The Grand Challenge:
Transforming Arizona's K12 Education by Adopting an eLearning Systems Design

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ARIZONA EDUCATION'S PROBLEM: Arizona's K12 Education system is failing to properly prepare students for a 21st Century workplace defined by a "globalized," knowledge-based economy. In fact, Arizona ranks 38th in (NAEP) test scores, high school graduation rates and young adult education; worse (lower) in other education and income metrics; and 51st – dead last – in teacher pay parity with other occupations. This is exacerbated by several painful factors:

1. Being one of the hardest hit states in the real estate crash and economic crisis, drastic budget cuts have curtailed many forward-looking education initiatives; i.e., 2007's "Building 21st Century Schools."

2. As (Education is) a mature "legacy" industry, attempts at incremental improvement –hiring more teachers, full-day kindergarten, increased class hours and tutoring, pay raises, etc. – have proven counterproductive: nationally, *we now spend 44% more per student with no appreciable improvement in results.*

3. The Education industry has largely missed out on harnessing the advantages of Moore's Law, the phenomenon of ever-increasing computing power accompanied by ever-decreasing costs. In Arizona, online learning comprises only 5% of all learning, computer-interfaces per student average 8:1 and learning has yet to
move out of the computer lab into the actual classroom. Many rural areas still wait for broadband access.

4.   Professional Development –about $100 per teacher per year - is a fraction of what is needed to prepare Arizona's 55,000 educators for mastering the "digital classroom" (other technology-based industries average *$2,000* per employee). Meanwhile, we have a profound shortage of master teachers in STEM and languages.

5. Although stakeholders from government, education, industry, foundations and civic groups are in conceptual support of the digital classroom, the perceived lack of a feasible systemic solution has generally resulted in "crisis"-driven reactions (e.g., 2010's Prop. 101) that only provide temporary, limited effect.

Without a cost-effective, measurable way to produce world-class graduates, Arizona will continue to lose ground vis-à-vis other states in a vicious Economy-Workforce-Education circle/spiral characterized by lack of high-value job creation (potential employers go elsewhere), lack of skilled workers, and the resulting opportunity loss of tax revenues from higher wage earners and profitable Arizona-based industries.

THE SOLUTION: "*DISRUPTIVE INNOVATION*" --A complete transformation of Arizona's legacy Education system via effective and efficient adoption of eLearning. This ten-year "Grand Challenge" is (shall be) unique in the U.S. education system and applies a *systems designed* integrated model across all five levels –national, state, district, school, classroom – with particular emphasis upon the teacher-student nexus, the most crucial dyad of learning exchange. Arizona non-profit eSATS formed in 2004, is currently both the evangelist and architect for this sweeping paradigm.

Three (3) pilot projects in Arizona as well as numerous national Meta-studies have demonstrated – even in "disadvantaged" schools – eLearning's efficacy at producing *significant academic performance transformation*, shifting the Learning Effects (achievement) bell-curve impressively to the right: improving grades (C to B) improving school test score rankings (10th percentile to the 50th), etc. However, eLearning "done right" is much more than computer-based learning.   It is a holistic approach involving interactive digital curricula; self-paced, student-centric personalized learning; ubiquitous interface/access; empowered teachers providing a hybrid approach of both legacy ("sage on the stage") and innovative ("guide on the side") roles; and, an intellectual and physical infrastructure leveraging sophisticated data warehousing/sharing and broadband penetration.

The goals of the eSATS Grand Challenge are tantalizing yet *achievable:* 95% graduation rate (by 2019); an NAEB ranking in the top quartile – challenging Massachusetts at "the top"; a sustained teacher-student ratio of 19.4; teacher compensation incrementally increased by 15% over ten years (*above* normal COLA and other raises); other specific metrics demonstrating comparative robustness of Arizona industry with the national/global economy; and, a State funding outlay that is at worst *budget-neutral* (negligible net investment), paying for itself through increased student productivity (accelerated path to graduation, thus reducing class burden), operational efficiencies from technology (Moore's Law), and synergies from intelligent data exchange (i.e., reducing redundancy, early warning, better reporting, etc.).

IMPLEMENTING THE eSATS SOLUTION: Arizona's innovation driver, eLAC (eLearning Action Central), shall provide project management, decision support, advocacy/relationship building, and drive implementation of the ten-year Grand Challenge roadmap. They will *not* "dictate" solutions or timing decisions to schools(!). eLAC will develop/oversee the key macro-elements for successful eLearning transition. Necessary elements include:

A State-Level and District-level *Intellectual Infrastructure*, highlighted by 1) comprehensive digital curricula, accompanied by a sophisticated portal-based knowledge system (enabling access to best-in-class research and products) and onsite support (one expert for every seven schools); 2) data-driven decision support leveraging the SAIS data warehouse to streamline decisions (i.e., compliance, real-time learning, etc.); 3) a teacher education and training program, consisting of upgraded curricula within colleges of education and an enhanced continuous professional development system capable of taking a teacher *from Basic to Master eLearning professional* within four years; 4) revising the State regulatory and accounting system to enable complex tracking of individualized competency learning, to permit ubiquitous curricula sources, and to enact multi-level eLearning teacher certification; 5) new real time formative assessments (goal: 2014-15) emphasizing higher-level skills.

A State-Level and District-level *Physical Infrastructure*, highlighted by 1) partnering with telecommunication providers to provide cost effective and redundant broadband Internet connectivity to all schools (GITA's goal: completion by 2013), with 2019 broadband connectivity increasing *2,600%* from 8 to 210 gigabytes per second; 2) a *1:1* student-computer ratio via ubiquitous interfaces including wireless keypads, PDA's, iPods, eBooks, cell phones and handheld devices, netbooks/notebooks/laptops, and "traditional" networked workstations; 3) educator workstations and supporting software suites, enabling orchestration of multiple curricula sources with multiple peripherals (whiteboards, scanners, printers, etc.); 4) building ten new 21st Century schools per year, as defined by SFB's 1998 mandate; and 5) Transforming Arizona's 2,000 legacy schools to 21st Century (eLearning) standards, starting with 20 schools in Year One, peaking at 200+ in 2016.

A linked coalition of agencies/initiatives such as eSATS, GAZEL, ADE, ABEC, P20, CTE, iNACOL, and ASU (and other university research centers) sharing knowledge. Also, direct linkage of Education to Economy & Workforce (Chamber of Commerce, economic partnerships, etc.) while leveraging the thought leadership of Arizona's many impressive Education companies such as Pearson Digital, Apollo, Grand Canyon U., ...

BENEFITS: The eSATS Grand Challenge is **WIN$^{X.}$** … **for *all* Arizona Education stakeholders**

Students: Graduation rates soar, spurred by personalized, self-paced education that simultaneously decreases failure rates and enhances interest (they won't dropout from boredom!). They receive many times more individual attention and enjoy a *3:1 – 6:1 increase* in pace of learning (as experienced in meta-studies).
Teachers: Careers are enhanced; pay scales are accelerated. They are elevated (and "freed up") into true 1:1 tutelage roles enabling a far greater scale of questions, answers and other individual student attention.
Schools: Become true enablers of 21st Century learning, harnessing an impressive array of technology interface/modalities and "rich media" curricula to maximize learning outcomes. Further, they operate more efficiently via better decision support, better summative and formative data, and steady support from eLAC's staff.
State budget: A full eSATS design actually produces an $8.5 billion *cost-savings* over 10 years (compared to the baseline scenario). Students graduate faster thus reducing overhead burden; scaled digital technology and remotely hosted (e.g. Software-as-a-Service) curricula save a fortune in traditional books and maintenance upkeep; technological costs-per-transaction drop consistent with Moore's Law; and, better decision-making streamlines operational costs. *These cost-savings don't begin to account for the greater Return-On-Investment of enriched state revenue* (tax) flows vis-à-vis 1) growing private enterprise sector and 2) more highly skilled workers!
Industry: An increased *quantity* and *quality* of high-skilled workers will attract more private industry to Arizona, enabling us to effectively compete with Silicon Valley, Carolina's Research Triangle, Colorado's Front Range, Austin, Seattle, the Massachusetts I-28 corridor and other innovative hotbeds of industry.
State image: As a trend-setter and early adopter – "first mover" – Arizona stands to benefit from powerful unintended consequences (a fortunate phenomenon of every transformational innovation!) Furthermore, Arizona will be well-positioned to win lucrative grants (such as Race to the Top, NCLB, Small Business Innovation Research, etc.), further accelerating a "virtuous cycle" of innovation, leadership, and economic rewards.