National Assessment Governing Board

Ad Hoc Committee on Measures of Postsecondary Preparedness

Thursday, August 2, 2018

1:30 – 4:00 pm

Developing Recommendations

AGENDA

1:30 – 1:40 pm	Welcome and Overview of Committee's Charge *Terry Mazany, Committee Chair*	
1:40 – 2:00 pm	Reflections on the Futurists Expert Panel Meeting *Terry Mazany*	*Attachment A*
2:00 – 2:30 pm	Technical Considerations for the Committee's Potential Recommendations *Peggy Carr, Associate Commissioner*	
2:30 – 3:45 pm	Discussion of Potential Recommendations & Prepare for Friday's Board Meeting Discussions *Terry Mazany*	*Attachment B*
3:45 – 4:00 pm	Next Steps to Develop Recommendations and Report *Terry Mazany*	

Additional Items:

DRAFT State Assessment Focus Group Meeting Notes	*Attachment C*
Higher Education Expert Panel Meeting Notes	*Attachment D*
Industry Expert Panel Meeting Notes	*Attachment E*

Draft Notes of the Expert Panel Meeting Representing Futurists
June 21, 2018
National Assessment Governing Board
Ad Hoc Committee on Measures of Postsecondary Preparedness

Contents

Notes of the Expert Panel Meeting Representing Futurists

June 21, 2018
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As one step in addressing the charge of the *Ad Hoc* Committee on Measures of Postsecondary Preparedness, HumRRO organized and facilitated a meeting with a select group of futurists.[1] The purpose of this meeting was to elicit input from thought leaders regarding the future of postsecondary education and work.

We were fortunate to assemble an exceptional panel of visionaries with a variety of perspectives. The panel members included **Randy Bennett**, Educational Testing Service; **Karen Cator**, Digital Promise; **David Conley**, EdImagine; **Alana Dunagan**, Clayton Christensen Institute; **Devin Fidler**, Rethinkery Labs, and **Nancy Lue**, Advanced Education Research and Development Fund on behalf of the Chan Zuckerberg Initiative and the Bill & Melinda Gates Foundation. Also, in attendance were several Governing Board members, Governing Board staff members, and HumRRO staff.

The meeting was held on June 21, 2018 in San Francisco, California. An overview of the National Assessment Governing Board and the charge of the *Ad Hoc* Committee on Measures of Postsecondary Preparedness, a "facebook" of attendees with brief biographic summaries, along with the agenda and logistical information for the meeting were sent to the panelists in advance of the meeting. Appendix A contains the agenda, list of attendees, and panelist biographies.

Terry Mazany, *Ad Hoc* Committee Chair, welcomed the futurists and set the stage for the role of NAEP in the future, given the impact of technology on work as well as the economic and global context in which students enter the postsecondary world. He led the attendees through introductions. Thanos Patelis (HumRRO) reviewed the agenda and stated the goals for the meeting.

To establish the perspectives of these varied experts, each panelist provided a 10-minute presentation of their initial thoughts regarding five discussion questions: (a) what are the trends you see that will define the future of learning and schools? (b) what are the trends you see that will define the future of work and the skills that will be most valued by employers of the future? (c) what are the most promising technologies that will redefine education? (d) what things are most likely to disrupt how we think about teaching and learning? and (e) what are the trends that most concern you, and why? Copies of the presentation slides are in Appendix B.

Following the presentations, Thanos Patelis facilitated deeper discussion about common themes and the five questions. Finally, Terry Mazany offered some concluding comments.

The purpose of this document is to summarize the themes and comments made by the panelists. The information in this report is meant to provide insight into the rich conversation and comments provided by the expert panelists.

[1] Although some panelists would not describe themselves as "futurists," per se, their careers all include the identification and evaluation of trends, as well as forecasting future conditions or developments.

Presentations

Randy Bennett described seven trends in the future of learning.

- Learning is increasingly technology-based with complex tasks (e.g., simulation and games).
- Materials and methods used in learning are only now catching up with cognitive science.
- Learning is more person-based, adaptive, and customized on different dimensions, to (a) allow accessibility to make learning more available to students with diverse learning types, (b) personalize in terms of competency level, (c) engage students effectively, and (d) give students greater agency over their learning goals.
- New constructs and competencies, such as socioemotional learning, citizenship and citizen engagement, and cross-cultural competency, are becoming more prevalent.
- Prior knowledge is critical when learning new information or developing new skills.
- There is a focus on cross-disciplinary skills such as communication and problem solving. However, contextual differences within disciplines are important considerations (e.g., problem solving in art differs from problem solving in science).
- Assessment embedded in instruction with automated analysis and feedback, allows for adjustment of instruction.

In addition to trends in the future of learning, Dr. Bennett described two trends of most concern.

- Personalization – There is concern that personalization could be used to exacerbate as much as ameliorate differences in opportunities and learning. For example, students from underrepresented groups could be routed toward basic skills classes.
- Embedding assessment in instruction – There is potential for embedded assessment in instruction for student learning, however conflating assessment for learning with assessment for accountability could be problematic, especially if used to make policy judgements.

Karen Cator provided the following perspectives reagarding the five questions:

- Trends in the future of learning include: (a) personalization to accommodate variability in students through learning science, (b) more flexible learning to obtain and demonstrate competency, and (c) performance-based assessments leading to credentials for the changing global workforce.
- Trends in the future of work and skills include artificial intelligence (AI) which has the potential to disrupt many jobs. Employees will need deeper learning skills such as collaboration and social emotional skills. We should focus on what is uniquely human.[2]
- Technology can be used to augment human performance. For example, data from embedded assessment and improved diagnostics can provide more precise and accurate analyses of student knowledge and performance, helping teachers perform more effectively in the classroom.
- Learning science could be disruptive. People will have jagged profiles—different levels of competence across skills—based on individual differences and the contexts in which they apply the skills.

[2] Ms. Cator recommended Jack Ma's presentation at the World Economic Forum on The Way We Teach; https://www.youtube.com/watch?v=pQCF3PtAaSg.

- Most concerning is disenfranchisement of teachers. As an example, one-third of current teaching jobs in St. Louis are vacant. Other areas of concern include limited resources in schools, increasing cost of higher education, limitations of current assessments, equity of access to quality learning activities, and the digital learning gap.

David Conley shared the following insights regarding the five questions:

- The future of learning includes the following trends: (a) taking the teacher out of the bottleneck role, thereby allowing students to work at their own pace and receive just-in-time learning; (b) providing more social learning; (c) using technology to identify learning patterns to personalize learning; and (d) focusing on adapting skills to accommodate changes in work rather than learning fixed skill sets.
- Trends in the future of work and skills include changes such as (a) gig work versus long-term careers, (b) continued adaptability, (c) hiring at low- and high-skill end with less at the middle-skill level, (d) global work teams while living locally, (e) increasing service work, and (f) standardization versus bespoke work (see jagged profiles as mentioned by Ms. Cator).
- Promising technologies in education are adaptability, including a wider variety of students, specialized job/task-specific reading, and web-based learning.
- The following may contribute to disruptions in teaching and learning: (a) students having more agency over their learning, (b) basic skills taught in context using simulations or serious games such as used in the military and medical training, (c) self-directed learning will require resources for teachers to help students who have trouble directing their own work, and (d) emphasis on career preparation with certifications and badges over liberal arts education.
- The three most concerning trends are (a) equity in education, (b) equity in defining preparedness, and (c) increasing the pace of disruptive economic change.

Alana Dunagan discussed three trends in the future of learning and work: (a) increased online learning in higher education and K-12, (b) certified learning not requiring a terminal degree (e.g., a certification), and (c) workforce alignment of education.

Regarding disruptions to teaching and learning, Ms. Dunagan explained that corporate bankruptcy following implementation of disruptive technology occurs when companies do not adapt by using technology to expand the reach of their services (i.e., they continue serving the same set of customers rather than expanding their customer base); Blockbuster is an example of this situation. Disruptive innovations in education are similar. Higher education institutions are seeing falling enrollment, while training in specific skills matter more. Jobs requiring higher education are growing twice as fast as jobs that do not, because of disruption by the education technology market. Innovators in the education technology space are developing partnerships with employers and creating new ways of offering higher education providing the needed training.

Ms. Dunagan stated the biggest concern in education and work is the prestige-based model of signaling competence (i.e., a degree from an elite university is highly valued over a degree from a lower tier school without regard to a student's actual knowledge and skill). This model ignores the skills a student has and does not include employers in identifying the skills that students should learn. A better model would engage businesses in identifying skill needs, offer education aligned to workforce needs, and provide students with evidence of skill attainment and a means for submitting that information to employers.

Devin Fidler described a history of change in organization strategies from guilds to industrialization to manufacturing/assembly to digital. The advent of the World Wide Web facilitated communication and has expanded to commerce and coordination. He provided examples of using technology to speed up work; for example, peer to peer applications such as TaskRabbit, Gigwalk, and Upwork have millions of people enrolled to offer their services with qualifications based on past performance. Employers can use these applications to identify well-qualified candidates with the appropriate skills mix and a history of positive reviews; employees can use these applications to find jobs and to see what skills are in demand.

Mr. Fidler noted the most promising technologies are using organizational technologies in education technology with artificial intelligence. Disruption will come from small innovative organizations who are more nimble than large businesses. The biggest concern is the stereotype that organization is dehumanizing; however, organization can expand human capability.

Nancy Lue identified the following education trends:

- Return on education (i.e., value of education)
- Continuous improvement (e.g., Kaizen education)
- Rock star teachers available through technology
- Knowledge as currency (e.g., microcredentials, badges)
- Bid data as smart data (i.e., using data to personalize learning with Dreambox, Knewton, etc.)
- Mobile technology learning applications
- Mind, body, and soul incorporated into learning (e.g., Goldie Hawn's MindUp curriculum)

Ms. Lue stated equity issues pervade all the trends. For example, education technology has costs which limits access. Ten percent of students do not have smartphones.

Discussion

Thanos Patelis (HumRRO) facilitated a deeper discussion among panelists about common themes and the discussion questions.

Personalized learning. Content can be tailored to student preparation, interest, and ability. Learning will feel more purposeful, connected, and relevant. Fewer students will be seated in rows in classrooms on a rigid schedule. In high school, students may enroll in work training programs or participate in micro-internships. Teachers will serve as mentors. There is a need to change the traditional school organization/culture and provide teachers with the knowledge and skills to educate students in a new environment.

Contextual data. Is a student goal-focused or not? Using data about students' goals can improve instruction. Contextual data (e.g., goals, interests, self-confidence) may provide clues as to why a student might be struggling and may also provide insights to inform how to individualize instruction.

Equity. Opportunity to learn pervades multiple areas. Cost and availability can be barriers to access educational technology and higher education.

Big data. Educational technology generates a lot of data. Educators need to learn how to analyze and use the data, taking a data systems point of view. Also, there is a need to teach

teachers how to capture and document performance data on what students are doing in the classroom and how to use those data to improve classroom instruction and activities.

Data dashboards. Data dashboards can connect data from different sources, interpret multiple data points, and provide evidence of what students can do (versus cannot do).

Micro-credentials. Micro-credentials can be used by students and teachers. Students could earn a micro-credential when mastering a concept. Teachers can use their students' micro-credentials to identify the skills acquired and those that need to be taught or re-taught.

Competency assessments. Students would benefit from measures of job-related skills to show their potential and demonstrate performance capabilities, particularly if the measures do not correlate to student background. Employers benefit because they have evidence of a job candidate's skills. Educators can use competency data to mentor students on achieving goals.

Panelist Recommendations

As a wrap-up exercise, Thanos Patelis asked each panelist to make one recommendation for the Governing Board to consider.

Randy Bennett – Use NAEP's national probability sample to describe what instruction is like at different levels for different types of students (e.g., students with disabilities, socioeconomic status) across time.

Karen Cator – Work toward a more coherent assessment system across NAEP and states.

David Conley – Endorse the work of the *Ad Hoc* Committee with a longer-term vision for NAEP to be bold in creating better items and measuring traditional content with greater precision.

Alana Dunagan – Develop innovative methods to measure flexibility, problem solving, and non-traditional skills that people will need in the future.

Devin Fidler – Look at partnering with prestigious organizations within the learning space that function outside of formal assessment, such as skunk works and incubators.

Nancy Lue – Use NAEP to assess the technology gap and equity issue in technology use outside of the classroom.

Reflections

Terry Mazany expressed his appreciation for the panelists' insights. He noted that each expert presented similar ideas through a different lens; while this might have seemed repetitive, it actually reinforced the conclusions. The panelists convinced him that traditional education enterprise is collapsing in slow motion. Innovation outside of education is occurring at an accelerating pace. Learning might occur in smaller units such as micro-credentials.

Mr. Mazany discussed the high cost of traditional higher education and the trillion-dollar impact of student debt on the economy. He acknowledged the existence of prestige-based signaling that maintains inequity in the system. These are complex and challenging social issues. NAEP may be able to be a market signal by Governing Board priorities regarding what to measure and report on. He opined that perhaps NAEP can reinforce that prestige alone is not the gold standard.

Appendix A: Meeting Agenda, Attendees, and Panelist Biographies

Futurist Expert Panel

Thursday, June 21, 2018 1:00 pm – 4:00 pm PT

Room: Cypress A * Hyatt Regency San Francisco Airport
1333 Bayshore Highway * Burlingame, California, USA, 94010

Agenda

1:00 – 1:15 pm	Welcome, Introductions, and Overview of the Ad Hoc Committee *Terry Mazany, Chair of the Ad Hoc Committee on Measures of Postsecondary Preparedness* Overview of the Agenda and Goals for the Meeting *Thanos Patelis, HumRRO*
1:15 – 2:45 pm	Panelist Perspectives and Initial Thoughts Regarding the Discussion Questions *A series of ten-minute presentations, each followed by a five-minute Q&A.* 1:15 – 1:30 Randy Bennett *(Educational Testing Service)* 1:30 – 1:45 Karen Cator *(Digital Promise)* 1:45 – 2:00 David Conley *(EdImagine)* 2:00 – 2:15 Alana Dunagan *(Clayton Christensen Institute)* 2:15 – 2:30 Devin Fidler *(Rethinkery Labs)* 2:30 – 2:45 Nancy Lue *(Advanced Education Research & Development Fund)* *Questions for Discussion:* 1. What are the trends you see that will define the future of learning and schooling? 2. What are the trends you see that will define the future of work and the skills that will be most valued by employers of the future? 3. What are the most promising technologies that will redefine education? 4. What things are most likely to disrupt how we think about teaching and learning? 5. What are the trends that most concern you, and why?
2:45 – 3:45 pm	Panel Discussion *Facilitated by Thanos Patelis*
3:45 – 4:00 pm	Final Reflections *Terry Mazany*

Conducted in Support of the National Assessment Governing Board's
Ad Hoc Committee on Measures of Postsecondary Preparedness

Attendees

Expert Panelists:

- Randy Bennett, Norman G. Frederickson Chair in Assessment Innovation in the Research & Development Divisions, Educational Testing Service
- Karen Cator, President and CEO of Digital Promise
- David Conley, President, EdImagine
- Alana Dunagan, Researcher for Higher Education, Clayton Christensen Institute
- Devin Fidler, Founder, Rethinkery Labs
- Nancy Lue, Co-Lead, Advanced Education Research & Development Fund

Governing Board Members:

- James Geringer, former Governor of Wyoming
- Carol Jago, Associate Director, California Reading and Literature Project at UCLA
- Terry Mazany, Chair, *Ad Hoc* Committee on Measures of Postsecondary Preparedness
- Dale Nowlin, Teacher and Mathematics Department Chair, Bartholomew Consolidated School Corporation, Columbus, Indiana
- Alice Peisch, Legislator, Massachusetts House of Representatives, Wellesley, Massachusetts
- Linda Rosen, former Chief Executive Officer, Change the Equation, Washington, DC
- Chasidy White, Director of Strategic Initiatives, Office of the Superintendent, Montgomery, Alabama

Governing Board Staff Members:

- Michelle Blair, Assistant Director for Assessment Development
- Bill Bushaw, Executive Director
- Lisa Stooksberry, Deputy Executive Director
- Lily Clark, Assistant Director for Policy & Research

HumRRO Staff Members:

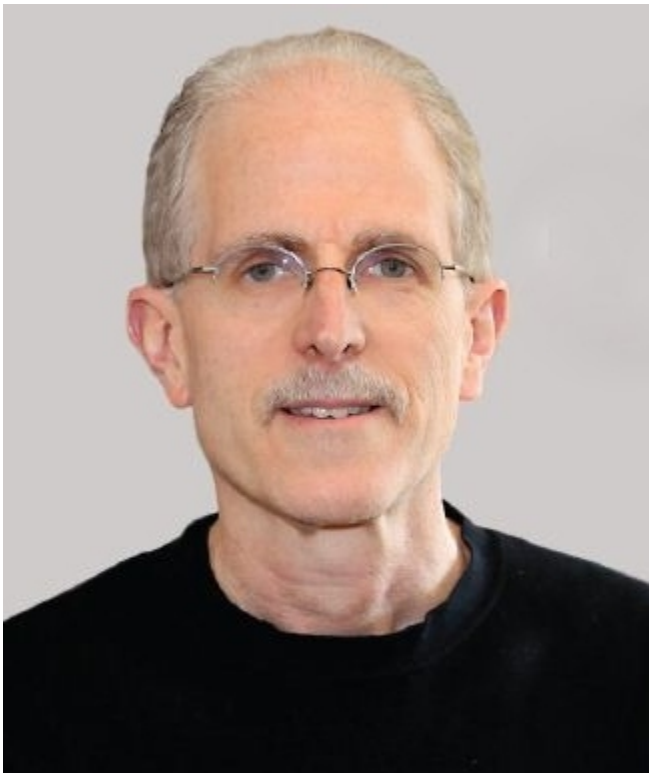
- Monica Gribben, Senior Staff Scientist
- Sunny Becker, Principal Staff Scientist
- Thanos Patelis, Principal Scientist

Ad Hoc Committee Meeting on Postsecondary Preparedness

Panelist Biographies

Randy E. Bennett Ph.D.

Norman O. Frederiksen Chair in Assessment Innovation in the Research & Development Division
Educational Testing Service



Randy E. Bennett is Norman O. Frederiksen Chair in Assessment Innovation in the Research & Development Division at Educational Testing Service in Princeton, New Jersey. Bennett's work has focused on integrating advances in cognitive science, technology, and educational measurement to create approaches to assessment that have positive impact on teaching and learning. From 1999 through 2005, he directed the NAEP Technology Based Assessment project, which included the first administration of computer-based performance assessments with nationally representative samples of school students, and the first use of "clickstream," or logfile, data in such samples to measure the processes used in problem solving. From 2007 to 2016, he directed an integrated research initiative titled, *Cognitively-Based Assessment of, for, and as Learning* (CBAL), which focused on creating theory-based summative and formative assessment intended to model good teaching and learning practice. Randy Bennett is president of the International Association for Educational Assessment (IAEA) (2016-), an organization primarily constituted of governmental and non-governmental nonprofit measurement organizations throughout the world, and immediate past president of the National Council on Measurement in Education (NCME) (2017-2018), whose members are individuals employed primarily in universities, testing organizations, state education departments, and school districts. He is a Fellow of the American Educational Research Association.

Karen Cator
President and CEO of Digital Promise

Karen Cator is President and CEO of Digital Promise and a leading voice for transforming American education through technology, innovation and research. From 2009-2013, Karen was Director of the Office of Educational Technology at the U.S. Department of Education, where she led the development of the 2010 National Education Technology Plan and focused the Office's efforts on teacher and leader support. Prior to joining the department, Cator directed Apple's leadership and advocacy efforts in education. In this role, she focused on the intersection of education policy and research, emerging technologies, and the reality faced by teachers, students and administrators. She began her education career in Alaska as a teacher, ultimately leading technology planning and implementation. She also served as Special Assistant for Telecommunications for the Governor of Alaska. Cator holds a master's in school administration from the University of Oregon and received the 2014 College of Education Distinguished Alumni award. The American Association of Publishers has awarded Cator with the 2014 Visionary Award. She received her bachelor's in early childhood education from Springfield College and received the 2015 Distinguished Alumna award. She is an Aspen Pahara Fellow, the past chair for the Partnership for 21st Century Skills and has served on boards including the Software & Information Industry Association-Education.

David Conley, Ph.D.

President, EdImagine
Professor of Educational Policy and Leadership in the College of Education at the University of Oregon
Director, Center for Educational Policy Research

David Conley is Professor of Educational Policy and Leadership in the College of Education at the University of Oregon where he directs the Center for Educational Policy Research. He is the founder and president of EdImagine, an educational strategy consulting company. Additionally, he founded and served for 12 years as CEO of the Educational Policy Improvement Center, EPIC (now Inflexion). He recently completed an appointment as Senior Fellow for Deeper Learning under the sponsorship of the Hewlett Foundation.

Dr. Conley is a national thought leader in the areas of college and career readiness, student ownership of learning, systems of assessment, educational accountability, and the future of education and the economy. He has published multiple articles and policy briefs as well as three books in these areas. His most current book, published by Harvard Education Press, is entitled *The Promise and Practice of Next Generation Assessment.*

He serves on numerous boards and advisory committees including as a member of the technical advisory committee of the Smarter Balanced Assessment Consortium (SBAC) and the Illinois State Board of Education Accountability Technical Advisory Committee, and as a founding board member of New Meridian, which now manages the PARCC assessments. Additionally, he chairs the New Meridian Steering Committee. Previously, he co-chaired the Validation Committee for the Common Core State Standards.

He has conducted multiple major research studies for the Association of American Universities, the College Board and its Advanced Placement program, the International Baccalaureate, and the National Assessment of Governing Board. He has most recently studied next generation systems of assessment, new indicators of college readiness, and new methods to determine career readiness.

Before entering higher education at the University of Oregon in 1989, Dr. Conley spent 20 years in the public-school system in a variety of roles including teacher and co-director of two alternative schools, a site and central-office administrator, and an executive in a state education agency. He is a first-generation college attendee who received his AA from Cabrillo College, his BA from the University of California, Berkeley, and his MA and PhD from the University of Colorado, Boulder. He grew up on the central coast of California, where he spent a great deal of time at the beach.

Alana Dunagan
Researcher, Higher Education, Clayton Christensen Institute

Alana leads the Institute's higher education research and works to find solutions for a more affordable system that better serves both students and employers. In this role, Alana analyzes disruptive forces changing the higher education landscape. Her research includes studying business model innovations, public policies, and investment strategies that can give rise to new and sustainable postsecondary models.

Prior to joining the Christensen Institute, Alana spent ten years in institutional investment management working on behalf of nonprofits, particularly colleges and universities. She worked as an investment consultant for Slocum, and spent five years with Macalester College managing their $700 million endowment. She holds a BA in Economics and Political Science from Macalester College and an MBA from the Harvard Business School.

Devin Fidler
Founder, Rethinkery Labs

Devin has worked with senior leaders at dozens of Fortune 1000 companies to systematically explore emerging issues and technologies, and to analyze their potential impacts. His ongoing work at Rethinkery Labs, including developing tools for "self-driving" management, has been covered by HBR, the New York Times, Wired and a number of other publications. He argues that today, companies themselves are a technology on the verge of disruption. Prior to founding Rethinkery, Devin founded and led the Future of Work and Future of Learning programs at the Palo Alto-based Institute for the Future.

Devin is a frequent speaker at gatherings of business leaders and others interested in the transformation of work and organizations. He approaches projects from a strongly international perspective, having lived and worked in several countries throughout his career.

Nancy Lue

Co-Lead, Advanced Education Research & Development Fund

Nancy Poon Lue is currently co-leading the exploration of a national Advanced Education Research & Development Fund on behalf of the Chan Zuckerberg Initiative and the Bill & Melinda Gates Foundation. She is also a Partner and Secretary of the Board of Directors of the venture philanthropy organization Silicon Valley Social Venture Fund (SV2). Previously, she served as Executive Director at the venture capital firm Global Silicon Valley (GSV) and was the inaugural General Manager of the EdTech Lab at GSVlabs. During the Obama Administration, Nancy was a Senior Advisor at the U.S. Department of Education where she led the development of the agency's five-year strategic plan. Nancy is a Senior Fellow with the American Leadership Forum-Silicon Valley and sits on the Advisory Board of the AT&T Aspire Accelerator and the GreenLight Fund-Bay Area. She earned her B.A. and Ed.M. from Harvard College and Harvard Graduate School of Education

Appendix B: Panelist Presentations

Note: These slides are the intellectual property of the presenters and should not be used or distributed for purposes beyond this Committee without permission.

Bennett Presentation

Trends in the Future of Learning

- Be technology based, making greater use of complex tasks, games, simulations
- Based on more modern underlying models of cognition and learning
- Be personalized in terms of:
  - Accessibility
  - Competency level
  - Background and interest
  - Learning goal
- Include (or give greater emphasis to) "new" competencies, e.g.:
  - Socio-emotional learning
  - Citizenship, civic engagement
  - Cross-cultural competence
  - Using technology tools for problem solving
- Include traditional competencies
  - Knowledge acquisition and construction
  - Made more (not less) important by technology
- Include focus on cross-cutting skills within the disciplines
  - Communication, critical thinking
- Embed assessment within instruction, including automated analysis and feedback

3 |

Thoughts on the Future of Education and Work

Randy Bennett
Educational Testing Service
Princeton, NJ 08541
rbennett@ets.org

Presentation as a member of the Futurist Expert Panel at the meeting of the National Assessment Governing Board's Ad Hoc Committee on Measures of Postsecondary Preparedness, San Francisco, CA, June 2018.

Trends in the Future of Work

- Continued automation of many types of manual, cognitive, and social-interactional work
- Pervasiveness of technological tools for problem solving as:
  - Aids requiring constant proximal human interaction (Excel)
  - Extensions allowing for remote reach (drones)
  - Assistants: Carry out this subtask (Siri)
  - "Intelligent" implementers: Work independently with human QC

4 |

Overview

1. What are the trends you see that will define the future of learning and schooling?
2. What are the trends you see that will define the future of work and the skills that will be most valued by employers of the future?
3. What are the most promising technologies that will redefine education?
4. What things are most likely to disrupt how we think about teaching and learning?
5. What are the trends that most concern you, and why?

2 |

Most Likely Challenges to Disruptions for Teaching and Learning

- In K-12, the challenges are still greater than the disrupters
  - Level of, and extent of variation in, quality of teaching
  - Level of, and extent of variation in, school technology
  - Variation in funding for education by locale
  - Grade-based organization of schooling
  - Local control
    - Little coherence, massive inefficiency due to no chance for economy of scale
  - Size (3rd largest country in the world)
  - Concerns for privacy of student data
  - Concerns over the corporatization of education
  - Public indifference, even antipathy, toward rigorous expectations and toward addressing inequality

7 |

Skills Most Valued by Employers

- Using technology tools for problem solving—i.e., to create value by being able to use:
  - Aids requiring constant proximal human interaction (Excel)
  - Extensions allowing for remote reach (drones)
  - Assistants: Carry out this subtask (Siri)
  - "Intelligent" implementers: Work independently with human QC
- Being able to, individually and in collaboration with others, locate, evaluate, integrate, synthesize, apply, and construct knowledge (i.e., to learn)
- Being able to communicate, educate, and help others make effective decisions

5 |

Most Likely Disruptors

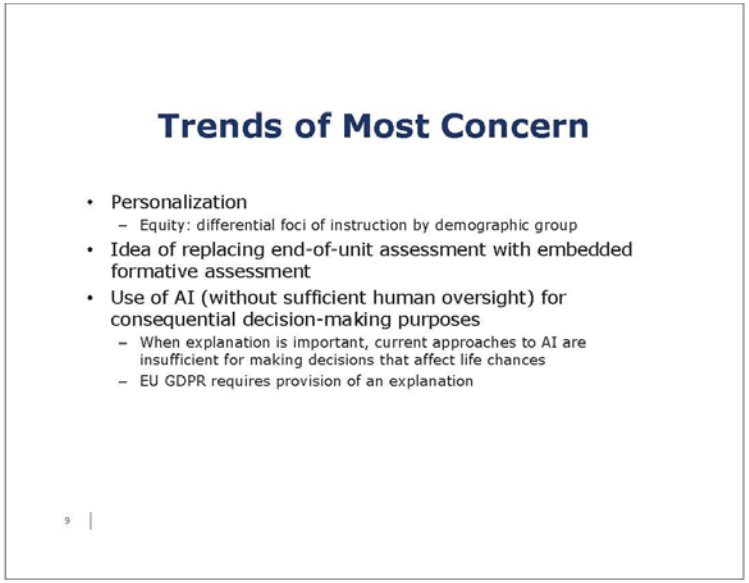
- People
  - What factors will make educators, policy makers, parents, students, and public advocate for, and accept, change?

8 |

Most Promising Technologies for Education

- Technologies that increase opportunities for remote social interaction
  - Learning is a social activity
- Adaptive learning (intelligent tutoring) combined with human instruction
- Simulations, games, virtual reality that pose tasks and situations similar to the ones students must learn to negotiate as proficient practitioners in a domain
- Analytics to help adapt instruction, guide students in managing their learning, help teachers improve instruction and its management

6 |



Cator Presentation

What are the trends you see that will define the future of work and the skills that will be most valued by employers of the future?

Artificial Intelligence

- Ability to learn
- Work with others
- Flexibility and comfort with complexity
- Creativity and solution development
- Computational Thinking

What is uniquely human?

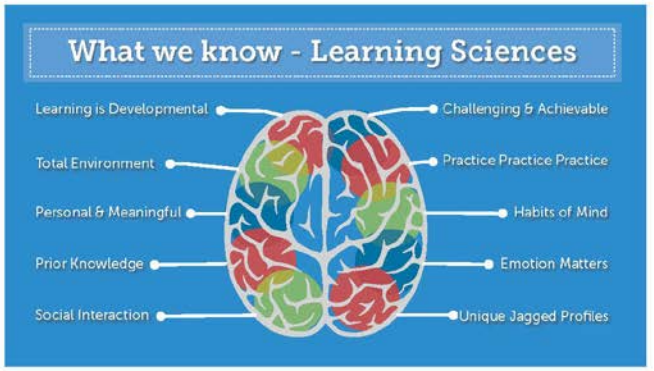
What are the most promising technologies that will redefine education?

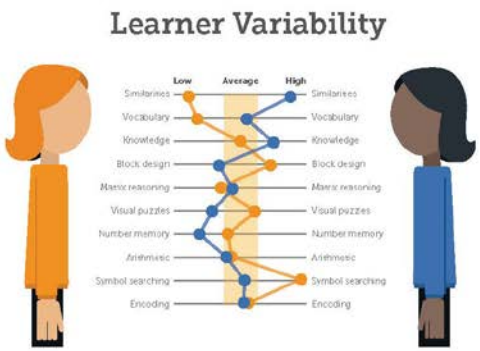
Augment Human Performance

- Data and instrumentation (like location & weather) - Adaptive
- Improved diagnostics and embedded assessment
- Moving from (average and comparison) to precision and accuracy
- Virtual and augmented reality
- Open Education Resources - organized, findable and contextualized

What things are most likely to disrupt how we think about teaching and learning?

- Learning Sciences
- Improvement Science
- Research and Evidence
- Advanced R&D - Pasteur's Quadrant



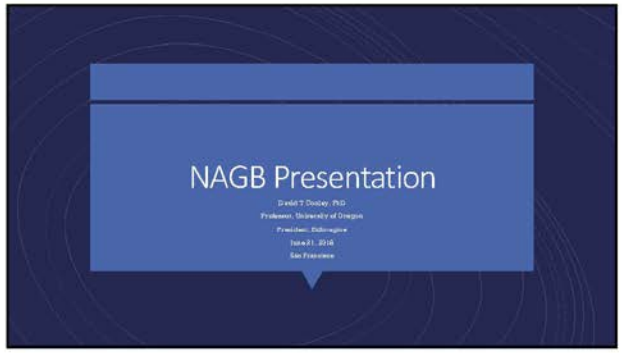


What are the trends that most concern you, and why?

- Lack of respect for and disenfranchised teachers
- Under-resourced schools
- Cost of higher education
- Assessments that fall far short of the full picture
- Issues of inequity
- Digital Learning Gap (Access - Participation - Powerful Use)

Conley Presentation

6/24/2018



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6/24/2018

skills that will be most valued by employers of the future

- adaptability
- data analysis and interpretation
  - ability to collect and analyze information, determine validity of source, reach conclusions
- entrepreneurship
  - be one's own employer
- problem formulation
  - not problem solving
- ability to work with wide variety of people
  - different cultures/backgrounds/gender/social class
- ability to read technical manuals, interpret graphics
  - charts, graphs, diagrams)
- all types of computer skill including web-based skills

the most promising technologies that will redefine education

- neuroscience
  - understanding the physiology of learning
- 5g cellular networks
  - 3 gigabit/sec to well over 10Gbps
- gamification including simulations
  - learner ability to manipulate the learning environment and move through it at their own pace and on their own path
- AI in its various manifestations
- matrix learning

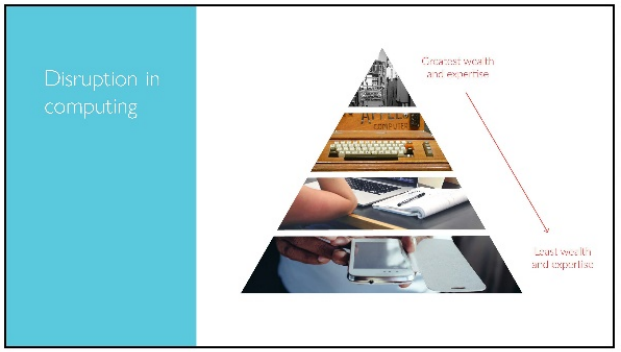
things are most likely to disrupt how we think about teaching and learning

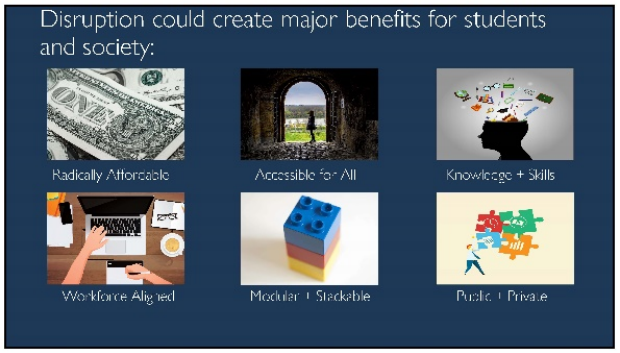
- self-directed learning
- de-emphasis of basic skill mastery out of context
  - bases learned via application of knowledge
- simulations, serious games
- self-directed learning
- decline of liberal education
- modularization of learning
  - certificates, badges, competencies

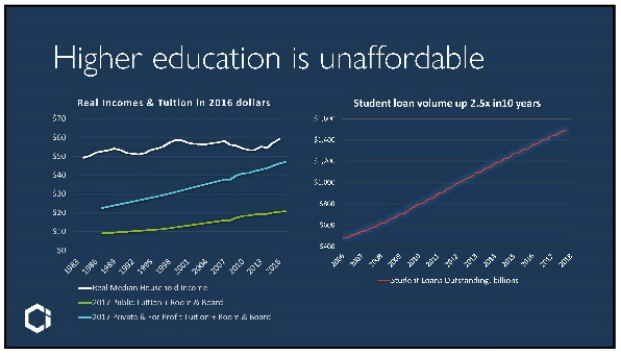
2

Dunagan Presentation

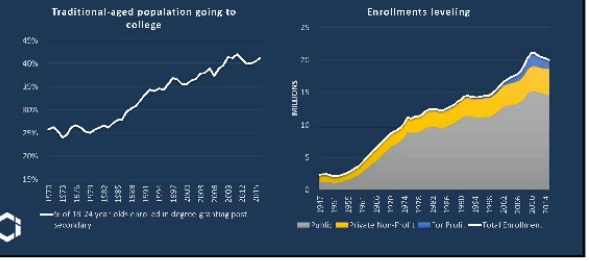
6/24/2018







Today's Landscape: Enrollment



But our economy is more dependent on skilled workers than ever before

Skills matter more than ever

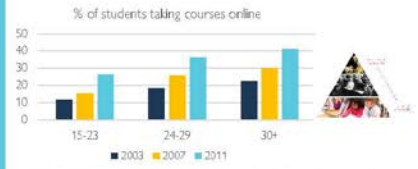
- Employers can't hire because they can't find skilled workers
- Jobs requiring higher education were growing twice as fast as those that don't

Lots of new, innovative players emerging

Coursera
UDACITY
CHRYSLER
Western Governors University
degreed
STRAYER UNIVERSITY
Udemy
COLLEGE for AMERICA
Credly
straighterline
PURDUE
REVATURE
insidetrack
GENERAL ASSEMBLY

6/24/2018

1) Online learning is quickly becoming ubiquitous in higher education



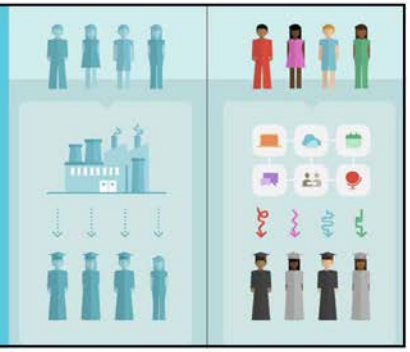
Fall 2016: 30.8% of undergrads and 36.8% of graduate students are learning online

Online learning is especially prevalent among those who otherwise wouldn't be able to access higher education

About half of ***parents*** *enrolled in school were learning online*

Access and equity, affordability

Personalization, competency based education, student supports & mentoring, experiential learning



College is still the currency of the labor market…

…But, as Ryan Craig says, it's a currency system with $10,000 bills *and no smaller denominations.*

Automation and technology are changing the nature of work—and that change will be continuous.

Learning won't end with college graduation.

…This creates big opportunities

Udemy

coursera

UDACITY

degreed

2) Learning in smaller denominations than the degree

3

Fidler Presentation

6/24/2018

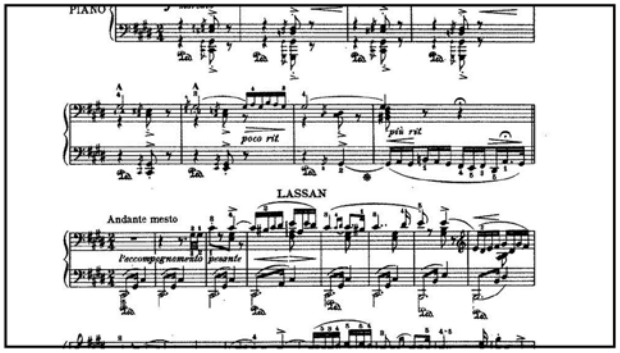
- Biotech
- Nanotech
- Greentech

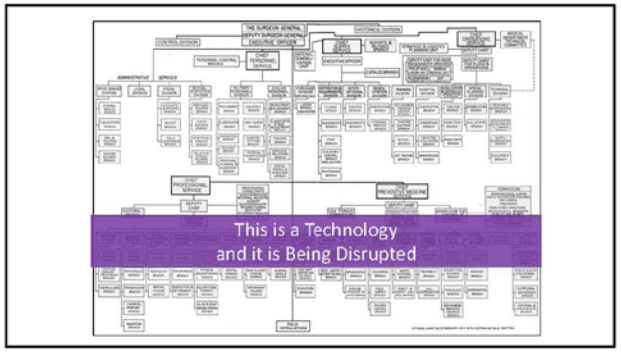
Much Bigger: Organizational Technologies

Preparing for Next Generation Organizational Technologies

Devin Fidler | Devin@RethinkeryLabs.com

6/24/2018





6/24/2018

There Are Many Ways to Organize

- 4000 years ago- First legal structures for companies
- 900 years ago- Trade guilds encode industry across Europe
- 250 years ago- Industrialization and modern companies emerge
- 130 years ago- Assembly lines, globalization etc.

RETHINKERY LABS

There Are Many Ways to Organize

- 4000 years ago- First legal structures for companies
- 900 years ago- Trade guilds encode industry across Europe
- 250 years ago- Industrialization and modern companies emerge
- 130 years ago- Assembly lines, globalization etc.

RETHINKERY LABS

Digital Organization is Special

RETHINKERY LABS

6/24/2018

Communi cation - Commer ce - Coordinat ion

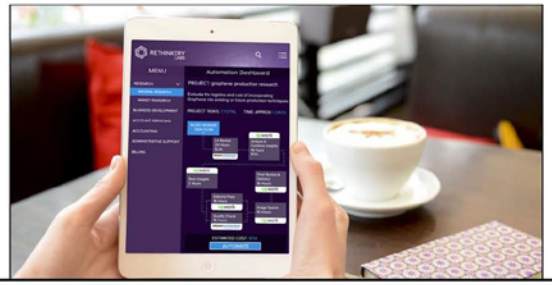
6/24/2018

Human Task Routing

toptal
taskrabbit
intel
Upwork
UBER
Microsoft
Gigwalk
CATALANT
airbnb
P&G
amazonmechanical turk
heal

Use emerging technologies to:
activate, deactivate & reconfigure resources
where they are needed &
when they are needed

The Frontiers of "OrgTech"



A Collective Intelligence Engine

- Work that looks for people, instead of people looking for work
- Using platforms to find the best matches available
- Collective Intelligence Surfacing Insights

Gigwalk
Upwork
taskrabbit

Training, National Interest, and the New OS

- Orchestration becomes a more powerful skill
- Many more established industries can expect competitors built along these lines- Transition and national interest

RETHINKERY LABS

Thank You!

Devin Fidler | Devin@RethinkeryLabs.com

RETHINKERY LABS

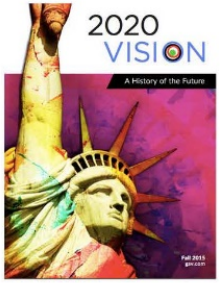
Lue Presentation

6/24/2018

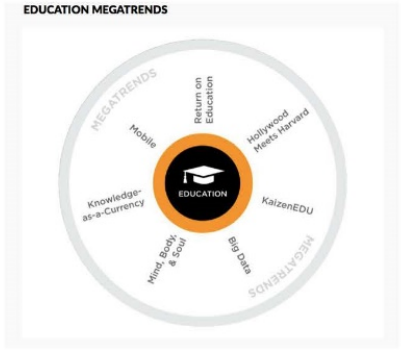
National Assessment Governing Board Futurist Panel

June 21, 2018

Nancy Poon Lue



gsv.com/2020-vision



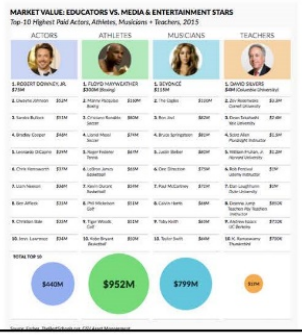
1. Return on Education (ROE)

1

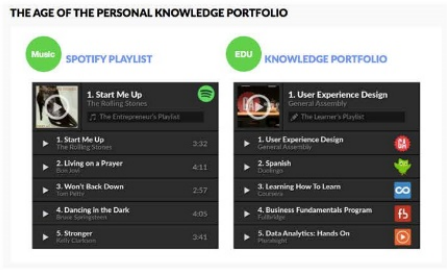
6/24/2018

2. Kaizen Edu

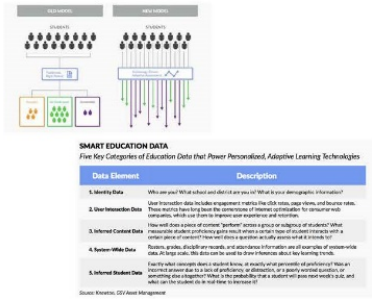
3. Hollywood Meets Harvard



4. Knowledge As a Currency



5. Big Data = Smart Data



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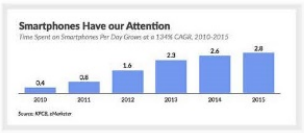
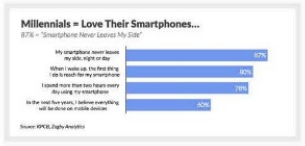
6/24/2018

6. Mobile





7. Mind, Body, Soul

3

Ad Hoc Committee on Measures of Postsecondary Preparedness Potential Recommendations: A Working Draft

This initial working draft reflects the deliberations of the Ad Hoc Committee on Measures of Postsecondary Preparedness' (the Committee, or we) thus far in pursuit of its charge. This draft should be challenged and improved, as the Committee members debate the potential recommendations and prepares the Committee's final report to the Board.

Background and Charge

In August 2017, the National Assessment Governing Board commissioned the Ad Hoc Committee on Measures of Postsecondary Preparedness to review existing research, collect expert testimony, and prepare recommendations for the National Assessment Governing Board's consideration to achieve Strategic Vision priority #10, which states, *"Develop new approaches to measure the complex skills required for transition to postsecondary education and career."*

At the broadest level of policy, The Nation's Report Card, also known as the National Assessment of Educational Progress (NAEP), provides a platform to change the nation's valuation of what is important in student learning and create a paradigm shift in America's education system about what matters and gets measured. The Governing Board has the opportunity to determine if there is a compelling national interest that warrants changes in NAEP to signal such a shift.

Exploratory Approach

To address its charge, the Committee considered the trends that most likely will shape the future, and thereby determine, to a great extent, the skills and knowledge students will need. Through meetings with expert panels and commissioning focused research papers, the Committee pursued the answers to the following three research questions:

1. ***Work of the future (readiness for what?):*** What are we, as a nation, preparing students for? Changes in the workplace are not only inevitable, but are accelerating, driven by technological advances, demographic shifts, and social changes. The growing prevalence of self-driving vehicles, the widespread use of robots, and advances in artificial intelligence are signs of existing innovations poised to dramatically change the jobs available to young Americans. Young Americans hold different expectations about work, and the ways in which people connect and communicate with each other are also changing. How will the workplace change given these trends and emerging

technologies? How will our communities change given these trends and how will the nature, content, and delivery of education opportunities change?

2. ***Requisite skills for future work (skills for what?):*** With a better understanding of the future workplace, we can better understand the skills that young Americans will need to succeed. But should we consider more than just workplace skills? What about skills like citizenship and financial literacy? How do these skills factor into the question of measuring postsecondary preparedness?

3. ***Measures of preparedness (measures for what?):*** Finally, what metrics exist to capture the skills that young Americans will need in the workplace, for their roles in their communities, and in their personal lives? Can such metrics include data from sources in addition to or instead of assessments? Additionally, what metrics do not exist but are needed to help the nation better understand if students are prepared as they exit high school, regardless of which paths they take—through college or other postsecondary learning experiences or directly to the workforce?

Beliefs and Values

Based upon its investigations to answer the three research questions, the Committee identified the following beliefs and values that will guide its final recommendation(s) to the Board:

- We believe that high school graduation remains an important transition in a young person's life, and that the nation needs to know if the culmination of PK-12 schooling and other experiences have prepared students for life following high school.

- We value the multiple pathways that young Americans take following high school, and challenge the notion that all high school graduates must immediately enroll in a four-year college to be successful in life.

- We believe that academic knowledge remains critical for students' success, and that other crosscutting cognitive skills such as creativity and problem-solving are increasingly important for postsecondary preparedness.

- We confirm that a comprehensive measure of the degree to which young Americans are prepared for life after high school, regardless of the pathway they pursue, does not currently exist.

- We recognize that in the United States, education policy formulation and implementation remain the responsibilities of states. Therefore, whatever measures are established to document students' postsecondary preparedness should be available not

only as a national measure but also as a measure of each state's progress in preparing young people for life after high school.

- As the agency established by the United States Congress to set policy for The Nation's Report Card, we believe it is the National Assessment Governing Board's responsibility, in partnership with the National Center for Education Statistics (NCES), and stakeholders, to identify thoughtful and meaningful approaches to providing the American public with measures that indicate how we as a nation are preparing America's youth for their lives following high school.

NAEP's Assets

By law NAEP must remain a low-stakes assessment with generalized results and is prohibited from gathering data in a way that could generate individual school or student scores. Thus, any reports to the American public on measures of postsecondary preparedness will be provided at the national, state level, and Trial Urban District Assessment (TUDA) level, assuming sufficient funding and the voluntary participation of states and TUDA districts. These requirements protect NAEP results against misuse and enable the Governing Board to engage in groundbreaking work in reporting on postsecondary preparedness.

NAEP has a portfolio of established measures, which have the potential to provide critical indicators of postsecondary preparedness. These include:

- NAEP Frameworks & Assessments – NAEP frameworks and assessments can be used to determine 12th grade student knowledge and skills in areas including: reading, mathematics, science, writing, civics, U.S. history, geography, economics, technology and engineering literacy, and the arts.

- NAEP's High School Transcript Study – NAEP's High School Transcript Study collects a variety of measures which could be utilized in a report on postsecondary preparedness.

- NAEP Student, Teacher, and Principal Surveys – NAEP has a long history of collecting information from students and teachers and reporting that information alongside NAEP assessment results to provide context about students' learning opportunities, school climates, teachers' experiences, and related characteristics to understand if, how, and why those data correlate with student achievement.

In addition, the Governing Board may consider creating new NAEP measures and/or incorporating non-NAEP data sources to populate a more complete report card on postsecondary preparedness (for example, other NCES survey data, data collected by other federal or state agencies, etc).

Developing Potential Recommendations

The Committee's conversations to date have focused on its desire to contribute to the nation's understanding of postsecondary preparedness, but more discussion is needed on what the Governing Board and NCES could and should pursue. Regardless of the ultimate claim that NAEP would make or the measures it would use, the Governing Board needs to identify the critical constructs that define postsecondary preparedness. This leads to the following potential recommendation:

> *Draft Recommendation #1: The Governing Board should create a new NAEP framework that identifies the comprehensive set of knowledge and skills necessary to indicate postsecondary preparedness for any pathway after high school.*

Presuming the Committee recommends the creation of a new postsecondary preparedness framework, the Governing Board and NCES would collaborate in conducting the necessary research about what measures exist within NAEP or beyond NAEP and what measures would need to be developed for that framework. Based on the data available, a preparedness framework most likely would be based on a system of indicators derived from multiple sources. In recommending the Governing Board engage in further work to report on postsecondary preparedness indicators, the Committee should consider what, ultimately and realistically, its desired report card would look like. The Committee's preferences will shape the scope of its second recommendation, which might include one or more of the options listed below in #2 A-E.

> *Draft Recommendation #2: The Governing Board should commit, to the extent that it can, given its statutory authority and what is technically defensible, to measure and report on the postsecondary preparedness of students in grade 12 by utilizing one or more of the following approach(es):*

A. **Align Existing NAEP Assessments with Postsecondary Preparedness Indicators**: As NAEP frameworks and test items are revised, the Board and NCES could shift the knowledge and skills measured within each subject assessment to better align with the constructs identified in the NAEP Postsecondary Preparedness Framework.

B. **Enhance and Elevate NAEP's Contextual Variables**: Within the context of existing NAEP assessments, develop and include contextual questions that capture dimensions of preparedness and contribute to changing the national narrative on what is important in student achievement by increasing the focus on contextual variables in the initial reporting of NAEP results.

C. **Develop a New NAEP Postsecondary Preparedness Assessment**: Develop a new voluntary NAEP assessment for postsecondary preparedness knowledge and skills

that could be offered at grade 12 (and possibly earlier) at the national, state, and TUDA levels.

D. **Create a New NAEP Report Card Utilizing Extant NAEP Measures**: Design a new NAEP Report Card that utilizes existing measures across NAEP, including assessment data, contextual variables, and the High School Transcript Study to issue a report to the nation with a more complete analysis of postsecondary preparedness measures.

E. **Serve as a Clearinghouse of Postsecondary Preparedness Indicators using NAEP and External Data Sources:** Broker data from various sources beyond NAEP to capture a wider range of achievement measures that are more reflective of, and customizable to, students' learning pathways, by reporting on industry-recognized credentials, workplace learning experiences, apprenticeships, etc.

What are the challenges?

As we consider what our recommendations to the Governing Board should be, we should give due consideration to the challenges in pursuing this work. Endeavoring to define and measure postsecondary preparedness in a way that encompasses skills needed for both college and career marks a dramatic departure from how the Governing Board has approached this issue in the past.

In deciding what and how NAEP might report on postsecondary preparedness, the Board must conduct a review of our statutory authority. The Board should give credence to the language we use to describe those skills and guard against any negative connotations that may be associated with the terms "soft," "basic," and "non-cognitive" skills. And while some may debate the worthiness of including those types of skills more prominently within NAEP, we note that OECD has made substantial use of these types of variables with great acceptance and demand for them. While the prohibition against NAEP providing individual student results limits the usability of the data, it also creates the critical low-stakes environment for the Governing Board to pioneer new indicators of student success.

DRAFT Summary of the Focus Group Meeting with State Education Officials June 28, 2018

National Assessment Governing Board

Ad Hoc Committee on Measures of Postsecondary Preparedness

In an effort to provide input from state education departments to the charge of the *Ad Hoc* Committee on Measures of Postsecondary Preparedness, HumRRO, with the assistance of National Assessment Governing Board (Governing Board) and Council of Chief State School Officers Organization (CCSSO) staff, organized and facilitated a meeting with state education officials responsible for assessment and/or accountability in their states. The meeting was scheduled to take advantage of the presence of these state officials at the National Conference on Student Assessment (NCSA) sponsored by CCSSO in San Diego, CA from June 27 to June 29, 2018. The purpose of this meeting was to elicit input from state officials about their efforts in developing and using indicators of postsecondary preparedness/readiness.

The attendees of this meeting included **Chris Janzer,** Michigan; **Russell Keglovits,** Nevada; **Shelley Loving-Ryder,** Virginia; **Vaughn Rhudy,** West Virginia; **Michael Sibley,** Alabama; **Jenny Singh,** California; **Allison Timberlake,** Georgia; and **Vince Verges,** Florida. Also, in attendance were two Governing Board members, Governing Board staff members, CCSSO staff members, and HumRRO staff.

The meeting was held on June 28, 2018 in San Diego, California. An overview of the National Assessment Governing Board and the charge of the *Ad Hoc* Committee on Measures of Postsecondary Preparedness, along with the agenda and logistical information for the meeting were sent to the participants in advance of the meeting. The agenda is in Appendix A.

Thanos Patelis (HumRRO) started the meeting and reviewed the agenda along with the goals for the meeting. Lily Clark, Assistant Director for Policy and Research for the National Assessment Governing Board welcomed everyone and provided an overview of the National Assessment Governing Board's Initiative on Postsecondary Preparedness.

Thanos Patelis facilitated a conversation with the participants to discuss the following set of guiding questions:

- How does your state define college and career readiness?
- Did your state consult with industry groups to define career readiness?
- What measures does your state use to assess career readiness?
- Is military service a component of postsecondary readiness in your state?
- How does your state use non-cognitive measures?
- Are there innovative or non-traditional indicators that your state might use to measure or report on students' college and/or career readiness (e.g. student interest, micro-credentials earned, work-based learning, etc.)?
- What NAEP reporting on postsecondary readiness would be useful to states?

The purpose of this document is to provide a summary of the themes that represented the input from and conversation among the meeting participants.

- Definitions of college and career readiness/preparedness included:
    - Ready to enroll and succeed in college courses without remediation
    - College readiness is different from career readiness, making it difficult to agree on a definition covering both and treat them with parity.
    - Career can be defined as a job paying a living wage, which varies by location.
    - Military readiness is a postsecondary option involving a set of cognitive and physical requirements, and seen as an indicator in some state accountability plans.
    - Assessments play a role in defining what is college and career ready based on performance levels established empirically.
- Obtaining college and career readiness skills
    - Schools and industry jointly develop diplomas with technical career skills.
        - Earn through career technical education (CTE) programs, work-based learning, industry/credential exams, portfolios
        - Examples of efforts within states were discussed.
    - Soft skills, such as communication and leadership skills, can be learned through service learning, student organizations, work-based learning, and simulated work environments.
    - Skills beyond soft skills such as accessing information
    - How do we ensure students are agile in facing an environment where we do not know what will be required?
- College and career readiness data
    - Geographic differences were reported based on the types of local industry and jobs available. States want data at a regional level.
    - Some soft skills are not easily defined or measured (e.g., time management, intellectual curiosity).
    - Student level data on absences, credits, and required course attainment can serve as proxies for soft skills
    - Availability of readiness data might impact willingness of industry to stay in or come to an area.
    - Portfolio of artifacts (in the form of certificates, work-based learning, etc.), experiences (advanced courses, dual credit) and other measures
    - Concern about equity
    - One suggestion involved the state supporting and incorporating local accountability plans and metrics that involve school-specific indicators around important constructs of school culture, climate, and other environmental measures.
- Measurement of college and career readiness
    - College readiness is easier to measure than career readiness.
    - Soft skills typically are not included in state standards.
    - Measures should be general (vs. specific) to stay relevant over time.
    - Should measure soft skills early.
    - Governing Board is in unique position to develop measure of soft skills at the state level.
    - States would like to see best practices in providing, documenting, and measuring college and career readiness skills. Is there evidence that students with certificates have been successful?

Appendix A: Meeting Agenda and Attendees

Discussion of State Efforts on College and Career Readiness

Thursday, June 28, 2018, 7:30 to 8:50 a.m.
Room: Cobalt 520 (Level 5)
Hilton San Diego Bayfront
San Diego, CA

Agenda

Purpose: Identify and discuss states' current and innovative practices regarding college and career readiness to inform the National Assessment Governing Board's effort to *"Develop new approaches to measure the complex skills required for transition to postsecondary education and career"*.

7:30 – 7:45 a.m. **Breakfast & Introductions**

7:45 – 8:00 a.m. **Overview of the National Assessment Governing Board's Initiative on Postsecondary Preparedness**
Lily Clark, Assistant Director for Policy and Research
National Assessment Governing Board

8:00 – 8:50 a.m. **Discussion of State Efforts on College and Career Readiness**
Thanos Patelis, Facilitator, HumRRO

Guiding Questions:

- How does your state define college and career readiness?
- Did your state consult with industry groups to define career readiness?
- What measures does your state use to assess career readiness?
- Is military service a component of postsecondary readiness in your state?
- How does your state use non-cognitive measures?
- Are there innovative or non-traditional indicators that your state might use to measure or report on students' college and/or career readiness (e.g. student interest, microcredentials earned, work-based learning, etc.)?
- What NAEP reporting on postsecondary readiness would be useful to states?

8:50 AM **Thank you and Adjourn**

Attendees

State Officials (Department of Education)
Chris Janzer, Michigan
Russell Keglovits, Nevada
Shelley Loving-Ryder, Virginia
Vaughn Rhudy, West Virginia
Michael Sibley, Alabama
Jenny Singh, California
Allison Timberlake, Georgia
Vince Verges, Florida

CCSSO Staff Members
Fen Chou
Scott Norton

National Assessment Governing Board Members
Tyler Cramer
Joe Willhoft

National Assessment Governing Board Staff Members
Michelle Blair
Lily Clark
Sharyn Rosenberg
Lisa Stooksberry

HumRRO
Sunny Becker
Monica Gribben
Thanos Patelis
Sheila Schultz
Art Thacker

Notes of the Expert Panel Meeting Representing Higher Education
April 19, 2018

National Assessment Governing Board
Ad Hoc Committee on Measures of Postsecondary Preparedness

As one step in addressing the charge of the *Ad Hoc* Committee on Measures of Postsecondary Preparedness, HumRRO organized and facilitated a meeting with a select group of higher education innovators. The purpose of this meeting was to elicit input from leaders and experts in higher education about (a) the jobs that will exist in 2030, (b) the skills that these jobs will require, and (c) the measures/indicators that would be needed to determine the status of elementary and secondary students with respect to these skills.

We were fortunate to assemble an exceptional panel of experts and leaders. The panel members included **Dr. Sarah DeMark**, Vice President of Academic Programs, Western Governors University; **Dr. Pradeep Kotamraju**, Bureau Chief, Career and Technical Education, Division of Community Colleges and Workforce Preparation, Iowa Department of Education; **Mr. Michael Morsches**, Dean of Learning Enrichment and College Readiness, Moraine Valley Community College; **Dr. Yvette Mozie-Ross**, Vice Provost for Enrollment Management and Planning, University of Maryland, Baltimore County; and **Dr. Holly Zanville**, Senior Advisor for Credentialing and Workforce Development, Lumina Foundation. Also, in attendance were some Governing Board members, Governing Board staff members, and HumRRO staff, listed in Appendix A.

The meeting was held on April 19, 2018 in Chicago, Illinois. An overview of the National Assessment Governing Board and the charge of the *Ad Hoc* Committee on Measures of Postsecondary Preparedness, along with the agenda and logistical information for the meeting were sent to the panelists in advance of the meeting.

Thanos Patelis (HumRRO) opened the meeting and after quickly informing the group of some logistics, Terry Mazany, *Ad Hoc* Committee Chair, set the stage for the role of NAEP in the future, given the impact of technology on work as well as the economic and global context in which students enter the post-secondary world. He led the attendees through introductions. Thanos Patelis facilitated the meeting around the three areas of inquiry involving (a) the jobs of 2030, (b) the skills these jobs will require, and (c) the measures/indicators needed to measure these skills. Finally, Terry Mazany offered some concluding comments. The agenda and the list of all attendees is in Appendix A.

The purpose of this document is to summarize the themes and comments made by the panelists. The information in this report is meant to provide insight into the rich conversation and comments provided by the expert panelists.

The Future of the Workplace and Work

With experts representing higher education, the discussion of the future of the workplace and work focused on pathways to work, primarily through postsecondary education and training.

- Postsecondary institutions need to create pathways to develop agile employees who are open to lifelong learning.
- Lifetime or continuous learning will become the norm. Employees will need to continue to learn from different providers, from colleges/universities to specific training courses to experiential opportunities, throughout their lives. Information technology (IT) workers already face this with a variety of certifications for specific technology tools and applications. Highly-regulated occupations will likely be the last ones to make changes.
- Postsecondary institutions need to partner with employers to identify education and training needs so that graduates possess the knowledge and skills needed for jobs.
    - Look to IT which is leading the way in defining job requirements and credentials for employees.
    - One of the panelists described a keynote presentation by the CEO from Chegg, Dan Rosensweig, describing the current disconnect between expectations and responsibilities of employers, higher education, and students. He illustrated this by placing each of the stakeholders at the vertices of a triangle with arrows facing outward indicating a lack of working together rather than arrows pointing inward, toward each other, signaling collaborative planning and working together toward similar goals.
    - Educators can be resistant to business models.
- There are still barriers to postsecondary education. Although community colleges have an open policy (in some states students do not need a high school diploma to enroll in community college), students may find it difficult to pursue their desired major or to matriculate. Prerequisites and competitive admission in selected programs (e.g., healthcare) are barriers to entry.
    - Similarly, some 4-year colleges guarantee admission to those with associate's degrees, but cannot guarantee admission into specific programs due to enrollment capacity and accreditation requirements such as completion of specific coursework.
    - Some community college graduates are not prepared for 4-year colleges and universities because their 2-year institutions have limited qualification requirements for instructors and low standards for their graduates. Both of these factors could be a barrier to continued education.
- More individualization in postsecondary education requires "policy by anomaly."
    - In developmental education, need to identify what students need and how to get it to them. Placing students on paths matching their goals raises retention rates.
- Strong partnerships are needed between 2- and 4-year institutions of higher education to facilitate students' transfer between schools.
    - High school graduation projections show Hispanics are the fastest growing group[1] and many of this group begin their postsecondary studies in community college.
    - Many students are graduating from high school with associate's degrees obtained through early middle college programs and dual enrollment.
- Colleges and universities must provide different, perhaps individualized, services to students who enter at different points on the pathway to a 4-year degree. Historically, 18-year-old high school graduates enter as freshmen with new-student services and support structure

[1] See Bransberger, P., & Michelau, D. R. (2016). *Knocking at the college door: Executive summary*. Boulder, CO: Western Interstate Commission for Higher Education.

for the first year or two. Institutions are now called on to help a select group of high school graduates entering college with associate's degrees, yet perhaps still needing wraparound services due to their youth (compared to the services offered to 20-year-old or older students transferring to a 4-year program with an associate's degree). Other students may start and stop their education multiple times and attend several institutions before graduating.

- To prepare students for future jobs, we need vertical and horizontal articulation. For horizontal articulation, students need technical, academic, and employability skills (e.g., grit, self-understanding). For vertical articulation, the key is determining at what age/grade to start. High school staff say it needs to start in middle school; middle school staff say it needs to start in elementary school.
- Need a mechanism to validate training and experience as part of the pathway to a degree. More and more high school graduates are already working through the gig economy. Other students have jobs and families while attending college.
    - Look to the military; they validate training as credits.
    - Western Governors University (WGU) provides micro-credentials or badges as students achieve milestones to show them the skills and knowledge attained as they work toward their bachelor's degree.
    - Give students the ability to curate their work and educational experiences.
- There is tension between an integrated approach providing a broad range of skills (academic, technical, and employment-oriented) and the business need for a narrow, specific set of skills to meet a skill shortage. One is too esoteric, the other too pragmatic.
- Post-secondary institutions will not be the destination, but a vehicle for certifying student competencies.
- Expect the acquisition and use for knowledge and skills to flip. Currently, knowledge is the base foundation provided by formal education and we obtain skills as needed. In the future, skills will be the base and we will obtain knowledge as needed.

Skills Needed in the Future

- Don't teach students to do what a robot can do better.
    - Robots are better than humans at pattern recognition, repetitive tasks, etc. but they are not able to understand nuance of language, social relationships, or creativity.
    - It will be important for humans to connect domains.
    - McKinsey has developed a list of human skills such as empathy, planning, creativity, common sense, sense making, novel thinking, nuance of language, social relationships, etc.[2]
- In addition to content or professional knowledge, students need:
    - practical transition skills
    - key learning skills and cognitive strategies
    - strong foundation of self-understanding and engagement strategies
    - critical thinking
    - affective mindset and skills
    - meta learning
    - financial literacy
    - information technology literacy
    - health and wellness literacy.

[2] See Chui, M., Manyika, J., & Miremadi, M. (2016). *Where machines could replace humans—and where they can't (yet)*. McKinsey Global Institute. https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet

- Schools can provide learning and workplace skills.
    - College experience courses for high school students.
    - WGU offers eight synchronous online sessions with a small, facilitated cohort on skills such as self-efficacy, communication, and learning styles. In a pilot test with at-risk students, there were significant positive outcomes: performance in courses as well as retention increased. Some of the skills, including leadership and communication, were identified by the medical profession as ones missing in graduates. These skills not only make graduates better job candidates but also more resilient students.
- Consider where or why skills are needed to build awareness of how skills fit into work.
- Four-year institutions look for grit or persistence as a necessary skill for student success. Students with a solid academic foundation and grit should be able to succeed, whereas students with a strong foundation of academic knowledge and no grit may not be able to handle the rigor of college.
- Class attendance is the best predictor of success, as evidenced both by anecdote and research. Some colleges require attendance and initiate interventions if students do not attend class.
    - There is a question of how to measure attendance for online courses. One approach is to look at student engagement using interaction data from Learning Management Systems (LMS).
- Students need to learn how to get "unstuck" when in a challenging situation.
- Employers are looking for people who can work across left and right brains and are able to work with technology.

Measures of Skills in the Future

- Employers offer performance-based pay for high-value, high-priority credentials supporting ability to use skills.
    - Students may demonstrate their skills through portfolios.
    - Use blockchain[3] to document achievements and portfolio.
- Need new types of student assessment.
    - Current assessments focus too much on knowledge and not enough on skills, character, and meta learning.
    - Students take most current assessments working alone rather than in teams. Need authentic assessments of team work with hands-on performance components.
- Leading-edge assessments use simulation and are more applied, with problem solving scenarios that assess whether you can use knowledge.
- Create dashboards for parents and students to see skill attainment, including credentials.
- Use micro credentials and then stack those credentials to meet employer-relevant needs.
- There is a tension between broad versus specific measurement of skills.
- Include all stakeholders in identifying what and how to measure skills.
- Measuring college or postsecondary readiness is different than college or postsecondary success.
- Some postsecondary institutions use transcripts, others don't.
    - Transcripts could provide an opportunity to leverage high school data for postsecondary instructors to know what students have done prior to college and to personalize postsecondary instruction.

[3] For information about blockchain: https://hbr.org/2017/01/the-truth-about-blockchain

    - Expect seat time to be a less helpful measure from an industry perspective. They will be interested in a "transcript" with learning opportunities, perhaps using blockchain technology.
    - For transcripts to be useful to instructors, need a way to standardize them.
    - Need to include attendance on transcript.
- Metrics of academic rigor exist with validity evidence provided to support their value in predicting college outcomes.
- Concern with the shelf life of measures such as SAT or ACT, course grades, etc. Are high school results as valid for older, returning students?
- Metrics should include student employment.
- Measures of service learning are needed.

Reflections

Terry Mazany offered four reflections on the discussion:

1. We need to project all of the allied trends in society to 2030. Work is shifting to a gig economy. This will be the reality for 16- to 18-year-olds in 2030. We need to factor the expected changes in the economy of 2030 into the skills required to work in the future. Data is the new oil. Micro-credentialing and digital badges will more and more populate transcripts and portfolios.
2. There will be several paradigm shifts: (a) knowledge/skill flip, (b) everything has a developmental progression except technology, (c) the nontraditional student of today will be the traditional student of tomorrow, (d) students will be agents for themselves, and (e) a world where trust is collapsing in every venture except nonprofit ventures – blockchain as a key to build this trust.
3. We are in-between systems. We need to maintain an ecological perspective of each part of the system and look at the reciprocal changing role of employers.
4. The role of NAEP: We need to align NAEP with the requirements of Every Student Succeeds Act (ESSA), such as conditions of learning. This might be done by back-mapping the requirements of ESSA with what NAEP provides.

Appendix A: Meeting Agenda and Attendees

Expert Panel Meeting
National Assessment Governing Board
Ad Hoc Committee on Measures of Postsecondary Preparedness

April 19, 2018 | Agenda

11:00 to 11:05 AM **Start Meeting**
Thanos Patelis, Facilitator, HumRRO

11:05 to 11:15 AM **Welcome and Introductions**
Terry Mazany, National Assessment Governing Board Member
Chair, Ad Hoc Committee on Measures of Postsecondary Preparedness

11:15 AM to 12:00 PM **Work of the Future**
Thanos Patelis

Guiding Questions:

- *What do you see as the postsecondary pathways that high school seniors graduating in 2030 will be choosing among?* (11:15-11:40)
- *Compared to now, what kind of trends do you see shaping postsecondary education in 2030?* (11:40-12:00)

12:00 to 12:15 PM **Break to get lunch**

12:15 to 1:00 PM **Skills for the Work of the Future**
Thanos Patelis

Guiding Questions:

- *How have postsecondary entrance expectations changed in recent years?* (12:15-12:40)
- *What types of competencies and content knowledge will graduating high school seniors need to be prepared for postsecondary pathways in 2030?* (12:40-1:00)

1:00 to 1:45 PM **Measures of these Skills**
Thanos Patelis

Guiding Questions:

- *What measures do you see being used for these competencies?; What will require new or updated measurement tools?* (1:00-1:20)
- *What metrics would provide helpful information in the aggregate about the competencies of graduating high school seniors?* (1:20-1:45)

1:45 to 2:00 PM **Final thoughts and concluding remarks**
Terry Mazany

Attendees

Expert Panelists:

- Sarah DeMark, Vice President of Academic Programs, Western Governors University
- Pradeep Kotamraju, Bureau Chief, Career and Technical Education, Iowa Department of Education
- Michael Morsches, Dean of Learning Enrichment and College Readiness, Moraine Valley Community College
- Yvette Mozie-Ross, Vice Provost for Enrollment Management and Planning, University of Maryland, Baltimore County
- Holly Zanville, Senior Advisor for Credentialing and Workforce Development, Lumina Foundation

Governing Board Members:

- Terry Mazany, Chair, Ad Hoc Committee on Measures of Postsecondary Preparedness
- Dale Nowlin, Teacher and Mathematics Department Chair, Bartholomew Consolidated School Corporation, Columbus, Indiana
- Alice Peisch, Legislator, Massachusetts House of Representatives, Wellesley, Massachusetts
- Chasidy White, Director of Strategic Initiatives, Office of the Superintendent, Montgomery, Alabama

Governing Board Staff Members:

- Bill Bushaw, Executive Director
- Lisa Stooksberry, Deputy Executive Director
- Lily Clark, Assistant Director for Policy & Research

HumRRO Staff Members:

- Monica Gribben, Senior Staff Scientist
- Sunny Becker, Principal Staff Scientist
- Thanos Patelis, Principal Scientist

Expert Panelists

Sarah DeMark, Ph.D.
Vice President of Academic Programs
Western Governors University

Sarah DeMark joined nonprofit Western Governors University (WGU) in September 2014, and serves as the Vice President of Academic Programs, responsible for leading WGU's portfolio strategy as well as the design and development of the university's competency-based degrees, curriculum and assessments. This portfolio includes more than 50 programs, 600 courses, and nearly 1000 assessments.

Prior to joining WGU, DeMark spent more than 15 years at leading IT companies, serving in various leadership roles where she oversaw the strategy and execution of the design, development, and deployment of certification and curriculum-based assessment portfolios. Previously, she was an independent consultant working with state and local school districts, as well as working with The College Board on SAT and AP program evaluation.

DeMark is published in numerous journals and books and is a sought-after speaker. DeMark currently sits on ANSI's Personnel Certification Accreditation Committee, which serves to validate whether certification programs adhere to standards.

DeMark earned a Ph.D. in Educational Psychology (Measurement, Statistics, & Methodological Studies) from Arizona State University. DeMark earned B.S. degrees in both Elementary Education and Psychology from Vanderbilt University.

Pradeep Kotamraju, Ph.D.
Bureau Chief, Career and Technical Education
Division of Community Colleges and Workforce Preparation
Iowa Department of Education

Dr. Pradeep Kotamraju is currently the Bureau Chief, Career and Technical Education, Division of Community Colleges, Iowa Department of Education. As Iowa's State Director for Career and Technical Education (CTE), he has leadership responsibility in managing those secondary and community college CTE programs that are funded through the Carl D. Perkins federal program. Previous to his current position as the Iowa CTE State Director, Dr. Pradeep Kotamraju has served the Deputy Director, National Research Center for Career and Technical Education (NRCCTE), University of Louisville, Louisville, Kentucky. Prior to that, he served as the System Director, Perkins, at the Minnesota State Colleges and Universities, Office of the Chancellor. Dr. Kotamraju has worked in several senior administrative positions in higher education and workforce development agencies in Minnesota.

Dr. Kotamraju has written several publications and monographs, and made numerous presentations, in the area of student success in career and technical education, workforce development in the United States, and, in the area of economic progress in the developing world. His research has included the examination of a variety of labor market information and workforce development issues that connect occupations, skills and careers, as individuals transitioned back and forth between employment and education. Dr. Kotamraju has been invited to participate on several statewide, regional and national committees that have focused on CTE programs, budget and finance, and accountability. Some of these committees have had even broader focus that places CTE right front and center when it comes to connecting education, workforce development, and economic development.

Before working in the public sector, Dr. Kotamraju taught college- and university-level Economics and Statistics at several higher education institutions in Minnesota and Kentucky. Dr. Kotamraju holds a Ph.D. in Economics from the University of Illinois. He received his Masters Degree in Economics from George Washington University, and his Bachelors in Economics from the University of Delhi, India

Michael Morsches
Dean of Learning Enrichment and College Readiness
Moraine Valley Community College

Michael Morsches has worked in higher education for more than thirty years. His primary focus has been on developmental education and the transition from high school to college.

Michael currently serves as the Dean of Learning Enrichment and College Readiness at Moraine Valley Community College. He oversees the ABE/GED, ESL, developmental education, literacy volunteers, and tutoring programs. Michael has published numerous articles and handbooks on retention, student engagement, and teacher training in post-secondary institutions.

Yvette Mozie-Ross, Ph.D.
Vice Provost for Enrollment Management and Planning
University of Maryland, Baltimore County

Yvette Mozie-Ross, PhD, is Vice Provost for Enrollment Management and Planning at the University of Maryland, Baltimore County (UMBC). As Vice Provost, Dr. Mozie-Ross provides oversight and strategic planning for the areas of undergraduate admissions and orientation, financial aid and scholarships, academic and pre-professional advising, records and registration, and the student administration project (student information system). With a higher education career spanning over 25 years, she has served in numerous professional capacities including residence community director, coordinator of multicultural recruitment, assistant director for transfer recruitment and admissions, director of undergraduate admissions, and director of academic services (advising and registration). Dr. Mozie-Ross has served on various national and statewide committees and workgroups including the College Boards' Commission for Transfer Policy and Practice, and the Maryland Higher Education Commission's State Plan Writing Group on Access, Affordability and Completion. She has served on the university's Strategic Planning Steering Committee and is currently serving as a member of the governing board for the Baltimore Collegetown Network, a consortium of 13 colleges in Baltimore, Maryland. Dr. Mozie-Ross frequently lends her expertise, both nationally and internationally, in the area of data analytics and leveraging analytics for institutional transformation. Dr. Mozie-Ross earned her bachelor's degree from UMBC in 1988, her master's degree from University of Maryland University College in 1994, and her doctorate in Education Policy and Leadership at the University of Maryland, College Park in 2011. Her dissertation research examined the academic and background characteristics of high school graduates who identified teachers as influential in their choice of college. Dr. Mozie-Ross enjoys spending time with her husband of 22 years and their 20-year old son. Her pass-time interests include family genealogical research and running.

Holly Zanville, Ph.D.
Senior Advisor for Credentialing and Workforce Development
at Lumina Foundation

Holly Zanville is Senior Advisor for Credentialing and Workforce Development at Lumina Foundation. She leads a new portfolio on Worker and Employer Engagement that focuses on building the capacity of educators and employers to scale and spread the best ideas in training, credentialing, and other workforce development strategies linked to postsecondary learning opportunities; and examining issues around the future of work and learning. Her work includes cultivation of networks and partnerships essential to the emerging new postsecondary learning system including Credential Engine, quality assurance efforts to ensure that credentials stand for high-quality learning, and networks for research and industry sector engagement. She previously led Lumina's development of the national Connecting Credentials initiative, credential completion for returning adults with prior college/no credential, and statewide approaches to reverse-transfer degrees through the Credit When It's Due initiative. Zanville received her Ph.D. in Educational Administration from the University of Minnesota; MA in English from the University of Wisconsin-Madison, and BA in English and Biology from Lindenwood University.

Notes of the Expert Panel Meeting Representing Industry
February 22, 2018

National Assessment Governing Board
Ad Hoc Committee on Measures of Postsecondary Preparedness

As part of meeting the charge of the Ad Hoc Committee on Measures of Postsecondary Preparedness, HumRRO organized and facilitated a meeting with industry experts. The purpose of this meeting was to get input from leaders and experts in industry about (a) the jobs that will exist in 2030, (b) the skills that these jobs will require, and (c) the measures/indicators that would be needed to provide a status of elementary and secondary students with respect to these skills.

We were fortunate to assemble an exceptional panel of experts and leaders. The panel members included **Ms. Paula Collins**, Texas Instruments, **Mr. Marcelino Ford-Livene**, Intel Corporation, **Dr. Scott Heimlich**, Amgen Foundation, **Dr. Chauncy Lennon**, JPMorgan Chase, and **Mr. Reginald McGregor**, Rolls-Royce Corporation.

The meeting was held on February 22, 2018 in Alexandria, Virginia. An overview of the National Assessment Governing Board and the charge of the Ad Hoc Committee on Measures of Postsecondary Preparedness, along with the agenda and logistical information for the meeting were sent to the panelists in advance.

Thanos Patelis (HumRRO) opened the meeting and after quickly informing the group of some logistics, Terry Mazany provided an overview and led the attendees through introductions. Then, Thanos Patelis facilitated the meeting around the three areas of inquiry involving (a) the jobs of 2030, (b) the skills that they will require, and (c) the measures/indicators that will be important to provide. Finally, Terry Mazany offered some concluding comments. The agenda and the list of all attendees is in Appendix A.

The purpose of this document is to provide information on the themes and comments made by the panelists. The information in this report is meant to provide insight into the rich conversation and comments provided by the expert panelists.

The Future of the Workplace and Work

- The titles of the jobs in 2030 cannot be predicted. However, the jobs of the future will require many skills and will be driven by globalization, artificial intelligence, and “big data”.
    - Globalization will change the workplace, from the types of jobs available (i.e., global competition for jobs) to working on cross-cultural teams.
    - Workplace integration will increase (e.g., working across disciplines instead of in silos by discipline).
    - The pace of automation and existence of the internet enable rapid access to information which will affect what employees do on the job and their job descriptions. The use of the internet and automation will only increase
    - Employers should embrace new methods of communication, driven by the next generation. For example, hiring managers may not be familiar or may be

uncomfortable with the latest communication modes of those applying for jobs. Rather than allowing that to impact negatively on job applicants, employers should acknowledge the differences as innovation or trends to monitor. Job applicants may also need to be attuned to this dynamic.
    - Technology will be at the forefront. For example, JP Morgan Chase is a "tech company that also loans money"; they do not consider themselves primarily a financial institution.
    - Complicated tasks can be handled by automation (which will replace some jobs). Employees of the future will need to work with automated equipment and employees will be needed to design and service the automation.
    - Complex tasks will take human thought (and these types of jobs will remain and additional ones will be added in the future).
- There is and likely there will continue to be a duality in the job descriptions of the future: academic skills and college degree required versus high school diploma and training and apprenticeship experience required. Panelists noted they come from the academic skills track and although they acknowledge the diploma-training track, they suggested consulting with experts in that area for a more detailed picture of what the future holds for those not following the 4-year college track.
    - Need to hire the person with the right skill set, not the person with the most qualifications (who may be overqualified and a poor fit for the work). This is sometimes a tendency when college-graduate hiring managers put more emphasis on college degree, the background they come from and perspective they bring to their job, than is warranted by the demands of the job being filled.
    - Most jobs that do not require a 4-year college degree, will require additional training, such as a 2-year college degree, technical training, or post-secondary education and/or training leading to certification.
    - Employer provides job skills (e.g., specific knowledge and procedures), while employee brings workplace competencies to the job (see competencies in the skills needed in the future). More job-related training will be provided by the employer, such as in-house mini-MBA programs provided by large corporations.
    - Continuous learning will be required to keep up with change. The employer will support or provide the training or education; the employee must participate to keep pace.
- Panelists indicated the need for initiatives to empower students, especially those who are "at-risk" and do not have role models, with an understanding of the labor market and expose them to employment options. Suggestions for empowering students so they are ready for post-secondary steps to meet their goals:
    - Help them define pathways to jobs.
    - Assist in setting goals; define an individual's "*north star*".
- Employer/employee relationships will change.
    - More contract work will emerge, which allows workers to dictate own schedule and/or workplace.
- Office space will be different.
    - For example, if employees come to the office, they will use a laptop and choose a work space area plugging into the network. The exact location may vary and will be more fluid than today.

Skills Needed in the Future

- Panelists described the need for employees to be able to apply skills, which defines competencies. Having a skill is not sufficient. Must know how to apply the skill to real world problems.
- The skills that were highlighted were as follows:
    - Ability to collaborate with people and machines, as the workplace incorporates more technology and automation as well as more collaboration.
    - Ability to interact with technology in jobs at all levels. Career Technical Education (CTE) can provide skills and certification for certain jobs.
    - Data skills are in demand - *data is the new oil*.
    - Less focus on job-specific content skills and more on workplace competencies:
        - Critical thinking, effective communication, collaboration, adaptability, problem solving, creativity, integrity, community/workplace citizenship, agility, learning disposition, persistence, attitude, interest.
    - Able to handle failure – *know what to do when the button fails*.
- Need power skills and experience, especially for at-risk students, to navigate the job market and succeed in entry-level positions – resume writing, oral communication, working on teams, basic reading/writing and mathematics ability.

Measures of Skills in the Future

- Consider measuring post-secondary readiness skills in grade 8.
- Maintain traditional knowledge measures (i.e., reading, mathematics).
    - Some went as far as to say that these measures of academic skills should not be removed and any other measures should be added.
- Design-build skills can be measured by persistence. Do you persist until object is built?
- Measure *application* of skills at grade 12. Can students demonstrate their skills (versus showing their knowledge of skills)?
- Add new measures tapping workplace requirements. Be creative in measuring skills (e.g., use certificates or credentials). Leverage CTE curriculum and measures.
    - In the interview process for candidates, hiring managers will give a problem to solve. Therefore, such metrics that demonstrate process and results of solving problems would be helpful.
- Need measures on collaboration, empowerment, and creativity.
- Tie relevancy of measures to industry and align with education. Do this regionally so that measures of preparedness are informative to:
    - students (do they have the skills needed for jobs in their community?),
    - industry (do local job applicants have the skills needed for jobs being offered in their community?),
    - educators (are they preparing students for post-secondary opportunities in their community?), and
    - policy makers (does the local workforce have the skills that industry in their community require?).
- While this may not be the Governing Board's responsibility, students should be given the ability to develop digital portfolios, including coursework and experiential activities, in school to demonstrate their skills and achievements. This would be helpful to employers.

- The measures must keep evolving as the type of work and required skills change over time.
- One interesting observation was that the panelists described job training interventions for at-risk youth with measures of program success embedded as artifacts of the experience. Did the participant build something? While the final product might not have been their initial design, the focus was on the creative process and the ability to troubleshoot problems as well as to persist in developing the final product.

Appendix A: Meeting Agenda and Attendees

Expert Panel Meeting
National Assessment Governing Board
Ad Hoc Committee on Measures of Postsecondary Preparedness

February 22, 2018 | Agenda

11:00 to 11:05 AM **Start Meeting**
Thanos Patelis, Facilitator, HumRRO

11:05 to 11:15 AM **Welcome and Introductions**
Terry Mazany, National Assessment Governing Board Member
Chair, Ad Hoc Committee on Measures of Postsecondary Preparedness

11:15 AM to 12:00 PM **Work of the Future**
Thanos Patelis, Facilitator, HumRRO

Guiding Questions:

- *What do you see as the type of jobs graduating high school seniors will have in 2030?*
- *Compared to jobs now, what kind of trends do you see emerging for jobs in 2030?*
- *Do you foresee any differences of jobs by industry or do you expect similar trends to occur for all jobs?*
- *What do you see as expectations of employers for these students?*
- *How do you envision the hiring process to be?*
- *What role will postsecondary institutions play in training and preparing students for these jobs?*

12:00 to 12:15 PM **Break to get lunch**

12:15 to 1:00 PM **Skills for the Work of the Future**
Thanos Patelis, Facilitator, HumRRO

Guiding Questions:

- *What types of skills will graduating high school seniors need to have in 2030 in order to get the jobs in 2030?*
- *What would you consider pre-requisite skills vs. skills that can be acquired on the job?*
- *What role will postsecondary institutions play in training these skills?*
- *What would a hiring manager in 2030 look for in prospective hires?*

1:00 to 1:45 PM **Measures of these Skills Associated with Work of the Future**
Thanos Patelis, Facilitator, HumRRO

Guiding Questions:

- *What measures do you see being used to represent these skills?*
- *What metrics would provide helpful information in the aggregate about the skills of graduating high school seniors?*

1:45 to 2:00 PM **Final thoughts and concluding remarks**
Terry Mazany, National Assessment Governing Board Member
Chair, Ad Hoc Committee on Measures of Postsecondary Preparedness

Attendees

Expert Panelists:

- Paula Collins, Texas Instruments
- Marcelino Ford-Livene, Intel Corporation
- Scott Heimlich, Amgen Foundation
- Chauncy Lennon, JPMorgan Chase
- Reginald McGregor, Rolls-Royce Corporation

Governing Board Members:

- Terry Mazany, Chair, Ad Hoc Committee on Measures of Postsecondary Preparedness
- Honorable James E. Geringer, Former Governor of Wyoming, Cheyenne, Wyoming
- Carol Jago, Associate Director, California Reading & Literature Project at UCLA, Oak Park, Illinois
- Dale Nowlin, Teacher and Mathematics Department Chair, Bartholomew Consolidated School Corporation, Columbus, Indiana
- Honorable Beverly Perdue, Former Governor of North Carolina, New Bern, North Carolina
- Linda P. Rosen, Chief Executive Officer, Change the Equation, Washington, DC
- Chasidy White, Director of Strategic Initiatives, Office of the Superintendent, Montgomery, Alabama

Governing Board Staff Members:

- Bill Bushaw, Executive Director
- Lisa Stooksberry, Deputy Executive Director
- Lily Clark, Assistant Director for Policy & Research
- Laura LoGerfo, Assistant Director for Reporting & Analysis
- Munira Mwalimu, Executive Officer & Contracting Officer
- Sharyn Rosenberg, Assistant Director for Psychometrics
- Angela Scott, Management & Program Analyst

HumRRO Staff Members:

- Monica Gribben, Senior Staff Scientist
- Deirdre Knapp, Vice President, Assessment and Evaluation in Education and the Workplace
- Jackson Millard, Research Associate
- Thanos Patelis, Principal Scientist

Expert Panelists

Paula Collins
Vice President, Worldwide Government Relations
Texas Instruments

Paula J. Collins is vice president of Worldwide Government Relations for Texas Instruments where she leads the Company's advocacy activities in the United States and abroad. She joined Texas Instruments in 1999 as Director of Government Relations and managed the Company's legislative and public policy activities on a wide range of issues, including immigration, funding for basic research and education.

Ms. Collins came to Texas Instruments with extensive government, corporate and business association experience. After serving as a legislative assistant on Capitol Hill, she joined American Express Company, where for ten years she directed the Company's legislative activities on a wide range of public policy issues including a number of trade initiatives. In 1993, she joined the Business Roundtable where she worked closely with corporate leaders to develop and implement public policy campaigns on international trade, budget and workforce initiatives. From 1995-1997, she directed international trade relations at Eastman Kodak Company and from 1997-1999 was a principal with The Fratelli Group, a strategic communications firm where she played an active role in the development and implementation of comprehensive public affairs strategies for several coalitions on trade and telecommunications issues.

Ms. Collins is a graduate of Yale University and attended the Program for Management Development at Harvard Business School. She is an active participant in her church and local civic organizations, and is a member of several professional organizations. She is a member of the Board of Directors and Executive Committee of the Information Technology Industry Council, and chairman of the Board of the Task Force on American Innovation.

Marcelino Ford-Livene
General Manager, Global Programs and Alliances
Intel Corporation

Marcelino Ford-Livene is the General Manager of Global Programs and Alliances for Intel's Worldwide Corporate Affairs Group. In this capacity, he leads the organization charged with designing the framework and strategic plan for identifying and prioritizing win-win strategic alliances, relationships and partnerships with various global industry, government and special interest groups that advance the strategic direction of Intel's Diversity and Inclusion Initiative. Prior to this role, Ford-Livene was the General Manger of New Channels and Advanced Advertising for Intel Media, where he led the organization charged with programming, licensing and distributing new format television channels and advertising-supported video-on-demand programming. He was also responsible for advertising sales, advertising operations, audience research and data analytics for Intel Media's OTT services. He also co-authored patents on TV viewership analytics and advanced advertising behavioral targeting. Prior to Intel, he was a senior member of TV Guide's corporate development and planning team. He has also held senior positions with the U.S. Federal Communications Commission in Washington, DC. He served as Special Counsel for New Media Policy for Chairman William E. Kennard and as Senior Counsel and Director of Media Strategic Analysis for the FCC's Office of Strategic Planning under Chairman Michael Powell. Ford-Livene was the Division Chairman of the Interactive Media Division for the American Bar Association's Forum on the Entertainment and Sports Industries from 2006 to 2013. He also served for eight years on the board of the TV Academy, the organization that awards the prestigious Primetime Emmy for creative excellence in the television industry. He was also the TV Academy's Board Secretary and a member of its Executive Committee from 2010 to 2013. He is currently the Co-Chairman of the TV Academy's Diversity Committee and a founding board member of the Digital Diversity Network. Corporate boards that Ford-Livene has served on include Delivery Agent in San Francisco, CA and TRA Global, which was acquired by TiVo. Ford-Livene earned a B.A. in economics from UC San Diego, a J.D./M.B.A. from the University of Illinois and has completed an Executive Leadership Program at Harvard Business School.

Scott Heimlich
Vice President, Amgen Foundation

Scott M. Heimlich is vice president of the Amgen Foundation. He is responsible for the strategic management and direction of the Foundation's science education portfolio, including the development and oversight of key initiatives at the K-12 and higher education levels. He was the principal architect and continues to lead the Amgen Scholars Program, the Foundation's largest initiative providing undergraduates with access to research opportunities at premier educational and research institutions across the world. Under his leadership, the Amgen Biotech Experience transformed from a local program into a multi-site, international initiative bringing biotechnology lab experiences to over 80,000 secondary students a year. With these and many other initiatives, the Foundation's commitment to science education recently surpassed the $125 million milestone.

Prior to joining Amgen in 2005, he served in positions at the University of California, Los Angeles, Los Angeles Pierce College, University of Southern California, and a junior high school in Japan. He holds a bachelor's degree, master's degree, and doctorate in education from the University of California, Los Angeles.

Chauncy Lennon
Managing Director and Head of Workforce Initiatives
Global Philanthropy
JPMorgan Chase & Co.

Chauncy Lennon leads JPMorgan Chase & Co.'s initiatives to promote economic opportunity through investments in workforce practice, innovation, and policy. These include New Skills at Work, a $250 million global initiative to support demand-driven workforce systems that promote prosperity for workers and industries; New Skills for Youth, a $75 million initiative to increase the number of young people who complete career pathways that begin in high school and end with postsecondary degrees or credentials aligned with good-paying, high-demand jobs; The Fellowship Initiative, a program providing young men of color with learning experiences that help them achieve their education and career potential; and a $17 million investment in Summer Youth Employment Programs in US cities to help underserved youth obtain the skills necessary to build lasting careers.

He serves on the New York City Workforce Development Board, the College Promise Campaign Advisory Board, and the Neighborhood Trust Financial Partners Board.

He joined JPMorgan Chase from the Ford Foundation, where his grant-making focused on promoting economic advancement for low-income workers by improving access to workforce development and work support programs. Prior to the Ford Foundation, he was senior vice president for Asset Building at Seedco, a national workforce development intermediary. He also has extensive experience researching the mobility patterns of the working poor. He earned his Ph.D. in anthropology from Columbia University, master's degree from the University of Chicago and bachelor's degree from Williams College. He has taught urban studies at Columbia's School of International and Public Affairs and Barnard College.

Reginald McGregor
Manager, Research & Technology Strategy Group
Rolls-Royce Corporation

Reginald McGregor, Manager of Engineering Employee Development and STEM Outreach at Rolls-Royce Corporation. He is a Mechanical Engineer with over 15 years' experience in various engineering roles. He spent over 8 years in early career development managing the engineering co-op; high school internship and graduate development programs. Reginald holds BS in Mechanical Engineering, MBA and currently completing a MS in Technology Leadership and Innovation. He is very active in workforce development and STEM education and serving the community. Reginald enjoys reading, outdoor activities and spending time with family.

Reginald serves on several boards and committees including the Governor-appointed Region 5 Works Council, President of the Lawrence Township School Board, Indiana STEM Advisory Council, STEMx National Advisory Board, Purdue Engineering Education Industrial Advisory Council, Marion County Superintendents STEM Coalition, Indiana Chamber of Commerce K-12 and Workforce Committees, Million Women Mentor Steering Committee, Indiana Afterschool Network Board, and EmployIndy Youth Committee.