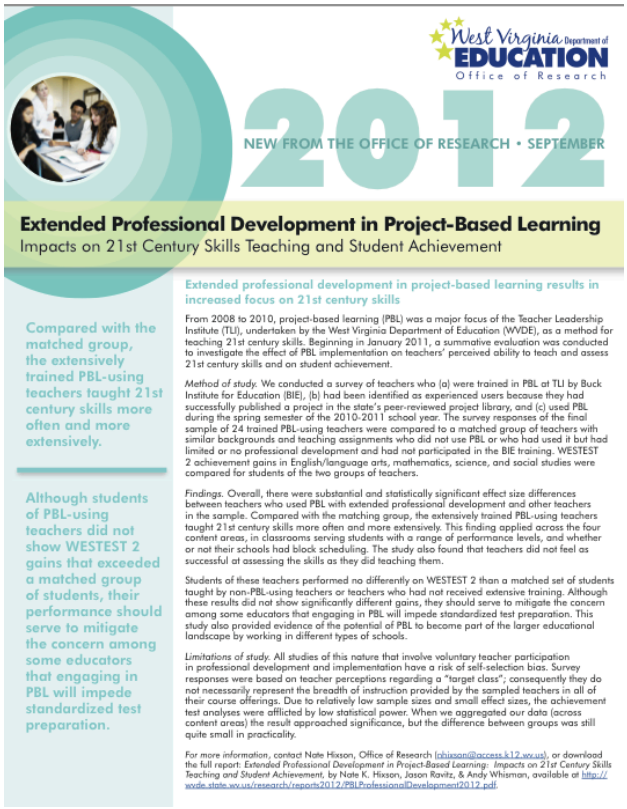
A Survey for Measuring 21st Century Teaching and Learning:
West Virginia 21st Century Teaching and Learning Survey [WVDE-CIS-28]

Jason Ravitz, Ph.D., Evaluation and Research Professional <jason.ravitz@gmail.com> Richmond, CA January 31, 2014

This teacher survey is available for re-use in studies of 21st century teaching and learning. It has demonstrated excellent reliability, improving on reliable measures from previous studies (std. alpha > .90, inter-item correlations > .58). Support for content validity is based on review of existing frameworks and measures. Support for concurrent validity includes strong relationships to time spent using project-based learning.

Image of WVDE research brief



West Virginia Department of EDUCATION
Office of Research

2012

NEW FROM THE OFFICE OF RESEARCH • SEPTEMBER

Extended Professional Development in Project-Based Learning
Impacts on 21st Century Skills Teaching and Student Achievement

Compared with the matched group, the extensively trained PBL-using teachers taught 21st century skills more often and more extensively.

Although students of PBL-using teachers did not show WESTEST 2 gains that exceeded a matched group of students, their performance should serve to mitigate the concern among some educators that engaging in PBL will impede standardized test preparation.

Extended professional development in project-based learning results in increased focus on 21st century skills

From 2008 to 2010, project-based learning (PBL) was a major focus of the Teacher Leadership Institute (TLI), undertaken by the West Virginia Department of Education (WVDE), as a method for teaching 21st century skills. Beginning in January 2011, a summative evaluation was conducted to investigate the effect of PBL implementation on teachers' perceived ability to teach and assess 21st century skills and on student achievement.

Method of study. We conducted a survey of teachers who (a) were trained in PBL at TLI by Buck Institute for Education (BIE), (b) had been identified as experienced users because they had successfully published a project in the state's peer-reviewed project library, and (c) used PBL during the spring semester of the 2010-2011 school year. The survey responses of the final sample of 24 trained PBL-using teachers were compared to a matched group of teachers with similar backgrounds and teaching assignments who did not use PBL or who had used it but had limited or no professional development and had not participated in the BIE training. WESTEST 2 achievement gains in English/language arts, mathematics, science, and social studies were compared for students of the two groups of teachers.

Findings. Overall, there were substantial and statistically significant effect size differences between teachers who used PBL with extended professional development and other teachers in the sample. Compared with the matching group, the extensively trained PBL-using teachers taught 21st century skills more often and more extensively. This finding applied across the four content areas, in classrooms serving students with a range of performance levels, and whether or not their schools had block scheduling. The study also found that teachers did not feel as successful at assessing the skills as they did teaching them.

Students of these teachers performed no differently on WESTEST 2 than a matched set of students taught by non-PBL-using teachers or teachers who had not received extensive training. Although these results did not show significantly different gains, they should serve to mitigate the concern among some educators that engaging in PBL will impede standardized test preparation. This study also provided evidence of the potential of PBL to become part of the larger educational landscape by working in different types of schools.

Limitations of study. All studies of this nature that involve voluntary teacher participation in professional development and implementation have a risk of self-selection bias. Survey responses were based on teacher perceptions regarding a "target class"; consequently they do not necessarily represent the breadth of instruction provided by the sampled teachers in all of their course offerings. Due to relatively low sample sizes and small effect sizes, the achievement test analyses were afflicted by low statistical power. When we aggregated our data (across content areas) the result approached significance, but the difference between groups was still quite small in practicality.

For more information, contact Nate Hixson, Office of Research (nhixson@access.k12.wv.us), or download the full report: *Extended Professional Development in Project-Based Learning: Impacts on 21st Century Skills Teaching and Student Achievement*, by Nate K. Hixson, Jason Ravitz, & Andy Whisman, available at http://wvde.state.wv.us/research/reports2012/PBLProfessionalDevelopment2012.pdf.

The Framework

The conceptualization of skills for this instrument came from the international Innovative Teaching and Learning study (Shear, Novais, Means, Gallagher, & Langworthy, 2010). We also drew upon the Deeper Learning framework from The William and Flora Hewlett Foundation (2010), and Partnership for 21st Century Skills (p21.org).

After extensive review of different sources, here is the framework we used, with definitions:

- **CRITICAL THINKING SKILLS** refer to students being able to analyze complex problems, investigate questions for which there are no clear-cut answers, evaluate different points of view or sources of information, and draw appropriate conclusions based on evidence and reasoning.

- **COLLABORATION SKILLS** refer to students being able to work together to solve problems or answer questions, to work effectively and respectfully in teams to accomplish a common goal and to assume shared responsibility for completing a task.

- **COMMUNICATION SKILLS** refer to students being able to organize their thoughts, data and findings and share these effectively through a variety of media, as well as orally and in writing.

- **CREATIVITY AND INNOVATION SKILLS** refer to students being able to generate and refine solutions to complex problems or tasks based on synthesis, analysis and then combining or presenting what they have learned in new and original ways.

- **SELF-DIRECTION SKILLS** refer to students being able to take responsibility for their learning by identifying topics to pursue and processes for their own learning, and being able to review their own work and respond to feedback.

- **GLOBAL CONNECTIONS** refers to students being able to understand global, geo-political issues including awareness of geography, culture, language, history, and literature from other countries.

- **LOCAL CONNECTIONS** refers to students being able to apply what they have learned to local contexts and community issues.

- **USING TECHNOLOGY AS A TOOL FOR LEARNING** refers to students being able to manage their learning and produce products using appropriate information and communication technologies.

Measures

Each section of the survey provides (1) the above definition, (2) a list of related practices, and (3) questions about perceptions. We wrote new items and re-used practice items based on the most reliable items from Novais & Gallagher (2010) and in personal communications with Gabriel Novais (April 27, 2011).

After each definition the survey asks about the frequency of 5 to 8 practices pertaining to that skill (e.g., having students work in groups to support collaboration). Response choices were 1 'Almost never'; 2 'A few times a semester'; 3 '1-3 times per month'; 4 '1-3 times per week'; 5 'Almost daily'.

In addition to the frequency of different practices, we asked how much teachers perceive having taught and assessed each skill, using critical thinking as an example: (a) I have tried to develop students' critical thinking skills; (b) Most students have learned critical thinking skills while in my class; and, (c) I have been able to effectively assess students' critical thinking skills. Response choices were 1 'Not really'; 2 'To a minor extent'; 3 'To a moderate extent'; 4 'To a great extent', 5 'To a very great extent'.

Reliability

When presented with the definitions the practice and perception items were highly correlated and contributed to **extremely reliable overall measures for each skill (**standardized alpha > .90, inter-item correlations > .58).

Factor analysis tended to verify that the instrument was measuring different constructs. The last four skills -- global connections, local connections, self-direction and using technology skills -- emerged cleanly as four different factors when analyzed as a group (Hixson, Ravitz & Whisman, 2010, Appendix D). However, critical thinking, creativity, collaboration and communication items were less empirically distinct. These items sometimes loaded together, but there were exceptions. For example, having students convey ideas using media was intended as a communications skill, but it often loaded with using technology as a tool for learning (Hixson, Ravitz & Whisman, 2012, Appendix E). These analyses might be used to revise the instrument or to focus on smaller sets of closely related measures.

Content validity

The framework in the survey is the result of a careful review of the literature including the following key sources:

Students' 21st Century Skills - ITL/SRI version (Shear et al., 2010)

- **Knowledge Building**: Students move beyond the reproduction of information to construct knowledge that is new to them.
- **Problem-Solving and Innovation:** Students solve problems for which there is no previously learned solution, make choices in their approach, and implement their solutions in the real world.
- **Skilled Communication:** Students present their ideas in ways that are clear and compelling, and present sufficient relevant evidence on a topic or theme.
- **Collaboration:** Students work together in groups, take on roles, and produce a joint work product.
- **Self-Regulation:** Students plan and monitor their work, and make revisions based on feedback or self-assessment.
- **Use of ICT for Learning:** Students use ICT to construct knowledge; choose when, where, and how to use it; and evaluate the credibility and relevance of online re- sources.

The William and Flora Hewlett Foundation (2010) Deeper Learning initiative has focused on preparing students to:

- **Master core academic content**
- **Think critically and solve complex problems**
- **Work collaboratively**
- **Communicate effectively**
- **Learn how to learn (e.g., self-directed learning)**

In addition, the WVDE Office of Instruction reviewed the framework and instrument to make sure that items were compatible with the West Virginia 21st Century Content Standards and Objectives, as follows:

- **Standard 1: Information and Communication Skills**—The student will access, analyze, manage, integrate, evaluate, and create information in a variety of forms using appropriate technology skills and communicate that information in an appropriate oral, written, or multimedia format. (p. 1)

- **Standard 2: Thinking and Reasoning Skills**—The student will demonstrate the ability to explore and develop new ideas, to intentionally apply sound reasoning processes and to frame, analyze and solve complex problems using appropriate technology tools. (p. 4)

- **Standard 3: Personal and Workplace Skills**—The student will exhibit leadership, ethical behavior, respect for others; accept responsibility for personal actions considering the impact on others; take the initiative to plan and execute tasks; and interact productively as a member of a group. (p. 5)

Concurrent validity

In our analysis of findings we see evidence for concurrent validity. This includes strong relationships with PBL use and other key measures. On balance, teachers who were strong on project-based learning (PBL) use reported more teaching and assessment of 21st century skills than a comparison group. This pattern was seen for all academic subjects, especially math. We also saw this independent of perceived class achievement levels and block scheduling. The only exception was for global connections, skills often taught by social studies independent of PBL use. This indicates the measures are sensitive to teaching practices.

Equity

Concerning the equitable distribution of practices, teaching of 21st century skills was evenly distributed regardless of teachers' ratings of student academic performance in their target class and did not appear to interfere with content learning based on surveys or test scores. However, all of the PBL with extended professional development teachers had experience supporting professional development in schools, compared to only 1/3 of the comparison group. This suggests characteristics of the teachers in our study could help explain both their teaching of 21st century skills and use of PBL.

References

Hixson, N. , Ravitz J. & Whisman, A. (2012*). Extended professional development in project-based learning: Impacts on 21st century teaching and student achievement*. Charleston, WV: West Virginia Department of Education. Retrieved from https://www.academia.edu/1999374.

Novais, G. & Gallaher, L. (2010). *ITL Research Technical Memo*. Retrieved from http://itlresearch.com/images/stories/reports/ITL%20technical%20memo%2012%20Dec%202010.pdf

Shear, L., Novais, G., Means, B., Gallagher, L., & Langworthy, M. (2010). *ITL Research Design*. Menlo Park, CA: SRI International. Retrieved from http://itlresearch.com/images/stories/reports/ITL%20Research%20design_15%20Nov%202010.pdf

The William and Flora Hewlett Foundation (2010). *Education Program Strategic Plan*. Menlo Park, CA: Author. Retrieved from http://www.hewlett.org/uploads/documents/Education_Strategic_Plan_2010.pdf

Important Notes

This is only part of a survey and part of a larger study. For a full report and a complete copy of the instrument, please see:

Hixson, N., Ravitz, J. & Whisman, A. (2012). *Extended professional development in project-based learning: Impacts on 21st century teaching and student achievement*. Charleston, WV: West Virginia Department of Education. Retrieved from https://www.academia.edu/1999374.

This work was undertaken at the Buck Institute for Education in partnership with the West Virginia Department of Education (WVDE) Offices of Instruction and Research.

Please let us know your plans for re-use and address any technical questions to Jason Ravitz <jason.ravitz@gmail.com>. To find out about WVDE use of these measures contact Nathaniel (Nate) Hixson <nhixson@access.k12.wv.us>.

Before answering these questions, teachers select a target course and a **target class** within this course. Teachers answer the survey with this target class in mind, the one in which they feel their practices are most effective, including project-based learning when applicable. Each box represents a single page in an online survey The preferred print layout for administration is one skill type per page, landscape format.

Instructions

The rest of this survey asks about your teaching practices that might support students' learning of the following 21st century skills.

Critical Thinking
Collaboration
Communication
Creativity & Innovation
Self-Direction
Making Global Connections
Making Local Connections
Using Technology as a Tool for Learning

For each of the above you will be asked about your general teaching of these skills, and about a few specific practices you may have used.

There are no correct or incorrect answers and all responses will be kept confidential.

CRITICAL THINKING SKILLS refer to students being able to analyze complex problems, investigate questions for which there are no clear-cut answers, evaluate different points of view or sources of information, and draw appropriate conclusions based on evidence and reasoning

1. Here are some examples of practices that may help students learn CRITICAL THINKING SKILLS.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	**Almost never**	**A few times a semester**	**1-3 times per month**	**1-3 times per week**	**Almost daily**
a. Compare information from different sources before completing a task or assignment?	O	O	O	O	O
b. Draw their own conclusions based on analysis of numbers, facts, or relevant information?	O	O	O	O	O
c. Summarize or create their own interpretation of what they have read or been taught?	O	O	O	O	O
d. Analyze competing arguments, perspectives or solutions to a problem?	O	O	O	O	O
e. Develop a persuasive argument based on supporting evidence or reasoning?	O	O	O	O	O
f. Try to solve complex problems or answer questions that have no single correct solution or answer?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	**Not really**	**To a minor extent**	**To a moderate extent**	**To a great extent**	**To a very great extent**
a. I have tried to develop students' critical thinking skills	O	O	O	O	O
b. Most students have learned critical thinking skills while in my class	O	O	O	O	O
c. I have been able to effectively assess students' critical thinking skills	O	O	O	O	O

COLLABORATION SKILLS refer to students being able to work together to solve problems or answer questions, to work effectively and respectfully in teams to accomplish a common goal and to assume shared responsibility for completing a task.

1. Here are some examples of practices that may help students learn COLLABORATION SKILLS.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Work in pairs or small groups to complete a task together?	O	O	O	O	O
b. Work with other students to set goals and create a plan for their team?	O	O	O	O	O
c. Create joint products using contributions from each student?	O	O	O	O	O
d. Present their group work to the class, teacher or others?	O	O	O	O	O
e. Work as a team to incorporate feedback on group tasks or products?	O	O	O	O	O
f. Give feedback to peers or assess other students' work	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' collaboration skills	O	O	O	O	O
b. Most students have learned collaboration skills while in my class	O	O	O	O	O
c. I have been able to effectively assess students' collaboration skills	O	O	O	O	O

COMMUNICATION SKILLS refer to students being able to organize their thoughts, data and findings and share these effectively through a variety of media, as well as orally and in writing.

1. Here are some examples of practices that may help students learn COMMUNICATION SKILLS.

In your TARGET CLASS, how often have you asked students to do the following	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Structure data for use in written products or oral presentations (e.g., creating charts, tables or graphs)?	O	O	O	O	O
b. Convey their ideas using media other than a written paper (e.g., posters, video, blogs, etc.)	O	O	O	O	O
c. Prepare and deliver an oral presentation to the teacher or others?	O	O	O	O	O
d. Answer questions in front of an audience?	O	O	O	O	O
e. Decide how they will present their work or demonstrate their learning?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' communication skills	O	O	O	O	O
b. Most students have learned communication skills while in my class	O	O	O	O	O
c. I have been able to effectively assess students' communication skills	O	O	O	O	O

CREATIVITY AND INNOVATION SKILLS refer to students being able to generate and refine solutions to complex problems or tasks based on synthesis, analysis and then combining or presenting what they have learned in new and original ways.

1. Here are some examples of practices that may help students learn CREATIVITY AND INNOVATION SKILLS.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Use idea creation techniques such as brainstorming or concept mapping?	O	O	O	O	O
b. Generate their own ideas about how to confront a problem or question?	O	O	O	O	O
c. Test out different ideas and work to improve them?	O	O	O	O	O
d. Invent a solution to a complex, open-ended question or problem?	O	O	O	O	O
e. Create an original product or performance to express their ideas?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' creativity and innovation skills	O	O	O	O	O
b. Most students have learned creativity and innovation skills while in my class	O	O	O	O	O
c. I have been able to effectively assess students' creativity and innovation skills	O	O	O	O	O

SELF-DIRECTION SKILLS refer to students being able to take responsibility for their learning by identifying topics to pursue and processes for their own learning, and being able to review their own work and respond to feedback.

1. Here are some examples of practices that may help students learn SELF-DIRECTION SKILLS.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Take initiative when confronted with a difficult problem or question?	O	O	O	O	O
b. Choose their own topics of learning or questions to pursue?	O	O	O	O	O
c. Plan the steps they will take to accomplish a complex task?	O	O	O	O	O
d. Choose for themselves what examples to study or resources to use?	O	O	O	O	O
e. Monitor their own progress towards completion of a complex task and modify their work accordingly?	O	O	O	O	O
f. Use specific criteria to assess the quality of their work before it is completed?	O	O	O	O	O
g. Use peer, teacher or expert feedback to revise their work?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' self-direction skills	O	O	O	O	O
b. Most students have learned self-direction skills while in my class	O	O	O	O	O
c. I have been able to effectively assess students' self-direction skills	O	O	O	O	O

GLOBAL CONNECTIONS refers to students being able to understand global, geo-political issues including awareness of geography, culture, language, history, and literature from other countries.

1. Here are some examples of practices that may help students learn to make GLOBAL CONNECTIONS.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Study information about other countries or cultures?	O	O	O	O	O
b. Use information or ideas that come from people in other countries or cultures?	O	O	O	O	O
c. Discuss issues related to global interdependency (for example, global environment trends, global market economy)?	O	O	O	O	O
d. Understand the life experiences of people in cultures besides their own?	O	O	O	O	O
e. Study the geography of distant countries?	O	O	O	O	O
f. Reflect on how their own experiences and local issues are connected to global issues?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' skills in making global connections	O	O	O	O	O
b. Most students have learned to make global connections while in my class	O	O	O	O	O
c. I have been able to effectively assess students' skills in making global connections	O	O	O	O	O

LOCAL CONNECTIONS refers to students being able to apply what they have learned to local contexts and community issues.

1. Here are some examples of practices that may help students learn to make LOCAL CONNECTIONS.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	Almost never	A few times a semester	1-3 times per month	1-3 times per week	Almost daily
a. Investigate topics or issues that are relevant to their family or community?	O	O	O	O	O
b. Apply what they are learning to local situations, issues or problems?	O	O	O	O	O
c. Talk to one or more members of the community about a class project or activity?	O	O	O	O	O
d. Analyze how different stakeholder groups or community members view an issue?	O	O	O	O	O
e. Respond to a question or task in a way that weighs the concerns of different community members or groups?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	Not really	To a minor extent	To a moderate extent	To a great extent	To a very great extent
a. I have tried to develop students' skills in making local connections	O	O	O	O	O
b. Most students have learned to make local connections while in my class	O	O	O	O	O
c. I have been able to effectively assess students' skills in making local connections	O	O	O	O	O

USING TECHNOLOGY AS A TOOL FOR LEARNING refers to students being able to manage their learning and produce products using appropriate information and communication technologies

1. Here are some examples of practices that may help students learn to USE TECHNOLOGY as a TOOL FOR LEARNING.

In your teaching of your TARGET CLASS, how often have you asked students to do the following	**Almost never**	**A few times a semester**	**1-3 times per month**	**1-3 times per week**	**Almost daily**
a. Use technology or the Internet for self-instruction (e.g., Kahn Academy or other videos, tutorials, self-instructional websites, etc.)?	O	O	O	O	O
b. Select appropriate technology tools or resources for completing a task?	O	O	O	O	O
c. Evaluate the credibility and relevance of online resources?	O	O	O	O	O
d. Use technology to analyze information (e.g., databases, spreadsheets, graphic programs, etc.)?	O	O	O	O	O
e. Use technology to help them share information (e.g., multi-media presentations using sound or video, presentation software, blogs, podcasts, etc.)?	O	O	O	O	O
f. Use technology to support team work or collaboration (e.g., shared work spaces, email exchanges, giving and receiving feedback, etc.)?	O	O	O	O	O
g. Use technology to interact directly with experts or members of local/global communities?	O	O	O	O	O
h. Use technology to keep track of their work on extended tasks or assignments?	O	O	O	O	O

2. To what extent do you agree with these statements about your TARGET CLASS?	**Not really**	**To a minor extent**	**To a moderate extent**	**To a great extent**	**To a very great extent**
a. I have tried to develop students' skills in using technology as a tool for learning	O	O	O	O	O
b. Most students have learned to use technology as a tool for learning while in my class	O	O	O	O	O
c. I have been able to effectively assess students' skills in using technology for learning	O	O	O	O	O