

## Tools and Infrastructure

As detailed below, our company has invested in a technical infrastructure for our services so that research programs can be executed efficiently and accurately.

### Security and Reliability Techniques and Procedures

At Empirical Education we are vigilant concerning the security of our electronic and physical data. Our security policy includes both technical and social procedures to ensure restricted access to sensitive student and school records. We maintain a firewall and use encryption on data requiring confidentiality. We are protected from interruption of operations by a rigorous backup schedule including off-site storage of backup tapes and critical records. Data transfers with customers are fully secure. Customers can upload data via the Internet with our *Empirical SecureServer*<sup>™</sup> website, which is password-protected and fully encrypted, using VeriSign Security and SonicWall. Similarly, our *MeasureResults*<sup>®</sup> and *SurveyCenter*<sup>™</sup> tools use a top-quality VeriSign security certificate; all teacher interactions are confidential over the Internet. Our off-site server has 24/7 technical support and a direct connection to the Palo Alto fiber ring, one of the fastest and most reliable Internet connections in the US. The server is guarded by a top-of-the-line firewall and several anti-viral and anti-spyware programs.

### Data Warehousing

Our data warehousing techniques and software are optimized for school data and can easily handle large and complex datasets. Our procedures are designed to address the many cases in which data provided by districts have not been fully verified or standardized. In addition to being able to interface with our SAS analytical engine and established analytical tools and with our survey generation tools, including our Survey Mirror tool, our database schemas and structures can support a wide range of scenarios. These include multi-level structure for districts/schools/students that allows flexible hierarchies, default structures for handling standard demographics while allowing extensions (extended ethnicity, for example), ability to track changes such as attrition and its causes, and multi-year support for projects spanning several years, including tracking changes in teachers, students, and rosters. Our data tools also include the proprietary FastMatch program, a simple adaptation of artificial intelligence techniques, that matches student names in cases where established IDs are not available. In addition, we have developed programs that process Scantron and similar input and provide data in the format useful in our databases.

### Surveys

As noted, our tools provide sophisticated capabilities for authoring, presentation, and collection of web-based surveys. Our proprietary *SurveyCenter*<sup>™</sup> provides a portal for survey participants, tracks their participation, and supplies other communication facilities. Surveys used in our research often consist of a series of individual questionnaires that provide time samples of teacher practices, resources, attitudes, and observations. The system can handle weekly logs concerning specific students. The facility uses a commercially available tool for web delivery of surveys which are maintained on a remote web server. Our off-site server has 7X24 technical support and a direct connection to the Palo Alto fiber ring, one of the fastest and most reliable Internet connections in the world. The survey server is guarded by a top-of-the-line firewall and several anti-viral and anti-spyware programs. Our tools provide sophisticated capabilities for authoring, presentation, and collection of web-based surveys. Our proprietary tool includes the interface to our database, which allows automated invitations to be sent via email to active and listed participants. The custom software performs automated aggregation of data from the surveys. New figures resulting from aggregation are fed back into our main databases where they are automatically transferred to analysis.

## Analytical Tools

Empirical Education uses the industry-leading statistics engine SAS for most of our analyses. We have enhanced the capabilities of SAS with several standardizing tools and procedures. Specifically, we have developed workflow tools that provide for an efficient analytical operation. These include early identification of data requirements, transmission of data sets from data warehousing, and automated listing of tasks and responsibilities. We have developed SAS macro sets to combine commonly used analyses, such as moderator analyses using demographic variables that can be carried out quickly and efficiently. SAS output is processed by Word and Excel macros that accurately generate complex tables and figures in standard, easy-to-use formats. We are also currently working with R, a rapidly growing open-source platform for statistical data analysis. R is more suitable for development of custom analytical projects, easily programmable graphics and tables, and more advanced data post-processing including report generation.

## Reporting Tools

Each of our reports is customized to the individual needs of our client. When appropriate, we utilize template guides to ease and streamline uniform reporting practices. For this, we have developed a number of tools, including Microsoft Office macros, that support the efficient reuse of templated text, table, and graph-building scripts used to create the final presentations of data.

## Office and Location

Empirical Education maintains 5,300 square feet of office space in Palo Alto, California, known as the birthplace of Silicon Valley and the home of Stanford University. The University of California campuses at Berkeley and Santa Cruz are both less than an hour away.

## Library Resources

Our staff members have access to the nearby Stanford library containing books, journals, and reference works numbering more than 8 million volumes. Stanford's Cubberley Education Library contains over 150,000 volumes and subscriptions to approximately 670 education journals. The collection includes curriculum guides, educational tests, and historical textbooks. We also have access to the full range of electronic library resources. Empirical Education serves as the Reference Desk for a federally funded regional laboratory, and as such, we access literature databases through the National Library of Education.

## THE EMPIRICAL EDUCATION TEAM

With an extraordinarily talented staff currently of 30 members, our company has the capacity to conduct high quality research efficiently. Beyond our expertise in research methods, we bring experience in teaching, school administration, product development, marketing, and publishing.

Our Executive Team's expertise encompasses educational research and evaluation, classroom practice, staff development, product development, and commercial publishing.

**Denis Newman** (*President*) founded Empirical Education in 2003 after a 25-year career in education. To help school districts succeed in their mission, he draws on his awareness of children's learning in the classroom, extensive experience in developing instructional technologies, lifelong commitment to scientific research, and entrepreneurial drive. Newman's PhD is in Developmental Psychology from the City University of New York. He has conducted research and development at Rockefeller University, UC San Diego, Bank Street College of Education, and BBN Corporation. He has published more than 35 books and articles and has served as program chair for the American Educational Research Association's Curriculum and Learning Division. He was a pioneer in the application of Internet technologies for student learning, professional development, and school administration, bringing to market the first integrated web server designed for schools. His business career has included senior positions at educational software companies Tegrity and Soliloquy Learning.

**Andrew Jaciw** (*Chief Scientist*) complements his deep understanding of statistical methods and experimental design with five years' practical experience as a third-grade teacher and ESL instructor. Jaciw holds a PhD in Education as well as an MS in Epidemiology from Stanford University. The research for his PhD focused on hierarchical modeling of longitudinal data of adolescent outcomes and using econometric methods to measure selection bias in studies of educational interventions. Before joining Empirical Education, Jaciw completed a BS in statistics and MA in math education at the University of Toronto and worked as a statistical analyst at the Ontario Institute for Studies in Education and Ontario's Education Quality and Accountability Office. As Empirical Education's Chief Scientist, Jaciw is involved in design and analysis for all our company's research.

**Valeriy Lazarev** (*Research Scientist*) holds an MS in Applied Math from Moscow Institute for Physics and Technology and a PhD in Economics from the University of Houston. Lazarev has held numerous research and teaching positions at Stanford University, Yale University, the University of Houston, and Moscow University, and has participated in a number of collaborative social science research projects. He is a recipient of the prestigious John M. Montias prize in Comparative Economic Studies and has most recently held the Campbell National Fellowship at the Hoover Institution. He brings to the company his extensive experience in both econometric data analysis and analytical software development and continues to work on both directions, providing scientific coordination of observational studies and contributing to the development of the company's data analysis system MeasureResults.

**Boya Ma** (*Manager of Design and Analysis*) holds a Masters in Statistics from California State University. Ma has over 6 years of experience as a statistician using sophisticated experimental methodologies and programming environments such as SAS, R, HLM and Matlab to conduct effectiveness evaluations of educational products. At Empirical Education, Ma oversees the design and analysis team and works with data warehouse engineers and research managers to assist in the writing of reports and interpretations of study results and support in the ongoing quantitative theoretical and empirical research to develop, implement, and automate cutting edge method in analyzing multilevel data. Currently, much of her work focuses on analyzing results from multi-site group randomized control trials as well as quasi-experiential multilevel data sets with continuous and categorical outcome variables.

**Gloria I. Miller** (*Director of Evaluation Design*) is both an experienced classroom educator and an expert learning-products developer in the electronics industry. While academic director of Sonoma State's PreCollege Programs, she helped the 3-1-3 program—now called University Transition Academy and winner of California State School Board's 1998 Golden Bell Award—to become a model high school-university collaboration. Miller co-authored *Digital Design: Foundations of Web Design*, which aligns key national technology standards—including both the ISTE National Educational Technology Standards for Students and the National Workforce Center for Emerging Technologies—with the needs of K-12 education. In her tenure as Director of Evaluation Research and Director of Research Operations, Miller has designed and implemented observational, interview, and survey measures for studies on topics ranging from elementary and secondary mathematics to college preparation and support policy initiatives. She is completing a PhD at the Stanford University School of Education's Learning Sciences and Technology Development program, with a concentration on Curriculum and Teacher Education.

**Sandy Philipose** (*Research Scientist*) brings both a practitioner and researcher lens for looking at issues of empirical research in education. Sandy completed her BA in History and Spanish and Masters of Arts in Teaching at Austin College in Sherman, Texas. Prior to attending Stanford University and completing her PhD in Curriculum and Teacher Education, she worked as a high school Spanish teacher for the Plano Independent School district in Texas for five years. During her time at Stanford, Sandy worked on projects focusing on topics such as teacher preparation, teacher practices, and their connection to student achievement. Areas of research include teacher learning and development and the teaching of language.

**Kylene Chinsio Shen** (*Product Manager*) brings more than ten years of experience in the education industry to her role as Product Manager for Empirical Education. Since receiving her MSEd from Northwestern University, she has worked as a curriculum developer on an NSF-funded environmental science initiative for high school students and has taught first and second grades and served as a math specialist in inner-city Boston. As an instructional designer and product manager at Kaplan K12's student technology division, Shen managed the development, implementation, and support of seven online education products. At Empirical Education, she oversees the production and marketing team in the development of company products, identification of new prospects and partnerships, and evaluation and improvement of company processes.

**Robert L. Smith** (*Vice President of Engineering*) holds a PhD in mathematical logic from Stanford University. As senior vice president of Computer Curriculum Corporation, he led the company's product development through its principal years of growth, creating the underlying algorithms for instructional optimization as well as the tools for efficient content formulation and for maintenance and design of the management system. At Stanford, Smith was the manager for a large National Science Foundation project involving computers and artificial intelligence in education. He taught computer science at Rutgers University and spearheaded that university's deployment of new computer systems for education and research.

**Laurel Sterling** (*Director of Research Operations*) applies her extensive experience in urban education, public school administration, research, and public policy to support schools in conducting evidence-based research. She has a Master's degree in Public Policy from the University of California, Berkeley. As a Program Manager/Evaluator in Oakland Unified School District's Department of Research and Evaluation, Sterling conducted summative and formative evaluations, best practices studies, needs assessments, and policy analyses.

**Kathryn Thomas** (*Research Scientist*) served over 17 years as a school teacher and administrator. While earning a PhD in Education Administration from the University of North Texas, she taught science, mathematics, and social studies courses for teacher candidates. With the Texas Center for Educational Research and with Academic Information Management, Thomas conducted research in school reform, vouchers and charter schools, academic accountability, teacher preparation, and special education issues. As research associate with LTG Associates, she evaluated California grant-funded

programs supporting efforts among law enforcement, mental health agencies, and community service providers to assist juvenile offenders and their families.

**Xiaohui Zheng** (*Research Scientist*) holds a PhD in Quantitative Methods and Evaluation from the University of California, Berkeley, with an emphasis on multilevel modeling and item response theory. She has advanced training in statistics and psychometrics and a broad range of research and applied experience in latent variable models, explanatory item response models, growth analysis, and large-scale assessments, as well as assessment systems for the evaluation of educational interventions.

**Professional staff.** Currently 19 additional staff members constitute the professional workforce to conduct our research and report results. These include research managers and survey analysts who have a wide range of practical school experience and expertise in disciplines such as psychology, sociology, education policy, instruction, and professional development. Our statistical analysis team is trained in advanced techniques required for the complex research designs called for in rigorous studies in schools. Our engineering team has extensive experience in database development and school data systems. Additional staff members provide support in product and contract management, accounting, HR, and general business administration.

## RESEARCH PARTNERS, SITES, AND CONTENT AREAS

We have worked in more than a thousand classrooms across the United States. Our partners have included districts, state agencies, and publishers. Our exclusive focus is on instructional and professional development programs in K-12 schools.

### Selected School Districts and State Agencies

Alabama Department of Education	Maui Community College, HI
Alum Rock Union School District, CA	McKinney Independent School District, TX
Amarillo Independent School District, TX	Mesa Public Schools, AZ
Anaheim Union High School District, CA	Miami-Dade County Public Schools, FL
Berryessa Union School District, CA	Mt. Vernon City School District, NY
Boston Public Schools, MA	Nacogdoches Independent School District, TX
Bowie Independent School District, TX	Nazareth Area School District, PA
Brevard Public Schools, FL	Niagara Falls City School District, NY
Charlotte-Mecklenburg Schools, NC	Ogden City Schools, UT
Corpus Christi Independent School District, TX	San Diego City Schools, CA
Delaware Department of Education	School District of Philadelphia, PA
Diocese of St. Petersburg, FL	Pickens County Board of Education, AL
Duncanville Independent School District, TX	Poway Unified School District, CA
East Side Union High School District, CA	Putnam County Schools, WV
Federal Way Public Schools, WA	Reynoldsburg City Schools, OH
Forsyth County School District, GA	Richardson Independent School District, TX
Fresno Unified School District, CA	Riverview Gardens School District, CA
Griffin-Spalding County School System, GA	San Diego Unified School District, CA
Hawai'i Department of Education	Springfield School District, IL
Illinois Valley Central School District, IL	Triad Community Schools, IL
Jefferson County School District, KY	Visalia Unified School District, CA
Kalamazoo City Schools, MI	Wauconda Community Unit School District, IL
Kanawa County Schools, WV	Wood County Schools, WV
Maui School District, HI	Yorkville Community Unit School District, IL

### Selected Publishers

Our company has partnered with these publishers to recruit school district sites and conduct randomized experiments or comparison group studies.

Frey Scientific	Pearson Education
Harcourt Achieve	Peoples Publishing Group
McGraw-Hill	Scholastic
PCI Education	Texas Instruments

## Federally Funded Grants and Contracts

We are working on grants and contracts with the following organizations:

### U.S. Department of Education

Institute of Education Sciences (Education Policy, Finance, and Systems)

National Center for Education Research

### Regional Education Laboratories (USED Institute of Education Sciences)

REL Southeast (University of NC, Greensboro)

REL West (WestEd)

REL Northeast and Islands (Education Development Center)

REL Midwest (Learning Point Associates)

REL Northwest (Education Northwest)

## Selected Interventions and Content Areas

Our basic research design and methods of data collection and statistical analysis apply to any instructional program expected to have an impact on measured student achievement. We have conducted research on the following content areas and interventions:

### Elementary School

**Early reading** (Scott Foresman's *Links to Reading First*)

**ELA test preparation** (PPG's *Measuring Up*)

**English language learning** (Harcourt Achieve's *On Our Way to English*)

**Math** (confidential)

**Reading** (confidential)

**Reading – Special education** (PCI's *Level One Reading Program*)

**Science** (Scott Foresman's Science)

### Middle School

**History** (Teachers' Curriculum Institute's *History Alive!*)

**Pre-algebra** (Carnegie Learning's *Bridge to Algebra*)

**Reading remediation** (intervention in progress)

**Reading – Special education** (PCI's *Level One Reading Program*)

**Science** (Frey Scientific's *Premier Science*)

### High School

**Algebra** (Carnegie Learning's *Cognitive Tutor*)

**Algebra** (Texas Instruments' *TI-Navigator system*)

**Foreign languages** (Language Learning Solutions' *Classpak*)

**Geometry** (Texas Instruments' *TI-Navigator system*)

**Reading remediation** (Scholastic's *READ 180*)

**Science** (confidential)

### Teacher Professional Development

**Backward design model** (confidential)

**Using electronic whiteboards with instruction** (Forsyth County, GA)

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