

学校教育の情報化に関する懇談会（第1回）
4月22日（木）16:00～18:00 文部科学省3階1特別会議室

自己紹介、論点に対する意見

東京大学 大学発教育支援コンソーシアム推進機構 副機構長
大学院教育学研究科 三宅 なほみ

自己紹介

- 専門分野 認知科学・学習科学
- 研究テーマ 複数の方が関与する理解、問題解決、知的創成活動支援
- ICT 教育利用 JST CREST「高度メディア社会のための協調的学習支援システム」平成12年7月～平成19年3月
大学1,2年専門課程授業を協調学習化；IT利用
- 現在の仕事 社会人、大学知による教材開発と学校での活用実績をweb上で共有して「知を構造化するコミュニティ」を形成し、その中で学習者が21世紀に求められる人知的なスキルを育成するモデル事業を展開

21世紀に求められる認知的スキルの一例

ATC21S プロジェクト <http://www.atc21s.org/home/>

Assessment & Teaching of 21st Century Skills

Melborne 大学、1 Cisco, Intel, Microsoft with OECD

Learning and Technology World Forum in London で開始、公開

21世紀に求められるスキル: **the 21st Century Assessment Project has targeted**

the following skills as critical to individual economic success and important to effective functioning at the personal and societal levels:

- Creativity and innovation
- Critical thinking
- Problem solving
- Communication
- Collaboration
- Information fluency
- Technological literacy

Assessment: Goal を決めて遡るのではなく、学習者自身が **emergent goals** を作り出しつつ追えるよう、学習のプロセスを詳細に記録して次の学習に繋げる評価を行う

「論点」への意見

掲げられている論点も大切だが、まずは学校で児童生徒が世界につながったインターネットを自由に使える環境を整える必要がある。決められた教材を決められた形で利用できるだけでなく、インターネットをツールとして使いこなすことができ、世界から必要な情報を得、世界に発信できる環境を整えたい。



REFORMING AND STRENGTHENING AMERICA'S SCHOOLS FOR THE 21ST CENTURY

Barack Obama and Joe Biden believe that our kids and our country can't afford four more years of neglect and indifference. At this defining moment in our history, America faces few more urgent challenges than preparing our children to compete in a global economy. The decisions our leaders make about education in the coming years will shape our future for generations to come. Barack Obama and Joe Biden are committed to meeting this challenge with the leadership and judgment that has been sorely lacking for the last eight years. Their vision for a 21st century education begins with demanding more reform and accountability, coupled with the resources needed to carry out that reform; asking parents to take responsibility for their children's success; and recruiting, retaining, and rewarding an army of new teachers to fill new successful schools that prepare our children for success in college and the workforce. The Obama-Biden plan will restore the promise of America's public education, and ensure that American children again lead the world in achievement, creativity and success.

SCALING CHOICE AND INNOVATION IN THE PUBLIC SCHOOL SYSTEM

Barack Obama and Joe Biden believe that public education in America should foster innovation and provide students with varied, high-quality learning opportunities. The Obama-Biden education plan will focus federal funding on the most effective programs with a proven record of success, and work to expand successful school choices for parents and students within public education.

Create an Innovative Schools Fund: Barack Obama and Joe Biden will create an Innovative Schools Fund to provide funds to states and school districts to implement plans to create a "portfolio" of successful public school types, including charters, nonprofit schools, Montessori schools, career academies and theme-focused schools. Such approaches have been adopted by a number of districts across the nation, including Chicago, which has expanded not only charter schools, but also schools like the Austin Polytechnical Academy – a public high school that partners with 37 companies to support hands-on student learning in engineering and advanced manufacturing. In Thornton, Colorado, the school district and teachers worked together to close down a large, low-performing high school and open 6 new small schools to let parents and students choose between schools that focus on the arts or on technology, offer an International Baccalaureate (IB) program, or focus on workplace internships or world languages. And in Ohio, the Knowledge Works Foundation has partnered with urban districts across the state to create Early College High Schools that have seen dramatic gains in student achievement and graduation rates. The Innovation Schools Fund will supplement state, local and private funding for these efforts to broaden the numbers of public school choices available to students, and seek to ensure that supported efforts are appropriately tailored to ensure the educational and economic success of underperforming students in the district. Innovation Schools Fund monies will be focused on not only late-stage planning and transition costs, but also can be used for supporting limited capital costs for the schools.

Support High-Quality Schools and Close Low-Performing Charter Schools: Barack Obama and Joe Biden will double funding for the Federal Charter School Program to support the creation of more successful charter schools, particularly in high-needs school districts where students continue to be trapped in underperforming schools. An Obama-Biden administration will provide this expanded charter school funding only to states that improve accountability for charter schools, allow for interventions in struggling charter schools and have a clear process for closing down chronically underperforming charter schools. An Obama-Biden administration will

also prioritize supporting states that help the most successful charter schools to expand to serve more students.

IMPROVING COLLEGE READINESS AND COMPLETION

The U.S. used to rank first in the world in the number of young people with a postsecondary degree; now we have fallen to seventh. This is not because our young people do not try, but because too many do not graduate. To combat this problem, we need to both require more transparency on how many students graduate from high school and attend college, and prepare our high school students to take college level classes. Today, only a fraction of our students come to college fully prepared in key subject areas. We need to refocus on preparing our students to enter college ready to succeed, and Barack Obama and Joe Biden will make college readiness the central component of their high school reform efforts by launching a national “Make College A Reality” initiative.

Support Advanced Placement, Dual Enrollment, and College Credit Initiatives: A critical component of college student readiness is access to college-level classes in high school. Barack Obama and Joe Biden will create a national “Make College A Reality” initiative, based on the successful efforts underway in many states to increase the percentage of students taking rigorous courses and assessments, such as Advanced Placement (AP) or International Baccalaureate (IB) courses, and to improve achievement. The “Make College A Reality” initiative will contain a bold goal to increase students taking AP or college-level classes nationwide 50 percent by 2016, and will build on Obama’s bipartisan proposal in the U.S. Senate to provide grants for students seeking college level credit at community colleges if their school does not provide those resources. Obama and Biden will also support efforts to allow students to take advantage of virtual learning opportunities for college-credit, particularly in rural areas.

Increase College Awareness and Access: Barack Obama and Joe Biden have proposed to create a new \$4,000 American Opportunity Tax Credit and eliminate the confusing federal financial aid application process to make college affordable and accessible for all Americans. The American Opportunity Tax Credit requires that all recipients complete 100 hours of community service each year, either during the school year or summer months. As part of their competitiveness agenda, Obama and Biden will allow the students to complete their community service component by participating in proven college retention programs that engage college students in preparing high school students for college, similar to the National College Advising Corps (NCAC) which places college students as mentors and advisers in low-income high schools and community colleges.

INVESTMENT IN INNOVATION AND TECHNOLOGY

We cannot ensure we’re ready for the economic challenges of the 21st century if our schools and learning systems are firmly planted in the 20th century. Today, the information economy is revolutionizing every area of our lives, but too many schools do not have access to these critical resources. Barack Obama and Joe Biden believe we must integrate technology and its range of applications into all our nation’s schools so that we go beyond the conception that educational technology just means specialization in technology. An Obama-Biden administration will ensure that all students are trained to use technology to research, analyze and communicate in any discipline – the 21st century economy demands no less.

Technology Investment Fund: Barack Obama and Joe Biden will build on existing federal education technology programs and create a \$500 million matching fund to ensure technology is fully integrated throughout schools. This fund will:

- Integrate technology throughout the classroom so innovative learning technologies such as simulations, interactive games, and intelligent tutors can assist in improving the quality of learning and instruction.
- Develop better student assessments that allow teachers and parents to identify and focus on individual needs and talents throughout the school year. Technology can help get information about student performance to teachers and parents in real time, and support ongoing efforts to improve student performance in an area of weakness and support student success in areas where the student shows particular interest or aptitude. Barack Obama will encourage states to use technology to provide regular

reports to parents on student performance.

- Create new technology-based curriculum with leaders in the technology industry so schools can create courses around developing high-demand technology skills and working on authentic projects, as is done at High Tech High School or the New Tech High Schools.
- Use technology to allow teachers to work collaboratively with their peers across the country to share best practices and support teachers to provide more individualized assistance to students so that teachers are no longer the primary source of facts and information, but instead the coaches on how to best analyze and apply information.

ENSURING EFFECTIVE TEACHERS AND SCHOOL LEADERS

In November 2007, Barack Obama announced a comprehensive education agenda that places an emphasis on recruiting, preparing, retaining, and rewarding America's teachers. The Obama-Biden education plan will attract tens of thousands of new, highly-qualified teachers by creating Teaching Service Scholarships that completely cover training costs in undergraduate or graduate school of education programs for those who are willing to teach in a high-need field or location for at least four years.

The Obama-Biden education plan will prepare and reward our teachers by creating a Career Ladder Initiative that will offer federal dollars to states and districts that design innovative recruitment and compensation systems that align with the following principles:

- More pay for expert veteran teachers who serve as mentors and coaches.
- More incentives and opportunities for teachers to improve knowledge and skills.
- More pay for excellent classroom teaching that supports student learning and achievement.
- More pay for highly-qualified teachers who teach in underserved schools and underserved subjects like math, science and special education.

The Obama-Biden Career Ladder Initiative will also provide mentoring for beginning teachers as part of an induction program that supports and evaluates performance before any tenure consideration. Participating districts will also be required to put forward a clear plan – developed with parents and teachers in the districts – to identify ineffective and struggling teachers, provide them with individual help and support, and remove them from the classroom in a quick and fair way if they still underperform.

RESPONSIBILITY FROM PARENTS AND WASHINGTON

In his November 2007 education reform speech, Barack Obama highlighted the critical need for parents to meaningfully engage in their children's education and the importance of Washington reforming federal education spending to maximize accountability and success. Barack Obama and Joe Biden support building on those core principles with tools that ensure that all elements of American society are accountable for the success of our children.

Create a Parent Report Card to Support Individual Learning Plans: An Obama-Biden Administration will work with state leaders to create a meaningful parent report card that gives parents the concrete information they need to help improve their child's performance each year and plan for post-high school education – a feature that currently does not exist in NCLB reports. States would be required to submit their plans for individual learning report cards in their state accountability plans to the Department of Education. These quarterly report cards will have the following common features:

- Where their child is expected to perform at their grade level to be ready for high school graduation and post-high school education
- Information about local afterschool, summer learning, tutoring, and/or mentoring programs that might provide additional assistance to students who have fallen behind and provide additional hands-on learning opportunities for students who excel in certain subject areas.

- Information about alternative public schooling options in the area that the student may be able to attend, and how those schools' students are performing.
- Expected amount of savings a family should have for future college tuition and information about eligibility for federal and state tax credits, grants, and other financial assistance.

Increase Parental Responsibility: Barack Obama believes that parents have responsibility to ensure that their children are on time and ready to learn every day, and that at night, their children are continuing their studies. As announced by Barack Obama in November 2007, the following principles will be implemented in an Obama-Biden administration:

- **Clear and High Expectations for Student Behavior:** Every school receiving funding under this plan is required to lay out clear and high expectations for student behavior and shared values, agreed on by the school's educators and parents. This plan will support summer planning time for teachers to design behavioral expectations or receive training in models driving positive student behavior school wide.
- **School-family Contracts:** The Obama-Biden plan will encourage schools and parents to work together to establish a school-family contract laying out expectations for student attendance, behavior, and homework. These contracts would be provided to families in their native language when possible and would include information on tutoring, academic support, and public school choice options for students.
- **Parental and Family Responsibility:** Barack Obama will call on parents to turn off the TV and video games, make sure their children are getting their homework done and work to take a greater stake in their child's education both in and outside of school.
- **Service:** All students in grant recipient districts will be expected to engage in community service.

Accountability from Washington: Barack Obama and Joe Biden will make federal education programs more performance-based and report results to the public and Congress at least once a year. They will promote the use of performance metrics – including student achievement, college and high school graduation rates and school report cards – to evaluate discretionary federal education spending programs. Independent performance teams will be tasked with analyzing and reforming underperforming federal programs, and will have the authority to demand improvement reviews within 30 days, make necessary reforms, fire bad managers and replace them with high-performing managers from other agencies, or shift the program's budget to other programs if necessary. And successful programs will have their funding expanded, in partnership with Congress.

“Invest in What Works” Initiative: An Obama-Biden administration will implement a federal "Invest in What Works" Initiative to put into action a recommendation of our country's innovation leaders, mayors and teachers. While we spend roughly \$400 billion annually in this country on public education, we spend less than seven tenths of one percent of that – \$260 million – figuring out what actually works. By comparison, the Department of Defense spends roughly ten percent of its annual budget on research and development (R&D). Barack Obama and Joe Biden will double our investment in educational R&D by the end of their first term. Part of this investment will be devoted to commissioning a blue-ribbon private sector panel of premier business leaders, educators, researchers, and others to make recommendations to the Secretary of Education on successful programs and innovations across the country that should be scaled. The panel will also be charged with making those successful practices and lessons learned universally available.

A Commitment to Fiscal Responsibility: The new proposals announced today build on Barack Obama's comprehensive education plan announced in November 2007. The additional proposals in today's plan will cost about \$1 billion per year when fully phased in. Obama will fully pay for this new commitment without increasing the deficit by dedicating a small portion of the savings from his comprehensive effort to cut government spending, including reforming federal contracting, reducing the number of federal earmarks, improving federal procurement processes, and ending wasteful and unnecessary federal programs.



21st Century Skills Working Group

Senta Raizen, Group Leader
WestEd

The goal of the Assessment and Teaching of 21st Century Skills Project is to identify and develop new technologies and methodologies that support the assessment of high-priority skills, competencies, and types of understanding that are needed to be productive and creative workers and citizens of the 21st century. This will be accomplished over the next few years through the efforts of scholars and practitioners organized into five inter-connected Working Groups: 21st Century Skills, Learning Environments, Methodological Issues, Technological Issues, and Policy Frameworks for New Assessments. Each Working Group will generate a white paper that reviews the current state of art in the respective area, identifies key issues and barriers, and specifies potential breakthrough solutions. Subsequent efforts of each Group and the Project as a whole will develop and implement these solutions in collaboration with partner organizations and participating countries.

The 21st Century Skills Working Group is charged with specifying high priority 21st century skills in measurable form. Early work of the Group will focus on a collectively-authored white paper. The paper will identify high-priority 21st century skills and for each, define them in operational terms, give examples of these skills as they are enacted in a range of real world situations, discuss issues related to their measurement, and give examples of assessment tasks and scoring rubrics that would evidence a level of student mastery of the skill. The Paper will also provide recommendations for curriculum reform that are consonant with assessment reform.

Previous Efforts

A number of organizations, many of which are participating in this Project, have done important foundational work in identifying 21st century skills. Paramount among them is the work of the Partnership for 21st Century Skills. The Partnership brought together the business community, education leaders, and policy makers to create a vision of 21st century learning and to identify a set of 21st century skills. Built around core subjects, the skills include learning and innovation skills; information, media, and technology skills; and life career skills. These skills have been adopted by a number of states in the US, including Maine, North Carolina, West Virginia, and Wisconsin. Similarly, the Lisbon Council in the European Union crosses knowledge in science, engineering, mathematics, language, and commerce with “enabling skills” that include: technological skills, informational skills, problem solving, adaptability, and team work. Other efforts have focused in on a more-specialized subset of crucial skills, such as ICT literacy or problem solving.

Some organizations define ICT literacy in very narrow terms as the skills needed to operate hardware and software applications. But others define it more broadly. Prominent among them is the International Society for Technology in Education (ISTE), which has defined a set of standards that include technology operations and concepts. They position technology skills in the context of school subjects and a broader set of skills that include creativity and innovation, communication and collaboration, research and information fluency, critical thinking, digital citizenship, and technology operations and concepts. These standards have been adopted by a number of countries and US states. The Educational Testing Service (ETS) iSkills Project defines ICT skills as the ability to solve problems and think critically about information by using technology and communication tools and information skills that include defining, accessing, evaluating, managing, integrating, and communicating information and creating new knowledge.

Based on these earlier efforts, the 21st Century Assessment Project has targeted the following skills as critical to individual economic success and important to effective functioning at the personal and societal levels:

- Creativity and innovation
- Critical thinking
- Problem solving
- Communication
- Collaboration
- Information fluency
- Technological literacy

While this list is not comprehensive, these are the high priority skills that will guide the developments of the Project. Listing of these skills is relatively easy; operationalizing them is much more difficult. For assessment purposes, skills must be defined precisely and in measurable terms so that assessment tasks can be designed and scoring rubrics can be specified. Age appropriateness and learning progressions must be considered. Relationships between these skills and subject matter knowledge and application must be examined.

Operationalizing the Skills

Work has begun to operationalize several of these skills in various international and national assessments. For example, the OECD Program for International Student Assessment (PISA) has assessed problem-solving skills in the context of reading, mathematics, and science literacy. Critical thinking (evaluating and analyzing data and drawing warranted conclusions from evidence) is part of science inquiry skills to be assessed in the 2009 NAEP Science Assessment (National Assessment of Educational Progress administered nationally and in most states in the US). This will be a particularly useful model as the 2009 administration will include some inter-active computer tasks for a subsample of students. Both Australia and Hong Kong have conducted pilot tests of



technological literacy skills and both NAEP and the International Association for the Advancement of Educational Achievement (IEA) are planning computer-based assessment of technological literacy in coming years.

However, some of the high priority skills, for example, creativity and innovation, have generally not been assessed except at the classroom level through the judgments of teachers or through prestigious competitions where participating students are self-selected. Collaboration, too, has generally been assessed only through teacher observation at the classroom level. And while there are some assessment examples that ask students to communicate their findings (say, from an inquiry task) to various audiences, few if any rubrics exist to evaluate such student responses. As to information fluency, there are a number of definitions in the field that need to be reconciled. Furthermore, work is needed to specify all of these skills in ways that are sensitive to a range of social and cultural considerations within and across the national contexts in which they will be assessed. And all of these skills need to be considered in the context of the learning and assessment of school subjects, such as science, mathematics, and language.

As far as possible, the Working Group will build on existing models to refine the definition of skills addressed in the best of current assessments. While this part of the task will not be easy, the greater challenge will be in developing precise definitions for the hard-to-measure skills such as innovation and creativity, and collaboration, as well as reconciling various definitions of those skills such as information fluency and communication where there is little consensus on what should be assessed. In producing its white paper, the Group will work with multiple stakeholders to develop a coherent assessment framework and set of measurable standards for each of the skills deemed critical to effective functioning in the 21st century.

The 21st Century Skills Group will also coordinate their efforts with the Learning Environment Group to examine ways that these skills are taught in innovative classrooms and draw on classroom learning and assessment practices to help specify how these skills can be assessed in a scaleable way. The 21st Century Skills Group will also work closely with the Methodological Issues Group and the Technological Issues Group to help identify problems and specify solutions as they related to the operationalization of 21st century skills. Conversely, we acknowledge the tentative nature of our list of skills until we do indeed know that the technologies and methodologies can be developed to measure them reliably.