

## Advanced Technologies Regional Network

Delivering High Quality
Technical Education in
Gallup, McKinley County
and for the State

## Table of Contents

Executive Summary.		1
Introduction		4
Training the Nation's	Future Labor Force	5
The Declining Compet	itiveness of the U.S. Labor Force	
The Role of Technical	and Professional Education	
National Case Exam	oles	9
South Mountain Comr	nunity College, Phoenix, Arizona	
Penn State University,	State College, Pennsylvania	
University of Massachu	usetts, Boston, Massachusetts	
Chemeketa Communit	y College, Salem, Oregon	
Maryland State Depar	tment of Education	
Bellevue Community C	College, Bellevue, Washington	
New Mexico's Best F Advanced Technologie Policy Recommenda	_	17
Focu	s I: Increase Academic Rigor in High School and Community College Technical Programs	
Focu	s II: Provide Instructional and Extramural Enrichments that Will Help Students Complete Secondary and Post-Secondary Degrees	
Focu	s III: Create Economic-Development Focused Public-Private Consortia to Guide Technical and Professional Education	
Conclusion		34
Interviews and Site	Visits	34
References		37

## **Executive Summary**

As part of Governor Bill Richardson's technical high schools initiative, New Mexico House Bill 293 appropriated \$10 million to seed the development of technical high school programs in community colleges. The purpose of the legislation was to re-make the anachronistic "Vo Tech" training begun in public schools almost 90 years ago with technical education that was sufficiently rigorous to prepare youth for good careers in the 21st century.

The University of New Mexico at Gallup was selected by the State of New Mexico's Public Education Department and Higher Education Department to introduce a regional technical education center, and, in the process, to develop an exemplary program that could be replicated statewide. Public Works LLC was commissioned by the University of New Mexico at Gallup to formulate the strategic plan for this new effort.

Public Works reviewed recent reports and analyses of career and technical education reform; researched high quality public school, community college, and state-level technical education best practices in New Mexico and other states; met with technical education experts, representatives of state agencies, community colleges, and the business community; proposed a process to determine use of available funding and pursued additional funding sources; and worked with employers, public school, tribal and university partners to determine programmatic goals.

The result is this blueprint for an Advanced Technologies Regional Network (ATRN), a community college-based, grades 9-14 educational program for advanced technicians and professionals.

#### This report:

- > Reviews the importance of technical education for training the nation's future labor force.
- > Outlines some of the elements of successful technical and professional education programs.
- > Describes the process for developing high quality education and training programs at the University of New Mexico at Gallup that produce a more competitive regional workforce.

Public Works proposes the following recommendations as the foundation for a worldclass advanced technical education system at UNM Gallup and for the state.

Focus	Recommendations	
Increase Academic Rigor in High School and Community College Technical Programs	Ensure that New Mexico's workers have the technical expertise, but also the higher-level thinking, language and reasoning skills to add value – and therefore command better incomes – in today's economy:	
	<ol> <li>Begin teaching mathematics, language, and reading concepts to public school students in pre-kindergarten.</li> </ol>	
	<ol><li>Require all public school graduates to complete a rigorous academic curriculum that will prepare them for post-secondary-level learning and the workplace.</li></ol>	
	<ol> <li>Emphasize science, technology, engineering, mathematics (STEM)     curriculum in secondary school advanced professional and technical     training and recruit highly skilled teachers in STEM disciplines.</li> </ol>	
	4. Integrate technical and academic learning for high school students through community college-based career pathways, incorporating team teaching and co-teaching among technical and academic teachers and among community college faculty and public school teachers.	
	5. Promote college-level course taking among high school students in career pathways by mingling high school and college students in the classroom, providing dual credit for all college-level coursework, and advancing students seamlessly through post-secondary curricula.	
	6. Develop a capstone course and/or a capstone semester to be taken in the university at the culmination of the community college degree.	
	<ol> <li>Provide professional development opportunities to retain the best teachers and faculty and promote high standards among all instructors.</li> </ol>	
Provide Instructional and Extramural Enrichments that Will Help Students Complete Secondary and Post- Secondary Degrees	Make learning relevant to the needs of students, their families and their communities:	

Focus	Recommendations
	1. Initiate a major state-funded marketing effort aimed at closing the achievement gap by promoting the value of higher education statewide and providing information about careers and wage levels, career programs of study, and educational funding options to students and their parents.
	<ol> <li>Offer technical education to students and their families         as an opportunity to pursue a good career that will earn         high-wages and to gain skills that will be transferable         within and across numerous occupations.</li> </ol>
	3. Invest in innovative student recruitment and retention strategies, including working with parents to set high expectations for student performance; providing extrainstructional support programs for at-risk and underprepared youth, including summer camps and intensive counseling; using parent volunteers to staff campus-based "Family Centers" that help mentor and advise students; and designing interventions to account for cultural and familial issues.
	4. Make available sophisticated technical and scientific equipment and technology in the classroom that provides essential opportunities for "real world" handson learning.
Create Economic-Development Focused Public-Private Consortia to Guide Technical and Professional Education	Establish Community College Technical Education Centers that can deliver a qualified workforce to meet local, regional, and statewide economic demand:
	Develop community college-led regional educational consortia that include university partners, employers, secondary schools, industry associations, federal and state agencies, and community groups.

Focus	Recommendations
Create Economic-Development Focused	2. Target training for high-growth industry sectors or
Public-Private Consortia to Guide	"clusters" that are of strategic importance to the
Technical and Professional Education	state and the region.
(continued)	
	Initiate career pathways instruction in identified
	"clusters" beginning in middle school.
	4. Provide incentives to community college and high
	school faculty to work together to develop a grades
	9-14 curriculum that is jointly delivered.
	5. Share instructors and instructional facilities and
	equipment among consortia educational institutions.
	6. Emphasize industry programmatic support – including
	contributions to curriculum design and evaluation,
	student and teacher externships, classroom
	equipment and technology, and industry advisory
	committees – and job placement.
	7. Develop a "common vision" among consortia
	members about what is being achieved and a
	willingness to find creative and collaborative
	solutions to achieve it.

## 1 | Introduction

New Mexico has begun a process to recast its technical and professional education. What used to be known as public school "vocational and technical" or Vo Tech education is commonly known as career and technical education (CTE). Vo Tech began as a means to provide occupational training for the majority of the nation's students who would not have the opportunity – or the need – to attend college. Today most technical workers require study at the college level to compete and perform in the workplace. CTE students now must begin professional training in secondary school and continue through a technical and professional credential in the community college.

Governor Bill Richardson has been steadily altering the education landscape in New Mexico since he took office in 2003. The Commission on Higher Education and State

Board of Education have been replaced with cabinet secretaries reporting to the governor. In recognition of its role as a building block in workforce development, adult basic education has been shifted from its out-of-date place in public instruction to the purview of higher education; and with the introduction and passage of House Bill 293 in 2004, requiring the establishment of "technical high schools" on community college campuses, the Governor and the legislature have signaled their intention to reconsider the role of technical and professional education in the state's 21st century economy as well.

As part of the Governor's technical high school initiative, the University of New Mexico at Gallup (UNM-G) was awarded \$600,000 to seed the development of its technical education collaborative with Gallup McKinley County Public Schools, Pueblo of Zuni Public Schools, and other partners. UNM Gallup also received special funding to study how technical education was being conceived and delivered in other states and to plan for the integration of public school and college-level students and programs in it's collaborative.

## 2 | Training the Nation's Future Labor Force

High school reformers have been debating the future of traditional career and technical education for at least a decade.¹ Public funding for vocational education began in 1917 when the federal government determined that public instruction should not be limited to liberal education and that students should have the opportunity to receive practical training that would help them earn a living.² At the time, and until late into the 20th century, career jobs were available for high school graduates across the economy. But the New Economy has demanded increasingly complex skills from its technical and professional workers – thrusting an ever-increasing number of students into advanced technical and post-secondary training and requiring educators, economists and policymakers to reevaluate the nature and purpose of public "vocational" education.

There is now considerable consensus among education reformers, government officials, and employers about the need to improve technical education, but they also agree on the tenets of a new system, which will be discussed below. An early 20th century model for vocational education cannot be expected to be effective for training the 21st century workforce, and researchers have found that the "overall record of CTE...in high school has been disappointing," because "graduation from a CTE program does not necessarily mean that a student is academically prepared for college-level work or for today's workplace."<sup>3</sup>

#### [1] The Declining Competitiveness of the U.S. Labor Force

The United States is facing unprecedented competition from the global labor market. The world economy is demanding more highly educated workers – economist Tony Carnevale has estimated that, in the future, as many as 70 percent of all jobs will require some form of post-secondary education<sup>4</sup>– but the United States is declining against its competitors in the quality and competitiveness of its workforce.

A decade ago, for example, more than half (57 percent) of 7th graders in the countries examined in a Harvard University study exceeded U.S. students' performance in math on the TIMMS international test of student proficiency. Countries that bested the United States include former communist-bloc countries like the Czech Republic, Slovenia, Hungary, and Bulgaria and Asian newcomers like Hong Kong and Singapore.<sup>5</sup> In 2000, that number jumped to 65 percent as measured among Organisation of Economic Cooperation and Development (OECD) countries on the PISA mathematical literacy scale for 15-year olds.<sup>6</sup> And while the percentage of the U.S. population with a higher education remains among the highest in the world – succeeded only by Canada – other countries far exceed the United States in the rate of growth of individuals entering higher education: "enrollment in tertiary education, which covers both university-level education and high-level vocational programmes, increased between 1995 and 2002 by more than 50% in the Czech Republic, Greece, Hungary, Iceland, Korea and Poland, and still by more than 20 percent in Australia, Finland, Ireland, Mexico, Portugal, Spain, Sweden and the United Kingdom."<sup>7</sup>

There have been serious national policy concerns about the health of the U.S. educational system and its capacity to uphold the U.S. economy since the publication in 1983 of A Nation at Risk.<sup>8</sup> Twenty years later, rather than concluding progress, the report of the United States Commission on National Security/21st Century, headed by former senators Gary Hart and Warren B. Rudman, described weaknesses in the U.S. educational system as among the gravest domestic security threats facing the nation.

The United States can remain the world's technological leader if it makes the commitment to do so. But the ...quality of the U.S. education system...has fallen behind those of scores of other nations. This has occurred at a time when vastly more Americans will have to understand and work competently with science and math on a daily basis. In this Commission's view, the inadequacies of our systems of research and education pose a greater threat to U.S. national security over the next quarter century than any potential conventional war that we might imagine. American national leadership must understand these deficiencies as threats to national security. If we do not invest heavily and wisely in rebuilding these two core strengths, America will be incapable of maintaining its global position long into the 21st century.

#### The Role of Technical and Professional Education

Changes in technology and globalization have permanently altered the makeup of the American workforce. Once-ubiquitous jobs that relied on workers with relatively little education to follow simple instructions are being replaced by automation or by low-cost overseas labor. Workers who add value – and therefore command better incomes – in today's economy must have technical expertise but also the higher-level thinking, language and reasoning skills to solve problems and adapt to changing conditions on the job.<sup>10</sup> The occupations of the future will be those that require workers to posses and utilize intuitive knowledge and hands-on expertise – not just doctors, technicians, and teachers, but also entrepreneurs, chefs and artists.<sup>11</sup>

This represents a radical change for the national economy, and permanently alters the meaning of career and technical education and the role of community colleges to support it: High schools have an unprecedented new responsibility to prepare all students for post-secondary-level learning and the workplace. Unfortunately, too few students are qualified for higher education or a workplace demanding higher skills.

The New Economy has brought enormous demographic changes to the United States, producing pressures throughout the educational system. More American youth are entering college than in any previous generation (nearly half of the U.S. population now receives some post-secondary education<sup>12</sup>), and in future generations 70 percent of these individuals will be minorities.<sup>13</sup> Higher education institutions are absorbing larger numbers of less prepared students<sup>14</sup> at the same time that state financing for higher education – which accounts for the bulk of the funding – and federal financial aid and other supports are declining.<sup>15</sup>

Community college-based technical education is a means to bridge the gulf between these seemingly irreconcilable poles: Smartly designed programs that offer high school students the opportunity to complete college-level coursework through community colleges provide academic and efficiency gains for states by raising the academic quality of high school curricula and shortening the timeframe for achieving college-level education. Thus, community colleges have been transformed from local corner stores to critical regional suppliers in the workforce supply chain.

> More than half of all college students in the United States are in community colleges – in New Mexico 74 percent of all freshman and sophomore students in the state attend community colleges, and enrollments at two-year institutions in 2004 grew at a rate of over 8 percent, twice as fast as that of the universities – which means that they are already serving as the de facto doorway to higher education opportunity.

- > Community college education is less expensive to produce and more efficient than university education. In New Mexico, community colleges spend \$6,915 per student on higher education<sup>16</sup>, and return over four dollars to the state for every dollar invested.<sup>17</sup>
- > Finally, community college technical education programs now effectively begin in high school. This new reality creates the opportunity for states not only to reap significant cost savings, but also to improve the high school experience:

The founder of the Redesigning the American High School initiative, Virginia Governor Mark Warner, is making major changes in high school policies in his own state. Virginia, for example, is challenging high school students to earn college credits while still in high school and making it easy for them to do so. The state has expanded access to dual enrollment programs, in which high school juniors and seniors take courses at community colleges for which they earn both high school and college credit, and advanced placement programs, in which students study and are tested in college-level coursework. The state has also established a sweeping new articulation agreement among 62 of its public and private institutions that ensures that a common academic core curriculum will be accepted for degree credit throughout the state. The state projects that this measure will "save students and their families up to \$5,000 in reduced college-tuition costs." 18

Preparing the workforce for 21st century jobs is a continuum that must start by secondary school and continues at least through entry into the workplace. Therefore, we must:

- 1. Make sure that children receive in secondary school the foundation they will need to go on to higher education.
- 2. Help students to complete secondary school and transition into higher education.
- 3. Provide them with the higher education they will need to transition into the workforce, in ways that appropriately prepare them for that real-world workforce.

Community colleges obviously have a pivotal role to play in all three of these goals:

1. Community colleges can help develop and inject rigor into high school curricula.

- 2. Community colleges can provide programs for high school students that enhance the high school experience and keep students interested and engaged in education, thereby smoothing their entry into and advancement through higher education.
- 3. Community colleges can coordinate with employers and other community partners the development of curricula and educational programs that ensure that students are properly prepared for the actual challenges they will face and the skills they will need in the workplace of the future.

These three elements are what successful technical and professional education programs provide. The following section highlights such programs in other states; many of which are being actively supported by their state governments. These states have adopted progressive technical and professional education strategies that impose rigorous academic standards in technical and professional education, merge secondary and post-secondary education, and tie training directly to their key economic sectors. Thus, they can serve not only as a blueprint for building the Advanced Technologies Regional Network at the University of New Mexico at Gallup, which is being formed as a result of this study, but also as the basis for a successful technical education consortia model for the state of New Mexico.

## 3 | National Case Examples

This section details how a focus on the priorities discussed above is leading to success in national case examples.

Following are six brief case studies that demonstrate how public-private consortia are guiding the development of a high quality technical and professional workforce in local and regional economies across the country.

#### [1] Set High Standards for Student Achievement

South Mountain Community College (SMCC) in the heart of urban Phoenix, Arizona would be the envy of any community college in the country: It has visionary administrators, abundant faculty resources, and is boosted by a thriving economy, vibrant business community, and a conducive policy environment. The Bioscience Collaborative at SMCC grew out of these ideal conditions, but it has succeeded because of the commitment of

Bioscience
Collaborative, South
Mountain Community
College, Maricopa
Community College
System, Phoenix,
Arizona

collaborative partners to a common vision for student achievement.<sup>20</sup> In this exceptional partnership, community college and secondary school faculty and administrators have achieved the integration of a rigorous academic and technical curriculum that high school reform researchers<sup>21</sup> envision. They jointly plan, manage, and teach a college-level, research-based advanced science program that prepares students to pursue both university study and professional and technical careers.

The Bioscience Collaborative at South Mountain Community College had its genesis in 1998, when the college added an agribusiness magnet charter school to its campus. From the outset college administrators encouraged their faculty to work together with secondary school teachers to build dual-credit opportunities for high school students. The result has been an innovative symbiotic partnership among the institutions and their other partners:

- > Faculty jointly develops the career pathways curriculum to ensure that high school students are prepared to step seamlessly into college-level coursework.
- > High school instructors teach both high school and college students, as do college instructors; and high school students mingle imperceptibly with college students and their instructors.
- > Because they are receiving college credit, many students in the program complete high school with most of the credits needed for an associate's degree.
- > A mutual goal among the collaborative's secondary and post-secondary partners is to train future scientists, not just technicians. The program emphasizes research as a means both to inject sufficient rigor into the high school curriculum and to provoke student creativity and intellect. Each student in the biotechnology pathway must design and complete an evidence-based research project.
- > The SMCC biotechnology associate's degree transfers toward the baccalaureate degree at Northern Arizona University.

#### [2] Ease Academic Transitions Along the 9-20-workforce Continuum

An exceptional partnership between the Commonwealth of Pennsylvania and Pennsylvania State University is making available world-class education in nanotechnology science and fundamentals to every community college student in Pennsylvania who wants to pursue it. The Penn State Nanofabrication Facility was started in 1991 in the college of engineering; through grants and cooperation with the university the project's directors have been able to build a fully functional nano-manufacturing plant on the university campus. In 1998, with support from the National Science Foundation (NSF) Advanced Technologies Education (ATE) program, the university founded the Regional Center for Nanofabrication Manufacturing Education, an educational

consortium with the state's community colleges and an employer network, to utilize the fabrication plant for educational purposes. In the only partnership of its kind in the Pennsylvania state university system, Center faculty directors and adjunct instructors and community college faculty collaborate in the development and delivery of community college-level curriculum, student placement activities, and industry outreach.

The Penn State **Center for** Nanotechnology Education and Utilization, **Pennsylvania State University, State College Pennsylvania** 

Pennsylvania is populated by a variety of companies from pharmaceutical, semiconductor, and chemical to telecommunications and computer technology that employ nanofabrication principles and techniques. The state has made strategic investments to cultivate this community, including in the development of a workforce qualified to support these companies, advance nanotechnology research and development, and attract new business and industry.

Penn State's Regional Center for Nanofabrication Manufacturing Education is a cornerstone of the state's high technology economic development strategy and a model of a seamless educational delivery system for the 21st century.

This pioneering program has established a career pathway that provides students with academic preparation to pursue university degrees as well as sophisticated skills to enter high technology occupations. Although Pennsylvania does not have a centralized higher education system or transfer agreements among public two-year and four-year colleges,

Penn State administrators and state legislators have been able to think creatively and practically about how to provide the assets of the university for the broader educational and economic good.

- > State government supports tuition remission and room and board for any community college student in the state enrolled in a community college nanotechnology program to complete a capstone semester and certificate program at Penn State University.
- > University partners throughout the state accept the community college degree and capstone semester certificate.

#### [3] Provide Necessary Professional Development for Educators

Gordon Moore, the co-founder of Intel Corporation, predicted in 1965 that the processing power of integrated circuits would virtually double every year for the foreseeable future, an observation that has proved so accurate that it has

become recognized around the world as "Moore's Law." Because of the constant acceleration in the power of IT products and applications, it is important that information technology faculty stay current with the latest technology knowledge and standards so that curriculum will be sufficiently rigorous academically and technically relevant.

Boston Area Advanced Technological Education Connections (BATEC), Boston, Massachusetts

Boston Area Advanced Technological Education Connections has addressed the demand to continuously upgrade the quality of the IT labor force not by providing education and training services for business but by opening a conduit between educators and practitioners. The consortium, based at the University of Massachusetts at Boston and supported by the National Science Foundation ATE program, creates opportunities for its business partners and member high school, community college and university faculties to exchange data, information and ideas about industry innovations that contribute to advances in information technology research, application, and pedagogy.

Example

BATEC works with industry partners to develop skills-based standards for educational curricula and with teachers to improve technical knowledge and pedagogical skill needed to help students meet those standards. Because of this approach, students in BATEC affiliated institutions are more likely to complete their programs and enter employment ready to work. BATEC programs train faculty to incorporate the latest industry tools, equipment, and practice in their coursework; provide both teachers and students with professional networking and internship opportunities; and encourage

institutions to create conditions that will make it easy for professionals to return to school to pursue advanced learning and degrees that will further their careers. BATEC sponsors a variety of activities that fortify its network and support the development of highly competent faculty and highly skilled professionals, including:

- Articulations and Curriculum Connections: BATEC has spearheaded a process with the University of Massachusetts at Boston to put in place articulation agreements among the center's community colleges.
- High Tech College Fair: Boston-area universities such as the Massachusetts Institute of Technology and the University of Massachusetts at Boston participate in this annual recruiting event.
- Public Forums: BATEC routinely brings together industry practitioners with secondary teachers and post-secondary faculty to share and disseminate knowledge and broaden professional outreach.

#### [4] Use Cutting-Edge Teaching and Learning Technology to Engage Students and **Increase Access**

The Oregon Gateway for Business and Education is an uncommon alliance in which business, education and workforce development partners have formed a common interest in the regional economy.<sup>22</sup> The project pulls together the resources of Chemeketa Community College, the Enterprise for Employment and Education – a public-private workforce development organization sponsored by Chemeketa Community College that combines local Workforce Investment Board (WIB) One-Stop services and Department of Labor generated labor market information with direct access to community college training programs and an independent oversight board – the Oregon Manufacturing Extension Partnership, and the Strategic Economic Development

The Oregon Gateway for Business and Education, Chemeketa Community College, Salem, Oregon

resources they need to succeed.

The Gateway for Business and Education is "industry's link to assessment and training resources for efficient and competitive employees." 23 The project provides cutting-edge teaching and learning technology for workers, employers, and training agencies through a fully functional web-based portal.

Corporation in a seamless system that provides both businesses and workers with the

- > The site is a good example of the comprehensive on-line offerings that should be available to support technical and professional education programs and that are mentioned in the executive summary as a necessary component of student success.
- > Courses are offered through Chemeketa Community College in partnership with specialized educational content providers like WorkKeys and KeyTrain, and cover a wide range of subjects, beginning with basic skills:
  - Human Resources Management
  - Computer Science
  - Hospitality
  - Leadership
  - Safety Training
  - Healthcare
  - Electronics
- > The Gateway supports a career pathways<sup>24</sup> approach in which technicians and professionals have "lifelong" access to education and skills upgrading.
- > High schools currently are not partners in the Oregon Gateway, but the next step in this collaborative would be to provide opportunities for youth to use the Gateway for skills assessments and upgrading, summer coursework, externships, internships and work-based learning.

#### [5] Prepare Students for Jobs in Strategic Industry Clusters

Maryland's approach to technical education reform has been smart and comprehensive. More than fifteen years ago the Maryland State

Department of Education (MSDE) Division of Career Technology and
Adult Learning initiated a business-led effort to reform its career and
technical education systems. This state-private sector effort focused
on reaching an elemental goal: ensuring that all students, making no
distinction between the college-bound and the non-college-bound,
were adequately prepared to support the state's high-growth
economy. The results have been stunning: "In 1993, when Maryland
first reported on the number of CTE students also completing the
coursework to prepare for college admission, only 14 percent of CTE

completers followed the college-prep course-taking pathway. Today that percentage has increased to 41 percent."<sup>25</sup> This finding validates the position first taken by the MSDE and its blue ribbon advisors that Maryland's high-tech workforce should be highly educated. The decision to adopt strategic industry targets statewide for

**Maryland Career Clusters** 

educational development as well as economic development has succeeded in producing the competitive workforce that Maryland's planners envisioned and making Maryland's economy one of the strongest in the country.<sup>26</sup>

Maryland Career Clusters was a groundbreaking initiative for several reasons. It:

- > Began with an emphasis on academic achievement long before the new standards imposed on public education by the No Child Left Behind Act
- Was a cooperative initiative among the Maryland State Department of Education, the Governor's Workforce Investment Board, the Maryland State Department of Business and Economic Development, and the Maryland Department of Labor
- > Identified ten broad career clusters linked to the state's "key economic sectors"
- > Incorporated substantive contributions from industry advisors to create the "knowledge and skills" components of these career clusters
- > Made the state's strategic career clusters the standard for technical education and training throughout Maryland public schools, and
- > Created incentives for districts to adopt the "best practices" career pathways curricula that had been created in the statewide initiative.
- [6] Position Community Colleges at the Center of Regional Consortia that Unite Education and Economic Development Partners

The National Workforce Center for Emerging Technologies is a proven example of the power of community colleges to broker the shared development of educational products and services among industry experts, academic researchers, and educators. Working with major industry partners like Microsoft Corporation, Oracle Corporation, The Boeing Company and Avaya, Bellevue Community College (BCC) has for ten years operated one of the foremost resource centers in the country on applied education, research, and analysis for the information technology industry. NWCET's supporters, among them the National Science Foundation, have endorsed Bellevue Community College's stewardship of this work because the college brings unique resources to the center's mission to:

National Workforce
Center for Emerging
Technologies and the Center
for Information Technology
Excellence, Bellevue
Community College,
Bellevue, Washington

- > Analyze IT industry trends, educational programs, and best practices;
- > Document industry skills standards; and
- > Promote skills standards-based curriculum.

# NWCET's state partner at Bellevue Community College is the Center for Information Technology Excellence (CITE). CITE offers a variety of products and services for the statewide IT community, including:

- > A data warehouse containing IT research and labor market information.
- > Technical assistance to help community colleges deliver training programs that meet customer needs for quality and convenience by incorporating web-based modules, flexible scheduling, customized and contract training methodologies, and credit and non-credit certificates.

The following are examples of CITE programs:

- > IT Futures Education Summit is an annual one-day workshop on emerging IT trends and their impacts on business and education.
- > Instructor Job Shadow is sponsored by businesses to allow college and school instructors to observe first hand the advances of technology in the workplace.
- > CyberCareers is a one-stop on-line resource that orients students, instructors, career changers and school counselors to the education and skill requirements of IT careers.

What do we learn from these examples of high quality programs? Primarily that global competition is requiring increased productivity from educational institutions as well as businesses. The organizations in this sample have formed strategic alliances that enhance their competitiveness by improving the quality of their product. Why is this necessary? Because the economy can no longer use "underpowered" human capital that anachronistic traditional high school CTE and community college vocational programs produce. The programs profiled here have shown, many over a period of a decade or more, that educators can improve efficiency and performance and spark innovation when they have a common vision for student achievement and the willingness to work together to develop a "seamless, non-duplicative pathway"<sup>27</sup> between secondary and post-secondary and among post-secondary learning to achieve it.

The following sections of this paper describe the blueprint that we developed for delivering technical and professional education at the University of New Mexico at Gallup that will produce a highly qualified regional labor force and a state-of-the-art technical and professional education system for New Mexico. We conclude with broad policy recommendations for improving the overall quality of workforce training in the state. The policy recommendations that found UNM Gallup's Advanced Technologies Regional Network and that make up the system solutions for the state are based on Public Works' research of model programs in other states and on national research on high school reform.

## 4 | New Mexico's Best Practice Model

New Mexico is a geographically large, primarily rural state in which the population density is only sixteen persons per square mile. Family agricultural, manufacturing and services businesses that have been the mainstay of the rural economy for centuries are steadily being eroded by high technology industrial operations and multinational suppliers. The vast majority of economic and employment activity still occurs in small, local enterprises, not large corporations, but most small- and medium-sized employers are centered in and around urban areas, which support 75 percent of the population, leaving large regions of the state cut off from the infrastructure, services, transportation, markets, and workforce needed for non-farm businesses. To sustain their economies and the quality of their way of life in the 21st century, rural communities will have to do several things:

- > Invest in high quality education programs that prepare homegrown teachers, healthcare workers, maintenance engineers, builders and others who, unlike many migrants, will remain in isolated areas to provide essential services.
- > Cultivate local entrepreneurs to start and operate small businesses for products and services that have high export- or niche-market values.
- > Form large regional economies with communities that share geographic proximity and/or cultural sensibilities to increase employment opportunities. For example, Navajo, Hopi, and Zuni tribal communities in Arizona and New Mexico share a cultural and physical base that could support a united economic development approach.
- > Plan for strategic economic growth with regional partners.
- > Create a fertile economic environment within the region by training highly skilled technicians for emerging and growing industries.

Form strategic alliances among national and regional educational institutions, employers, industry and trade associations and government agencies to leverage shared interests and resources.

The University of New Mexico at Gallup is located in McKinley County, which is bordered by the Navajo Nation to the west and the Pueblo of Zuni to the south. It has the highest enrollment of Native Americans of any two-year public university in the United States and serves one of the country's poorest, most isolated and most under-educated rural areas. The unemployment rate nationwide for those sixteen years or older and not in high school is 5.1<sup>28</sup> percent; for New Mexico, it is 7.3 percent; but in McKinley County it is 17.1 percent, and for the Navajo Nation it is almost 45 percent.<sup>29</sup> According to 2000 U.S. Census Bureau information, 34.8 percent of the McKinley County population lack a high school diploma (compared to 19.6 percent nationwide); only 5.8 percent of McKinley County residents have received an associate's degree, and only 6.6 percent possess a baccalaureate degree. Per capita income for Navajo people is \$6,217, and 56.1 percent live in poverty.<sup>30</sup>

In a global labor market, the McKinley County area will not succeed in attracting new business investment unless it develops a more skilled and competitive local labor force. Under the leadership of a new CEO, UNM Gallup has begun to reevaluate its role in the community and its capacity to address this challenge. College administrators have joined with community stakeholders, including tribal leaders, business executives, school board members, and district superintendents, in the McKinley Area Education Consortium to assess the area's workforce and economic development demands and the college's response to them. More than two years ago, the college initiated discussions with the Consortium that led to the formation of the Advanced Technologies Regional Network. As a direct result of this dialogue, the mission of the Network has grown to emphasize rigorous academic standards in a technically rich and relevant curriculum that is developed in cooperation with industry to meet the needs of the regional economy.

#### [1] Advanced Technologies Regional Network

The strategic partnership between the University of New Mexico at Gallup and area public and private secondary schools that makes possible ATRN has been in place for more than twenty years. UNM Gallup's Center for Career and Technical Education (CCTE), which delivers technical education in the Gallup McKinley County School District, the Zuni Public School District, as well as Wingate Bureau of Indian Affairs (BIA) High School, Rehoboth Christian High School, and Gallup Catholic High School, among others, provides more than four hundred high school students with the opportunity to earn college and high school credits while learning skills in numerous technical career paths. In many communities in New Mexico, community college and secondary school partners have not been able to resolve the practical terms of their mutual responsibilities to

account for students, make logistical arrangements to facilitate course taking and share financial costs in dual-credit secondary and post-secondary education. UNM Gallup CTE settled these issues a generation ago and now is prepared to meet the region's larger need for an advanced technical training center that serves a comprehensive workforce mission.

With the introduction of Governor Richardson's technical high schools initiative, the college determined to study technical high school reform and re-examine its own presumptions about technical education and the impact of its current practices on individual achievement and area economic development. As a result of this analysis, the ATRN plan has incorporated the components of national exemplary CTE programs that were discussed in the preceding sections and added innovations designed to stabilize the delivery of professional and technical education for New Mexico's 21st century economy. The binding principles for this approach are:

- > A focus on improving student achievement at both the secondary and post-secondary levels by setting rigorous academic standards, easing transitions along the educational continuum, and supporting professional excellence of teachers;
- Career pathways instruction that incorporates cutting-edge equipment and technology in the classroom and extramural experiences to keep students engaged in learning; and
- > A community college-based network of regional educational institutions, workforce and economic development partners, and employers that can ensure that students are well trained to fill the jobs needed to stimulate the economy.

#### [2] Organizational Design and Programs

The college's service district is vast and remote – including the Navajo Nation, which resides in three states and fills an area larger than the state of Connecticut – and its population is 75 percent Native American. Area reservations do not have accessible modern public transportation, and participating in college programs located at far distances from their homes is difficult and sometimes impossible for tribal students. To mitigate the burdens of long-distance travel for both Native American and non-Native American students, UNM Gallup already delivers CTE programs in locations throughout the greater Gallup, Pueblo of Zuni and Navajo Nation region.

ATRN is building on a concept, not brick and mortar. In part to make it more accessible, but also in recognition that it is a shared resource and community investment, ATRN will begin as a virtual network, offering programs at UNM Gallup, the Zuni campus of UNM,

Gallup High School, Gallup Junior High School, and through distance learning. College and district administrators are already planning to share facilities and expertise, and, in the future, may even share staff positions.<sup>31</sup>

The ATRN Business Partners Working Group<sup>32</sup>, led by an executive Industry Advisory Council (IAC), will serve as the college's external partner. The following individuals are members of the IAC: Glen Benefield, City of Gallup Economic Development; Richard Fairbanks, Sandia National Laboratories; Robert Hall, TVI Community College; Daniel Henderson, ConocoPhillips; Jack Jekowski, Innovative Technology Partnerships; Sherman McCorkle, Technology Ventures Corporation; Rachel Misra, Navajo Tribal Government; Andrew Othole, Zuni Tribal Government; Edward Rios, Giant Refinery; Paula Schrimsher, Intel Corporation; Hap Stoller, TPL Inc.; Al West, Southwest Center for Microsystems Education; John Wood, University of New Mexico College of Engineering.

Each new ATRN program will receive direct support and guidance through a Program Advisory Committee. The Program Advisory Committee will counsel each new program about economic and workforce needs, program structure and curriculum, and equipment and funding resources. ATRN administrators will work with industry partners to identify critical skills for career pathways, develop supporting curriculum, and provide internship and employment opportunities for successful students.

ATRN will be a next-generation CTE program, but it also will be a clearinghouse of advanced technical and professional training services, products and information for college students, adult workers and basic learners, employers, economic developers and agency officials. In addition to the technical high school coursework and college degree and certificate programs, ATRN will provide customized short courses for business; noncredit workforce training for WIA boards; and career pathways preparation for ABE, GED and ESL students. It will certify secondary school students, basic skills learners and others for "work readiness" using WorkKeys-based basic skills assessment and skills remediation. It will sponsor Job Fairs to introduce high school students to technical positions and work with local-area Workforce Investment Boards to place adults in training programs and in jobs. In the near term the Network's primary emphasis will be to provide opportunities for underrepresented Hispanic and Native American youth to pursue careers in business, science and technology as will be described below.

The mutual goal of ATRN partners will be to ensure that mid- and high-school students in the program are highly proficient in core math, reading, language, and science skills and are prepared to succeed in college-level work upon graduation from high school and that mid- and high-school teachers of students in the program use best teaching practices in the classroom. College administrators will cooperate with public school partners to align secondary and post-secondary coursework and to design a seamless system such that students receive college credit toward their degrees for college-level

courses taken in the technical high school, that core coursework completed for the technical degree transfers toward a baccalaureate degree in New Mexico four-year universities, and that the associate's degree transfers for full credit towards a bachelor's of applied science.<sup>33</sup>

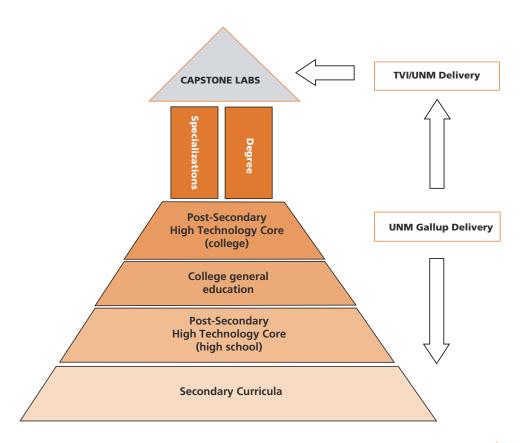
#### [3] Career Pathways

In its first phase, ATRN will include five primary career clusters and be comprised of CTE and related associate's degree programs in:

- > Health Sciences
- > Advanced Manufacturing Technology
- > Energy and Environmental Technology
- > Construction and Development
- > Retail and Business Services

Academic programs will emphasize fundamental advanced math, science, language, technology and reasoning skills and follow articulated career pathways. Following is a schematic of the ATRN degree pathways concept.

#### **ATRN Career Pathways**



UNM Gallup will partner in the delivery of its semiconductor and MEMS (micro electro mechanical systems) design and manufacturing coursework with the nationally recognized NSF ATE-supported Southwest Center for Microsystems Education (SCME) and its partners TVI Community College Electronics and Manufacturing Technologies Department, the University of New Mexico Manufacturing Training and Technology Center (MTTC) and Sandia National Laboratories.<sup>34</sup>

At the end of their course of study, Gallup students will have the opportunity to participate in capstone courses at TVI to gain hands-on experience with industry equipment. TVI courses in these areas are augmented by access to an industry-quality cleanroom at UNM's MTTC. To prepare the capstone curricula and to develop shared research and educational tools, college administrators will consult with John Wood of MTTC, SCME executive director Al West, and Robert Hall, director of TVI's Technologies department. To qualify for the program, students will be required to complete an application in which their "faculty sponsors" certify their skill levels and recommend inclusion in the capstone coursework.

#### [4] The High Technology Core

One of the recognized limitations of traditional CTE has been the need to have children making decisions about their future careers and livelihood when they are too young to do so. Science has shown that teenage brains are immature for decision-making related to career awareness and life planning.<sup>35</sup> This cognitive reality is at odds with a practical reality: students must begin a disciplined process of thinking about and planning for their careers even before their teenage years. The majority of technical and professional career occupations in the 21st century require community college-level certificates and degrees.<sup>36</sup> Students must expect to attend college and to have learned by middle school the fundamental math, science and reading competencies that they will apply in college-level coursework and in their professions. In the Gallup area, approximately 80 percent of the students entering UNM Gallup lack these foundational skills. Thus the overwhelming majority of youth in this workforce pipeline are not preparing to take college-level coursework, prepared for college, or capable of succeeding in the modern workplace.

ATRN seeks to marry these two conflicting demands – the need to begin gaining career skills as a pre-teenager and the lack of maturity to make career decisions at that age – with a unique approach. First, the ATRN career pathways will include challenging academic content beginning at the end of 8th grade. There is an abundance of research and programmatic evidence that all students, even low-income, minority, and at-risk students who have not performed well in the past can excel academically when they are challenged to do so.<sup>37 38</sup> Second, the ATRN degree programs will be built on a common "high technology core curriculum," designed to emphasize the attainment of

transferable skills inherent in advanced technical occupations. Students will take core coursework through their junior year of high school and will not select an ATRN career specialization until senior year.

The high technology core will not only provide students the benefit of experience in a variety of disciplines before having to select an occupational path; it will give students exposure to a comprehensive array of STEM (science, technology, engineering, mathematics) concepts that will make them more successful learners and more productive workers.<sup>39</sup> Because the ATRN career pathways begin college-level coursework in high school, students have the opportunity for a richer curriculum than they would be afforded in a typical technical degree.

#### [5] Student Success

The ATRN retention strategy will expand on the college's proven success in nurturing the interest, talent, and commitment to academic achievement of under-prepared students that has been demonstrated through its Middle College High School, Developmental Learning Department, and Title III program. These programs transform at-risk students and public school dropouts into college graduates. To assist with retention of students through high school graduation, the college will hire a full-time advisor to work with regional secondary schools. Retention measures will focus on including family members in the educational dialogue and designing interventions that account for cultural and familial issues.

There are two special features of ATRN that will require grant funding to fully develop but that are crucial to both the program's success and its long-term value as a bestpractice model for New Mexico:

- > FIRST STEP Females Interested in Reading, Science and Technology Summer Teaching Program is an extracurricular 10-day summer camp designed to help high school girls achieve the STEM skills to succeed in advanced college-level technical education.
- > Summer Leadership Institute offers secondary school math and science teachers intensive training in their disciplines and the opportunity to collaborate with university and community college professors.

It will be crucial to the development of ATRN to launch and evaluate the effectiveness of the FIRST STEP tutoring camp. U.S. students are not performing competitively on international math and science assessments, and despite the requirements for improved student achievement of the No Child Left Behind Act many students continue to enter high school without the academic reading, math or science skills needed for upper-level

coursework. This year "just 20 percent of 1.2 million [ACT college-entrance exam] test takers met all the benchmarks in science, math, reading and English." Academic performance for students in the Gallup area is below the state average and New Mexico's performance is in the bottom 10 percent nationally.

FIRST STEP aims to address these problems at their root by:

- > Taking a step toward closing the achievement gap in the underprivileged greater Gallup area by tutoring ATRN high school students in math, science and reading skills.
- > Ensuring that youth in the greater Gallup area have the academic skills to complete advanced technical and professional education programs, enter highwage employment, and pursue satisfying careers.
- > Increasing the number of Hispanic and Native American students graduating from high school and completing advanced technical associate's degrees.
- > Increasing the number of Hispanics and Native Americans in math, science, engineering, and high-technology manufacturing jobs.

Recent research by Alan Krueger of Princeton University indicates that "economically disadvantaged children fall behind during the summer months compared with their peers. The problem is that children from low-income families are less likely to read...during the summer, which causes their skills to atrophy when school is out of session...The depressed level of academic engagement in poor households when school is out is responsible for a major portion in the gap in achievement between low - end high - income students."<sup>42</sup> We are planning to tap students' interest, ability and commitment in math and science by:

- > Recruiting them to participate in the ATRN high school and FIRST STEP at the end of middle school.
- > Working with parents to set high expectations for student performance, including "contracts" outlining student and family obligations.
- > Making available intensive advising and extra-instructional supports.
- > Providing summer tutoring in math, science and reading for three years prior to the start of the ATRN high school programs in 11th grade.

The ATRN High School will consider applications from all students, but FIRST STEP students will be guaranteed admission if they complete the program and maintain the 2.5 grade point average that will be required for all students for admission to and continuation in ATRN. The FIRST STEP application will include a statement of interest from the student as well as a statement of commitment from the parent[s]. FIRST STEP will target female students to provide increased opportunities for underrepresented minority females to enter and succeed in high-growth, high-wage technical and professional careers.

Professional development of teachers is perhaps the most important ingredient in achieving meaningful high school reform and lasting improvement in school performance and student outcomes. However, to produce these results, professional development activities must address not only knowledge and skills but also the means to inspire a common purpose among teachers and their customers and stakeholders and empower teachers both to develop and to institute that vision. Academic research has shown that "organizations improve because they agree on what is worth achieving and then create processes that help their employees learn what they need to meet these goals."

The Summer Leadership Institute will train public school teachers to be leaders in the reform of technical teaching in their schools and provide them with the tools to effect expert pedagogy in their classrooms. The Institute's first responsibility will be to help middle- and secondary-school students excel in math, science and reading. To meet this goal, University of New Mexico and University of New Mexico at Gallup faculty will mentor public school math, science and language arts teachers in best classroom practices during five-day summer workshops. Seminars will be held during the day on the UNM-G campus. The Institute will review applications from teachers from throughout the region and accept thirty teachers each year. Teachers will receive a stipend to cover the costs of participating in the program.

The Institute will contribute to the creation of a shared commitment to student success and to improving the quality of life and economic security for families in the region by sponsoring public forums, social networking events and planning sessions among Institute participants, alumna, and ATRN members and stakeholders.

#### [6] Implementation Plan

ATRN's mission is to deliver high quality community college-based education beginning in high school and continuing through the community college degree that creates opportunities for local, regional and statewide businesses to gain the qualified professionals they require and for students, especially underrepresented Native American and Hispanic females, to attain the skills they need to succeed in advanced

technical careers. The program's aim is to provide support for a regional workforce that extends from the greater Gallup area south to the greater Albuquerque region, including Socorro, and east to Los Alamos, in a way that stimulates the growth of high-technology research, business and industry in that corridor.

Following is a short summary of UNM Gallup's plans for introducing the program:

- > UNM-G's plans to launch ATRN and to use the \$600,000 state capital appropriation to enhance existing facilities for teaching electronics, healthcare, and pre-engineering coursework have been approved by the New Mexico Higher Education Department.
- Architectural plans for a new building to serve Nursing and Allied Health are underway. Construction will begin in 2006 and be completed in 2007. Funds for the ATRN Technical Classrooms facility will be part of a statewide GO bond election in 2006. The college will leverage statewide GO bond funds with \$2 million in local GO bond revenue to reach funding needed to construct the new building.
- > ATRN will benefit from the college's existing grants and programs that support academic excellence in public school curricula, including but not limited to the Lumina Foundation for Education's multi-year Achieving the Dream initiative, the Middle College High School, Carl Perkins federal funding, and NASA Opportunities for Visionary Academics (NOVA), which is enhancing math courses for elementary school teachers. The college also is a partner institution in the United States Department of Energy's EPSCoR (experimental program to stimulate competitive research). EPSCoR will provide the college with mentoring opportunities for faculty and students.
- UNM-G has applied for grant funding from the National Science Foundation ATE program to launch its energy technologies and advanced manufacturing technologies career pathways and to initiate FIRST STEP.
- > The University of New Mexico at Gallup and Sandia National Laboratories will partner in support of the Lab's Critical Skills Development Programs. These programs develop a pipeline of qualified technicians, technologists, engineers, and scientists to help fulfill Sandia's mission in national security. Opportunities for UNM Gallup and the partner schools include teacher professional development, mentorships, and student internships.

- > United States Department of Education's Office of Vocational and Adult Education (OVAE) supports the Native American Vocational and Technical Education Program (NAVTP) as part of the Carl Perkins Act. Educational institutions that deliver vocational and technical education that benefits Native Americans are eligible to apply for the 3-year grants. If the Perkins Act is reauthorized in 2005, funding will be available for NAVTP and UNM Gallup will apply for funding.
- > Finally, the college is considering options for developing a marketing and promotion campaign for ATRN, its career programs, and the FIRST STEP summer tutoring camp to foster wide regional recognition of the UNM Gallup ATRN brand.

#### [7] Policy Recommendations

The implementation of the ATRN pilot study has the potential to influence the direction of community college-based technical education in New Mexico and nationally. The project provides a model for professional and technical education in New Mexico that the Legislature, the Governor, and the Public and Higher Education Departments can test in additional pilot projects; a method for sustaining regional economic development partnerships; and the opportunity to better leverage education funding to improve academic achievement by increasing research and collaboration among public school and community college and university and community college faculties and institutions.

The ATRN concept brings together a coalition of secondary and postsecondary educators with employers to co-develop technical education programs that create a challenging academic environment in which students are motivated by real-world opportunities and experiences to earn valuable occupational and life skills.

Public Works proposes the following specific strategy to reap the benefits of this approach.

#### FOCUS 1

For decades New Mexico has ranked at the bottom of national academic and economic achievement scores. As a result of this stagnancy, the majority of New Mexico workers do not have the skills or experience to succeed in 21st century jobs. This is not a shallow claim. New Mexico's educational systems have failed to adequately prepare generations of families for the demands of the modern workplace. New Mexico public school students are not meeting either national or international standards of proficiency in core math, reading, language, reasoning and science skills, and an insufficient number of New Mexicans are

entering and succeeding in college.44 As a result, the state is not producing a sufficient

Focus 1:
Increase Academic Rigor
in High School and
Community College
Technical Programs

number of qualified workers for existing jobs, nor is it adequately addressing the requirements to fill future jobs. This has left employers without the skilled labor force necessary to sustain their businesses, hampered the recruitment of new businesses, and contributed to the state's continuing problems, including low wages and slow economic growth.<sup>45</sup>

To ensure that New Mexico's workers have the technical expertise, but also the higher-level thinking, language and reasoning skills to add value in today's economy, the state should:

- > Begin teaching mathematics, language, and reading concepts to public school students in pre-kindergarten. For decades, academic researchers have known that students who do not learn fundamental reading, writing, calculating and other basic skills as young children face "a lifetime of ...difficulty. Eighty eight percent of children who have difficulty reading in first grade [for example] will have difficulty reading at the end of fourth grade... These problems can be overcome with quality parent education, childcare, and preschool programs that emphasize literacy and have environments conducive to literacy development." However, despite findings like this that are well documented and widely available, only thirty eight states in the United States finance pre-kindergarten programs. and only half of U.S. children between ages three and five are in pre-kindergarten programs.
- > Require all public school graduates to complete a rigorous academic curriculum that will prepare them for post-secondary-level learning and the workplace. In schools throughout the country, CTE programs continue to offer "dumbed-down" education featuring "applied" academics for students who administrators see as under-performing and therefore "non-college bound." As we have seen from programmatic and academic evidence cited throughout this report, including in such homegrown examples as the Middle College High School at UNM Gallup and the secondary school Academies in the Albuquerque area supported by TVI Community College and Sandia National Laboratories' Critical Skills Initiative, even technical education students who enter their programs ill-prepared for college-level work can thrive in an educational environment that demands both academic excellence and applied skill.
- Emphasize science, technology, engineering, mathematics curriculum in secondary school advanced professional and technical training and recruit highly skilled teachers in STEM disciplines. Technological advancements have changed the way we work and live. Today's students must be adept in math, science and technology to understand their world, to conduct their jobs, and to exercise lifelong mental acuity.

- > Integrate technical and academic learning for high school students through community college-based career pathways, incorporating team teaching and coteaching among technical and academic teachers and among community college faculty and public school teachers. We know that technical and professional workers now require college-level education and training and that all high school students must be prepared for college-level work. Technical education affords the opportunity for community college faculty and secondary school teachers to work together to design and deliver the academic and applied curricula needed to prepare qualified 21st century technicians.
- > Promote college-level course taking among high school students in career pathways by mingling high school and college students in the classroom, providing dual credit for all college-level coursework, and advancing students seamlessly through post-secondary curricula. This strategy yields not only learning gains and improved rates of student success, but efficiency gains as well. In an environment of rising costs of post-secondary education and declining availability of financial aid, high school students and their families must be given opportunities to pursue college-level coursework while in high school and to hasten the completion of college degrees.
- > Develop a capstone course and/or a capstone semester to be taken in the university at the culmination of the community college degree. With diminishing availability of state funds for higher education and an accelerating number of students going to college, all public education resources must be used more efficiently. There must be a new synergism among grade 9-14 programs and among two-year and four-year programs as well. Because of their research mission, universities have equipment and expertise not found in community colleges that should be shared with students in two-year colleges to improve their professional development and facility.
- > Provide professional development opportunities to retain the best teachers and faculty and promote high standards among all instructors. In the knowledge age, professional development of teachers is a necessity, not a luxury. As defined by researchers, effective professional development is a "process" that not only adds to a teacher's knowledge and skill but excites and renews professional creativity and commitment. Individual school districts are finding ingenious ways to pay for this commodity, but it is not routinely considered a state budget priority in New Mexico or elsewhere.

#### **FOCUS 2**

As we approach 2006, New Mexico's community colleges remain an underutilized state resource. Their funding and mandate is largely limited to bringing students in the door, and colleges have little to no discretionary or incentive funding to respond to economic development needs, participate in strategic partnerships, or focus on student success.

Focus 2: Provide
Instructional and
Extramural Enrichments
that will help Students
Complete Secondary and
Post-Secondary
Degrees

Pennsylvania are actively promoting community college education and creating incentives for community colleges to form strategic alliances that will improve student outcomes. 50 As major producers of outputs for the economy, community colleges must have the resources and know-how to utilize sophisticated technical and scientific equipment and technology in the classroom that mirrors industry technology and practice and state policy support to develop them.

New Mexico must make learning relevant to the needs of students, their families and their communities by:

- > Initiating a major state-funded marketing effort aimed at closing the achievement gap by promoting the value of higher education statewide and providing information about careers and their succedent wage levels, career programs of study, and educational funding options to students and their parents. Public awareness messages have proven to be an effective means to affect the public good, and have succeeded in changing behavior and increasing opportunity in such wide ranging areas as reducing tobacco and drug use, improving physical fitness, and empowering micro-entrepreneurs. In recognition of the importance of education to personal health and stability, states like Texas and Kentucky have invested in long-term state supported campaigns to promote education.
- > Offering technical education to students and their families as an opportunity to pursue a good career that will earn high-wages and to gain skills that will be transferable within and across numerous occupations. When interviewed, most parents reveal that they want their children to attend a four-year college. But students, parents and school professionals need up-to-date information about the value of a high-quality technical degree in the 21st century and the financial and professional benefits associated with various occupations. New Mexico would benefit its citizens and reform the public image of technical and professional education by providing a statewide clearinghouse of information about career certification requirements, employment opportunities and training providers.

- > Investing in innovative student recruitment and retention strategies, including working with parents to set high expectations for student performance; providing extra-instructional support programs for at-risk and under-prepared youth, including summer camps and intensive counseling; using parent volunteers to staff campus-based "Family Centers" that help mentor and advise students; and designing interventions to account for cultural and familial issues. Even mediocre students can achieve standout results when there are standards and expectations for performance and commitment in the classroom and at home.<sup>51</sup> Unfortunately, higher education funding presently does not provide incentive funding for student support, and community colleges must look to extramural sources to finance these services.
- Making available sophisticated technical and scientific equipment and technology in the classroom that provides essential opportunities for "real world" hands-on learning. As noted in this study, digital innovations occur at lightning speed in the New Economy. In general, technicians are tactile learners and workers. Advanced high-technology training programs must include industry-quality tools, equipment, and practices to be efficacious with employers and workers.
- > Providing high-quality distance learning options to accommodate students and families. Advanced technology can speed learning in and beyond the classroom. Web-based instruction is common in technical education because it simulates conditions in the workplace. Distance learning can make it easier for high schools and college students to complete their coursework and homework, to collaborate with other students, to access specialty faculty and classes, and to pursue a variety of extracurricular opportunities.
- > Availing students the opportunity to devise research projects and externships that enhance the curriculum. University students are required to complete research projects to expand their understanding of a subject and to strengthen skills that are known to be essential in the professional world: oral and written communication, problem solving, creativity, and teamwork. Most high school and community college coursework does not include an emphasis on research and analysis, but incorporating it in technical pathways would better prepare students for advanced higher education and the workplace.

#### FOCUS 3

Focus 3: Create
Economic-Development
Focused Public-Private
Consortia to Guide
Technical and Professional
Education

In 2004 the legislature approved the Governor's request for \$10M to fund
Vocational High Schools or "Technical Education Centers" on community

college campuses. The funding established Technical Education

"Centers of Excellence" pilot projects at the University of New Mexico
at Gallup and elsewhere. The pedagogical and programmatic best
practice standards established in these centers should guide the
development of premier TECs throughout the state. As has been
demonstrated in other states such as Georgia, Michigan and Kentucky,
TECs are efficient and effective suppliers of technical education. New
Mexico should access additional federal and state funding to make TECs
the standard for delivering professional and technical education in the
community colleges.

To promote Community College Technical Education Centers that can deliver a qualified workforce to meet local, regional, and statewide economic demand New Mexico should:

- > Develop community college-led, regional educational consortia that include university partners, employers, secondary schools, industry associations, federal and state agencies, and community groups. As has been noted in this paper, in the New Economy strategic alliances have become a necessary aspect of doing business, because they increase productivity and capacity without a commensurate increase in cost. New Mexico's community colleges cannot accomplish their missions to provide improved educational opportunity for the current and prospective workforce unless they ally with necessary partners: "suppliers" on the one hand public schools, workforce boards, employers and "customers"– universities, businesses, and economic developers on the other.
- > Target training for high-growth industry sectors or "clusters" that are of strategic importance to the state and the region. Strategic economic development seeks to exploit an area's natural, human, and acquired assets. In this endeavor state education, labor, workforce and economic development planners must work with their regional counterparts to cultivate niche industries and guarantee adequate infrastructure to support them. Educational institutions must participate directly in this effort so that they are prepared to provide topical education and training.
- > Initiate career pathways instruction in identified "clusters" beginning in middle school. Students who wish to pursue high-wage jobs in their state's high-growth industry sectors must have college-level STEM competencies. The public school

- "Academies" model initiates a technical course-taking sequence in middle school to prime students for specific college-level coursework. In another model, CTE students follow the college-prep course-taking pathway and its prerequisites beginning in middle school. These approaches have two distinct benefits: students consider career options and preferences at an early age and gain practical career experience which by itself creates an incentive to remain in school and are prepared to pursue a non-technical associate's degree or attend the university should they choose to do so in the future.
- > Provide incentives to community college and high school faculty to work together to develop a grades 9-14 curriculum that is jointly delivered. Innovative programs like Middle College, Early College, Advanced Placement and now professional and technical education have been melding the 9-14 educational experience. These programs show clear benefits for students, and the potential to excite teaching as well. Where secondary school teachers and college faculty can be brought together, a natural collaboration develops between the two groups, spurring intellectual collaboration, team-teaching, joint counseling and the genesis of a genuine "seamless" curriculum.
- > Share instructors and instructional facilities and equipment among consortia educational institutions. Strategic alliances among secondary and post-secondary educational institutions generate another major efficiency. Regional middle school, high school, community college and university partners have begun to form innovative business relationships that allow for common use of facilities, equipment, and staff. As in any classic strategic alliance, these relationships extend the partners' capacity to produce a high-quality product, and provide mutual financial and reputational benefits for the partners.
- > Emphasize industry programmatic support including contributions to curriculum design and evaluation, student and teacher externships, classroom equipment and technology, and industry advisory committees and job placement. A recent report by the Business Higher Education Forum, 53 supported by the CEOs of major multinational companies like Raytheon, Dow Chemical, Pfizer, and Toyota Motor North America and the presidents of top-tier research universities like Rensselaer Polytechnic University, Ohio State University, Georgetown University, the University of Maryland, and Columbia University, on the crisis in American education cited as one of the country's three most important education reforms the need to give business a leadership role in the design and implementation of educational improvement strategies. As has been noted throughout this report, employers are willing to contribute to the development of educational programs, and New Mexico's secondary and post-secondary institutions must follow the example set by other states and create vehicles that conduce that interaction.

> Develop a "common vision" among consortia members about what is being achieved and a willingness to find creative and collaborative solutions to achieve it. The reform proposals outlined here represent an ideal system that will be difficult to achieve and even more difficult to sustain. Regional community consortia that develop and share a mutual commitment and a common purpose will have the solidarity to create systemic change that will not only drive state policy but outlast ad hoc proposals of future policymakers and decision-makers.

### 5 | Conclusion

The New Economy has swept in a sea change in higher education, trailing the detritus of former systems of high school and occupational education. For the first time in history, the vast majority of the nation's workers will require (and receive) post-secondary learning to enter the labor force and throughout their lifetimes. There is an abundance of research and programmatic evidence that all students, even low-income, minority, and at-risk students who have not performed well in the past<sup>54</sup> can excel academically when they are challenged to do so. As part of their effort to redesign the American high school,<sup>55</sup> the nation's governors, policymakers and educators must create opportunities for high school students to participate in college-level work while in high school, both in academic, research-oriented coursework and advanced technical training. In the new landscape of the 21st century economy, community colleges have emerged as the vehicle for providing the higher-level learning to prepare the American workforce.

New Mexico has an opportunity to test the effectiveness of this method of professional and technical education by evaluating the Advanced Technologies Regional Network being implemented at the University of New Mexico at Gallup. As has been demonstrated in Virginia and elsewhere, there are enormous efficiency gains to offering introductory college credit to high school students and strengthening transfer agreements and partnerships among higher education institutions. Community college-based technical education consortia can produce the qualified workers necessary to improve New Mexico's economic competitiveness and should be tried.

## 6 | Interviews and Site Visits

- April 20, 2005: McKinley Area Education Consortium, Gallup, New Mexico
- May 4, 2005: Herb Mosher, President, et al., McKinley Development Foundation, Gallup, New Mexico
- **May 5, 2005:** Jeffrey Kiely, Deputy Director, Northwest New Mexico Council of Governments, Gallup, New Mexico
- May 10, 2005: Paul Hallacher, Director, Center for Nanotechnology Education and Utilization, Penn State University, State College, Pennsylvania
- May 16, 2005: Sherman McCorkle, president and CEO, Technology Ventures Corporation, Albuquerque, New Mexico
- May 17, 2005: Danny Earp, acting Educational Programs Director, et al., New Mexico

  Department of Higher Education, Santa Fe, New Mexico
- May 20, 2005: Conroy Chino, Secretary, et al., New Mexico Department of Labor, Albuquerque, New Mexico
- May 20, 2005: Herb Greenwald and Dan Hall, New Mexico Department of Labor Economic Research and Analysis, Albuquerque, New Mexico
- May 20, 2005: Ed Rios, Plant Manager, et al., Giant Refinery, and Daniel Henderson,
  Plant Manager, and Jeff Driver, Maintenance Foreman, ConocoPhillips,
  Gallup, New Mexico
- May 20, 2005: Terese Varela, Project Manager, Job Training Incentive Program, New Mexico Economic Development Department, Santa Fe, New Mexico
- May 23, 2005: Mike Case, Executive Director, Community Development Corporation, Gallup, New Mexico
- May 26, 2005: Karen White, Superintendent, et al., Gallup McKinley County Schools, Gallup, New Mexico
- May 27, 2005: Stephen Fonash, Professor and Founder, et al., Center for Nanotechnology Education and Utilization, Penn State University, State College, Pennsylvania

- May 31, 2005: Katharine Oliver, Assistant State Superintendent Division of Career

  Technology and Adult Learning, Maryland State Department of Education,

  Baltimore, Maryland
- June 2, 2005: Emily Stover DeRocco, Assistant Secretary Employment and Training Administration, United States Department of Labor, Washington, DC
- June 6, 2005: Agnes Balassa, Program Director, Chemeketa Community College, Salem Oregon
- June 7, 2005: Ken Roberts, Vice President Academic Affairs, Marshall Logvin, Bioscience Faculty, et al., South Mountain Community College, Phoenix, Arizona
- June 8, 2005: Deborah Boisvert, Executive Director, Boston Area Advanced Technological Education Connections (BATEC), Boston, Massachusetts
- June 9, 2005: Ted Wright, Program Director, Antioch University, Seattle, Washington
- June 9, 2005: Richard Kazis, Senior Vice President, Jobs for the Future, Boston,
  Massachusetts
- June 10, 2005: National Workforce Center for Emerging Technologies (NWCET) and
  Center for Information Technology Excellence, Bellevue Community
  College, State IT Futures Education Summit: Advancing IT Education for a
  Stronger Washington Workforce, Microsoft Corporate Campus, Redmond,
  Washington
- June 10, 2005: Eva Philpot, Executive Director, NWCET, Redmond, Washington
- **June 10, 2005:** John Colborn, Deputy Director Economic Development, The Ford Foundation, New York, New York
- June 13, 2005: Reese Fullerton, Executive Director, New Mexico Office of Workforce
  Training and Development, Santa Fe, New Mexico
- June 13, 2005: Brett Newberry, Partner, Newberry & Associates, Ltd., Gallup, New Mexico
- June 14, 2005: Dominique Foley Wilson, Program Coordinator, Sandia National
  Laboratories Critical Skills Development Program, Albuquerque, New
  Mexico

- June 14, 2005: David Fankhauser, Vice President and CCO, Worldwide Interactive Network (WIN), et al., Albuquerque, New Mexico
- June 17, 2005: Roselyn Shirley, Department Director, et al., Navajo Department of Workforce Development, Crownpoint, New Mexico
- June 22, 2005: Sean VanBerschot, Executive Director, Teach for America New Mexico, Albuquerque, New Mexico
- June 22, 2005: Jack Jekowski, Principal Partner, Innovative Technology Partnerships, Hap Stoller, President and CEO, TPL, Inc., David Baltzer, President, Rehoboth McKinley Christian Health Care Services et al., University of New Mexico at Gallup Business Forum, Gallup, New Mexico
- June 23, 2005: Glen Benefield, Vice President, Gurley Motor Company, Gallup, New Mexico
- June 24, 2005: Marc Wunder, Office of Senator Jeff Bingaman, Albuquerque,
  New Mexico
- July 8, 2005: Advanced Technologies Regional Network Presentation to the New Mexico Higher Education Department and Public Education Department, State Capitol, Santa Fe, New Mexico

## 7 | References

- 1 Remaking Career and Technical Education for the 21st Century: What Role for High School Programs?, Richard Kazis, Jobs for the Future, Boston, Massachusetts, April 2005.
- 2 Lessons from History: Industrial Arts/Technology Education as a Case, Patrick N. Foster, Journal of Vocational and Technical Education, Spring 1997.
- 3 Kazis 2005.
- 4 The Future of Education, Employment, and Training Policy in the United States, Anthony Carnevale, (Educational Testing Service, Washington, DC) Bridges to Opportunity Professional and Technical Education Best Practices Forum, Santa Fe Community College, Santa Fe, New Mexico, March 30, 2004.

- International Data on Educational Attainment Updates and Implications, Robert J. Barro and Jong-Wha Lee, Center for International Development, Harvard University, Boston, Massachusetts, August 2000.
- **Education at a Glance 2004**, Organisation for Economic Co-Operation and Development, Paris, France, 2004.
- 7 OECD 2004.
- 8 A Nation at Risk: Imperative for Educational Reform, National Commission on Excellence in Education, Washington, DC, April 1983.
- 9 Roadmap for National Security: Imperative for Change, the United States Commission on National Security/21st Century, Washington, DC, February 15, 2001.
- 10 "In the U.S., earnings for tertiary graduates are 86% higher on average than those for people with only secondary education." Education Levels Rising in OECD Countries But Low Attainment Still Hampers Some, Organisation of Economic Cooperation and Development, Paris, France, September 14, 2004.
- 11 What New Mexicans Must Know and Be Able to Do to Succeed in 21st Century Jobs, Frank Levy, (Massachusetts Institute of Technology, Boston, Massachusetts) New Mexico's State Summit on 21st Century Competitiveness, St. John's College, Santa Fe, New Mexico, March 29, 2005.
- 12 Barro and Lee 2000.
- 13 The New Mexico Educational System: What's in the Pipeline, Dennis Jones, (National Center for Higher Education Management Systems, Boulder, Colorado) Bridges to Opportunity Professional and Technical Education Best Practices Forum, Santa Fe Community College, Santa Fe, New Mexico, March 30, 2004.
- **14 Closing the College Participation Gap: A National Summary**, Education Commission of the States, Denver, Colorado, October 2003.
- State Fiscal Constraints and Higher Education Funding: the Role of Medicaid and the Business Cycle, Thomas J. Kane and Peter R. Orszag, Tax Policy Center, Washington, DC, May 2003.
- 16 Meeting our Mission: New Mexico's Community Colleges, New Mexico Association of Community Colleges, Santa Fe, New Mexico, Fall 2004.

- 17 The Education Equation: Getting Smart about New Mexico's Community Colleges, New Mexico Association of Community Colleges, Santa Fe, New Mexico, from Our Community Colleges: An Economic and Social Impact Study of New Mexico's Community Colleges, Southwest Planning and Marketing, May 2003.
- 18 Mark Warner, Governor of the Commonwealth of Virginia, Education Week, November 17, 2004.
- 19 A 1994 law, for example, established a standard general education core curriculum for all state higher education institutions and required universities to accept community college coursework in the core to transfer toward the university degree.
- 20 Teaming Up for School Improvement in New York City, Kathy Hughes and Lawrence Bailis, Columbia University Institute on Education and the Economy, New York, New York, 2001.
- 21 Hughes et al. 2001.
- 22 Another Public Works report, Help Wanted: New Mexico's Workforce Development System—And How to Make it Work (Public Works: West Chester, Pennsylvania, February 23, 2004) describes the more common situation: "[The] business community and workforce development system are disconnected. The workforce development system is not structured or coordinated in a way to permit businesses...easy access...or keep up with the needs of a constantly changing marketplace. As a result, businesses lack confidence that their needs for a skilled workforce are being met."
- 23 The Oregon Gateway for Business and Education: http://www.trainingmatrix.com/oregongateway/.
- 24 Career pathways "begin with basic skills, integrate education with work, and propel individuals toward successively higher levels of skills, responsibility and wages."
  Workforce Education: Issues and Opportunities, Workforce Strategy Center:
  Brooklyn, New York, July 2001.
- **25 Reform in Maryland: Achievement Matters Most**, Katharine M. Oliver, Maryland Department of Education, in Kazis 2005.
- "Maryland had a job growth rate of 0.8 percent in 2001, significantly above the national average of 0.3 percent, and well above all of Maryland's neighboring states. In fact, the state had the 15th fastest job growth rate in the nation. The Corporation for Enterprise Development [has] graded Maryland's economy as one of the 10 strongest in the U.S." (David S. lannucci, Secretary, Maryland Department of Business and Economic Development, in **Baltimore Business Journal**, 2002.)

- 27 Oliver 2005.
- **28 The Employment Situation: September 2005**, Bureau of Labor Statistics, September 2005.
- 29 2000/2001 Comprehensive Economic Development Strategy Report, Navajo Nation Division of Economic Development.
- 30 Navajo Nation 2001.
- 31 Teach for America is a national non-profit organization that recruits graduates from the nation's top universities to teach for two years in public schools in rural and innercity areas of the United States. Many Teach for America alumna decide to remain in teaching at the public school or community college level.
- 32 The ATRN Business Partners Working Group was formed at The Business Forum, held at the University of New Mexico at Gallup on June 22, 2005.
- 33 UNM Gallup is one of a handful of community colleges in the country participating in the Lumina Foundation for Education's multi-year, national "Achieving the Dream: Community Colleges Count" initiative. The UNM-G Achieving the Dream initiative has formed a High School/College Articulation Task Force. Activities include workshops between counselors and advisors; workshops for the math and English instructors/faculty; and developing strategies that will increase collaboration between college faculty and high school instructors, such as having faculty work with teachers to develop curriculum and share teaching strategies.
- **A Large-Scale Initiative for Small-Scale Training**, Eric Billingsley, The Magazine, Technology Research Collaborative, Albuquerque, New Mexico, August 2005.
- **Teen Brains on Trial**, B. Bower, Science News Online, week of May 8, Volume 165, No. 19, 299. www.sciencenews.org.
- 36 Carnevale 2004.
- 37 See? If Pushed, Kids Deliver, J. Matthews, The Washington Post, December 5, 2004.
- 38 Hughes et al. 2001.
- 39 Frank Levy 2005.
- 40 The New Mexican, August 17, 2005.

- 41 Jones 2004.
- **Vouchers for Summer School Could Help Halt the Learning Slide**, Alan B. Krueger, The New York Times, August 17, 2000.
- 43 Hughes et al. 2001.
- 44 Jones 2004.
- 45 In the Corporation for Enterprise Development's Development Report Card for the States, 2003, New Mexico received an F in "earnings and job quality, an F in "competitiveness of existing businesses," and an F in "human resources development. It was ranked last among the states because of its poverty rate and working poor, 48th in business failings, and 47th for its shortage of health care workers and in the number of individuals who are in involuntary part-time employment.
- 46 Reading Programs that Work: A Review of Programs for Pre-Kindergarten to 4th Grade, John Schacter, Milken Family Foundation, Santa Monica, California.
- **47 Preschool Policy Matters**, National Institute for Early Education Research, Rutgers University, New Brunswick, New Jersey, December 2004.
- 48 Pre-kindergarten Initiatives: Efforts to Help Children Enter School Ready to Succeed, Children's Defense Fund, Washington, DC, 2003.
- 49 Evaluation of Professional Development Efforts of ATE Projects and Centers Phase IV Report, The Evaluation Center, Western Michigan University.
- Virginia, for example, has formed a Career and Technical Foundation to "bridge the gap between the large number of technical jobs available throughout Virginia and the comparatively small number of qualified applicants to fill them. Through public-private partnerships, the foundation promotes and supports initiatives that facilitate greater awareness of career and technical employment opportunities, quality training programs, and the many positive benefits of related career choices. The foundation has also launched...www.knowhowvirginia.org to serve as a clearinghouse for students, their parents, and teachers on career opportunities in technical fields, as well as certification requirements and available training. The Web site is part of a broader effort by the foundation to strengthen the image of career training among students." (A Governor's Approach to Improving Secondary Career Education, Mark Warner, Governor of the Commonwealth of Virginia, in Kazis 2005.)

- 51 Inner-City Teacher Takes No Shortcuts to Success, Michelle Trudeau, All Things Considered, National Public Radio, April 26, 2005.
- **Partner Risk: Managing the Downside of Strategic Alliances**, Warnock Davies, Ichor Business Books, Purdue University Press.
- A Commitment to America's Future: Responding to the Crisis in Mathematics & Science Education, Business Higher Education Forum, Washington, DC, January 2005.
- See, for example, The Freedom Writers Diary: How a Teacher and 150 Teens Used Writing to Change Themselves and the World Around Them, The Freedom Writers with Erin Gruwell, Main Street Books, 1999.
- 55 Redesigning the American High School is an initiative of the National Governors Association initiated by NGA Chairman Governor Mark Warner of Virginia in 2005.