work. "It pushed me further than I thought it could." (Jessica, 2008) Students select an array of "college ready" work across six subject-specific disciplines and specified interdisciplinary tasks (e.g. research paper, oral presentation, multi-media presentation) and reflect on how those tasks demonstrate both their mastery of disciplinary thinking skills as well as more general leadership skills. The demands of the portfolio are high, and quite at odds with "senioritis" of most 12th grade students. As most seniors begin to completely check out of school, Envision students are investing, albeit sometimes reluctantly, considerable energy in their work. "It forces you to remember that you're still in school." (Miles, 2007)

Ben's work reviewing his academic experiences was validating to him in large part because he had produced a body of work that he was proud of, and one that demonstrated growth over time:

> *Also I feel successful because I produced stuff… it wasn't just that I amassed a certain number of educational minutes sitting in the classroom… I went through every class syllabi and I remember we made… 11 big projects, 11 movies, 6 games, countless essays. I also have a body of work that improves over time, so I have stuff and I have evidence of growth in writing and analysis, in filmmaking, and stuff like that. So that's cool too, and I not only have a vague sense of "I learned a lot. I was successful," but some concrete evidence.* (Ben, 2007)

For Melanie, the portfolio defense was a large source of pride and satisfaction. She enjoyed reflecting on the work of her high school career and putting it together into the end product. The theme of her portfolio is reflected in the quote by J.R.R. Tolkien, "Not all those who wander are

lost," and speaks to her understanding of education as an exploratory process. One artifact, "High Dive Unit Problem" utilized trigonometric formulas to solve a complex mathematics problem. The second was a research paper called "Human Nature", in which Melanie used the ideas of Ayn Rand and John Locke to answer an essential question about free will versus pre-destination. She used critical thinking skills to apply the philosophical ideas to the question and in one line of her paper she writes, "Without free will, the sense of individuality that sets the human race apart from all other living things would be lost, and our society would be void of expression." The third artifact presented was an essay in Spanish comparing two poems. In each of the artifacts, Melanie applies academic concepts to real world problems and makes connections to herself in her reflections and answers to questions posed by the panel.

> *My work is on a different level because I know I had to get it to this sort of…this level of achievement and this certification area as opposed to well I studied for my final I guess and whether I passed or not well I'll find out the next summer or it's just…it just doesn't feel like your senior year when you sort of go through a testing like that. So I feel like it …I mean you just come down like off a high – you're just on a high for like a whole week saying, ' I passed it, oh my God.' Because you put so much emotion into the preparation for it that when you pass it, you feel like you achieved something so great. And it really does… and the way that they stress that the defense is gearing you up for college you feel like, 'OK so I am ready to move on. I can do this, and at least six people have approved of me moving on and it's really great.'* (Melanie, 2008)

Reflection/Metacognition. Miles describes the portfolio as "your best work" – a culminating experience that allows you to reflect on who you are and how you've grown as a person in a way that is creative and personal. Several students value what they perceive to be the purpose of the graduation portfolio and express appreciation for the opportunity to reflect on and be responsible for their own work. Allison shares her enthusiasm:

> *I loved the end result - which was the graduation portfolio itself. I think it was a really neat project. It really did help you reflect on all the work you'd done and how much you'd really grown, and what you've accomplished. It was a really good reflection process. It was also just really cool seeing everyone's work and the way that they pulled it all together.* (Allison, 2007)

Violet, among other students, specifically calls out the importance of reflecting both within and across work samples:

To prove to ourselves that we can do this work, and that we've done it. And that it's up to standard. And also to help us reflect on the work. Because a lot of what CAT does is this whole idea of metacognition and kind of internalizing your learning. And I think that the process of writing your reflections is really good for that because we were reflecting on our entire experience with each subject. And that really helped me to internalize and think about our learning and think about the process that we've gone through. I think that was sort of the purpose of it. (Violet, 2008)

Almost all of the students have strong reflective skills and can describe themselves as learners in ways that serve them personally and academically. Ben articulates, "I have habits of mind in order to develop, helping me clarify my ideas and understand concepts… I [have] methodologies for learning and working on my own." (Ben, 2007) He cites, as other students do, specific skills and habits he expects will serve him well in college and career. Project management is one of them. His ability to assimilate new information is another. But Ben's description of "knowing his own mind" suggests a deeper level of reflection wherein he uses his metacognitive thinking to support his learning. Miles explicitly applies his understanding of self to college success:

My favorite part was the defending part – when they asked me questions. I think that's the best thing that a school could ever do to someone who's graduating because the teachers helped me reflect on how I started and how I grew. That kind of summed up my life … as a high school student. Most of the time, like at [another high school]… you would just graduate, get your diploma. But…here, it's actually like you did a whole process, and now you're done with the whole process. They helped me reflect on how I grew from when I came [to MSAT] to now, and now I could enter college knowing how I grew. (Miles, 2007)

Two or three students did not reflect deeply on their work, nor seemed able to explain the purpose of various aspects of their educational experiences during interviews. For example, one student described the process of completing her graduation portfolio in terms of "getting her stickers" for the large chart in her classroom indicating which students had completed what tasks. She reflects on her portfolio defense with the following: "I think I messed up in some parts…As soon as I hit the 5-minute mark, I didn't want to talk anymore." (Jessica, 2008). By and large, the higher achieving students are better able to recognize and connect the practices (e.g. small class size, reflections) to the outcomes. And while some students notice they are participating in various structures or experiences such as small class sizes, work that relies

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heavily on groupwork, and interdisciplinary projects, they are not necessarily aware of the intention of a particular experience.

That said, for many Envision Students, the portfolio defense was the first time each student worked independently on a major project, and it helped them gain confidence about working independently in college: "It was different to do it as a big presentation by yourself. I learned more about how I work by myself [compared with working with others]. I had never done a big presentation by myself like that before." (Emily, 2007)

Variation in Student Experiences with the Graduation Portfolio. While some students enjoyed the work of amassing and defending their best work and gleaned a considerable amount of learning from the process, others did not. Specifically, some students express frustration with "unclear expectations", the stresses of revising and reflecting, and failing their portfolio defense. One student shares:

> *We were told we would have to do a grad portfolio, but we weren't told that we would have to go through this many drafts and revisions and this process. So when we did [an assignment], we were doing things just for class and didn't know that we would have to have 'A-quality work'.* (Fiona, 2008)

This posed a challenge for students who did not have sufficient "proficient" work to fulfill the graduation portfolio requirements and forced them to return to work they had completed months ago that was not fresh in their head. "We had finished reading the book, we're months and months away from the project and I'm having to go back. I'm adding stuff, but it doesn't make sense since I have different thoughts on the project now." (Fiona, 2008). Other students describe the graduation portfolio as "pretty abstract" until late in their junior year, and one student noted that she did not see graduation portfolio assessment rubrics until January of her senior year (Violet, 2008). Furthermore, since most teachers did not evaluate student work with the graduation portfolio rubrics along the way, students did not know whether their work would be good enough for the graduation portfolio as they completed it. Thus, the revision process for many of the pieces was compromised. As Violet summarizes, "I did not get a lot out of the revision process." In addition, students were not consistently required to write formal reflections about their work as they completed it, so they had to revisit their work shortly before graduation and reflect on it in a way that felt inauthentic or disconnected to some of them.

Finally, a few students who failed their first attempt at defending their graduation portfolio state they did not have clarity about what was expected of them, though other students thought the expectations clear, but they were just not prepared. Of the eleven case study students, about a third did not pass their defense on the first try, suggesting that the expectations and standards for students are high and that students are not always ready to defend their work at the level required to pass.

Some of the variations in student experience around the portfolio can be partially accounted for by the developmental nature of the graduation portfolio, as it was being piloted for the first time with these first two graduating classes, and by some individual differences among students and teachers in how they understand and approach the portfolio. Furthermore, some differences in how students experienced the portfolio requirement can be explained by differences in how it was implemented by schools. For example, students at MSAT (2007) had greater choice in selecting graduation portfolio tasks, which did not have to meet a clear, established standard on the scoring rubrics to be considered "proficient". Students at CAT graduating in 2008, on the other hand, had more limited options for portfolio pieces since teachers constrained them to selecting pieces meeting the criteria for certification. While students at both schools knew the defense and portfolio were "high-stakes" assessments, they also knew that as the first graduating classes of their schools, they were "guinea pigs" and had to be flexible as various educational innovations were launched and continued to evolve during their four years of high school.

College/Career Aspirations. The students share an array of aspirations for post-secondary education. Of the eleven students interviewed, eight of them describe plans to attend and graduate from a 4-year college. One student, who is eligible to attend a 4-year college/university, states she will pursue a culinary certificate. Another student, with documented learning challenges, looks forward to earning a 2-year degree and working in auto mechanics. A third student describes a short-term desire to complete a 2-year degree, along with a certificate in massage therapy, though also remarks he may pursue a Ph.D.

While one of the students felt anxious about being able to manage their own learning independently in college, the rest of the students expressed feeling "absolutely ready" for college, and attribute much of that readiness to their high school preparation, especially in comparison to their non-Envision Schools peers:

[W]hen I compare our work with my friends from other schools you feel really…like well, 'I may not have the same curriculum as you but I'm getting just as much, if not more than you are'…there is a method to their madness of how they sort of structure our school. (Melanie, 2008)

Post Script on Student Case Studies: As of March 2009, each of the case study students was enrolled in either a 2- or 4-year college program. Ben, Violet, Allison, Melanie and Miles have attended 4-year programs while Anthony, Fiona, Ricardo, Jessica, and Alex have enrolled in 2-year programs. Anthony has reapplied to 4-year programs, anticipating a fall start.

Research Question 2: *How have teachers' experiences with implementing performance-based assessments in their classes influenced their ways of thinking about their teaching, their instructional practice, and their perceptions of student learning?*

Findings from Teacher Focus Groups and Interviews

During the 2007 data collection cycle, the Stanford research team conducted a focus group with all six of the Upper Division (11th-12th grade) teachers at the Marin School of the Arts and Technology (MSAT), and in the 2008 data collection cycle, conducted individual telephone interviews with three of the six Upper Division (11th-12th grade) teachers at the City Arts and Technology (CAT) High School in San Francisco. The teachers ranged in teaching experience from one year to 19 years (with an average of 6 years experience), and represented the six major content areas offered at the Envision Schools in the Upper Division: 1) digital media; 2) Spanish; 3) government/economics; 4) mathematics; 5) English language arts; and 6) science. (Performing and visual arts are taken in the Lower Division as required courses.)

For this report, we focus on three major themes that emerged from analysis of the interview transcripts, in relation to the research questions:

1) Rationale for project-based learning, including

    a) Engagement in learning;

    b) What students learn from project-based learning;

    c) Access to academic rigor and content knowledge;

2) Organizing one's classroom instruction for project-based learning (impact on teaching);

3) A new kind of accountability for students and teachers.

1. The Rationale for Project Based Learning

When asked what they thought was the rationale for using project based learning (PBL) and performance assessment as the primary means of instruction and assessment at the Envision Schools, almost all teachers reported that the goal of PBL was to **engage students in *active learning***. Other purposes cited was to help students construct their own knowledge and understandings, to help students find real-world relevance in their academic work, and to provide access to academic content to students who would otherwise not be academically successful.

> *Not all students perform well on standard academic tests. But as a teacher, I want them to be able to show that they have mastered the content in some way. And so by giving them projects that they can think about and process, and scaffold their mind and knowledge, and be able to take what they've learned in class and show it in a way that demonstrates that they've mastered the content, to me, it gives more students an opportunity to be successful in the classroom. That's what I like about it.* (MSAT teacher, 2007)

What do teachers think students are learning from doing projects and the graduation portfolio? Teachers cited that PBL helps to **prepare students better for college and careers** by requiring them to **develop and use Leadership Skills**. These skills are practiced in the context of completing projects and are requisites for completing the projects successfully. For example, one teacher asserted that students learn how to approach a problem that does not have an obvious solution and that through projects, they gain a set of experiences that fosters confidence in their ability to tackle future problems.

> *Ultimately you produce students – and this also prepares them for college and the workplace – because you produce students whose wide range of skills and competence level make them ready, willing, and able to tackle any problem, and very creatively tackle any kind of problem that's given to them. It's mainly the confidence, that you've given them a skill set or a tool box that they can feel confident that they can solve any problem posed to them.* (MSAT teacher, 2007)

Similarly, another teacher asserted that projects support students' learning about how to learn:

> *For me, projects are the single best way to teach the single most important skill we can do – and that is teaching students how to learn, which is obviously what they can take with them going forward. What I'm really struck by with students talking about projects, reflecting on them, is they figure things out about themselves, about what kind of a learner they are, what kind of thinker, collaborator, and so on....* (MSAT teacher, 2007)

This same teacher acknowledged that the Envision Schools may not prepare graduates for the current reality of many state colleges, where most instruction is delivered via lecture. However, he argues that "If you take a step back and look at college from a helicopter point of view, it is this big project that students are managing their own classes, picking and choosing stuff, managing their time, working with other kids in study groups."

Another commonly cited outcome of engaging students in PBL (and is affirmed by the student case studies) is that doing projects, presenting at exhibition nights, and completing and defending the graduation portfolio were associated with students' sense of **academic pride**:

> *What I've noticed here is that many of the student find an intrinsic value in learning, and when you've created a project that has a strong essential question, that asks the students not only to absorb the academic work but to ask questions of themselves and who they want to become and who they really are, no matter what the subject matter is, then when they've really thought about it and created the project that you've asked them to create, they have this intrinsic pride…they're so proud of what they've accomplished. And that's something I've never seen at any other school before. That's really an important aspect of the projects.* (MSAT teacher, 2007)

> *Students understood why they were doing the defense after they went through it. Some students would come back to school after the defense to help their classmates get through it. When students got it done – they were really proud of themselves. It's almost an academic pride similar to athletes who are good at sports on an all-star team...* (CAT teacher, 2008)

Another learning outcome that some of the teachers cited was that engaging students in projects provides many students with **access to rigorous academic content and skills**. One of the MSAT teachers talked about how projects can be used to motivate students to engage in more traditional academic work (e.g. doing research, writing an essay) as a means toward completing an authentic, engaging project.

> *It makes it so much easier for teachers to convince students of the importance of more traditional looking academic work when it's couched within a well designed project. How hard is it for a teacher to convince waves and waves of teenagers that writing a ten-page research paper is a great skill that they should learn how to do? And when that's the end, rather than the means to an end, it's pretty hard to make that argument...But when you put that 10 page research paper as a step toward a goal that is much more engaging to them, for example, a short documentary film that looks like stuff on the History Channel that they all enjoy watching at home – they know what that looks like. They don't sit and read academic history journals…whereas when you say, 'Hey, check out this Ken Burns documentary on baseball of the Civil War,' and they're like, 'Oh*

yeah, I saw that two years ago on Channel 9.' 'Well we want you to make one of those.'
'Sweet! Let's do it!' – 'Well, guess what? Before Ken Burns started making his
documentary film, he read about 50 books and pored through archives and found photos
and all that stuff.' And all of a sudden they're like 'Okay, let's do it then.' So projects
aren't, when they're well designed, at the expense of traditional academic work. (MSAT
teacher, 2007)

While recent critics of 21st Century Skills have claimed that a focus on these "soft skills" come at
the cost of rigorous academic work in the content areas (see e.g., Toppo, 3/5/09), several of the
teachers concurred that authentic PBL work can both engage students and build their Leadership
Skills, as well as provide an entry way into learning rigorous academic content more deeply.

2. Organizing classroom instruction for project based learning – What is the impact on teaching?

We asked teachers how their instruction is different with PBL or what it means to teach with
projects. Some of them cited the intensive work of planning for a PBL unit and all of the
considerations that must be addressed, from the technology and technical skills that students
need for the work to the kinds of scaffolds that are needed to support students in learning the
content and skills required for the project. Many cited the use of "benchmarks" – milestones in
the completion of a project, or formative assignments that are used to break down a final project
into smaller, more manageable chunks. Last, the interdisciplinary nature of the projects was
highlighted as a way to help students "see how these subjects are interrelated and connected - it's
really powerful for them and all learners that are involved." (MSAT teacher, 2007)

In addition, a few teachers discussed their particular approaches to supporting low-achieving
students.

> *For low achieving students, it is important to find ways for them to be part of a group,*
> *giving them small chunks that they can definitely handle. And finding their niche within*
> *the group, whether they're the leader, or they're in charge of the technology, or they're*
> *in charge of the artistic storyboard. Finding their strength so they feel like they've*
> *contributed.* (MSAT teacher, 2007)

Furthermore, teachers cited the potential that PBL has for tapping into "multi-modal ways of
learning – the audio, visual, kinesthetic…It's easier to tap into the various gifts that students
bring to the table." (MSAT teacher, 2007) In addition to capitalizing on students' strengths, one
teacher from CAT (2008), who had previously taught at MSAT, highlighted the importance of
building a trusting relationship so that low-achieving students will follow through on the

scaffolds that teachers design for them to be successful on the projects. The strength of these trusting relationships was also highlighted by the students in their case study interviews.

> *You do your best to get to know them really, really well. I feel like what the skill level is – in terms of getting a student to finish something that they thought they couldn't do – the pull that you have with them isn't how great you are in terms of knowing history – that you're a history expert or anything like that – it has everything to do with how much they trust you when you request them: 'I know you don't know this very well or spent very much time on it, but let me scaffold something out for you, and I'm telling you that if you do these things'… It takes a lot for a kid who isn't academically successful to trust you that it's going to be okay, unless you've already gone through those experiences with them in class, those exhibitions.* (CAT teacher, 2008)

We also asked teachers what was challenging about implementing PBL in their classrooms. One noted challenge is getting students, when they first enter in the ninth grade, to actually engage in the kind of thinking they are expected to do: **"**One challenge, especially in the ninth grade, is students saying 'Just tell us what to do.' When you pose open-ended projects to them, that knocks the pins out of most kids. They're just like 'What, what do we do?' (MSAT teacher, 2007). Another challenge was getting high achieving students to work collaboratively with lower achieving students and leaving behind their competitive identities so that they could effectively work with other students who may be struggling with the content or not "pulling their weight".

Another instructional challenge that some teachers cited was the tension between teaching for depth versus teaching for breadth. While one teacher expressed concern about the demands of college and whether students need a greater foundation of knowledge in their disciplines to be successful at the college level, most teachers agreed that the sacrifice of breadth for depth was well worth it, and that the school gave them flexibility and permission to focus on deep learning rather than trying to cover the curriculum broadly. One English language arts teacher acknowledged that teaching with projects definitely slowed things down and kept him from covering as many books as most high school teachers do. But he felt that the "payoff" was well worth it.

The fact that teachers focused little on covering content is consistent with students' reports of how their teachers presented the state exit exam and end-of-course exams, and the lack of emphasis on covering the state standards. One teacher from CAT who became an administrator explained that as a teacher, he did not feel any tension between content coverage versus implementing projects: "Students remember the projects, not the stuff they memorize for tests."

But as a school administrator, he now feels that he does have to pay attention to the state tests for political reasons: "I understand the value of being a school that gets good test scores."

Another challenge that one teacher cited related to the graduation portfolio and the defense was some lack of clarity about the purpose of the portfolio and the scoring rubrics, as well as the multiple rubrics that were in use across the schools at various levels. He felt that early on in his experience with the rubrics, he wasn't sure what purpose they served. Now that he understands the purpose of having a set of rubrics for each content area, he is able to use the rubrics to "backwards plan" projects and assessments. There seems to be a developmental factor in teachers' ability to buy into the rubrics, understand their purpose, and use them to guide their instructional plans. It took this teacher three years and the experience of guiding his students through the graduation portfolio process to truly understand the purposes of the assessment system.

This teacher suggested that it would be helpful to have teachers at the 11th grade assigning graduation portfolio-worthy projects to increase students' selection of work for the graduation portfolio, but also to spread out over two years the "certification" process (by which work undergoes revision until it is scored "proficient" on the rubrics so that it can be used to meet graduation portfolio requirements), and to also increase teacher buy-in of the scoring rubrics. He also suggested the need for models for what a high quality graduation portfolio and portfolio defense looks like to provide greater clarity to both teachers and students about what is expected of their work. Last, he cited the importance of a shift in his teaching from "teacher as instructor" to "teacher as coach" that supported his students' success on the graduation portfolio: "If a teacher coaches his or her students well enough, it becomes a very powerful experience. But if it's just treated as a guideline that doesn't need to be followed, it's not as effective…Students' success on the portfolio depends on how much time a teacher spends with a student coaching a student to get their work to proficient."

When asked what professional development supports and opportunities helped them to understand and implement projects and the graduation portfolio, several of the teachers cited their involvement in jointly developing the performance outcomes and rubrics with the Stanford School Redesign Network, which enabled them to "buy into" the assessment tools. In addition, several of them cited the annual "calibration" training in which teachers are trained to score student work using the subject-specific rubrics, and in a few cases, opportunities to spend time

jointly planning interdisciplinary units and projects with other teachers in their instructional team. This weekly common planning time is a precious asset that teachers find indispensable to their ability to carefully plan and execute projects.

Findings from the Buck Institute for Education Study. Further evidence of the influence of performance-based assessments on teacher practice comes from an evaluation of Envision Schools' best practices conducted by the Buck Institute for Education (Ravitz, 2008). The Buck Institute for Education (BIE) collected the original data regarding teachers' practices in a national survey of high school reform and project based learning (PBL) conducted in Fall 2007. The survey defined PBL as "an approach to instruction that included extended student inquiry into a topic, some degree of student self-direction or choice, and presentation by students of their findings, results or conclusions." At the time the survey was conducted, the Envision graduation portfolio system was in development for use with the second cohort of graduating seniors. Thus, the survey data speak to the influence of the Envision graduation portfolio for a limited number of teachers and students in the pilot year of the graduation portfolio. That said, the definition of PBL encompasses key elements of the Envision performance-based assessment focus and the participating teachers would have been developing and preparing to use the portfolio system at the time.

The BIE study included teachers from Envision Schools in addition to teachers from several other major high school reform networks that emphasize PBL as an instructional approach. Overall, the survey showed that, among other differences, the Envision teachers felt more prepared to use performance assessments, used traditional assessments less frequently, and required more reflection from their students. For example, the results indicated that Envision teachers felt significantly more prepared (53% vs. 25%) than other teachers to assess skills beyond academic content. At the same time, Envision teachers were less likely than others to assess students using multiple choice or short answer tests (33% vs. 8% "Never" used them). Envision teachers were also more likely to have students reflect on the quality of the project, the work that went into it, or their learning (57% vs. 42%). All reported comparisons were significant at the $p< .05$ level.

3. A new kind of accountability for students and teachers – making work public

One last important theme that came up in the focus group and interviews with teachers was that engaging in projects (and exhibitions) changed the nature of how teachers are held accountable for their work. In contrast to other schools, where content coverage, principal walk-throughs, and students' performance on standardized tests are the basis for teacher evaluation, teachers at the Envision Schools feel a strong sense of accountability because of the way that projects and exhibitions make their work public:

> The way that projects change teaching is that it makes the student work public and it makes the teacher's work public. And so, when it's two weeks until exhibition time, and I joke – we get into the sort of angry director mode. We're getting emotional and screaming at kids that they've gotta step up to the plate. Part of that is coming from the fact, as a leader of the project, and someone who's going to be judged just like the students, it's high-stakes for me. And my pride and my professionalism are on the line, ultimately I think in a healthy way, because it helps the school environment. And I love, as a professional, being able to rise to that challenge. That's what keeps me going... projects become this wonderful built-in system that keeps me doing my best...When students see how much I care about this, and they realize 'Oh wow, this is how much one needs to care about things in life,' and every time an exhibition night comes on, and 3 days, 2 days, and 1 day before, we're still wringing our hands over whether it's going to be good or not, the kids step up, for the same reason that the teachers are stepping up. (MSAT teacher, 2007)

> [Administrators] come to the exhibitions to see what the students have created – are they learning this stuff? Have they mastered the content? Great! Fantastic, you're a good teacher. It's not a system of coming in and monitoring the nitty-gritty everyday things, because as we all know, that can be ugly at times as students go through the process of learning. Have they mastered the content? Have they produced works that they are going to be proud of? And do they understand the material? Great, then you've done your job as a professional. (MSAT teacher, 2007)

These comments provide evidence of how teachers' thinking about their instructional practice changes when they use projects and performance assessment as the basis for evaluating student learning. Both students and teachers are held accountable in a public and visible way that leads them to higher levels of engagement and effort in the work rather than feeling debilitated by the amount of curriculum to cover or tests that don't measure what they feel matters. Through exhibitions, as well as through the joint scoring of student work using the graduation portfolio subject-specific rubrics, teachers share what they are doing in their classes with their students, and in doing so, open themselves up to the scrutiny of their colleagues and other members of the school community, including parents. It is through the rich evidence of

student learning on projects that the school community participates in evaluating a teacher's effectiveness. Rather than test scores that come back to schools long after the students have moved on to a new teacher, the rigor and quality of the projects that teachers design, their ability to move students toward success on these projects, and their ability to successfully coach students to success on the graduation portfolio are evident, providing immediate formative feedback that can inform teaching decisions immediately.

VI. Discussion & Conclusions

We find consistent themes that run through both the teacher and student interviews. First, both groups affirmed the power of the trusting relationships that teachers have with students that enables teachers to support student success through appropriate scaffolds. These one-on-one relationships and interactions with teachers, along with the strong community that students enjoyed in high school, are what Envision graduates from 2007 and 2008 repeatedly cited as the one thing they missed the most about high school during the Graduate Follow-up Study focus groups in January 2009. Second, both teachers and students describe the learning benefits of project-based learning primarily in terms of a) learning content more deeply, and b) learning the "leadership skills" (e.g., project/time management, collaboration, communication) that they believe are good preparation for college and careers. During the graduate focus groups, many of the college-going students reported that they felt well prepared for participating in classroom discussions, for managing their time and projects/papers effectively by setting their own benchmarks for completing a big task, and to some extent, for writing research papers (although some wished they had even more experience with this in high school). Third, both students and teachers describe the impact of projects and exhibitions on students' academic pride and engagement with school.

Descriptions of instructional practice offered by teachers and students also concur. Teachers spend little time in lecture and presenting information, and are more likely to engage students in small group work or class discussions. Students have more time during class to work on projects, get feedback from one another on projects, and meet in individual teacher-student conferences about their work. In addition, both groups acknowledged that teachers rarely mention the California state standards and the state testing program. Through authentic projects that draw on students' artistic and technological skills, it is apparent that teachers are able to engage a greater

number of students in rigorous academic work and sustain their interest. Teachers also make rigorous content and projects accessible to students with diverse academic and social needs by helping students relate the academic content to their own lives and the world, and by breaking down the projects into small, manageable chunks.

In addition, teachers and students both describe using formative assessment practices that Black and Wiliam (1998a,b) found were associated with greater student success: providing students with diagnostic information (for example, through individual conferencing on student work, scores on the graduation portfolio rubrics), providing clear feedback and opportunities for revision (for example, the project "certification" process), and supporting metacognitive (reflection) practices. The graduation portfolio assessment tools--the rubrics in particular--support teachers with providing detailed feedback on students work; and the process of "certification" engages students in the revision of their work to meet the graduation portfolio standards of proficiency. Last, the reflections that are required for each work sample that students select for the graduation portfolio and the portfolio defense itself engage students in reflection and meta-cognition about how their thinking within a content area has evolved, about their learning progress over four years, and about whether they are prepared to graduate.

Students and teachers also agreed that there were "bugs" in the definition and implementation of the graduation portfolio system. Students and some teachers felt that there was a lack of clarity around the portfolio and defense requirements, that the work of populating the portfolio with work samples and the process of "certification" were rushed at the end of the senior year, and that the revision process became more of a perfunctory requirement than an opportunity to learn. Students wished that they had begun the process of getting work certified beginning in their junior year and that teachers had pre-warned them of the need to have "A" quality work for the portfolio. They also wished that they had clearer models of what a high quality portfolio and a high quality portfolio defense look like. (It is understandable that there were no models in the first year of implementation – and now there are models.) Last, they felt that writing their reflections for each portfolio artifact would have been more authentic were they written immediately following their completion of each of the projects, rather than months later. For a graduation portfolio to serve formative purposes, it is critical that the process of completing it not be rushed, that students have multiple opportunities to produce work that might meet

portfolio requirements, and that they receive sufficient coaching as they reflect on and revise their work to meet the proficiency standards.

A last implication of this study is that students also need more opportunity to learn the content that is measured on some of the end-of-course exams. Comments from one student about being inadequately prepared for the state history exams and the SAT II history tests strongly suggest a need for a greater alignment of curriculum to these measures, particularly those that serve a gate-keeping function for colleges.

VII. Post-Script

While this study provides important evidence that a performance-based assessment approach (with coherent instructional and professional development supports) can be an educative experience for teachers and students, the long-term impact of this assessment approach on students' readiness for and success in college has yet to be examined. A follow-up study is currently underway in which graduates of the Envision high schools (the class of 2007-2009) will be followed into their first and second years of college or work to study the long-term impacts of their high school experience on their post-secondary attainment and achievement. This type of tracking effort represents an essential step in addressing the validity concerns surrounding performance-based assessment practices and aligning those practices at the secondary level with college level outcomes.

Preliminary results from the Graduate Follow-Up Study. Envision currently has 154 graduates in two cohorts, 2007 (N= 69) and 2008 (N=85). As part of the tracking study graduates are administered a survey as part of their participation in the tracking study. A version of the survey was piloted in Spring 2008 with the 2007 graduate cohort. Of the 69 graduates 21 (30%) responded. After having completed one semester of college, 90% of the students indicated that they felt prepared for college-level work. While findings are limited by low response rates, these preliminary results are promising and suggest that the Envision Schools approach to academic preparation may be successful in promoting college entry and success.

In addition to the survey information, college enrollment data for both cohorts was collected from the National Student Clearinghouse using Student Tracker reports. Initial results of these post-secondary tracking efforts indicate that, as of Fall 2008, 90% of the students in the 2007 cohort are enrolled in college. Of the 2007 college-going graduates, 48% were enrolled at 4-year

colleges and 52% are enrolled at 2-year colleges. For the 2008 graduates, 95% of the cohort is enrolled in college, with 65% of the college-going students attending 4-year colleges and 35% attending 2-year colleges. These represent relatively high college-going rates relative to the California state average of 40% for 2006, the most recent year with available data (Mortensen Seminar on Public Policy, 2008).

Because the class of 2007 is currently in their second year, we can also look at persistence and other trends for this group. Interestingly, none of the 2007 students who enrolled in college initially after graduating high school have left college altogether. This is quite positive, given the national statistics showing that half of those who end up leaving college without a degree leave after the first year. A more detailed analysis of the enrollment trends shows that four students who began 4-year colleges subsequently transferred to 2-year colleges and only one student who began in a 2-year school has since transferred to a 4-year institution. While the overall college persistence is encouraging, the overall trend of students moving from 4-year to 2-year institutions is an area for concern. This early data will help guide efforts to provide support and counseling to the graduates to help them persist in their college studies, particularly at 4-year institutions.

Because the tracking initiative is still in the early stages, we can currently draw only limited conclusions from the results. Perhaps the most important implication to date is the difficulty of tracking individual students. This highlights the importance of obtaining identification information and consent for accessing student records prior to high school graduation. However, even when identification and consent are obtained, challenges remain. For example, while the Clearinghouse provides extensive enrollment data through its partnerships with U.S. colleges and universities, the data are not comprehensive. A student may be enrolled in college, but those enrollments may not be found in the Clearinghouse data for a number of reasons including: enrollment in a college outside the U.S., blocked access to student records by the student or the school, or lack of unique identifying information such as SSN for students with common names. For this reason, Envision supplemented its Clearinghouse data through a combination of individual interviews and queries via phone, email, and on-line social networking sites.

References

Black, P. J., & Wiliam, D. (1998a). Assessment and classroom learning. *Assessment in Education, 5*(1), 7-74.

Black, P., & Wiliam, D. (1998b). Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 80*(2), 139-148.

Butler, R. (1987). Task-involving and ego-involving properties of evaluation: Effects of different feedback conditions on motivational perceptions, interest, and performance. *Journal of Educational Psychology, 79*(4), 474-482.

Clotfelter, Charles T., Ladd, Helen F. and Vigdor, Jacob L. (2006). *The Academic Achievement Gap in Grades 3 to 8.* NBER Working Paper No. W12207 Available at SSRN: http://ssrn.com/abstract=900992

Cohen, D. & Hill, H. (2000). Instructional policy and classroom performance: The mathematics reform in California. *Teachers College Record 102*(2), 294-343.

Conley, D.T. (2005). *College knowledge: What it really takes for students to succeed and what we can do to get them ready.* San Francisco: Jossey-Bass.

Crooks, T. J. (1988). The impact of classroom evaluation practices on students. *Review of Educational Research, 58*(4), 438-481.

Duschl, R. A., & Gitomer, D. H. (1997). Strategies and challenges to changing the focus of assessment and instruction in science classrooms. *Educational Assessment, 4*(1), 37-73.

Fadel, C., Honey, M, and Pasnik, S. (2007, May). Assessment in the age of innovation. Education Week. May 18, 2007. Retrieved on July 10, 2008 from: http://www.edweek.org/ew/articles/2007/05/23/38fadel.h26.html?print=1

Fuchs, L.S., Fuchs, D., Karns, K., Hamlett, C.L., & Katzaroff, M. (1999). Mathematics performance assessment in the classroom: effects on teacher planning and student problem solving. *American Educational Research Journal 36*(3), 609-646.

Haertel, E. (May 1999). Performance assessment and education reform. *Phi Delta Kappan, 80*(9), 662-666.

Heilig, J.V. & Darling-Hammond, L. (2008). Accountability Texas style: The progress and learning of urban minority students in a high-stakes testing context. *Educational Evaluation and Policy Analysis, 30*(2), 75-110.

Herman, J. L. (1992). *A practical guide to alternative assessment.* Alexandria, VA: Association for Supervision and Curriculum

Koretz, D., Mitchell, K., Barron, S., & Keith, S. (1996). *Final Report: Perceived Effects of the Maryland School Performance Assessment Program.* Los Angeles: National Center for Research on Evaluation, Standards, and Student Testing.

Lee, J. (2006). *Tracking achievement gaps and assessing the impact of NCLB on the gaps: An in-depth look into national and state reading and math outcome trends.* Cambridge, MA: The Civil Rights Project at Harvard University.

Linn, R. L., Baker, E. L., & Dunbar, S. B. (1991). Complex, performance-based assessment: Expectations and validation criteria. *Educational Researcher, 20*(8), 15-21.

Matthews, B. (1995). The Implementation of Performance Assessment in Kentucky Classrooms. Louisville, KY: University of Louisville.

Messick, S. (1996). Validity of performance assessments. In Phillips, G. (Ed.), Technical Issues in Large Scale Performance Assessment. ERIC # ED399300

Murphy, S., Bergamini, J., Rooney, P. (1997). The impact of large-scale portfolio assessment programs on classroom practice: Case studies of the new standards field-trial portfolio. *Educational Assessment, 4*(4), 297-333.

National Research Council. (2000). *How people learn: Brain, mind, experience, and school:* Expanded version. J. D. Bransford, A. L. Brown, & R. R. Cocking (Eds.). Washington, DC: National Academy Press.

National Research Council. (2001). *Classroom assessment and the National Science Education Standards.* J. M. Atkin, P. Black, & J. Coffey (Eds.). Washington, DC: National Academy Press.

New Commission on the Skills of the American Workforce (2007). *Tough Choices or Tough Times.* Rochester, NY: National Center on Education and the Economy.

Palincsar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension monitoring activities. *Cognition and Instruction, 1*(2), 117-175.

Mortensen Seminar on Public Policy (2008). Analysis of Opportunity for Postsecondary Education: Residence and Migration for College Freshmen by State (California). Oskaloosa, IA: Author. Retrieved on December 11, 2008 from: http:// http://www.postsecondary.org/

Ravitz, J. (2008, September 5). Evaluation of the Envision Schools' Stuart Foundation Initiative. Novato, CA: Buck Institute for Education.

Scardamalia, M., Bereiter, C., & Steinbach, R. (1984). Teachability of reflective processes in written composition. *Cognitive Science, 8*: 173-190.

Schunk, D. H. (1996). Goal and self-evaluative influences during children#s cognitive skill learning. *American Education Research Journal, 33*(2), 359-382.

Shepard, L.A., Flexer, R.J., Hiebert, E.H., Marion, S.F., Mayfield, V., Weston, T.J. (February 1995). Effects of introducing classroom performance assessments on student learning. CSE Technical Report 394. National Center for Research on Evaluation, Standards, and Students Testing (CRESST). Graduate School of Education & Information Studies, University of California, Los Angeles.

Stiggins, R. J. (1994). *Student-centered classroom assessment.* New York: Merrill.

Toppo, G. (5 March 2009). What to learn: 'core knowledge' or '21st century skills'? *USA Today.* Retrieved on March 23, 2009 from: http://www.usatoday.com/news/education/2009-03-04-core-knowledge_N.htm

White, B. Y., & Frederiksen, J. R. (1998). Inquiry, modeling, and metacognition: Making science accessible to all students. *Cognition and Instruction, 16*(1), 3-118.

Wiggins, G., & McTighe, J. (1998). *Understanding by design.* Alexandria, VA: American Association for Curriculum Development.

Wineburg, S.S. (1999). *Historical thinking and other unnatural acts: Charting the future of teaching the past.* Philadelphia: Temple University Press.

Vogler, K. E. (2002). The Impact of High-Stakes, State-Mandated Student Performance Assessment on Teachers' Instructional Practices. *Education, 123*(1), 39.