

Restructuring the Southside for Innovation: Technology, Education, and Holistic Job Growth in Danville, Virginia

John Patrick Killeen
Department of City and Regional Planning

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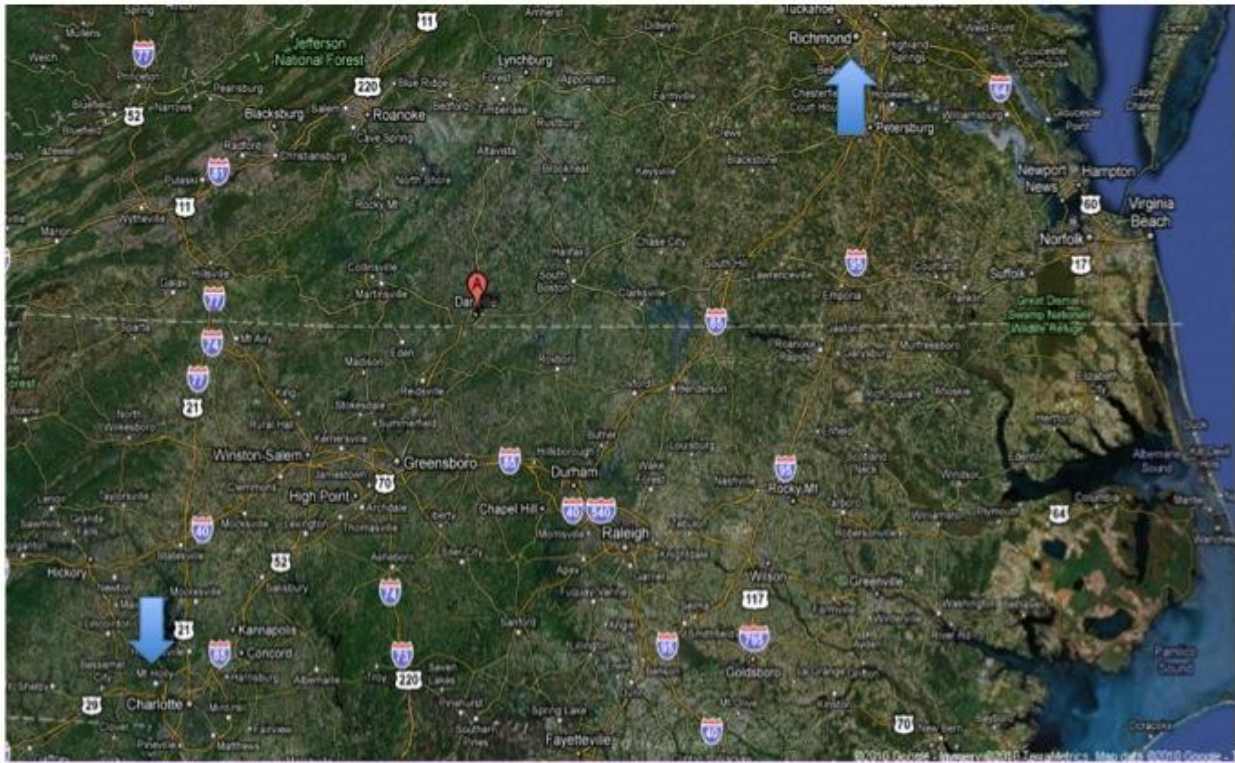
Introduction Like many mid-sized Piedmont manufacturing towns, Danville Virginia was hit hard by the wave of out-sourcing which swept the United States from the 1980s through the early years of the current century. With an economy disabled by the decline of textile and tobacco production, Danville faced serious losses in jobs and an increasing threat of economic devastation to the city (Breux, 2000). Regionally isolated in the south of Virginia, Danville is closer to Charlotte than to Richmond, two hours from Blacksburg, and about an hour and a half from the Research Triangle. It is a town known well for its “Millionaires Row,” where dazzling 19th century mansions tell the flamboyant story of the city’s once booming economy.

While the mansions have been lovingly cared for in many cases, homes in many of the neighborhoods relate the story of the town’s decline in recent years. Educational achievement in particular expresses the local disinvestment in workforce capacity due to decades of reliance on a pair of industries that needed little preparation from their workers. In 2000, adults over 25 years of age in the Danville region were significantly underperforming by statewide standards: 67.9% had graduated from high school, as compared with 81.5% statewide; 11.6% had bachelor’s degrees, almost a third of the 29.5% statewide estimate; median household income was also low at \$31,430, next to the state median of \$50,028 (Franklin 2008). The previous year an estimated 20% of individuals lived below the poverty line while 9.6% statewide did.¹

In the past decade, the Institute for Advanced Learning and Research has aimed at correcting some of these ills. The main interest of this qualitative study is to determine whether the Institute is by itself an answer to the employment/economic development problems faced by the town. How does the organization address barriers to inclusion for incumbent workers? Will its programs really replace the old manufacturing sector?

¹ US Census State and County Quick Facts <http://quickfacts.census.gov/qfd/states/51000.html>

Figure 1: Danville, Virginia Spatially Dislocated



While Danville appears equidistant from Charlotte and Richmond, the trip to Richmond takes longer due to low-volume state highway connections. Charlotte-to-Danville: 137 miles (2hrs, 15min.); Danville-to-Richmond: (at least) 144 miles (2hrs, 47 minutes). (Source: Google Maps, 2010)

Danville is not a unique case in its post-manufacturing malaise, of course. It is joined by numerous Piedmont towns and cities in Virginia and North Carolina (which is less than five miles' drive away) that have seen these industries drawn away to cheaper labor markets around the world while the local economies have declined. In North Carolina, much effort has been made to introduce biotechnology to state-sponsored education and this has been buffeted by the rise in “green” economic goals (NCBC, 2004). This has led to the development of biotech research programming at campuses in Raleigh, Greenville, Winston-Salem, Kannapolis, Research Triangle Park, Greensboro, and Charlotte. As of 2009, state funding for this program has reached nearly \$190 million, and creation of North Carolina’s Biomanufacturing and Pharmaceutical Training Consortium, which partners the state community college system, industry leaders, and researchers to generate a workforce base to support the bio science industry.²

² http://www.ncbiotech.org/biotechnology_in_nc/index.html

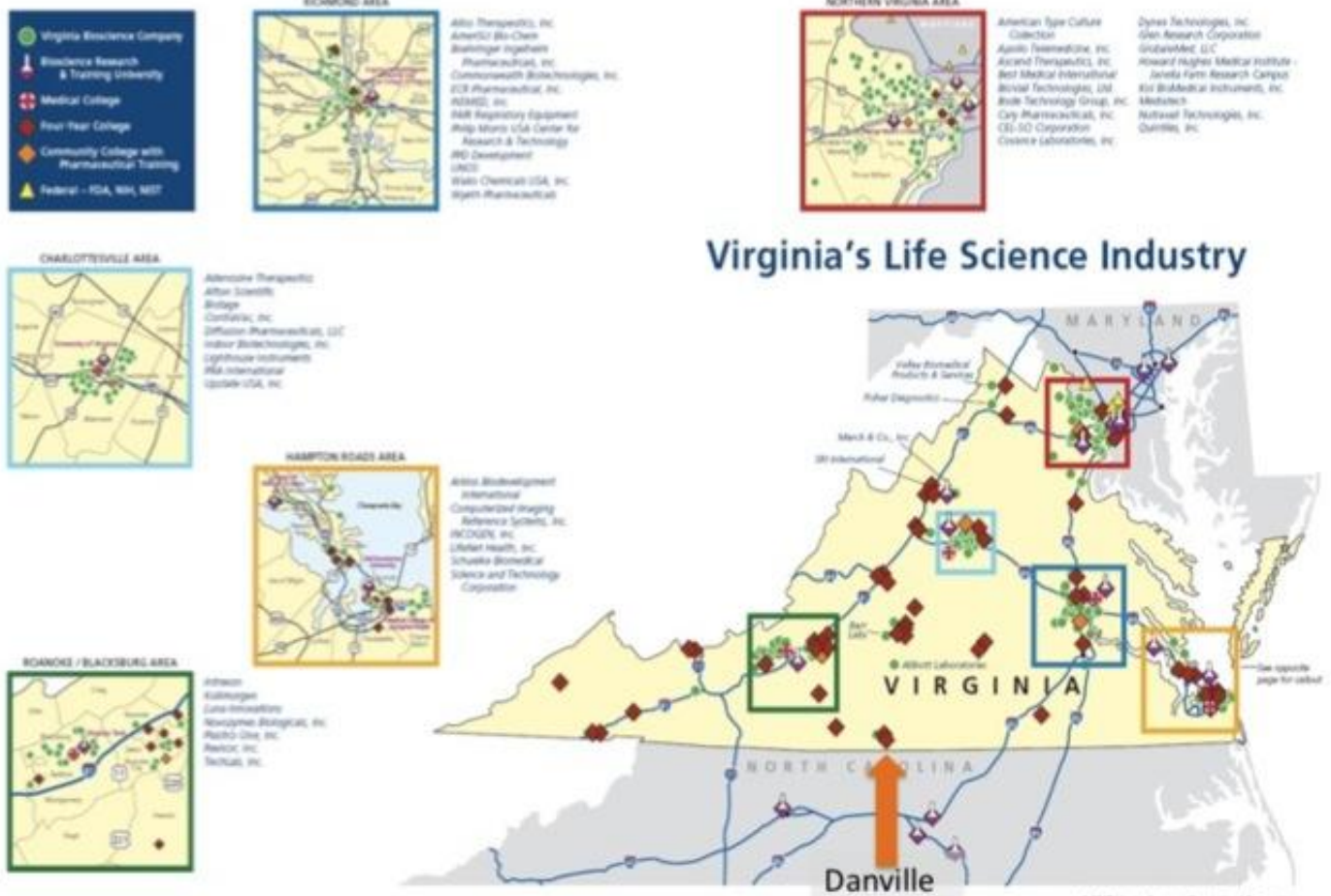
In Virginia, University-based programs like those at James Madison University have been supporting growth of bio sciences in the northern part of the state. The Virginia Biotechnology Association, based in Richmond, serves to connect the various statewide biotech programs and advocate on their behalf to the state legislature. But in the Southside,³ there is a dearth of universities to begin with. Those that do exist are in Roanoke, Blacksburg, and Danville. The Virginia Biotechnology Association has produced a map illustrating the locations of four-year colleges and universities, as well as the location of firms engaged in bio technology research (see graphic on page 5).

In Virginia, there are currently 82 biotechnology firms, 64% of which are located in Richmond or points north (VABIO, 2010).⁴ The Western area of the state, which here includes the Danville region, represents about 14% of the total. The Southside, overall, is the least represented in this. Danville is currently home to one private biotech company, Luna Nanotechnology, whose headquarters are in Blacksburg.

³ Note that “Southside” refers to the arc-shaped expanse of Virginia from Interstate 81 in the west and the Atlantic Ocean, reaching its farthest point north below Lynchburg.

⁴ <http://vabio.org/bioscience-in-virginia/>

Figure 2: Biotechnology and Life Sciences Research in Virginia



Danville is also home to the Institute for Advanced Learning and Research, a multi-partner, public/private, project aimed at replacing the lost manufacturing economy with innovation and research-based sectors. In the ten years since the Institute's creation, some of the difficulties of fully replacing the economic base of an industrial manufacturing town have become apparent. Chief among these things is the issue of retraining an incumbent workforce for the much higher, more specialized jobs offered in the new fields of biotechnology, mechanical engineering, and alternative fuels research. This is also of great concern in Danville for those being educated for the future workforce in public school right now. When we look into that population we learn there is a serious gap in achievement (See page 29 of this report) that is characterized by a racial division.

As holistic replacement of the base economy is concerned, the Institute serves remarkably well in the role of catalyst. It ultimately will have to focus its efforts on the quality of its research and supporting related businesses that arise in the Danville area. But by continuing its dedication to outreach the Institute will be positioned to offer its opportunities to more of Danville's communities than it has so far. This paired effort – of self-funding research and persistent community education and outreach – could lead to sustainable economic development.

But it will be equally important for other Danville institutions to serve as progressively as the Institute. The city public school system must respond to alarming trends in its high school classes; community development and public transportation must provide accessibility to training and jobs that are part of the new sector's development.

In the first portion of this essay, effort is made to describe the foundation of the Institute for Advanced Learning and Research and its growth and influence over the decade since 2000. Where the influence the Institute has had on the Danville economy is concerned, there are instances in which the story is best told by examining specific cases and those are presented here as well. These are not to be seen as the only or most important illustrations, but those which came out through research and speak well to the greater situation. After these points have been covered, the main goals of this essay are: a) assessing where some of the gaps exist in what the Institute has aimed at;

b) ascertaining how the Institute for Advanced Learning and Research has responded so far to those gaps; c) making recommendations for how the Institute may further address such issues, and how support can be provided from local authorities.

Methodology

In producing this report, the primary mode of research has been interviewing. This essay began as a qualitative study and its main intention is to capture personal perspectives from those involved with the Institute for Advanced Learning and Research. Beginning in the fall of 2009, the author interviewed representatives of the City of Danville Economic Development Department; Future of the Piedmont; Galileo Magnet School; Dan River Information Technology Academy; private firms located at or near the CyberPark – the Institute’s research campus; as well as past and current Directors of the Institute for Advanced Learning and Research. All of these interviews were recorded and analyzed for thematic content and used to guide further inquiry and interviewing.

This approach was chosen based on the assumption that due to the current nature of the case, secondary data would not be as robust as what could be gained from interviewing. Through the process of contacting those involved, it was discovered that much has been written about the Institute in its first decade. However, since much of that writing was produced before the tenure of the current Institute Director, Liam Leightley, previous to the current recession, and preceded the initiation of more recent Institute programs there is significant cause to maintain this reliance on interviews.

Data collection followed from interviews, in most cases. Subjects were often able to share reports, student tracking information, and research that has already been conducted on the Institute. This has included the PhD dissertation of Nancy Franklin, previous Outreach Director of the Institute, which has provided an essential theoretical component for this case study. Such is also the case with Jane Materna’s Virginia Tech masters paper on the Institute, which grounds the case in New Growth Theory. At times when it is helpful to explain the goals of the Institute in terms of economic development theory, this essay relies on input from Ed Feser and Emil Malizia’s text *Understanding*

Local Economic Development. Additional background research has come from U.S. Census data, digital news archives, and scholarly articles available through University of North Carolina library resources.

Interviews with the following individuals provide the basis of research for this essay.

Brown, Julie

Director of Outreach and Education, Institute for Advanced Learning and Research. February 19, 2010.

Dell, Dick

Executive Director Advanced Vehicle Research Center (AVRC); Conducted November 30, 2009.

Ferrell, Maurice

Assistant Director Center for Public Technology, UNC Chapel Hill; previously Chief Information Officer, Institute for Advanced Learning and Research; IT Director Danville Public Schools; and board member Dan River Information Technology Academy (DRITA). Conducted January 7, 2010.

Franklin, Timothy

Director, Office of Economic and Workforce Development Pennsylvania State University; (previously first director of Institute for Advanced Learning and Research). Conducted October 19, 2009.

Goff, April

Principle Galileo Magnet School, Danville Virginia. Conducted December 7, 2009.

Leightley, Liam

Director, Institute for Advanced Learning and Research. Interview Conducted February 9, 2010.

Wright, Linwood

Public and Governmental Affairs Consultant City of Danville Office of Economic Development; Conducted October 16, 2009.

The Institute for Advanced learning and Research

Overview and History

The relationships examined here are those between Virginia Tech, key industry leaders, the public school system, the City of Danville, Danville Community College, Averett University, and Martinsville's New College Institute (which offers Undergraduate Motorsports Engineering Technology degrees). These are not the only partners and beneficiaries of the Institute, but they often serve as basic links between long-standing local industries – such as agriculture, auto racing, mechanical engineering, and aerospace manufacturing – and the new, innovative economic sector. They are also the prominent local entities involved in the creation of and ongoing programming of the Institute.

The structure of the Institute's Board of Trustees reveals the foundational partnerships going into the organization. Of the 15 members, 3 are appointed by the Senate of the Virginia General Assembly, 3 are appointed by the House of Delegates of the General Assembly, 3 by the governor of Virginia, 1 is appointed by the Pittsylvania County Board of Supervisors, 1 by the President of Virginia Tech, 1 by the City of Danville, 1 appointed by Future of the Piedmont, and the remainder consist of the Presidents of Danville Community College and Averett University.

Mutual Simultaneous Invention

The story of Danville, Virginia's Institute for Advanced Learning and Research begins in the late 1990s with three broad initiatives: the founding of the Future of the Piedmont; Virginia Tech's renewed commitment to the economic development outreach embodied in the land-grant model; and third, the advent of the Tobacco Indemnification and Community Revitalization Commission.

The first of these was prompted by a theater restoration project in downtown Danville which brought together industry and government leaders determined to do something to foster tourism in the area. When the project did not develop, these individuals – still determined to generate significant economic growth – formed a committee called Future of the Piedmont . Charging themselves with pursuit of creative policies and projects to revive the town's declining economy, Future of the Piedmont courted

University of Virginia as an engaged research/economic development partner. While this relationship did not take root, it sparked the group's interest in university partnerships.

Linwood Wright, who was at the time Vice President of Quality and Development at Dan River Mills and serving on City Council, was an early leader in this group. Now a consultant for the city's Economic Development Department, Wright admits to the intention of creating a "small RTP", referring to North Carolina's Research Triangle Park (Wright, 2009). Wright had watched RTP transform North Carolina's Piedmont Triangle and believed something similar, though smaller in scale could be accomplished in Danville. The second broader initiative was Virginia Tech's new focus on remodeling its land grant mission and conducting engaged, distributed research in rural parts of the state. By the time Wright and Future of the Piedmont came to Virginia Tech president Charles Steger in 2000, the university had already begun to consider retooling the land grant mission for the 21st century and the 'dot com' age (Tim Franklin, Interview 2009).

Originally conceived to reach segments of the population unable to access private university education, the land-grant model developed through the 19th century to incorporate industrial training in its social mission (Bonnen, 1998). The Morrill Act of 1857 set aside land for public education in each state. States could use the land for such or sell it and use the funds to enhance public access to university education.⁵ In the case of Virginia Tech, the land was used for the establishment of a public university and its mission today very much reflects the social mission.⁶

VA Tech was founded in 1871 as a land-grant university. Despite being located in a fairly remote location, Virginia Tech (in Blacksburg, VA) has become a world-class research institution, with significant accomplishments in communications systems,

⁵ <http://www.ourdocuments.gov/doc.php?flash=old&doc=33>

⁶ "Virginia Polytechnic and State University is a public land-grant university serving the Commonwealth of Virginia, the nation, and the world community. The discovery and dissemination of new knowledge are central to its mission. Through its focus on teaching and learning, research, and outreach, the university creates, conveys, and applies knowledge to expand personal growth and opportunity, advance social development, foster economic competitiveness, and improve quality of life." From Virginia Tech-Southside Virginia Partnership Case Statement, 2004

nano-engineering, and sustainable energy research. At the close of the 1990s the university was in a position where it aimed to enhance its status as a world-class research university but needed to find new facilities that met 21st century needs (Franklin, 2009).

In contemporary economic development, university engagement is predominantly discussed in terms of technology transfer, where innovation at universities is licensed to private firms seeking to commercialize it. In contrast, the story of the Institute for Advanced Learning and Research is a revisioning of the land-grant university model. Dating to the mid 19th century and spurred by the rise of industrialism in the United States, this model fueled the creation of numerous universities and extension programs aimed at training a new workforce for industrialized manufacturing and agriculture. By the end of the twentieth century, however, these were concentrating almost exclusively on agriculture, and becoming less and less relevant to trends in economic development. Over the past decade in Danville, the role of Virginia Tech has been to sponsor research and foster the economic development needs of the city. The designers of this approach – Tim and Nancy Franklin – have come to refer to it as “Land Grant 2.0” and their model is what prompted this case study. Virginia Tech appointed staff to discover “how to effectively partner higher education institutions with economically distressed regions to create innovation capacity” (Franklin, 2008). Nancy Franklin, pointing to the broader goals of state economic development, indicates that land-grant universities should be engaged in fostering the economic independence of poor, rural communities (Franklin, 2008, p. 9).

[...] the wealthier areas of the state essentially subsidize the less prosperous areas. This is true in Virginia as it is in many states. Governors and state leaders invested in economic competitiveness know that subsidization suppresses a state’s economic growth potential.

Virginia Tech has invested in faculty, graduate students, and management for the Institute, including its first director and outreach coordinator: Timothy Franklin and Nancy Franklin, respectively (Franklin, 2009). The inception of the Institute also included putting members of each collaborating entity on the board of directors.

The third of the major initiatives spawning the early development of the Institute was the creation of the Tobacco Indemnification and Community Revitalization Commission by the state of Virginia, and more particularly its dedication of one half its funding to revitalize those communities of the state which had been hit hardest by the decline of the tobacco industry (Wright, 2009; Franklin, 2008). That is, in places exemplified by Danville. Later influences of the legislature would be equally meaningful – first, the Institute being declared a subdivision of the Commonwealth of Virginia (2003) and then the creation of an annual budget line for the Institute (2005). The timing of the latter is essential, since it helped capitalize the development of the CyberPark.

Initially, three focused waves of development were designed to establish foundational impacts in the community that would allow the future work of the Institute to have broad influence. In the first wave, resources were allocated for research facilities creating the 330-acre CyberPark. This included technology infrastructure, creating a communications technology cooperative called MidAtlantic Broadband; constructing a conference center and designing its operations; and technology outreach to kindergarten through 12th grade teachers. The latter aimed at training educators in the use of technology as an aid to learning. The second wave began with the Institute hiring further leadership and technical support; generating a first round of Tech graduate students to work at research facilities in Danville; hiring systems networking staff; and generating science, technology, engineering, and math curriculum for all levels of education. With the third wave, additional rounds of researchers and graduates were brought on board, and the Institute sought to create STEM “pathways” in K-12 and beyond to careers in industry (Tim Franklin, 2008).

Since the beginning, funding for the Institute has been provided by the legislature, the Virginia tobacco foundation, private investment, and the city of Danville. Virginia Tech committed to helping raise funds from other sources than itself, but was chiefly involved in bringing research resources (particularly faculty) to the table (Materna, p. 26). “They (Virginia Tech) loaned us their prestige and their name and we supplied the facility and the dollars,” is how Linwood Wright characterizes the transaction. The Institute has always relied greatly on state allocations and grant monies.

However, current fiscal challenges faced by the Institute do include declining state appropriations, though this decline is not the greatest concern. Rising federal and nongovernmental grants and contracts are generating increased operating revenues. More concerning than the declining state appropriations are steadily declining program revenues (see line 4 of Table 1 below), and the seeming turbulence of matching sources (FY 2008, lines 13 and 22). The latter of these could be potentially more dangerous when infusions of equity such as the “Local Fixed-Asset Donation” (line 11) are not feasible.

Table 1: Institute for Advanced Learning and Research, Fiscal Reporting

Operating Revenues		2007	2008	2009
1	Federal grants and contracts	\$1,878,418	\$2,959,746	\$3,545,824
2	Nongovernmental grants/contracts	\$1,647,281	\$2,016,751	\$3,113,057
3	Conference center sales/services	\$196,469	\$220,254	\$247,324
4	Program income	\$121,808	\$84,862	\$53,455
5	Interest Income			\$24,747
6	Rental Revenue			\$233,034
7	Other revenues	\$529,238	\$66,699	\$1,642
8	Total operating revenues	\$4,373,214	\$5,348,312	\$7,219,083
Nonoperating revenues				
9	State appropriations	\$5,967,293	\$5,910,573	\$5,610,173
10	State education equipment grant	\$119,919	\$39,973	\$221,003
11	Local Fixed Asset Donation		\$4,813,052	\$149,780
12	Total Nonoperating Income	\$6,087,212	\$5,950,546	\$5,831,176
13	Total Revenues	\$10,460,426	\$11,298,858	\$13,050,259
Operating Expenses				
14	Personnel costs and benefits	\$5,054,452	\$5,521,695	\$5,664,828
15	Contractual services/consultants	\$922,005	\$2,478,000	\$2,778,941
16	Supplies/equipment maintenance	\$768,781	\$770,252	\$667,105
17	Facility/Operations Expenses	\$687,355	\$1,004,080	\$989,424
18	Telecommunications	\$154,781	\$251,554	\$204,147
19	Utilities	\$321,405	\$391,525	\$524,567
20	Depreciation and Amortization	\$2,041,243	\$2,034,972	\$1,728,955
21	Other expenses	\$503,375	\$183,935	\$224,924
22	Total Operating Expenses	\$10,453,397	\$12,636,013	\$12,782,891
23	Net Assets (Beginning FY)	\$6,557,389	\$6,551,318	\$5,214,163
24	Net Assets (end of FY)	\$6,564,418	\$5,214,163	\$5,631,311
25	Total Change in Assets	\$7,029	-\$1,337,155	\$417,148

Source: <http://www.ialr.org/about-the-ialr/ialr-annual-reports>

Educational Programming

As an *educational* institution, the Institute has concentrated in three broad disciplines: mechanical engineering; advanced polymer processing (meaning chemical engineering); and horticulture and forestry (primarily genetically-based research and tissue propagation). These choices reflect Virginia Tech's research goals, but also Danville's regional assets, both industrially and in terms of natural resources.

Initially, the mechanical engineering concentration stemmed from Virginia Tech research in alternative and sustainable fuels technology. But in recent years it has been influenced by the racing industry: Virginia International Raceway, nearby on the North Carolina border, is home to Car & Driver's vehicle testing, as well as time trials for NASCAR teams. Research at the Institute has come to support the needs of this industry. Where mechanical engineering had two prongs – vehicle performance engineering and robotics – the latter has not developed as anticipated, with only one tenure-track professor conducting robotics research. While much of this program's resources have folded into automotive mechanical engineering, recent developments at the CyberPark may have a hand in regenerating interest in robotics (See AVRC below). Performance engineering, however, is still growing and will continue to (Wright, 2009). Graduate programs in mechanical engineering are currently offered onsite at the Institute; graduate degrees in engineering (chemical, civil, electrical, engineering physics, systems, mechanical and aerospace, materials science) are also offered onsite. It is important to note, however, that these degrees are not awarded by the Institute. The latter are offered by Virginia Commonwealth University (VCU), while the former are given by Virginia Tech; the courses offered by VCU are distance-learning, utilizing teleconferencing to enable students at remote sites to sit in the Danville classroom. Degrees offered through the Institute are awarded by the university offering the curriculum.

Programs and Platforms, 2010

In October of 2008, Dr. Liam Leightley became the Director of the Institute for Advanced Learning and Research (Leightley, 2010). Previously the Director of the Forest and Wildlife Center at Mississippi State University, Dr. Leightley also serves currently as co-chair of the South East Agriculture and Forest Energy Resource Alliance (SAFER).⁷ Founded in 2006, this organization shares much of the emerging mission of the Institute for Advanced Learning and Research, particularly matching biomass research and alternative fuel production, “policy, targeted research, efficient commercialization, and outreach and education.”⁸ Since Leightley’s arrival at the Institute, the state of Virginia has had to reduce its budget allocations for the Institute, reflecting the ongoing challenges of the recession. This has led to staffing changes at the Institute, and physical plant development is moving slower than expected, particularly for the Institute for Sustainable and Renewable Resources. Dr. Leightley admits they are currently “struggling to maintain” the physical plant that has been built, as well.

The Institute has newly focused its efforts since the economic downturn and in the face of continued need from the community. Now, as that decade has wrapped up, a more streamlined approach has been discussed. With monies from the State still significant, but less certain efforts to examine how the Institute can finance its own operations have led Liam Leightley to focus on industry research contracts (Leightley, 2010).

Leightley points to a growing consideration for self-reliance, no doubt related to the economic malaise of the time. The Institute continually seeks opportunity for industry research contracts and is “on target,” in Leightley’s estimation, to gain further credibility in this market (Leightley, 2010). This can be furthered by securing greater funding for the Institute for Sustainable and Renewable Resources, which is engaged in generating biomass-enhancing techniques for biofuels production. Additionally, the Institute acknowledges a certain degree of obscurity; it previously suffered, as “people didn’t even know what we do.” In spring of 2010, the Institute is hiring a business development director, a position never held before and a huge gap in the Institute program until now.

⁷ Liam Leightley, PhD: <http://www.ialr.org/about-the-ialr/ialr-management-team>

⁸ <http://www.saferalliance.net/about/about.html>

When asked about the near-term goals of the Institute, he described its four platforms. Officially, these are “strategic research, advanced learning programs, advanced networking and technology, and community outreach”.⁹ His assessment of the programs focuses the Institute’s goals more precisely.

“Strategic research” is expressed more fully as gearing research to community needs and strengths. Strengths of the region predating the Institute include auto racing, and the Institute aims offers its facility to test vehicle performance. This research is applied currently to both motorsports engineering and alternatively-fueled vehicles. Agriculture is the other sector of the Dan River region which lends itself to the Institute’s “strategic research”. Farmers have grown tobacco in this area for many generations and farming families are built on the lifestyle of agriculture. Taking advantage of the knowledge and skills in place, the Institute will conduct research to support farmers growing plants for the production of biofuels.

One recent success of this aspect of the Institute’s platform is the development of a means to grow miscanthus from tissue culture, rather than propagate it from root harvesting. The former option was considered the main barrier to using the plant for biofuels production, due to the process, which can be damaging and inefficient. The new method could lead to mass cultivation of miscanthus for biofuels. This can be carried further with other plant extracts like essential oils and chemical extracts. (See ***The Role of Agriculture***, below.)

“Advanced learning programs” relates to relationships with three community colleges (in Henry County, Danville and Pittsylvania County), as well as with four-year colleges. Institute does not design content for these educational partners, but makes its facilities available for their coursework and offers technological support in the form of web distribution of online courses. The goals of generating “advanced learning programs,

⁹ www.ialr.org: “The Institute for Advanced Learning and Research’s role as a catalyst for economic and community transformation will be accomplished through [strategic research](#), [advanced learning programs](#), [advanced networking and technology](#), and [community outreach](#). Central to this goal of transformation is research and education. Four strategic research centers, ranging from motorsports engineering to unmanned systems and robotics, are located at the IALR. From these centers will grow academic programs in both the undergraduate and graduate arenas through the IALR’s academic partners, [Virginia Tech](#), [Averett University](#), and [Danville Community College](#).”

advanced networking and technology, and community outreach” are each addressed by STEM programming in K-12. This is aimed at exposing everyone in the Danville Public School system to information technology training at a competitive standard. The Institute continues to conduct CyberPark trainings for regional public school teachers, most recently with a nano-science training workshop in February of 2010.¹⁰

The recently completed Mobile Lab is an example of Institute “community outreach,” as well. This is a mobile science and technology laboratory aimed at exposing students to engineering and IT professional and educational opportunities. More specifically, the Mobile Lab program aims at connecting the Institute to students from underserved populations who have not yet come to the Institute’s CyberPark (Brown, 2010). The mobile lab will visit neighborhoods around Danville and conduct one-day learning experiences. (Additional detail concerning the Mobile Lab can be found later in this essay; see **Opportunities**, below.)

Another Institute component that is directly aimed at addressing the gap between advanced-degreed research positions and the large pool of low-skill incumbent workers is its sustainable energy and jobs programming. A piece of this program is training for residential energy auditor (RESNET) jobs, a certification program for residential energy auditors. So far, this program has trained two “classes” of students from Danville and connected them to clientele through city and county utility providers and contractors. (See *Expansion of Energy Auditors Training Program* in *Opportunities*, later in this essay.)

Tim and Nancy Franklin have each written that the intention of the Institute for Advanced Learning and Research was to “holistically” generate a new economic base in Danville, one composed of communications technology and engineering. To holistically build capacity for innovation requires a broad base of vital partnerships. Without collaboration among high school educators, incumbent worker training programs, and industry leaders, such an effort cannot succeed.

There is now a more focused intent to create diverse skill-level jobs at the Institute. But the Institute’s Outreach and Education Coordinator Julie Brown admits to an ongoing

¹⁰ <http://www.ialr.org/education/life-long-learning/447-nanoscience-seeing-is-believing>

chicken-or-egg discussion over what is more effective: a) training a workforce with the intention of attracting new industry; or b) focusing effort on attracting new firms and then training to their specific needs. Brown's assessment comes from Institute philosophy as much as best practice: even if no local jobs exist, the Institute is obligated to prepare the residents of the Danville region for productive 21st century careers – even if they are leaving Danville to find them.

Ties to Regional Industry

In referencing New Growth Theory (NGT) in her 2004 essay on the Institute, Jane Materna concluded that Danville is somewhat unlike the economies often used to describe NGT:

It [NGT] assumes that robust physical and social structure exist. The [Institute] is servicing an economically-distressed region which has no history of being a knowledge-based economy. The Dan River region has minimal physical infrastructure. It also has social and even political structure [sic] which were sustained by a textile and manufacturing sector economy...High tech job growth is not sufficient for economic development. Physical infrastructure and a receptive social and political structure are necessary, too (Materna p. 59).

While the social and political structures of Danville were certainly fueled by those sectors, there has not been a total fallout in the years since Dan River's closure. In the first decade of the Institute's history, it has made use of political will and benefited from fairly broad connections with the educational and economic institutions of the Southside and Virginia as a whole. Moving swiftly from concept to an exemplary research plant and faculty which has attracted research firms, and has fostered serious educational achievements for the Dan River region, the directors of the Institute made very bold and definitive steps toward economic regeneration. Research and development did previously exist at Dan River Mills where chemists conducted product research; this also occurred in the auto racing field, and Goodyear conducts its own product research. So while R&D is not a total anomaly within the Danville economy, its scale and role as an economic base is unprecedented there.

Materna's assessment that "high tech job growth is not sufficient" is accurate, however. This is all too clearly evidenced by the numbers of jobs created by the manufacturing sector in Danville *since* 2000. According to a 2008 Washington Post article, Yorketown Cabinetry hired 540 when it chose Danville in 2005 (Mui, 2008). Another company that provides "technical support" hired 750 in 2004. And in May of 2008, IKEA opened its first domestic assembly plant in Danville, creating 175 more or less routine manufacturing jobs on the spot. And though temporarily stymied by the economic downturn, Institute-supported companies like AVRC claim they will proceed to their own precision production as research leads to commercialization (Dell, 2009). In fact, two unnamed auto manufacturers had to break commercial contracts with the Institute during the last year (Ferrell, 2010).

The case of Danville and the Institute differs philosophically from what we see in a place like Kannapolis, NC, where jobs creation is the main goal of development. While the Institute originally pitched itself as a creator of hundreds of future jobs and traced its influence in thousands of area jobs over the 2000's, it is not as much about growth as it is about development (Feser and Malizia, p. 244). Generally, economic development aims more at "sustaining economic growth that leads to improvements in per capita income levels and to less unemployment and instability" (Feser and Malizia, p248).

The Institute is not implementing a traditional economic development program, *per se*. Danville already has a city economic development agency which works to attract new industries, retain those who have located in the area, revitalize downtown, and foster workforce development. The Institute is a research, education, and innovation center founded under an ambitious scope of work that aims to accomplish more than most economic development departments alone can. For that, it stands somewhat on its own as a model. There are elements of staple theory in its reliance on individual industrial functions. Despite applicability to a range of industries, the Institute's biomass research, vehicle performance research, and nanotechnology research all come under the sectoral heading of research and development or innovation; from a workforce perspective, they require many of the same skills sets and education.

In staple theory, an economy is defined by the dominant industry that produces goods for export (Feser and Malizia, p. 23) Economic development within this construct entails projected and sustained growth of that sector, which allows for increasing employment but also increased efficiencies of scale. In this context “strengthening the existing specialization may be more sensible than attempting to diversify the economic base.” (Feser and Malizia, p. 24) This is characteristic of Piedmont economics in the past, when tobacco, furniture, or textiles employed much of the workforce in producing those goods for export outside the community.

It offers illustrations of shifting occupational-functional dimensions as well. The occupational-functional dimension stems from the concept of a staple-driven economy, identifying “what the place does” and describing in shorthand the skill sets represented in the community (Feser and Malizia, p. 247). For the majority in Danville – and for generations – that meant rote manufacturing labor in textiles production. In this occupational-functional context the Institute, seen as an economic development program, aims to bring the workforce into a new economic sector by introducing skills required for participation. Previously, Danville’s was a routine production economy; the last decade has seen a very concentrated effort to add a research and development base to what already existed. But while that is so, the new innovative dimension does not exist at the expense of the previous dimensional concentration in routine manufacturing. While the effort to shift occupational-functional dimensions is far-sighted, it should not be seen as the whole picture.

While it stems from the land grant university model and Virginia Tech’s role in it updates that concept, its future role as a more self-reliant industrial research center obtaining its revenues from contracts reflects more focus on wealth creation in general. The growing number of researchers in the community means a broader base of higher income households. The research goals of the Institute are internally aimed at the profit to be made from commercialization (Flinn, 2010); that in turn, increases the asset base of the Institute, (hopefully) creates higher-pay, specialized manufacturing jobs, and creates efficiencies of scope resulting from proximal research and production (Dell, 2009).

The Role of Agriculture

More pertinent to the Institute's efforts to connect with the economy of Danville as it has always existed, Dr. Leightley indicates a desire on the part of some at the Institute to provide similar research support for local farmers. The Institute has already conducted research on miscanthus. Their results are a means for cultivating the plant by tissue propagation, a process much more efficient and productive than the usual method of hand-selection from root clusters (Flinn, 2010). This can allow for production of miscanthus in much higher quantities, perhaps enough to be useful for energy production.

European-descended farmers had been growing tobacco since at least the 18th century in the Danville region (Siegel, 1987; p. 27). While the Institute has been honing its affinities with motorsports technology and mechanical engineering, its leadership has come to consider further development its relationship with agriculture. Liam Leightley sees this as a vital link between the Institute and a community that will always be needed but has not yet been included in its programming.

Leightley sees biofuel production as the key to getting this off the ground. Producing crops for biofuel production would allow farmers an opportunity to switch to high-energy crops which could bring that demographic of the workforce into the new economy without extensive retraining. Plant research can be done in Institute labs by faculty and graduate students and the results can inform what choices farmers make in their fields.

This has already begun, according to Leightley. Recent Institute research has identified a new means of propagating *miscanthus*, a plant that yields high amounts of energy. Previously, cultivation of the plant would require propagation from the roots by hand, an inefficient process. Students and faculty have identified a process of cultivation from tissue cultures which is yielding much greater results, with many fewer plants dying and less time required. According to Barry Flinn, Director of the Institute for Sustainable and Renewable Resources at the CyberPark, patents for processes like these are being sought. "Our hope is to be able to translate all of our advances into IP and associated economic potential for the region" (Flinn, 2010).

An essential piece of this equation, in Leightley's estimation, is convincing farmers of the profitability of growing such crops. But new efforts to engage this discourse are not currently underway, though the Institute's Sustainable Energy Technology Center, which is scheduled for completion in September 2010, is expected to support endeavors like this. In the near future collaborations that yield local biotech start-ups that employ graduate students and serve the farming community, while bringing green fuels to market at a profit, will take the whole process "full circle" (Leightley, 2010).

The Roles of Auto Racing & Engineering

“What you race on Sunday, you sell on Monday.” -unattributed

The Institute and CyberPark’s links to regional industry developed partially from proximity to the Virginia International Raceway (VIR), which originally began operations in 1957. Located roughly ten miles from where the CyberPark stands today, VIR was one of the first permanent motor raceways in the country (street racing had been banned in 1952). VIR quickly became a vital part of the burgeoning Sports Car Club of America (SCCA) racing circuit. After a period of decline and closure from the mid 1970s to 1998, the track was reopened under new ownership and has since been a location of NASCAR testing (though not racing, since the track is not part of the official NASCAR circuit)(VIR, 2010).

VIR currently hosts testing for NASCAR Sprint cup and Nationwide series teams, as well as Grand-Am Rolex Teams. It offers training for amateur drivers, off-road challenge courses, firing ranges, as well as lodging and dining for vacationers, making it a high-profile destination in the auto sports world. With other prominent tracks nearby in Martinsville and South Boston, and NASCAR headquarters at Charlotte, NC roughly two hours away – vehicular performance research facilities at the CyberPark have been well-used (Dell, 2009).

JOUSTER, or Joint Unmanned Systems Test, Experimentation, and Research, has been located at Institute since 2004. The JOUSTER program is a partnership between VIR, Institute, Virginia Tech, and the SFC Paul Ray Smith Simulation and Training Technology Center – a U.S. Army research and development branch located in Orlando, Florida. As of 2005, Joster hosted four research faculty members from Virginia Tech, 23 Masters Students, and 2 PhD students, engaging them in robotics and physics research to develop unmanned security and military robots for warfare application.

Currently, VIR operates Virginia Motorsports Technology Park. Tenants of the Technology Park include Synergy Racing (which customizes Porsche and BMW cars for professional racing), TMI AutoTech (manufacturer of the Ariel Atom, a custom race car) and Sasco Sports (a racecar preparation and restoration company that also specializes

in vintage racing tires). But VIR's most prominent tenants are Institute collaborations. VIPER, or Virginia Institute for Performance Engineering and Research, has been located at the CyberPark since 2005 when it was jointly established by the Institute and VIR. As its name indicates, VIPER conducts performance research for teams, but its facilities – particularly its chassis dynamometers – have also been recently used for testing of hybrid electric platforms (Dell, 2009).

Advanced Vehicle Research Center (AVRC)

Dick Dell was an engineer and strategic planning manager at IBM before he became an independent strategic planning consultant. One of his clients was the Skoda automobile company which was growing rapidly through the 1990s and after consulting for them he decided to begin importing Skoda autos to the US. In 2001 he undertook a new career path. When Skoda was unable to produce enough cars for export, Dell turned his attention to pursuing domestic possibilities (Dell, 2009).

Seeking to take risks and design a center modeled on MIRA in the UK¹¹ and Transportation Research Center (TRC) in Ohio¹², Dell proposed the Advanced Vehicle Research Center in NC. Early Federal and State support paired them with NC State's Solar Center and they have been conducting plug-in hybrid conversions ever since. Dell knew Danville's economic development director, Jeremy Stratton – who had previously been vice president of the Carolina gateways Foundation in Rocky Mount, NC – and when Stratton suggested Danville as a location, Dell saw it as a good fit. The AVRC was growing rapidly itself now, and testing space was quickly becoming necessary, and Danville was considerably closer than the site the company had been considering in Northampton County. The CyberPark site is also within walking distance to the Danville Regional Airport.

“They put together an attractive package,” said Dell. “They gave us the land outright would help with the commitment to produce jobs...it was enough to attract a young entrepreneurial company, which is what we are.” Part of the benefits to such a

¹¹ <http://www.mira.co.uk/>

¹² <http://www.trcpg.com/>

company are that financial incentives given in the Commonwealth of Virginia can only be in cash, since tax credits are prohibited by law. This is invaluable to research-driven start up companies that cannot anticipate significant income during the early years of growth (Seidman, 2005; pp. 152-153).

In addition to the land they received, AVRC was expected to make a \$2.5m investment in the site (\$2m of which has already been invested); Danville and Pittsylvania County gave \$200,000 to the firm; and the company is tied to creating 35 jobs, which Dell expects to fulfill by next Fall. In considering Danville, Dell was also aware of the Institute and personally knew Liam Leightley, its current director. The opportunity to take part in a cluster was presenting itself and currently Advanced Vehicles makes use of the Institute conference center, will make further use of the chassis dynamometers, and has submitted a proposal for a US Army contract to sponsor JOUSTER research.

While it maintains its original location in Raleigh, and its partnership with NC State, Advanced Vehicles is growing into the local relationships in Danville. "Our philosophy is," says Dell, "in order to move forward in today's environment you need to have a three way partnership between industry, government, and academia. We try to make all our projects have those components." Advanced Vehicles collaborates with Virginia Tech resources, most pointedly by its joint construction of a hybrid-electric test vehicle for AVRCs work at the CyberPark.

While AVRC required less than 8,000 sq ft., they built their Danville facility at 16,000 sq ft., intending to lease portions of the center that would go unused for the short term. In the four months since the center's construction was completed, however, the space has been fully leased and tenants reflect the general current in Danville. A Department of Energy project is one, pairing NC State resources and a Virginia Tech graduate who will produce an electric-hybrid test platform vehicle; second, Insight Technologies is a start-up autonomous aircraft company currently working on development of a fully-autonomous reconnaissance vehicle for the U.S. Army; and NexGen Aircraft from California is renting bay space and offices. Dell has plans now for a second phase of development at the CyberPark to accommodate future growth of AVRC. Currently that

site is “graded and leveled and ready to start construction” in February 2010. This will be an additional 10,000 sq ft for AVRC projects.

Beyond the growth in research, engineering, and technician jobs, Dell expects even further development when research converts to commercialization. Manufacturing will “absolutely” be a phase of this cycle, he believes. Smaller companies like Tesla, Skoda, and some Chinese manufacturers may actually seek to manufacture closer to their U.S. markets. Citing the decline of the dollar, non-union rates, repatriated profits, and production of rapidly evolving technology, Dell indicates risks for companies sending inputs abroad for assembly. With assembly on site or nearby the research and design, a collocated efficiency can exist that globalized manufacturing cannot offer a small, hi-tech auto company.

Saying more about the benefits of collocation, Dell referred to future affinities with Danville Community College and EIT, an electrical component manufacturer located near the CyberPark. The Community College maintains one of the few remaining programs which trains machinists – a trade essential to auto manufacturing on any scale, and a higher paid profession than mechanical engineering. EIT manufactures small runs of specialized wiring harnesses and circuit boards. Because of its location close to the innovative automobile research market, EIT products are cheaper than those of foreign competitors who are more reliant on scale of production. Due to its highly specialized fabrication needs AVRC will source electronic components from EIT.

Influence on Public Education: Galileo Magnet High School

The most prominent K-12 development in public education since the inception of the Institute is the Galileo School, which was created in 2002 and funded by the Tobacco Commission and an \$8 million grant from NASA. The Galileo curriculum has three tracks: advanced networking and communication technology, air and space technology; and biotechnology.

Galileo is a Danville Public magnet HS with an enrollment of about 250 students. It is a “school of choice”, with all Danville Public School students eligible to apply. “If you apply on time and there is room,” says April Goff, the school’s principle, “we will accept you.” Goff further characterizes Galileo’s screening process as being mostly reliant on its International Baccalaureate World standards: “those that can make it here, stay; those that struggle either pick it up or transfer to GW (George Washington, Danville’s main high school).”

While the Institute does not have a direct input in the curriculum of Galileo, the coursework within the school’s programming matches the origins of the Institute as much as the funding sources that started Galileo. Mrs. Goff refers to the “direct correlation” between Galileo’s communications curriculum and the work of the Institute.

Galileo’s extensive program for networking and communication technology focuses on developing core skills in software and hardware generation and problem solving, as well as training for creating and managing web pages and multi-media web presences. This directly reflects the goals established early on by Institute leadership, which aimed to provide state of the art information technology access and training throughout the Danville region.

The magnet school also hosts a program for all Danville high school students at the Institute called Dan River Information Technology Academy (DRITA). DRITA is an NSF-funded program that selects 9th graders from backgrounds underrepresented in the information technology field – particularly Hispanic and African-American students – and gives them foundational training in information and communications technologies. Galileo teachers conduct the courses, which develop through all four high school years

and are offered on Saturdays, preventing any conflict with regular curriculum requirements. Courses are conducted at the Institute.

“While we (Galileo and the Institute) may not have a direct partnership as in developing curriculum together,” said Goff, “I do think there has been a real push to make sure that we are all aware of what the Institute offers and encouraged to partner with them as we can.” Additionally, Institute leadership has made efforts to have Galileo staff present at meetings with future tenant/employers that aim to locate at the CyberPark.

It is important to note that while Galileo currently works in tandem with the Institute, it also builds on existing industry opportunities, much as the Institute has done with embracing automotive performance technology. Goodyear, one of the only remaining substantial manufacturers left in Danville after the 1990s had long been producing wheels and components for aircraft at its Pittsylvania County plant. Training in Air and Space Technology at Galileo would prepare students for positions there as well as at Danville Regional Airport.

The National Aeronautics and Space Administration became interested in the Galileo Magnet School, and its concentration on Air and Space Technology as well. Originally funded by an \$8 million grant from the Space Administration, Galileo incorporated coursework that trained students in the foundations of that field (Goff, 2009). Air and space technology begins with basic background study of the elements of flight science and industries then progresses to problem solving and mechanics of flight, with a concentration on propulsion and aerodynamics. This track of the curriculum is also an apparent response to NASA’s inclusion of Danville Regional Airport in its Small Aircraft Transportation System (Peters, 2003).

Finally, the biotechnology curriculum at Galileo also reflects Institute goals in that it provides foundational training for high school students in the advanced cellular biology which Virginia Tech researchers were doing both in Blacksburg and at the Institute. Galileo coursework narrows to concentrate more closely on medical applications, however, while Institute research focuses more all the time on automotive applications of cellular biology.

Dan River Information Technology Academy (DRITA)

In 2006, the Institute received a three-year grant from the National Science Foundation to create a magnet high school that would teach Science, Technology, Engineering, and Math (STEM) programming to underserved Danville students. This program provides three years of Information technology training: from basic skills to programming, robotics and GIS. The program includes a strong college tracking aspect, as well, introducing students to the notion of continuing their education and developing professionally. This includes two college campus visits and ongoing college prep support – including application assistance (DRITA, 2009).

Figure 3: College Preparedness Among DRITA Students

Table 18

Student Interest, Confidence, and Feelings of Preparedness toward Going to a 4-Year College, by Number of Years in DRITA

% Students Reporting "Very or Extremely..."	Interested in Attending a 4-year College	Confident Can Attend Top College of Choice	Prepared to Apply to College
After 1 Year	100%	67%	67%
After 2 Years	100%	67%	84%
After 3 Years	78% ⁵	56%	88%

N=36

(Source:Dean, Kochman, 2009)

Students in the DRITA program are also placed with local businesses in year 2 and 3 to employ their IT skills. These are 70 hour externships that are required for completion of the Academy program. Upon completion of the program, students receive \$500 scholarships for use toward college tuition. Additionally, the DRITA courses qualify students for 6 credits at Danville Community College.

Figure 4: Likelihood of STEM-oriented careers among DRITA graduates

Table 22

Student Likelihood of Pursuing a STEM Career After DRITA

	Very Unlikely	Unlikely	Possibly	Likely	Very Likely
Science	6%	8%	28%	31%	28%
Math	8%	14%	25%	22%	28%
Engineering	6%	11%	31%	25%	33%
Technology	0%	3%	25%	31%	42%

N=36

(Source: Dean, Kochman, 2009)

According to the 3rd annual report on the program, 2 externships have become part-time jobs and one student of the program has started his own web design business (GRG Report, 2009). Participating first year students are 65% African American (Report, p. 11), 65% female, and for between 82-92% of the three cohorts who have gone through the program, they were the first to attend college in their families.

The program has gotten greater retention results with each cohort: cohort 1 ended with 66% of its accepted applicants; Cohort 2 had 84%; and Cohort Three retained 93% of its accepted applicants (GRG, p.16).

The DRITA program is currently preparing its application for the next three-year NSF funding cycle. Assuming funding, programmatic support, and effective management follow this program's successful first cohorts, this program will provide concrete skills and job connections for Danville youth. Keeping in mind Julie Brown's articulation that well-trained individuals trumps keeping local talent in a stifling job market, that is of primary importance.

Assessment

Having considered the structure of the Institute’s programming, its influence in industry and education, the remaining portions of this essay aim to present a range of concerns and opportunities facing the Institute. Information concerning these was gathered through interviews conducted for this case study. In the process, emergent challenges and chances to address them arose, often as a result of reflecting on past engagement of the Institute and current foci. For example, while much of the early writing on the Institute concentrates on matters of public school integration and equity (Franklin, 2008), conversations with Institute leadership turned more commonly to research, commercialization, and industry partnerships. To examine how the component has progressed, further interviews were conducted, yielding information about the STEM Mobile Lab, which is described below. Some of these challenges are currently being addressed by Institute leadership and others are either going unaddressed or are reliant on external support. In each case, indication will be made below of involved parties that can address the concern or currently have begun to.

It should be noted that this assessment is based solely on community needs and Institute programming reported in documentation and interviews cited in this essay.

Challenges Facing the Institute

Declining State Funding

Due to economic pressures on the Virginia state legislature over the past three years, the state funding which has been such a prominent component of the Institute’s financial stability will be declining. In 2000 the state appropriation was \$6.3m (Franklin, 2008, p. 12). Reference to the table below shows that state funding will have declined by more than \$800,000 since then, while costs have increased dramatically.

Table 2: State Funding for IALR

FY	Amount
2011	\$5,525,061
2010	\$5,904,538

<http://dpb.virginia.gov/budget/budget.cfm>

This is coupled with dramatic fluctuations in operating costs. The previously mentioned gap in sources and funds, for example, appears to have been driven by large increases in personnel, contractors' services, and facility expenses. With construction currently underway on the Sustainable and Renewable Resources Center, each of these costs will increase.

High School Achievement Gaps

While separate programming has been developed to introduce information technology, biotechnology, engineering, and advanced content to Danville-area students, the high school student body as a whole does not reflect equal preparedness for entry to those separate programs. Underachievement in all sciences, as well as higher dropout rates reveal that more work must be done to address both the in-class gap, and out-of-class, home and neighborhood influences that are driving down performance for black students. (See further data from Virginia Department of Education in Appendix 1.)

Table 3: Percentage of Students Failing High School Courses

2008-2009	Biology	Chemistry	Earth Science	Geometry	Algebra 1	Algebra 2
White	8%	5%	6%	7%	4%	2%
Black	36%	17%	39%	37%	12%	13%

Source: Virginia Department of Education School Summary, 2009: George Washington High School

Bridging high school and graduate education

As indicated in the previous section about Dan River IT Academy, efforts to connect local students to bachelors degrees is underway. But a gap exists in what opportunities are available locally. Students seeking an undergraduate engineering degree would have to leave the area, going to Blacksburg at least. Two recent developments may help to address this: Averett University has recently shown interest in pairing Institute programming with its own undergraduate biology curriculum; additionally, a University of Virginia/New College Institute undergrad distance-learning program in motorsports engineering has been developed.

Public accessibility

At present, City of Danville public transit only offers reserve-a-ride service to the CyberPark and RCATT. No bus route currently goes to the CyberPark from downtown, city neighborhoods, or the counties. In fact, the only extant public transit route serving the east side of the Dan River – besides Reserve-a-Ride – drops passengers on highway 58 at a fast food restaurant more than half a mile from the CyberPark. Not only does this prevent current employees of the Institute reducing vehicular trips, but it prevents access to public functions of the Institute by those reliant on public transit, predominantly low-income users. The chart below indicates that the majority of the Institute’s employees are potential transit riders, at least based on their location within Danville Mass Transit’s current service area. (See Appendix 2 “Danville Mass Transit Map” for current route system.)

Table 4: Employee Residence Location

Alamance County, NC	1
Campbell County, VA	1
Charlotte, NC	1
Danville, VA	50
Franklin County, VA	1
Halifax County, VA	2
Henry County, VA	1
Martinsville, VA	1
Pittsylvania County, VA	16
Raleigh, NC	1
Total	75
from Danville	66.67%

It is not only employees of the Institute who are expected to use the facility, either. There are employees of the various CyberPark companies, DCC which has a training facility adjacent to the CyberPark. The Institute also operates public computer labs that are open for the whole community. These are largely underused currently (Brown, 2010).

Opportunities

STEM Mobile Lab

On March 27, 2010, the Institute unveiled its mobile laboratory, an educational outreach vehicle – literally – aimed at bringing its programming to the communities thus far lacking exposure to it. The lab is fitted out with scaled versions of equipment and materials: the 8-post rig JOUSTER uses to test vehicular performance; kits that illustrate how nanotechnology can produce medical advances; the plants and filtration/reaction processes that produce the biodiesel which powers the vehicle, and more. The vehicle will bring a mobile wi-fi network with it as well.

Beginning this spring the mobile lab will visit schools around the region, aiming to reduce the self-described accessibility gap between Institute programming which has led to low numbers of “local” involvement. More explicitly addressing the distance between its programming and the minority, low-income communities of Danville and the counties, the mobile lab will be conducting day-long neighborhood workshops. This aspect is modeled somewhat on the book-mobile design, or Virginia’s mobile art education programming. If this effort perseveres in reaching low-income minority neighborhoods and successfully engages interest in STEM-oriented study, the mobile laboratory could make significant strides in overcoming a) the cultural devaluing of education, and b) the community opportunity gap between whites and blacks in the city.

Industry Contracts

Bearing in mind the coming State budgeting reductions, alternative and more market-oriented sources of revenue for the Institute will become increasingly important. Chief among these will be industry research contracts. These are likely to be in the vein of the miscanthus research mentioned previously and geared toward production of biofuels. Partnering with regional biofuel producers like Martinsville’s Red Birch,¹³ and Pittsboro’s Piedmont Biofuels could be a start to generating basic economic growth.

However, future contracts with automobile manufacturers should be pursued following current research specializations occurring at the CyberPark. This is being driven largely by military

¹³ <http://www.redbirchenergy.com/>

contracts and the alternative fueling research conducted by the Advanced Vehicle Research Center. With time, the Institute's reputation as a locus of industrial research could broadly diversify the markets served on site, moving beyond just agriculture and automotive performance and fueling. Without partitioning the industry contract revenues from the general contract revenues listed in the Institute's Annual Reports, it is difficult to know how significant a source they are and can be in the future.

Expansion of Energy Auditors Training Program

In its first two successful graduated classes, the Institute has trained energy auditors in response to industry demand within the Dan River area. A continuation of this should be cautious of continued local demand, but can provide vital ongoing job training Danville residents can use locally or take outside the community. The regional Cooperative Extension office, which is housed at the Institute, has secured grant funding to conduct farm auditing (Brown, 2010).

Focused Collaboration with Regional Partners

Halifax County's Riverstone Park, a virtualization and modeling facility generated by VA Tech and Halifax County. The plant includes full-virtual environment equipment and facilities, but no active programming. Currently managed by the Industrial Development Authority, this facility could become a Halifax satellite for the Institute, Halifax STEM Academy, and the Southern Virginia Higher Education Center in South Boston. This type of facility-based remote partnership would echo what currently serves the students of New College Institute's undergraduate motorsports engineering program and other distance learning opportunities at the Institute.

Halifax is not currently integrated in the Institute umbrella as well as Pittsylvania and Henry Counties, despite its proximity. According to Maurice Ferrell, the three centers – if united in their management, complementary in their programming, and driven by local facilities and resources – could ground Institute opportunities in the region as a whole (Ferrell, 2010).

Discussion

Looking as this essay does over the first ten years of an ambitious plan to revitalize the Dan River regional economy, it is necessary that commentary pause at the 10,000 foot level. More acute concerns such as transit accessibility are met with matters of identity:

can the Institute for Advanced Learning and Research be simultaneously a successful mechanical engineering, nanotechnology, sustainable resources, and performance engineering research center? Are the scale and scope of its aims fairly matched? The Institute has done well so far reining in its objectives and managing the expectations of its funders. Pragmatism seems to be a central tenet – perhaps more so than previously – under the direction of Liam Leightley.

The marriage of social and economic ambition with attainable scale and streamlined focus marks the trajectory of this case. The Institute seems to have moved from the nascent troubles of implementing its mission and remaining solvent, to the stage where it can hopefully grow its assets and develop a degree of latitude in its programming. The early years represent well the desires and commitment of the community as well as the visionary leadership on all sides; as the Institute becomes “institutional” its success will continue to rely on economic development outcomes. While previous gauges of success may have included high numbers of new jobs, it would be best to move beyond that metric to something adequately gauging real community growth. That will entail not only educational progress for underserved communities, but wealth building for them as well.

In 2006 the town of Kannapolis, North Carolina also saw the very definitive end of its textile economy when the vacant Cannon Mills buildings were imploded (Fischer, 2007). The town of roughly 40,000 had seen the plant close three years earlier and with it, the loss of 4800 jobs. At the time 14% of Kannapolis’ residents had bachelor’s degrees and unemployment rose to 11%. Under the guidance of the property’s owner, David Murdoch, an ambitious new plan for the property was developed. The property would be recreated as a bioscience research campus, linking North Carolinas numerous higher education institutions and the state/Golden LEAF biotechnology program.

Murdoch’s plan anticipated more than 2000 new jobs being created with the campus’ opening in 2008, 60% of which would not require bachelor’s degrees. An additional 3000 would be created by 2013. The campus would house 30 research faculty from the state universities and 50 support positions. A supporting program at Cabarrus Community College entitled “BioWork” has enrolled 70 incumbent workers, aiming to

familiarize them with the fundamentals of the biotech industry to foster access to the new skills base. Focusing, as this program does, on the most basic groundwork – the language spoken in the sciences – indicates there is a long way to go, where training is concerned.

The nascent Kannapolis biotech campus bears similarities to Danville's Institute, but it is useful as a contrast here as well. Both towns saw the rapid fall out of their employment bases and have embraced a new model that is highly dependent on advanced levels of education, as well as a paradigm shift in high school and community college curriculum. But unlike in Danville, the research campus here is expected to be a town center with commercial and residential uses interspersed with the office and research space. It begs the question: where will those 5000+ employees come from?

Leslie Boney, University of North Carolina's Assistant Vice President for Economic Development Research, Policy, and Planning in a 2007 article indicated "a disconnect between the old economy and the new economy" of Kannapolis. "[A]nd in the short term, that could be painful for people in the community." While Murdoch was aiming for a bright future (up to 37,000 new jobs over 25 years), and workforce preparation was a component of the planning, it was – and is currently – unclear that the pieces will be in place when they need to be. Firms have been attracted to Kannapolis¹⁴ (see Hester) but questions remain about whether the project can replace the lost manufacturing positions. On one hand, can the resources of Cabarrus Community College fill in the educational gaps for the existing work force and connect them to that 60% of new jobs that will not require bachelors degrees?

There are questions which ably refer to both cases: what can be done for the rest who cannot find positions at the campus? For those who lived by the low skill manufacturing jobs and cannot fit the new mold? What is being done to diversify the economy, not only to prevent its reliance on one or two industries, but also to reflect the broad diversity of skill levels represented in the community?

¹⁴ Anatomics, Angiogen, Carolinas Healthcare System and Red Hat, for examples.

Linwood Wright pointed out how it is difficult to expect fulfillment of those goals because of the incredible youth of the Institute. Not quite ten years on, there is a broad influence on economic expectations in Danville, but with actual job impacts unclear. In *Answering the Question of How...*, Tim Franklin indicates Danville and Pittsylvania County announced 6,000 new jobs between 2004 and 2008, with as many as 9,000 announced in the broader Institute “service region”. Also since 2004, Dan River Mills, once the city’s largest employer and the national leader in bedroom textiles, laid off its last 500 American manufacturing employees. In the meantime the Institute itself employs roughly 70 personnel; Advanced Vehicle Research Center aims to have 32 full time positions by autumn 2010; the CyberPark tenants researched for this article each employ small numbers of specially-trained individuals.

The Institute is not promising 5-digit job creation, however. According to Wright and Dell, the tremendous future opportunities created by the collocation of innovation are the economic development story here. Each of these education-intense jobs will have a substantial multiplier in the broader economy. Dell points out, there is serious potential for manufacturing, and this is possibly the best opportunity for large numbers of jobs for Danville’s existing workforce which was not trained for high-skill adaptability. Potential is still the operative term, however, as there is no promise commercialization of Institute or partner-company research will be accomplished locally. Global labor may still win out as the cheaper option.

The Institute is, however, developing a serious effort at direct workforce engagement with the Dan River IT Academy and the energy auditors training program. With further graduate tracking from these programs, a more adequate gauge will exist by which to determine how effectively the Institute itself has connected the incumbent workforce and youth with innovation opportunities. While these numbers will fall short of the numbers David Murdoch aims for in Kannapolis, there is much to be said for making stable and measured progress, and minding the multipliers.

Danville’s successful incentivizing of business locations relies on Institute presence and facilities; Institute facilities rely on university partnerships, foundation support, state allocations, and revenues from for-profit research. A range of anchor tenants are in

place now, as well, that attract their own new colleagues, as with AVRC's tenants. This quick growth will bring more demand for other retail and service positions in the economy. So far the numbers of relocated researchers is substantial (150+); with a multiplier like the one used in Texas, Danville could expect \$3.32 generated for every \$1 invested.¹⁵ In Virginia, University of Virginia research faculty members generate and average \$100,000 in sponsored funding (Science Coalition, 2009; p. 8). Scratching the surface of industry's growth as this study does, reveals that firms locating at the CyberPark are enthusiastic about collaboration and the mutual benefits of collocation. This has also revealed a breadth of research and applications that promise future diversity: a good indicator of relative sustainability.

Increasingly, however, the Institute should be focusing on those other lateral connections with what has been in place. This includes farming and manufacturing. While manufacturing is more the realm of firms that may bring product research to the point of commercialization, the City of Danville and surrounding counties continue to conduct traditional firm attraction, as with the case of IKEA, which came in promising more than 700 jobs (Mui, 2008). But the role the Institute can play with farming locally would be an essential link in developing the connection between the production and research bases of the economy.

Where social change is concerned, sustainability and longevity will be crucial. Rural economies that were once driven by the powerhouse tobacco market have not been able to move beyond agriculture; and those that balanced reliance on tobacco with textiles or another single industry were unfit for employing innovation as a quick strategy for growth. In communities like Danville, education previously served more as a role of safely occupying a child until they were old enough to work in the mill, at which point they were not required to have any training or skills for obtaining a job like their parents had for generations. This led to a decades-long decline in education investment and to a lowered cultural estimation of the role of schooling (Leightley, 2010; Brown, 2010). It will take generations to reverse that.

Yet, the early results of the Institute and its partnerships tell us that despite the troubles of a depressed economy, ostensibly lacking infrastructure, and a significant locational disadvantage, regional university/industry partnerships and innovation can – if managed well – yield significant economic development. Which is to say it has changed lives directly and indirectly in Danville – both lending the hope of future growth and providing for a comparatively small – though increasing – number of individuals, actual improvement in quality of life. The challenges shadowing that are weathering the economic storm of the current recession and the vagaries of political will. In the case of the former concern, state funding which has consistently tided Institute programming over from year to year is succumbing to budget cuts.

As for political will, this “experiment” has long been expected to produce quick and substantial returns for the local job market – and at times, Institute visionaries have endorsed this. But leadership on all sides seems now to agree that this will continue to represent just a portion of the total economy, even with commercialization and potential manufacturing that could come along ten or fifteen years into the program (Dell, 2009; Leightley, 2010; Brown, 2010; Ferrell, 2010). A more concentrated look at multipliers and means of embracing traditional elements of the local economy are becoming a focus for the Institute and this is reflected in its current leadership’s goals (Leightley, 2010). This remains true to the early vision of the program, and its intention to foster “holistic growth” of a new economic base.

That answers the question of what is being done to diversify the economy. As for the other, still unanswered, question – what opportunities are being created for those who lived by the low skill manufacturing jobs and have not found the chance to attain a graduate degree? One answer that does not translate to other towns facing the same predicament is that, in Danville, more than a thousand incumbent workers have found new manufacturing jobs at IKEA and Yorketown Cabinetry.

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Appendix 1: Additional High School Student Performance Data

Dropout Information

Schools report annually on the number of students in grade 7-12 who drop out. Dropout percentages represent the number of dropouts for a given school year divided by the membership on September 30th of that school year.

School - Dropout Information			
Student Subgroup	Count / Percentage		
	2006-2007	2007-2008	2008-2009
All Students	102 / 5.63%	92 / 5.23%	68 / 4.31%
Female	44 / 4.8%	41 / 4.64%	18 / 2.34%
Male	58 / 6.48%	51 / 5.82%	50 / 6.18%
Other	-	-	<
Black	77 / 6.03%	74 / 5.82%	58 / 5.07%
Hispanic	<	<	<
White	24 / 4.96%	18 / 4.16%	<
Asian	<	<	<
American Indian	<	<	<
Native Hawaiian	-	-	-

Key: < = A group below state definition for personally identifiable results
 - = No data for group
 * = Data not yet available

(Source: Virginia Department of Education School Summary, 2009: George Washington High School)

Appendix 2: Additional High School Student Performance Data

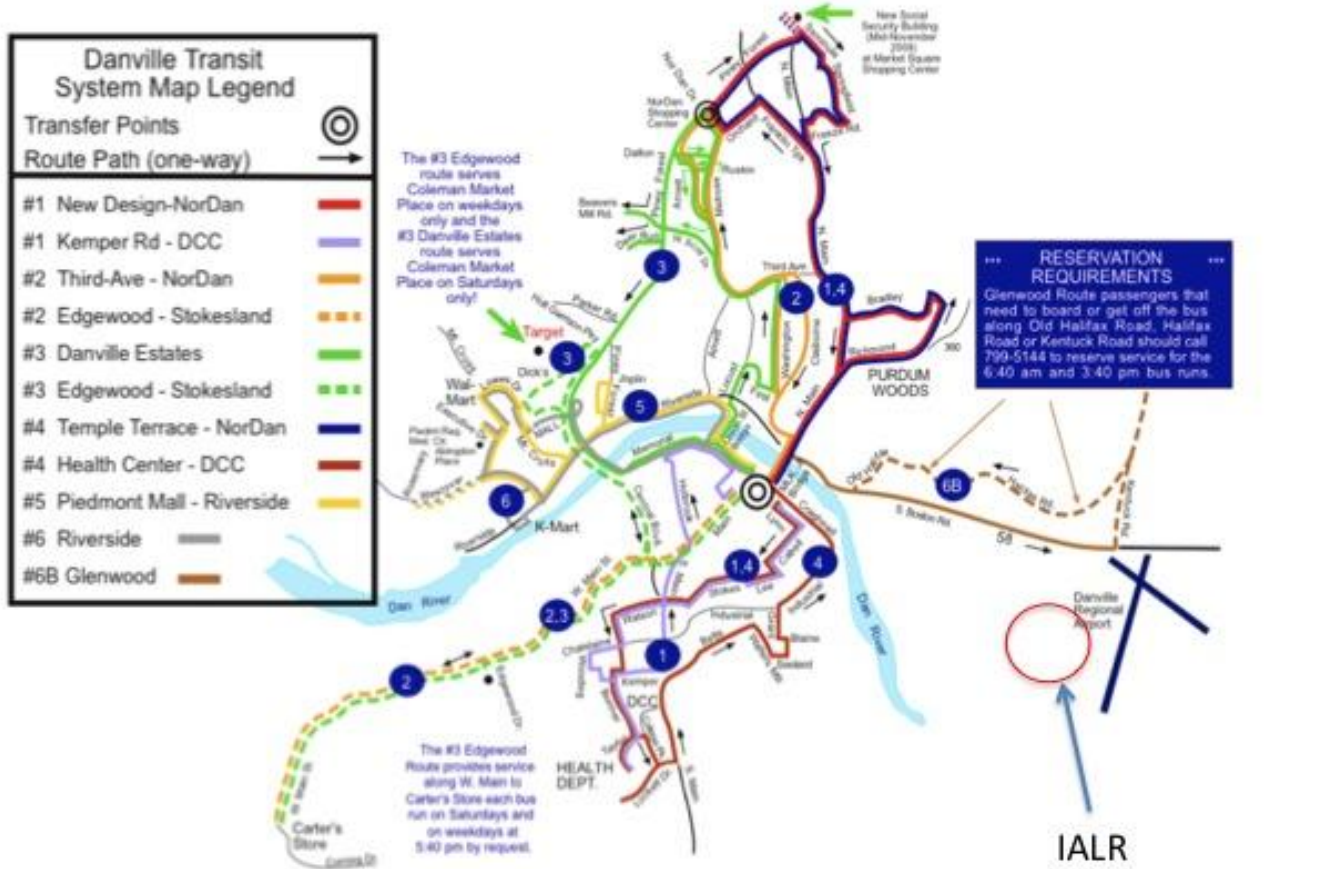
Other Academic Indicator for School with a Graduating Class

NCLB also requires schools, school divisions and states to make progress in graduation for high schools. The Graduation Rate is based on the most recent available data when AYP determinations are released prior to the first day of school. Only student subgroups represented are listed.

Other Academic Indicators				
Student Subgroup	Type	2006-2007 Percentage	2007-2008 Percentage	2008-2009 Percentage
NCLB Graduation Indicator				
All Students	School	68	68	68
	Division	70	71	71
	State	80	80	81
Black	School	64	66	64
	Division	65	67	66
	State	72	72	73
Hispanic	School	<	<	<
	Division	<	<	83
	State	64	67	71
White	School	75	73	81
	Division	77	78	86
	State	84	84	85
Students with Disabilities	School	14	21	21
	Division	17	25	30
	State	42	44	47
Economically Disadvantaged	School	73	76	76
	Division	74	77	78
	State	68	68	71
Limited English Proficient	School	<	<	<
	Division	<	<	100
	State	64	65	65
Notes:				
Graduation Rate: the percentage of students achieving a regular high school diploma (rate from previous school year is used for AYP)				
Key: < = A group below state definition for personally identifiable results				
- = No data for group				
* = Data not yet available				

(Source: Virginia Department of Education School Summary, 2009: George Washington High School)

Appendix 3: Danville Mass Transit System Map



The Institute for Advanced Learning (indicated by the arrow) is not currently on a Danville Mass Transit bus route. The nearest route services Hardees on Route 58. (Source: <http://www.danville-va.gov/index.aspx?NID=508>)

Appendix 4: Danville and the Institute for Advanced Learning and Research (IALR) Timeline

