

## Mission

In Macroeconomic terms, NLET was formed to help create parity between the education sector and other sectors of the economy and public service, to bring them into alignment so that the human capital production in the country better matches the human capital consumption needs for the country.

- NLET’s mission is to systematically assist in raising and sustaining the rate of learning for all individuals and institutions in the U.S. through the best technical, cultural, financial, and organizational means possible.
- NLET’s vision is for education to achieve or exceed technological and cultural parity with consumer, commercial and government information systems to better service individual learning.

NLET is uniquely situated to carry out its mission because it has developed a comprehensive strategy focused on sector change that is informed by organizational transformations, information technology utilization, and cultural adaptations outside of the education sector (in commerce, consumer life, and government). Transformations in education structure and delivery have occurred at least three times in U.S. history as education adapted to economic and social realities as the country evolved. Most pronounced of these was the transformation of education from the agrarian economy to the industrial economy. The country is overdue for an educational transformation from the industrial economy to the knowledge economy.

Within the United States significant transformations have occurred in all sectors of the economy and they are on-going in healthcare and government services. These transformations have included changes in organization, regulation, distribution of information, increased responsibility on the part of individuals, and reliance on Web-based data-rich technologies. In light of these changes, the U.S. education system has seen incremental improvement in certain schools, districts and states with education technology and digital content, but a comprehensive set of transformations has not occurred.

## History

*NLET as a private organization seeks to emulate the way the U.S. national laboratories investigate answers to large complex problems through research and development starting from first-principles.*

The National Laboratory for Education Transformation, “NLET,” is a California non-profit corporation (501C3) that was incorporated March 15, 2011.

The concept for the non-profit grew out of conversations in 2009 with individuals at the San Jose Unified School District (Marcy Lauck, Bill Erlendson), who were national experts at data warehousing and community building for the personalization of education and the management of academic performance. The conversation was expanded to individuals at the Los Alamos National Laboratory, where there is an interest in producing future engineers and scientists, to faculty at the University of California Santa Cruz, which has a commitment to widening education access and redefining learning and to the University of Texas Austin where there is an interest in the visualization of education data.

Gordon Freedman, the founder and president of NLET believes that there should be a “Manhattan Project” of education in the U.S. to address fundamental changes in education necessary to match the needs of the information age. Such a project, he feels, should be able to address the simple question, “how many kindergartners does it take to produce a PhD, an engineer or a professional, and is that number of kindergartners growing larger or smaller?”

## Objectives

*NLET believes that structure of education in the nation's public school systems and public community colleges and the culture of learning in the country are antiquated and inadequate.*

The problem NLET seeks to address is the failure of the United States to use its significant innovation capacity to innovate in education, learning and knowledge transfer in order to keep up with the rest of the industrialized nations in terms of academic achievement, skills acquisition and innovation output.

An area for clear American innovation is the focused re-thinking of the structure, experience and culture of schooling and the structure of community college attendance.

With the exception of a few nations whose mineral or natural wealth is overwhelming, most nations survive, prosper and compete based on the quality of their human capital to provide skilled and flexible labor forces, to provide high levels of research and innovation, and to invest in and finance growth as economies turn into knowledge-based societies.

The U.S. is not progressing in academic preparation and skills creation in comparison to other developed nations and some of the developing nations. These problems are acute and growing with regard to mathematics and science (STEM) in all demographics and with regard to general education progressions across certain racial, ethnic and lower socio-economic dimensions in all subjects.

A country, such as the United States, in the face of rising globalization that witnesses declines in the education and training output will pay an increasing amount to sustain non-productive members of society and will struggle to innovate in existing businesses and in the creation of new businesses.

These trends are and have been of strategic concern in the U.S. across all sectors of the economy and government, but have not been addressed strategically. Most of the extensive and expensive reforms that have taken place at a Federal, national and state level do not address the underlying structural issues of U.S. education which differ fundamentally from other nations.

### NLET's Objective is Two-Fold:

(1) **Gather, create, test and implement** individual learning solutions that use technologies on par with those used in the consumer, corporate and government sectors to help personalize learning.

(2) **Help develop new cultures and structures for learning** for all students, available in school, at home or in varied learning environment that can raise and sustain higher rates of learning than currently exist.

As fewer highly educated individuals enter the workforce with graduate and professional degrees, the competition within the U.S. rises for such individuals as there is less intellectual wealth to fill critical positions in government, the military and security forces, and to populate research centers and national laboratories focused on the public good. The U.S. already imports high-tech workers with degrees in computer science and computer engineering to fill critical shortages of citizens with such credentials despite the fact that many foreign nationals earn their degrees in the United States. A final reason for deep concern is that the quickly accelerating income disparity in the U.S., the greatest in any industrialized nation, is tied, in part, to declining levels of education attainment.

## Core Competency

*The social and technical means exist to facilitate appropriate education transformations, while the broad culture of acceptance of the current model makes such transformations difficult.*

The core strength of NLET is its ability to discover the appropriate organizations and people, to manage multiple organizational and professional relationships, to define projects that require the coordination of multiple stakeholders and to investigation and search for solutions to common problems together.

The keys to success for NLET are built on developing an ability to manage sociological and technological change in education philosophy, popular understanding and practice. This ability is based on working with specific groups of stakeholders, generally outside the education communities, in unison on common problems or investigations.

NLET generally involves stakeholders outside of the education practice, policy and research who can translate their successful methodologies into forms acceptable for achieving results in education and learning outcomes. The combination of (a) research methods, (b) commercial development and (c) educational experimentation are essential drivers for change. NLET routinely works to bring the three sectors together to assist in solving persistent education problems.

- **Research Methods** – Universities, Government Research Agencies, Research Institutes
- **Corporate Solutions** – Technology solutions from for-profit and non-profit corporations
- **Educational Experimentation** – Schools, Districts and Colleges willing to innovate

Simply creating better methods of transmitting information and knowledge contained in school curriculum is not acceptable for the current times or current learners. Instead, NLET focuses on the creation of new learning structures or “architectures” that allow students to personalize learning pathways to better adapt to the social norms and expectations of the current era and allow the schooling model to transform from a singular model into a services model.

The means of educating, or facilitating learning, must align with the needs and methods of society as it is constituted today. The work of NLET, then, moves on two levels.

- **Student Level:** Changing from transmission and testing of set curriculum to interactions with the surrounding knowledge and information associated with curriculum standards or their equivalent.
- **System Level:** Shifting the cultural, governmental and political acceptance of the “school” delivery model into a social and personalized learning model within various learning environments.

The student level work associated with personalized learning is broad, well-financed and studied, and on-going, though much can be improved. The system level work, changing systems of education to systems of learning, receives little serious attention in academic or practical research, in political and legislative bodies, or in the development of corporate and non-profit products and services. NLET believes that the student level work, from transmission to learning, cannot effectively scale to all students unless attention is paid to systems level work, by conducting experiments, investigating new organizational models that move from school-as-factory to learning site as facilitator-of-learning for all students. The work of NLET at both levels is intended to have measurable effects on the organization of schooling, the practice of instruction, and to introduce and experiment with the direct involvement and management of learning by students, families and mentors both in and out of school.

## Theory of Action

*Adapting education and learning for the demands of an uncertain world in the fast changing information and knowledge economy is the focus of NLET.*

NLET concentrates on operationalizing frameworks, social and technical, to incorporate the advances in the relatively new field of Learning Sciences into the practice of education and to model new learning environments and methods to mirror needs of the information age and the knowledge economy.

Cognitive Science and Artificial Intelligence emerged from a number of different disciplines and helped lead to the revolution in computing and networking that has transformed modern society. Learning Sciences can be part of the basis for transforming Industrial era education into Information era learning.

The goal of the Learning Sciences is to better understand the cognitive and social processes that result in the most effective learning, and to use this knowledge to redesign classrooms and other learning environments so that people learn more deeply and more effectively. The sciences of learning include cognitive science, educational psychology, computer science, anthropology, sociology, information sciences, neurosciences, education, design studies, instructional design, and other fields. ***Optimizing Learning: Implications of Learning Sciences Research, R. Keith Sawyer, OCED, CERI, 2008***

Sawyer adds that the current “model of schooling was based on common-sense assumptions that had never been tested scientifically” whereas Learning Sciences tests the critical assumptions in the school model. At the same time, Sawyer points out that “Standard model schools effectively prepared students for the industrialized economy of the early 20th century.” By contrast, early 21st Century society and commerce are driven by a knowledge-based economy in an information society, “the production and distribution of knowledge and information, rather than the production and distribution of things.” (Peter Drucker, *The Post-Capitalist Society*, HarperCollins, 1993)

The mechanisms of the factory-model such as grade progression, classroom size, division by school and district set up false parameters of comparison. Each unit of education produces bell curve results, while working with each student measured against standards can produce pathways associated with individual students. NLET believes that the unit of education must be each learner whereby learners can then be aggregated into classes, grades or schools. This way each student exists independently and as various groups as opposed to being viewed at all times only in light of various distributions of results.

Because the United States is moving to a largely national standards base for what is taught and tested in school, or to be learned and proven by students, the method of transmission becomes less important and does not have to be tied to a single model of delivery such as school. The social and technical means exist so that personalized learning allows a student the mobility to connect in-school and out-of-school activity into a coherent and meaningful set of understandings.

However, the schooling structure can only be taken so far before it will need to transform into a modern institutional structure that is both virtual and physical and allows for a wide range of variation of delivery, support and data outputs.

It is at the delta between what can work for individual students and what can work for publically-financed educational institutions that NLET operates. NLET sees three stages of evolution, the latter two being the concentration of NLET’s work: Traditional, Transitional and Transformational.

- The first is **traditional** schooling, which is dominant, based on the historical norm; it has had many reforms but few lasting results.
- The second is **transitional** schooling which uses available technologies and modern pedagogical methods, but can only personalize education so far as the schooling structure allows.
- The third is **transformational**, and moves from batch processing students, even in customized ways, to education that is personalized, built from the student up to the administration, what might be called a services model in modern Web-based organizational models.

NLET's work will be accomplished by conducting original research designed to develop and validate new methods that lead to the incubation of products and services that can measure the effects of emerging models of learning at the student level and at the modern systems level. This work will be socialized and shared with the public, educators and become the basis for new research and development to work on transitional and transformational work at the Student Level and the System Level.

### **Division of Work**

The bulk of NLET's work is divided into four centers covering Data, R & D, Math and Learner Identity. NLET believes these are among the strategic pieces that form a new form of education-learning

#### **Education Data Optics Center (UCSC, UT Austin, Los Alamos, NLET)**

There is a sea of education data, but it is not as well-formed as in other fields and businesses. This center involves multiple universities and research organizations and is devoted to using a variety of data tools to examine, understand and act on education data. This center uses big data, agent-based modeling, and other forms of analytics to understand education and learning patterns and trends.

- Kurt Steinhaus (Los Alamos), Paul Resta, Darv Winick (UT Austin), Rod Ogawa (UCSC), Marcy Lauck (NLET)

#### **Learning Architecture Center (UCSC, NLET)**

A collaboration between NLET and the University of California Santa Cruz (UCSC) Center for Educational Research in the Interest of Underserved Students. The Learning Architecture Center combines social, cultural and engineering components to facilitate Research and Development and Incubation for products and services as well as conducting frontline research.

- Co-Directors Rod Ogawa (UCSC), Gordon Freedman (NLET); Patty Ponzini (UCSC), Marcy Lauck, Bill Erlendson (NLET)

#### **Center for Mathematical Thinking (NLET)**

The outcome of learning and education should be an ability to think more creatively and more accurately. Mathematics education is a serious problem in the United States, one that can lead to analytic thinking and actual change in domestic output. This Center takes a strategic approach to the math problem in the U.S. and shifting to cultural social mandate for mathematical thinking.

- Keith Devlin (Stanford), George Tattersfield (NLET).

#### **Learner Identity Center (NLET)**

Identity in learning, how someone identifies and acts as a learner, increasingly can be expressed in data from school and sources on the Web. NLET is interested in students and families having access to their own data and the co-management of their learning, formal and informal.

- Gordon Freedman (NLET), George Tattersfield (NLET)

## Current Work

**(2011) National Science Foundation (NSF) Grant Program:** Discovery Research K-12, Directorate for Education and Human Resources (EHR)

- Funded Proposal: *"Collaborative Research: An Agent-Based Simulation Environment for Predictive Longitudinal Modeling of High School Math Performance"*
- PI/Partners: NLET Conceived and Organized. Michael Strong (UCSC, Principal Investigator) , Paul Resta (UT Austin, Co-Principal Investigator), Joanne Wendelberger (Los Alamos, Co-Principal Investigator). Gordon Freedman, Marcy Lauck, NLET Consultants.

**(2012) National Institute of Standards and Technology (NIST) Sub-Award:** The National Strategy for Trusted Identities in Cyberspace (NSTIC)

- Funded Proposal: *"Zero-Knowledge Identity and Privacy Protection Service (ZIPPS) for education and children"*
- Prime Contractor/Partners: Resilient Networks System, Inc. Sub-award for education Pilots, NLET.

**(2013) National Science Foundation (NSF) Grant Program:** Building Community and Capacity for Data-Intensive Research in the Social, Behavioral, and Economic Sciences and in Education and Human Resources (BCC-SBE/EHR)

- Funded Proposal: *"A Comprehensive Regional Approach to Data Set Integration to Support Data-Intensive Research in Education and Human Resource Development In Silicon Valley"*
- PI/Partners: NLET Conceived and Organized. Rodney (UCSC, Principal Investigator), Douglas Bonett, Scott Brandt, Ronald Glass, Carlos Malzahn (UCSC Co-Principal Investigators). NLET Contractor.

**(2013) Bill & Melinda Gates Foundation:** Postsecondary Success Strategy (PS), Scaled Models for Certificate Delivery (business planning grant)

- Funded Proposal: *"College Sky: A Certificates and Certification Marketplace"*
- PI/Partners: NLET Awardee, Gordon Freedman, Project Manager. Principal Partners: Pima Community College, National Coalition for Certification Centers ([www.NC3.net](http://www.NC3.net))