

INDIANA'S EDUCATION
ROUNDTABLE

Completion with a Purpose:
New Strategies to Strengthen Technical
Education in Indiana

A report prepared for Indiana's Education Roundtable
June, 2012



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INDIANA'S EDUCATION ROUNDTABLE

Co-chaired by the Governor and Superintendent of Public Instruction, Indiana's Education Roundtable serves to improve educational opportunity and achievement for all Hoosier students. Focusing collectively on critical issues in education, this committed group of bipartisan stakeholders includes key leaders from K-12 and higher education, business, industry, labor, parents, community, and the Indiana General Assembly.

Roundtable Members are jointly appointed by the Governor and Superintendent of Public Instruction for their commitment to improving student achievement and as leaders in their respective fields. Additional representatives from the General Assembly are appointed by legislative leadership.

To inform the Roundtable's ongoing efforts to set a vision for educational change and student success, the group seeks advice from local, state, and national experts, researches best practices, reviews state and national data, seeks stakeholder and public input, and rigorously discusses issues, policies, and strategies – with the underlying premise that Indiana will make real progress if Hoosiers reach fundamental agreement on key issues and strategies.

Dan Clark, Executive Director

Section I

Introduction and Overview

Introduction

Indiana’s Education Roundtable commissioned this report. The Roundtable asked FutureWorks to examine the evolving skill requirements of the Indiana economy, paying particular attention to the occupational structure and workforce education needs of employers. The Roundtable requested that FutureWorks then assess the alignment between those occupational skill needs and current strategies and structures for skill development at both secondary and postsecondary levels in the state. At the postsecondary level, our analysis focused primarily (but not exclusively) on sub-baccalaureate technical education.

The organization of this report is generally consistent with that scope of inquiry. After this introduction and overview of our findings and conclusions, we begin with a discussion of Indiana’s historically important wealth-driving sectors, manufacturing and healthcare, and emerging new high-wage sectors (some of which are better understood as *clusters* of interdependent firms cutting across traditional sector boundaries). We describe how the demand for skilled and educated workers in these historic and emerging sectors is evolving and increasing. Next, the report examines how the output of Indiana’s secondary and postsecondary technical education programs maps to the skill input requirements of these economic drivers. We describe what we see as misalignment in Indiana between the needs of the state economy and the output of the state public education system. This leads to a third section, which outlines our recommendations for new structure and new policies to increase the alignment and strengthen technical education in the state. The final section, an appendix, offers more detail from the economic analysis and review of educational output at the secondary and postsecondary levels.

The findings of this report support the argument that Indiana needs both more workers with postsecondary *technical* education and more effective ways to produce these workers. We see the need for new strategies and new educational structures to achieve these goals. This report offers a set of specific recommendations to build these new strategies and structures.

Overview

While the state’s policy goals for educational attainment, expressed through the *Reaching Higher* strategic plan for higher education, are certainly important, we find that *field of study* is also vitally important in strategies to achieve those policy goals. The key wealth drivers of the Indiana economy—manufacturing, healthcare, and high-wage emerging sectors—increasingly require a

technically skilled workforce particularly at entry-level positions as it is less and less possible to ‘learn as you go’ from unskilled to skilled work. The occupational composition within these wealth-creating sectors is rapidly taking a new shape. Once structured like a pyramid with large numbers of unskilled or semi-skilled workers at the bottom, the composition is shifting to more of a diamond shape with higher proportions of middle-skilled technicians and skilled technical workers. Sustaining the health and growth of these sectors and building the incomes of Indiana residents in the future will require more technically trained workers with postsecondary technical credentials.

This is not to diminish the strong evidence that economic growth and opportunity in Indiana requires higher levels of educational attainment across the board. There is unassailable evidence from national research that general educational attainment within a region is very tightly associated with per capita income. Rising attainment is tied to rising per capita income, and stagnant growth in educational attainment is just as closely tied to stagnant income. Disparities in educational attainment explain most of the disparities in regional income, wealth, and economic growth.

But in Indiana, because of its particular mix of wealth-producing business and industry, higher levels of attainment *in technical fields of study* are especially important. Increasing attainment in the current proportion between technical and non-technical fields of study will not optimally support economic growth.

A review of the enrollment and completion data on technical education reveals a significant qualification about the state’s recent progress toward higher attainment goals. While Indiana is enrolling and graduating increasing numbers of students from postsecondary institutions, most of them are concentrated in just a few fields—mainly healthcare and nursing, business studies and administration, and social studies and liberal arts. These fields account for large proportions of all graduates of secondary career and technical education and other high school programs, from two-year colleges, and from four-year colleges. For example, fully two-thirds of all two-year degrees granted annually in Indiana are in the fields of healthcare, business administration, and general studies and liberal arts. Far fewer students are gaining degrees in technical fields.

Simply stated, much of Indiana’s current postsecondary educational attainment is coming from just a few fields of study that, outside of healthcare, do not necessarily directly support the state’s wealth-creating economic sectors. Even in healthcare, there are some anecdotal indications that demand for non-patient care technical jobs, like those in health information technology, will increase faster than the demand for direct patient care positions. Yet, the large majority of healthcare credential completers are targeted toward patient care. Although increased attainment even without regard to field of study certainly benefits the state, there is clear need for greater numbers and more effective production of degree attainment across a wider range of technical fields. Broadly increasing existing patterns of educational attainment alone will not sufficiently support these sectors—the mix needs to change.

This report presents striking data showing that neither secondary school career and technical education nor postsecondary technical education, in either Indiana’s two- or four-year institutions, is producing nearly enough credentialed graduates in technical fields. We find that:

- While many secondary students are *sampling* career and technical education (CTE), very few are *concentrating* (taking at least three courses) in these CTE pathways.
- Among secondary students who are concentrating and graduating in a CTE field, most are not choosing to enter fields related to the state’s most important wealth drivers.
- Among secondary students concentrating in CTE fields, only a small percentage follow their concentrations into related postsecondary education programs or directly into related employment.
- Among postsecondary students who do enroll in a technical program related to key wealth drivers in the state economy, very few complete those programs and obtain a credential with labor market value.

The state’s goals for educational attainment contained in its policy initiatives are challenging and entail very large increases in the numbers and rates of residents obtaining postsecondary credentials. Much of the discussion of these goals has focused on the overall rates of enrollment, completion, and level of attainment. The sidebar translates the percentage increase goals for Indiana’s major attainment initiative *Reaching Higher* into the numbers of Indiana residents obtaining credentials needed in order to meet the goals.

There is significant opportunity embedded in these challenging numbers. Addressing *technical* educational attainment in Indiana is perhaps the most critical opportunity of all in reaching Indiana’s goals for educational attainment. Simply reversing the low rates of completion among technical programs, even at current levels of enrollment, could fill a very large proportion of the gap between current postsecondary attainment and the goals of *Reaching Higher*.

The impact on educational attainment through merely increasing the completion rates in technical programs of study would be dramatic. Without increasing enrollments, if Ivy Tech, for example, were to increase the average percentage of students completing its technical programs in manufacturing to just the same rate as its healthcare programs, it could produce half the associate’s degrees needed to reach the goal above. And, if secondary CTE programs increased the percentage of their graduates entering two-year postsecondary programs to 50 percent of their current number of graduates, another 1,000

Indiana *Reaching Higher*, Goals for 2015

10,000 additional bachelor’s degrees per year... From about 32,000 to 42,000 bachelor’s degrees (through 2025).

4,000 more associate’s degrees and certificates annually... From about 8,000 to 12,000 associate’s degrees and certificates.

8,500 more high school graduates entering a college annually, achieving a 55 percent college entrance rate for secondary school graduates.

Source: CHE, Reaching Higher 2010

students would eventually obtain a credential to reach 75 percent of the total annual goal. No other change in educational policy or practice that has been proposed would have such a large and immediate impact on rates of educational attainment in the state. And no other change in educational policy would go as far in meeting the needs of Indiana employers for a more technically skilled workforce.

In FutureWorks' recommendations to the Roundtable, we suggest that Indiana policymakers can address these challenging issues only by recasting the structure of technical education programming in its secondary and postsecondary systems within three broad policy guidelines or objectives:

- First, Indiana needs to align technical education more closely with Indiana's economic drivers and the critical occupations within them.
- Second, policymakers should aim at making sure that more students and their families can make well-informed choices about good technical careers in Indiana.
- Third, the choice of a technical education should lead directly to a technical postsecondary credential.

For Indiana to produce more workers with technical credentials in programs of study aligned with the drivers of the state's economy, there must be far more integration between current structures of career and technical education in high schools and in postsecondary technical education. *The sharp traditional division between high school and college is no longer appropriate for building a technically skilled workforce. Entrance by a high school student into a CTE program in his or her junior year of high school should finish with a postsecondary credential that has meaning in the labor market.*

This report recommends new ways to organize secondary and postsecondary technical education in Indiana, starting with a new, deep organizational linkage between high schools and colleges. The goal here is to eliminate the gap between high school and college, thus increasing both the number and rate at which people can earn postsecondary credentials. In this way, Indiana can build a more technically skilled workforce ready to embark on a meaningful career pathway.

Section II

Key Findings and Observations

Drivers of Wealth Production in Indiana

Two sectors, manufacturing and healthcare, have driven the Indiana economy for the past several decades and, in all likelihood, will drive the economy into the future. Together, these two sectors account for 40 percent of the gross state product (GSP), 30 percent of all private sector employment, and 40 percent of the total wages in 2010 in Indiana. Manufacturing has declined in overall significance in Indiana from the 1990s and 1980s when it accounted for 30 percent of all employment, but it is still by far the predominant job- and wealth-producing sector in the Indiana economy. Healthcare is gaining importance, growing rapidly, and adding employees and value to the economy each year, even during the recent recession; it may soon equal or surpass the jobs impact of the manufacturing sector. Whether this happens or not, it is clear that these two sectors will continue to dominate the Indiana economy and will define significant employment and employment opportunity as far into the future as we can reasonably see.

Additionally, other economic clusters (groups of industries from different sectors but tightly tied in design, production, and market relationships) now emerging as significant wealth producers are related to manufacturing and healthcare. This is an important relationship because the scale of manufacturing and healthcare creates concentrations of talent, technology, and skills that support development of new technology and spinoffs of new related companies. These emerging clusters are advanced manufacturing, life sciences, defense and aerospace industries, logistics, and energy. While not nearly as large as the sectors of manufacturing and healthcare in terms of contribution to the GSP or employment, the very high wages in these clusters make each very important in terms of potential growth and contribution to the overall economy.

Because these emerging clusters cut across the traditional classifications of industries and occupations, it is somewhat difficult to develop statistical comparisons between these emerging sectors and traditional sector reporting. The Indiana Business Research Council has constructed categories of employment and wages for the emerging clusters by aggregating occupations associated with those industries based on NAICS codes. Results from analysis of those categories are quite striking. Uniformly, the wages in each of the sectors are significantly above the median wages of all other sectors. Average wages in all the sectors except logistics, which spans truck driving and software design, are well above the state median annual gross income of just over \$46,000 in 2010. These are very high value-creating segments of the state's economy. They are creating the wealth that is driving growth in the other parts of the economy toward the future.

In these high-value clusters, occupational skill requirements are much different than in other parts of the economy and they are changing more rapidly than in other parts of the economy. The type of employment now growing in the manufacturing and healthcare sectors and in the emerging clusters is changing the shape of occupational structures in the state. In every sector, there is a strong shift away from semi-skilled work toward both technical and professional occupations as well as more specialized skills. The complex technologies now routinely used in most industries increase the skill levels required for both entry-level and experienced workers.

We examined national level data for occupational structures of employment in the manufacturing and healthcare fields. In each field, such as electronics, medical devices, and hospital employment, the occupational structure has shifted markedly away from unskilled or semi-skilled employment and toward technicians, higher-skilled technical occupations, and professional positions.

This reflects the growth of what many have described as “middle-skill” occupations, where skill content and educational requirements are less than a four-year degree but more than a high school diploma. In Indiana, these jobs are expected to make up 55 percent of all new jobs through 2018. Conversely, new jobs in semi-skilled or unskilled positions will decline as a proportion of all new jobs.

To some extent, national projections of growth in middle-skill jobs mirror big shifts in the national economy across sectors. They reflect projections of growth in broad sectors, like information technology (that have always been heavily dependent on technical occupations), and projected decline in other sectors, like manufacturing (that historically have employed more low-skilled workers). Labor market projections of middle-skill jobs tend to emphasize growth industries and occupations that may or may not be related to the key wealth drivers of local economies. These broad projections can tend to minimize important occupational shifts and significant employment opportunities within the sectors that may not be showing significant absolute growth. Our analysis does not question the general trend toward growth of these middle-skill jobs in general, however, we need to emphasize the rising importance of these jobs and the shift toward increased dependence on them *within* sectors, manufacturing in particular, that are reshaping the existing occupational structures and the opportunities for employment in Indiana.

The need for workers with increased skill credentials is becoming deeply embedded in the economy and among employers. Employers now tend to seek entry-level employees with credentials that certify higher levels of technical skills and knowledge that will be “brought into” the workplace, not just developed there. In fact, most employers no longer have the capacity (or time or resources) to develop and support long-term skill development or significant on-the-job training. Lean manufacturing practices, strong emphasis on productivity increases from the workforce, and corresponding reductions in the numbers of employees within a company all mean that there is less time and supervision available to help unskilled workers learn the job and gradually become productive. Employers need workers with the right technical skills who can be productive without a steep learning curve. And this has translated into employers seeking workers with higher levels of educational attainment.

The occupational structure of growth sectors in Indiana reflects the growing proportions of jobs that require technically skilled workers, well beyond the typical skill sets and educational credentials of semi-skilled workers. Across the wealth drivers of Indiana, in hospitals, laboratories, and manufacturing companies, the need for specialized technical skills and demand for skilled technician jobs are both increasing. This is a significant shift in the Indiana economy and a strong movement away from an earlier employment structure that could assimilate large numbers of workers with a high school degree or less education.

Indiana employers expressed concern about the implications of these changes for Indiana as they discussed market- and technology-driven occupational shifts in their companies and industries. We spoke with manufacturers, hospital administrators, and leaders of trade associations who described changes both in their labor force and in their perception of the Indiana economy. Many manufacturers commented on the decline of commodity and durable goods assembly and the rise of firms relying on research, innovation, and advanced technologies as a strategy to stay competitive in their fields. In hospitals, administrators spoke of the increasing reliance on technical specialties, specialists in treatment technologies, and the importance of information technologies. The pressure to operate more efficiently in an environment of declining reimbursements leads hospitals and other healthcare facilities to focus more on technology-based procedures, both in patient care and in administration, that generate revenues faster.

No one in our interviews suggested that unskilled or even semi-skilled work would be growing or somehow “come back” to Indiana as the economy strengthens. All interviewees saw these skill changes as structural and permanent. They stressed higher requirements for their operations and higher skills for the workforce. The summary comments below for different sectors suggest that national trends toward higher skill levels in many sectors also affect Indiana employers.

Summary Comments from Indiana Employer Interviews, Selected Sectors:

- **Advanced Manufacturing:** *Firms we know about are moving more into R&D and innovation...There's less mass production ...and so we need fewer production workers, and more technicians and people who know how to work in technically driven environments.*
- **Defense and Aerospace:** *Product development and innovation is a key to our growth. We need high-level skills of engineers and very skilled production workers.*
- **Health:** *Cost-cutting means more finely graded jobs, fewer generalists ... changes the skill mix toward specialists...nurses and medical technicians need more specialized skills.*
- **Information Technology:** *We rely on technicians who can apply the technology to solve real problems...need wider skill sets and applications of skills to change quickly...*
- **Energy:** *This industry is moving fast from HVAC repair and maintenance to environmental systems specialists ... need crossover skills in electronics, IT, and telecom.*

Our focus on the wealth-producing sectors provides us with the ability to identify sources of significant opportunity for economic growth and opportunities for employment in Indiana. Moreover, this helps focus the question of how the state’s educational investments and the outputs of educational systems are aligned with those key wealth-producing sectors to support economic growth and prepare Indiana residents for employment opportunities.

Mapping Technical Education in Indiana

Indiana’s system of technical education begins in the state’s high schools with career and technical education programs of study and continues through two- and four-year postsecondary institutions. Indiana maintains an extensive career and technical education system at the secondary school level. Initially a system of secondary vocational training, CTE is now designed to prepare students to enter directly into career-building employment or, a more recent emphasis, to enter postsecondary education. The system is widely recognized as innovative and is part of a national movement in career and technical education to design programs of study for a seamless transition to postsecondary education and education for career readiness.

Once students graduate from high school, the principal sources of technical education in Indiana are the two- and four-year colleges and universities. A few states—Tennessee, Louisiana, Oklahoma, and others—maintain distinct systems of postsecondary technical institutes or technical colleges that grant diplomas or certificates for completion of programs of study in a variety of vocational and technical fields. But in Indiana, as in most states, the sources of technical training and credentials in technical fields are either certificate or associate’s degree programs in community colleges or baccalaureate programs at four-year colleges and universities.

Indiana supports a statewide system of community colleges in Ivy Tech Community College of Indiana and a traditionally (and still largely) residential two-year college, Vincennes University. Baccalaureate institutions include a robust array of Indiana public and private four-year colleges and universities ranging from smaller liberal arts schools to world-class research institutions.

One overarching observation about technical education in Indiana shapes our analysis of both secondary and postsecondary systems: they are very choppy systems. Metaphors of leaky educational pipelines do not adequately describe the extent of the student falloff from one educational point to another. At the secondary level, not only do very few students choose to enter a CTE program of study that is aligned with Indiana’s key wealth-driving sectors, but of those students who enter such a program there is a 20 percent chance or less that they will graduate and enter a related field of study or employment. For example, in 2009, by generous estimates, only between 10 and 15 percent of high school students concentrating in a manufacturing or pre-engineering program went on to enroll in an Indiana postsecondary program of manufacturing, manufacturing engineering, or in a related technology.

Postsecondary programs show similar falloff, but in different areas. Many students enroll in technical education programs in the state’s colleges. However, few complete a program and earn a credential. In

two-year colleges, for example, there is about a 10 percent chance that a student enrolling in a technical program of study will complete a two-year degree or one-year certificate.

Secondary Career and Technical Education

About one-third of Indiana's 315,000 high school students took at least one CTE class at a comprehensive high school or at one of 46 career centers in 2008 and 2009¹. Most were either exploring whether or not they would eventually concentrate in a program of study in a technical field that could lead to postsecondary enrollment or employment or, more likely, they were simply filling an elective slot with a CTE class at their high school with no intention of CTE concentration. After that initial engagement (one course), enrollments in CTE programs of study—concentrators in CTE—drop sharply. In any given year, only about one-fifth of the students enrolling in a CTE class (or 21,000 students in 2008-2009) chose to enter a subsequent sequence of classes leading to a concentration in a technical field and spend one to two years attending CTE program classes at their school district's career center.

Further, there is considerable attrition among these students. Of those students completing a concentration in a career cluster, only about 10,000 students graduate with both a high school diploma and a concentration in a CTE field.

Programs of study in CTE range from pre-engineering and biomedical sciences and engineering (often using Project Lead the Way's curricula that are clearly designed as gateways to college), to more job-related programs of study such as cosmetology, culinary arts, and automotive services. Career centers either serve students from a single large district, such as the McKenzie Center north of Indianapolis, or will draw students from several school districts, such as the Central 9 Career Center south of the city. The latter are independent organizations supported by "sending" school districts. Centers that enroll students principally from one district are governed and funded by that district.

Indiana makes a significant investment in CTE at the secondary level—about \$100 million annually—to support administration and delivery of technical education in district high schools and career centers. In addition, about \$25 million in federal funds (Perkins Act Funds) are awarded to Indiana for CTE. The funds are divided between the state's secondary schools, receiving about 64 percent of the funds, and postsecondary institutions, mainly Ivy Tech Community College.

Indiana is in the forefront of some national trends in CTE, especially in seeking to integrate career readiness within an overall path from high school into college. For example, the Indiana Department of Education and with the Department of Workforce Development, which oversees CTE programs, adopted a comprehensive career pathway/cluster model with full implementation in 2013. The career clusters are composed of related fields grouped around technologies or industry sectors that have been vetted by local educators. Indiana has identified 12 (from 16 U. S. Department of Education approved) clusters

¹ Indiana Department of Workforce Development, CTE Student Enrollments and Concentrations, 2008-2009, data supplied to authors.

for implementation. In the near future, most of the programs offered in CTE at either high schools or the career centers will be within one of the clusters.

Within the clusters, schools will offer pathway programs (programs of study) that focus on specific occupations or technical areas. For instance, in the transportation cluster, students select a pathway program in an occupational field such as automotive service technician, aerospace technology, or logistics and supply change management. There will be nearly 100 pathways across all the clusters. Through these pathways, CTE leadership at the state level intends to create a seamless transition from secondary schools into further education or employment.²

An additional linkage to postsecondary education and inducement for students to continue their education into postsecondary programs is *dual course credit* in which students receive credit toward college coursework in cooperating colleges' concentrations in various technical and occupational programs (for CTE programs, this generally is either Vincennes University or Ivy Tech). Ivy Tech Community College, for example, reports steady increases in the number of students in dual credit high school courses. In 2011, about 25,000 qualified Indiana high school students were enrolled in courses that were approved by Ivy Tech for dual credit.³ At Vincennes University, 46 percent of the total annualized student enrollments in 2010/2011 were high school students in dual credit courses.⁴

Dual credit is just beginning to be used within CTE programs of study. Most of the current dual credit enrollments are in classes related to academic pathways, not CTE classes. Most of the dual credit accumulation to date has been for courses that will help students complete their college general education requirements. Nevertheless, dual credit is becoming more widespread among CTE students: in the 2009/2010 academic year, 10,337 students were awarded postsecondary credit while also enrolled in a CTE program. That is a 70 percent increase from 2006/2007.⁵

Career pathways and dual credit programs promise to increase participation in CTE and may increase enrollments in postsecondary programs. But what happens now as high school students take CTE courses and decide to enter a course of study in CTE at either a high school or a career center? This is a question both about the choices students make concerning their education and a question about outcomes of the education. Students make this choice just before or during their third year of high school. Our research has not included a detailed examination of how students make choices to pursue a particular program of study, but we see this as a very important issue to explore.

² Indiana secondary schools are also leaders in the adoption of Project Lead the Way (PLTW), a national program with high school curricula in engineering and biomedical sciences. Schools participating in PLTW and students enrolled have increased considerably since its early adoption. Nearly 375 high schools offer PLTW curricula, and an estimated 31,000 students are enrolled in one or more of the program's classes.

³ Ivy Tech Community College, Institutional Research, data supplied to authors.

⁴ Sources: Ivy Tech Community College, Institutional Research. For Vincennes: Commission on Higher Education, Annualized Enrollments, and Awards, 2007-2011.

⁵ Indiana Department of Workforce Development, *Career and Technical Education Data Profile, 2011*.

We have been able to look at the consequences of those decisions in terms of the output of high school CTE programs. Our comparison of the distribution of CTE enrollments in career clusters to the top wealth-producing sectors of the Indiana economy suggests that students are not choosing to concentrate in those clusters of greatest economic significance in the state. Five career clusters account for over 50 percent of all students who concentrated in a program: health services, logistics, human services, agriculture, and construction. Although, no one would question the importance of supplying skilled workers to these sectors or assert that job opportunities in these sectors are unimportant to the state or to individual students, only two of the top five clusters, health services and logistics, are also represented among the key wealth drivers of the economy.

Within the career clusters, however, some programs of study draw far more students than others. To understand more clearly their relationship to the economy, it is also important to know which programs of study students choose to pursue. CTE clusters hold very different occupational fields collected under a general occupational theme or broad technology. For example, health services includes the biomedical engineering curriculum of Project Lead the Way as well as home health aide programs of study. The human services cluster is overwhelmingly composed of two programs of study, early childhood education and cosmetology. The logistics cluster, one of Indiana's key industrial sectors, includes courses and programs of study in aerospace technology as well as auto service and auto body technology. Of 5,200 students who took one or more courses in fields within the logistics cluster, 4,866 took automotive service technician classes, while 314 took classes in aerospace technology.⁶ This suggests that even within a cluster relevant to the state's economic development, such as logistics and transportation, the specific CTE programs of study taken by a majority of students may not be related to the sector definition used in the state's economic development policy or industry associations. For example, if the state's definition of logistics were applied to the logistics cluster as defined for CTE programs, that cluster would hold only a handful of students.

CTE programs of study are designed to prepare students for further education or for employment. So, a fundamentally important question that must be examined is this: to what extent do students who have concentrated in a CTE program of study actually follow a path into college or employment that is *related* to their program of study?

To answer this question, we looked at post-high school outcomes of CTE students who graduated in 2009 and who could be tracked into an Indiana public college or followed to wage-based employment with an Indiana employer. These data were developed by linking student identification numbers to records of postsecondary institutions in Indiana and with Indiana Unemployment Insurance records in order to identify those students who were employed in Indiana, the industrial sector of their employer, and wage calculations. The data need to be taken with considerable caution and there are several caveats about too close an interpretation, but they are the best indication we have of how students are following an educational path toward careers whether into jobs or into education. For each field or

⁶ Source: Indiana Department of Workforce Development, 2008-2009. Duplicated headcount of students in classes.

program of study, we examined the numbers of students pursuing any kind of postsecondary education or any kind of employment as well as the proportions of those entering programs or employment that were related to their

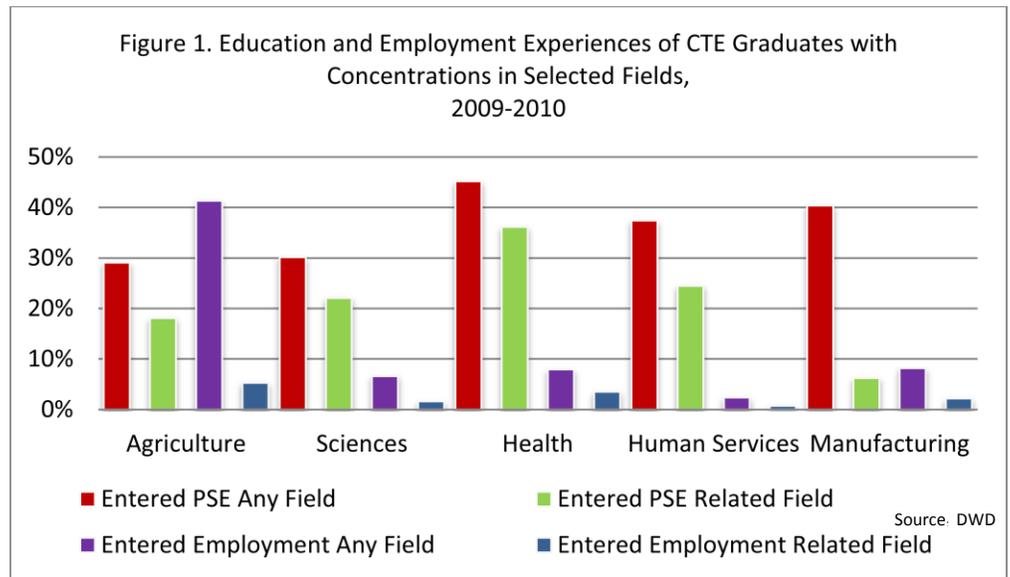
CTE program of study.⁷ Figure 1 shows the results of our analysis; each career cluster shows the percentages of students entering postsecondary study (PSE) or employment in any field or in a field related to their program of study.

Even with appropriate cautions on the evaluative quality of

the data, it is clear that very large numbers of students who graduate from a CTE program do not follow their beginning career education into a related field of study or related employment. In each cluster, there is considerable drop-off of students entering a postsecondary institution in any field. This falloff is even greater with regard to the proportion that enters a postsecondary program specifically related to their CTE concentration. In some clusters, such as manufacturing, the falloff is dramatic.

Overall, it appears that only small minorities of CTE students pursue employment or education in their high school concentrations after they graduate. There are more data refinements and additional research needed to fully corroborate or dispute these inferences. Yet, the suggestions of these data are supported by anecdotal accounts of career center administrators and faculty interviewed for this report. They frequently commented, with dismay, about the low numbers of students who follow their concentration into related education or employment.

There are important consequences to this. First, the state reaps only part of the benefit of its own investment in providing CTE to secondary students. There is certainly some benefit in general to any kind of education that prepares students for their working futures, but when students do not follow the educational path they have begun, the content and investment in a specific field are lost.



⁷ Source: Department of Workforce Development, Career and Technical Education. The department provided data on graduates and linked those with known valid ID numbers to postsecondary databases and to UI data; analysis of the data by the authors. There is some unknown amount of error in these data and in the assignment of related fields.

Second, there is a loss of talent and sources of skilled employees to the state’s economy. Because of the scale of the proportion of CTE students who do not pursue postsecondary education or employment in a related field, these losses are significant.

Third, there may be significant loss to students themselves in not following a pathway into education or into employment for which they had prepared. This is certainly suggested by a quick examination of the median wages of CTE graduates who were reported as employed in Indiana through UI data (those earning less than \$7.00 an hour were excluded). Figure 2 below provides median wages for CTE graduates who concentrated in a particular program of study in selected clusters and who were employed in any field, compared to those who were employed in a field related to their concentration. Again, caution should be used in interpreting these data; they show only suggestions of differences in the median wages of those entering fields related to their technical education and those who do not follow their program of study.

In some CTE fields, there are large differences in earning between students who enter a field in

their technical concentration and students who do not follow their program of study into employment. However, when paired with the data showing that few students actually *do* enter a related field of employment, it becomes clear that this differential is highly concentrated in a small number of graduates and that the large majority of CTE graduates who enter employment do so at low wage levels. It may be too strong to say this represents significant forgone earnings for the students and a loss of wealth production for Indiana, but the data point in that direction.

Finally, the figure above suggests the need for additional research in this analysis of employment and wage outcomes for CTE graduates. The students represented in the figure above were graduating on the heels of a deep recession; results may be different during a recovery or during a period of lower unemployment. These data showing a lack of wage differential (healthcare and human services) also raise the question of whether some CTE programs of study are educating students to enter very low-wage paying fields.

From our analysis of the data from secondary CTE programs, subtle but important inferences can be drawn from the outcomes data, employer comments, and implications of data on occupational changes in sectors. Despite our earlier expression of caution in over-interpreting these data, we believe these

Figure 2. Median Wages of CTE Secondary Graduates Concentrating in Selected Fields, 2010*

	Agriculture	Construction Trades and Technology	Sciences, Technical, Research	Healthcare	Human Services
Median Wage--Any Field**	\$ 9.93	\$ 10.82	\$ 9.75	\$ 8.92	\$ 9.04
Median Wage--Related Field**	\$ 12.11	\$ 17.18	\$ 12.35	\$ 9.08	\$ 8.72

***Where graduate’s SSN is known and valid.**
**** UI record match, 4th quarter 2010.**

Source: Indiana DWD

data paint a pretty clear picture that a high school diploma is no longer enough to find employment in a career-building job in the labor market. Low numbers of students entering related employment after high school graduation may reflect a trend that employers have anecdotally described for some time; here we see what may be the same phenomena from the jobseeker perspective. The low rates of high school graduates entering related employment may indicate a lack of success in trying to find related employment armed only with a high school degree. These data on student employment and educational experience may show that a high school diploma, even within a significant technical field, does not give students an advantage in seeking employment in the current labor market. While some students can and do enter employment related to their field of study, most do not.

The literature, observations, and comments from employers on labor market trends all suggest that postsecondary credentials are increasingly necessary for entry-level jobs in a growing number of industries. From the supply side, we see indications that those with a high school diploma are not entering employment in their field of training perhaps simply because that diploma is not enough; the student has not received enough preparation. Low rates of students entering employment in related fields may just be the effect of rising skill and credential requirements.

We would require additional data and evidence of labor market experience from these students in order to know exactly what is happening to those graduates who enter the job market after high school. Our analysis should be replicated more thoroughly across more programs and for more years. However, a plausible implication of these data is that it is now not enough to hold only a diploma, even with a CTE concentration, for entry into the jobs for which students trained in high school.

Indiana's long-held tradition of a high school diploma as a significant point of educational attainment no longer parallels the structure of the labor market. Yet, the educational education system and the "career ready and/or college ready" slogan continue to send the message that completing high school prepares students to enter employment. It does not. It may allow entry into low-end jobs that have no formal skill requirements (and typically no upward mobility), and/or it may in rare cases provide a certification of minimal skills for low-wage positions. However, these are at best "casual jobs." A high school diploma will not prepare a young person who is currently in the K-12 system for a "career job." The goal and accountability metrics of CTE at the secondary level should not be career readiness. The more appropriate standard for secondary CTE is how well it propels students through high school and into postsecondary career education, ensuring that these students are properly trained on a fundamental platform for their work life.

Postsecondary Technical Education at Two-Year Colleges

Because our main focus here is on technical education for jobs that require some postsecondary education but less than a four-year degree, we look in particular at two-year technical education programs such as that offered at Ivy Tech Community College and Vincennes. As with secondary programs in CTE, we ask the same questions of the postsecondary system in Indiana concerning the

alignment with economic drivers and the level of production of graduates who have earned degrees or credentials in technical fields.

The answers suggested by the postsecondary data are different than the description of what actually happens to secondary students. In postsecondary education, there are significant numbers of enrollments in technical programs in two-year colleges, and these programs are very much aligned with skills sets needed in the economy. However, in two-year postsecondary technical education, few of those enrolling in a technical program complete a credential. So the output of credentialed individuals in technical fields from two-year colleges is very low compared to the scale of enrollments.

However, as with secondary CTE programs, the concentration of associate’s degrees and certificates awarded in Indiana is only partially aligned with the state’s key sectors. First, although postsecondary institutions—community colleges and baccalaureate schools—offer a wealth of technical education programs

relevant to all sectors of the Indiana economy, the *graduates* of all two-year college programs are concentrated in very few fields of study. In terms of credentials and degrees awarded, the data show that

they are very concentrated in a handful of fields of study—healthcare, business administration, and liberal arts/general studies. Those three fields account for 67 percent of all 8,600 associate’s degrees awarded by all educational institutions in 2010. Figure 3 shows the top five enrollment programs and associate’s degrees for all students graduating from associate degree awarding colleges in Indiana. The concentration in a small number of fields is striking.

Figure 3. Five Largest Program Areas, Indiana, by Headcount and Associate’s Degrees Awarded, 2010

Program Area Descriptions* All Associate’s Degree Awarding Institutions	Headcount 2010	Associate Degree Awards 2010	% of all Associate Degrees**
Health Professions and Related Clinical Sciences	18,357	3,129	36%
Business, Marketing, and Related Support Services	18,144	1,632	19%
Liberal Arts and Sciences, General Studies, Humanities	31,039	1,038	12%
Engineering Technology	7,808	760	9%
Construction Trades	5,098	474	6%

* By 2 digit CICP code **Total Degrees Awarded in 2010 = 8,601 in both 2- and 4-year institutions.
Source: CHE

In Ivy Tech and Vincennes University’s most heavily enrolled programs, degrees awarded are concentrated in a relatively small number of programs. Figures 4 and 5 show program headcount enrollments and associate’s degrees awarded in the top 10 degree programs (out of about 90 different degree and concentration programs) for Ivy Tech and for Vincennes University in 2010. Data for Ivy Tech show both associate’s degrees and certificates awarded; only associate’s degrees are shown for Vincennes because the number of certificates awarded is too small to have much meaning. For both institutions, the top credential producing fields were general studies, business, and healthcare. Even among the certificates awarded by Ivy Tech, which are more frequently awarded in technical and occupational fields, 60 percent of the 1,800 certificate awards shown here were in healthcare fields.

Figure 4. Ivy Tech Top 10 Degree Programs by Headcount Enrollment

Degrees Awarded, 2010			Certificates Awarded, 2010		
Ivy Tech Degree Program Name	2010		Ivy Tech, Formal Certificate Program Name	2010	
	Headcount	Degrees Awarded		Headcount	Certificates Conferred
A.A.S./A.S. in General Studies	18,899	240	T.C. in Medical Assisting	2,690	391
A.A.S./A.S. in Business Administration	10,524	742	T.C. in Practical Nursing	1,491	624
A.A.S. in Medical Assisting	4,908	293	T.C. in Early Childhood Education	468	34
A.A.S./A.S. in Criminal Justice	4,750	201	T.C. in Automotive Technology	335	30
A.S. in Liberal Arts	4,575	76	T.C. in Industrial Technology	266	45
A.A.S./A.S. in Human Services	3,612	186	T.C. in Manufacturing Production and Operations	249	55
A.S. in Nursing	3,507	1520	T.C. in Business Administration	240	165
A.A.S./A.S. in Early Childhood Education	3,416	152	T.C. in Dental Assistant	222	74
A.S. in Education - Elementary Education	3,062	83	T.C. in Office Administration	206	72
A.A.S. in Accounting	3,036	220	T.C. in Industrial Technology	191	1

Source: CHE

At Vincennes University, a somewhat different distribution of associate’s degrees granted is shown in Figure 5 below. Of the 11,500 students enrolled at Vincennes in 2010, 50 percent were enrolled in a general studies program, compared to about 12 percent of the Ivy Tech students. Enrollments in other programs, even those included in the top headcount programs, drop off sharply in Vincennes. Part of the reason for the large proportion of Vincennes students enrolled in general studies programs is due to the large numbers of dual enrollment high school students who are included in these enrollment figures; in fact, almost half of Vincennes total enrollments are high schools students. Nevertheless, beyond the large enrollments in general studies programs, the relative concentrations of enrollments in business and healthcare are similar to those of Ivy Tech.

These two figures bring us to three observations. First, with the exception of healthcare, there are low numbers of degrees or certificates awarded in fields related to the key sectors of the state’s economy. Second, a high proportion of the total awards are concentrated in just a few fields. Finally, there is a dearth of technical fields represented in the most highly enrolled programs. This is all the more striking since Ivy Tech and Vincennes are Indiana’s principal public postsecondary institutions for occupational education.

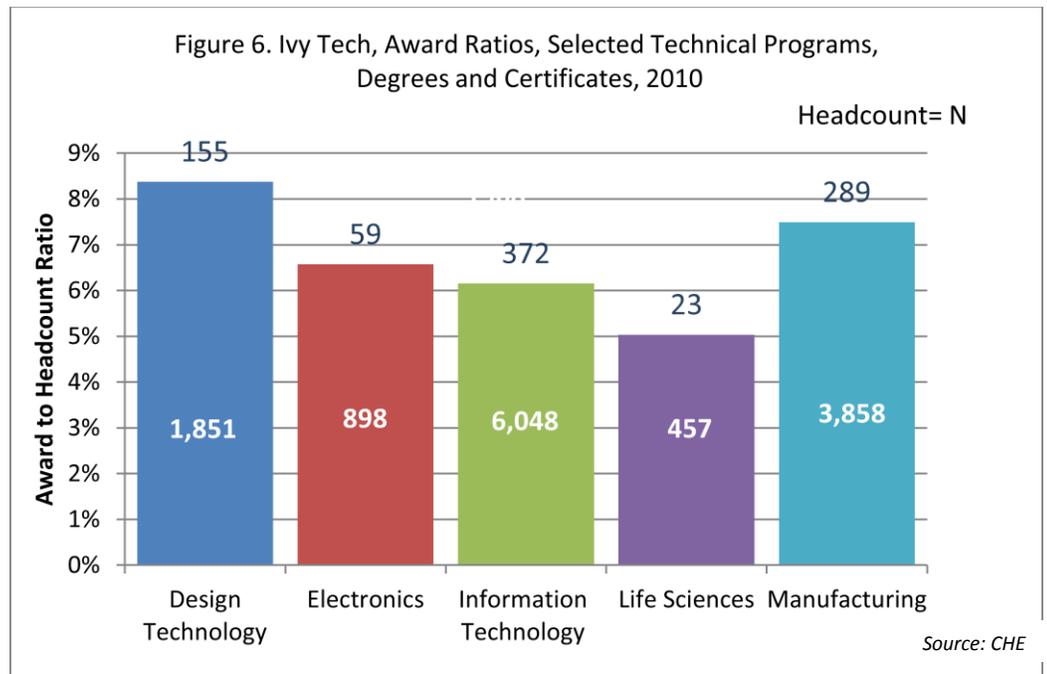
Figure 5. Vincennes University Top 10 Degree Programs by Headcount Enrollment and Degrees Awarded, 2010

Vincennes University Degree Program Formal Name	2010	
	Headcount	Degree Conferred
A.A.S./A.S. in General Studies	5,782	293
A.S./A.A.S. in Law Enforcement	432	58
A.A.S. in Accounting	310	16
A.S. in Business Administration	296	22
A.S. in Nursing	286	94
A.S./A.A.S. in Conservation Law Enforcement	215	36
A.A.S. in Business Management	194	28
A.S. in Health Information Management	150	17
A.S. in American Sign Language	137	9
A.A.S. in Administrative Office Technology	134	20

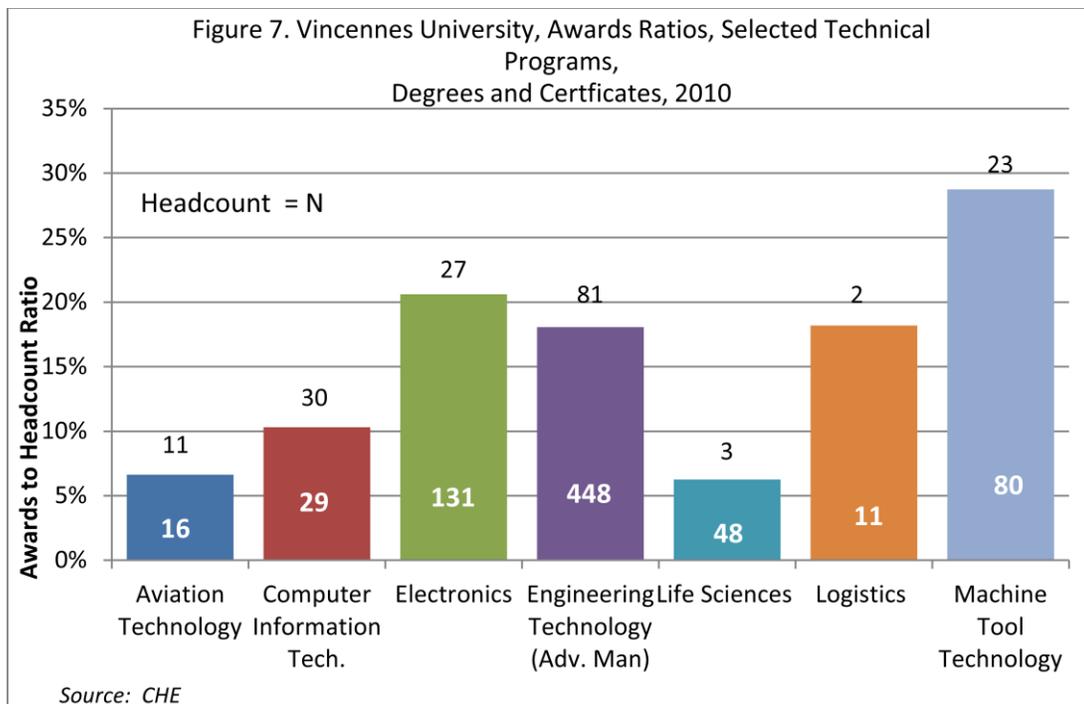
Source: CHE

We were also able to look at enrollment and completion data on specific technical programs directly related to key sectors in the state. Figures 6 and 7 below show selected technical programs and completion ratios (degrees to enrollments) at Ivy Tech and Vincennes. A completion ratio is simply the number of those receiving a credential over the total enrollment for the same year; it is not a cohort-based rate. The numbers of enrollments and completions are shown in Figures 6 and 7. At Ivy Tech, there are substantial numbers of student enrolled in these programs, but very small numbers of credentials awarded. None of these programs show a completion ratio of over 9 percent, and these are typical numbers for every technical program offered at the institutions.

Comparing Ivy Tech and Vincennes University, we primarily see the effect of enrollment scale. At Ivy Tech, relatively robust enrollments but low completion ratios produce modest numbers of degrees and certificates (shown at the tops of the columns). At Vincennes, a much smaller total enrollment in the college leads to lower specific program enrollments and very



small total numbers of awards even though the percentages of completions are higher than Ivy Tech's. In either case, production of degrees in specific skill areas related to the state's economic drivers is very low.



Unlike secondary CTE, these postsecondary technical programs generally show substantial enrollments but few completions of degrees or certificates. In secondary programs, few students chose to enter a technical field related to the state's key industrial sectors. In Indiana's postsecondary environment, many more are choosing to enter a technical program, but very few complete the program and achieve a credential.

Ivy Tech and Vincennes are both obviously well aware of this challenge. Ivy Tech has launched a number of reforms intended to increase the percentage of students who complete the technical programs they enter. The school is experimenting with several approaches to accelerating student progress through programs and has started wide-ranging reforms of traditional approaches to development education, where much of the loss of persistence and student falloff occurs. In addition, Ivy Tech has established a new Technology Institute for one-year certificate programs. This Institute will apply new strategies of block scheduling and cohort enrollment to boost student persistence and completion.

These reforms will have a significant impact and will help a larger percentage of enrolling students find their way to successful completion of technical programs. But this is not enough. In the *Recommendations* section of this report, we describe how these programmatic reforms need to be supplemented and reinforced by structural changes in the relationship between secondary and postsecondary CTE and in the linkages between two-year and four-year institutions.

Baccalaureate Technical Education

In relation to technical education programs, Indiana's baccalaureate colleges are broadly similar to two-year colleges. Graduates are concentrated in a relatively small number of fields, and the technical programs produce few graduates. Bachelor's degrees awarded at all Indiana public four-year colleges and universities are heavily concentrated in just five fields. At the same time, more students who enter four-year college technical programs will complete the programs than is the case at community colleges. The completion ratios for technical baccalaureate programs are significantly higher than those of two-year colleges, even though the percentages of completions are lower than those of other bachelor's degree programs in Indiana.

Figure 8 below shows the top program fields and the percentages of students receiving degrees in those fields as a percentage of all degrees awarded. While none of the top five enrollments or completions were technical fields, four-year colleges and universities still enrolled and graduated substantial numbers of students in STEM (science, technology, education, and mathematics) related and technical fields when compared to two-year colleges.

Figure 8. Top Baccalaureate Fields, Degrees Awarded, 2010			
Program Area Description	Headcount 2010	Degree Awards 2010	% of all Bachelor's Degrees
Business Management, Marketing, and Related Services	27,332	4,733	18%
Education	20,628	3,044	11%
Health Professions and Related Clinical Sciences	14,676	2,383	9%
Liberal Arts and Sciences, General Studies and Humanities	10,195	1,894	7%
Communication, Journalism, and Related Programs	9,682	1,713	6%
Social Sciences	8,689	1,529	6%
Engineering	8,018	1,524	6%
Psychology	6,866	1,092	4%
Visual and Performing Arts	7,474	1,054	4%
Engineering Technology	5,173	987	4%
Biological and Biomedical Sciences	7,435	955	4%
Total Bachelor's Degrees 2010 = 26,875			Source: CHE

One other comparison between associate degree production and bachelor degree production is worth noting and suggests an additional reason why increasing two-year associate degree production might be very important in Indiana. Recently, the Indiana Business Research Council released a report on the relative pay-off of education in Indiana for individuals and for the state, including a calculation of “remain rates” for those receiving degrees in the state. After five years, over 70 percent of those with either an associate’s degree or certificate remain in Indiana, compared to less than 50 percent of those with a bachelor’s degree or above. One interpretation of these data is that Indiana four-year colleges and universities are serving both a national student body and a national labor market, while associate degree-producing colleges serve students more likely to stay in the Indiana labor market.

Summary Observations

It is beyond the scope of this research to explore all the reasons contributing to the sharp drop-offs of students pursuing a career path in CTE secondary programs or the low completion rates at two-year colleges in Indiana. However, it is important to identify implications that these low rates of completion have for the state and support of its wealth-driving sectors.

- First, low numbers of credential completions in technical educational programming in Indiana means that individuals do not hold the credentials they need to enter employment in the growing numbers of jobs that demand postsecondary credentials. Without credentials appropriate for the job requirements, Indiana workers very quickly reach the limit on their ability to take advantage of opportunities for higher wages typically associated with “middle-skill jobs.”
- Second, large numbers of adults lacking credentials to contribute to the overall level of educational attainment in the state suggest that Indiana will be unable to attract significant new business that depends on a skilled workforce. Indiana will be less able to adequately meet the workforce needs of the state’s key wealth-creating economic sectors.
- Third, the issues associated with technical education in the state do not at all reside with one part of the system alone. Though the characteristics of low outcomes of those with technical degrees may vary by their location in the educational pipeline, the issues run throughout. Solutions, therefore, must take into account the full spectrum of technical education in Indiana.

Section III

Recommendations

FutureWorks' scan of demand and supply for a technically educated workforce in Indiana illustrates a need to rethink and restructure how the workforce is educated and how it moves through the educational systems in Indiana. This begins with a clear acknowledging that a high school diploma is not enough for employment in technical fields and, for that matter, for anything more than casual employment in any field. The current organization of technical education in the state no longer corresponds to what most employers need to compete and grow. Next, Indiana needs ways to stop the losses of so many students who enter programs but do not follow them through to careers. At each key juncture or transition point in technical education—beginning with a student's choice of field, completion of an educational program, and progression towards a career path—the numbers of students failing to move to the next step are striking.

We cannot predict exactly how many technically trained people Indiana needs to sustain the wealth drivers of the economy now and into the future. However, even in today's recession-dampened economy, employers across the state are not able to find people with the right technical skills to fill substantial numbers of openings.

We also know that wealth production in Indiana's economy is primarily driven by healthcare and manufacturing, and these sectors increasingly will rely on technicians and technically skilled workers. In emerging high-value clusters related to manufacturing and healthcare that hold the greatest long-term promise for the state's economy, the reliance on these technically skilled workers and technical professionals is even more pronounced.

While Indiana has taken a number of steps and launched a number of initiatives to increase overall educational attainment, there is a clear need for a stronger and sharper focus on technical education. Indiana needs policies to increase the supply of students choosing to enter technical fields related to the state's drivers of wealth, incomes, and economic growth. The education pipeline toward these fields, at every key juncture, is leaking potentially high-value students—it needs fixing. To reach the state's lofty goals for educational attainment in the population, many more students and working adults will need to complete postsecondary credentials, and much of the increase in educational attainment must come from more students entering and completing technical education.

This report began with an analysis of the state's economy and identification of its key wealth-producing sectors. The demand side is also the place to begin to define solutions for fixing Indiana's technical education pipeline. Input from employers in those sectors combined with a thorough understanding of the occupations within the sectors will guide educators and policymakers in designing policies and practices that encourage more students to enter technical fields of study. These employers can help educators design real educational paths leading into career opportunities and can help the state realize

increased benefits from its considerable investments in technical education. The goal of technical education, unlike liberal arts, is to prepare individuals to enter specific occupations. These occupations and careers should lead the reshaping and reinvention of technical education.

We are suggesting substantial changes in the ways technical education is organized in the state. As stated previously in this report, there are a number of good initiatives underway at both the secondary and postsecondary levels. We hope our recommendations incorporate these initiatives and offer new ways to create a framework where those initiatives can flourish and reach significant levels of scale.

Indiana also clearly has many outstanding, high-quality educational programs and faculty in its secondary and postsecondary schools. FutureWorks was not retained to assess the quality of these programs or courses. *This report focuses on the organization of technical education and the ways that people—younger aged students and adults—gain access to it and take advantage of the opportunities it presents.*

The recommendations that follow are intended to promote:

- **More** students choosing to enter technical education and a technical career.
- **Quicker** and *truly* seamless paths designed so that students complete a technical education, gain a valuable postsecondary credential, and move into careers.
- **Better** educational outcomes designed to ensure that students can meet employer expectations and the requirements of contemporary occupations.
- **Faster growth** in skill-based, wealth-producing companies in Indiana.

RECOMMENDATION #1: Strengthen the Linkages between Secondary and Postsecondary Technical Programs

Indiana has education policies and programmatic initiatives in place that are favorable to increasing the numbers of students who complete postsecondary education in areas aligned with occupational sectors. The Indiana Department of Education has recently developed a set of career pathway programs that connect high school and postsecondary education through dual credit courses. Among the strongest policies is one that allows students who complete their high school “core 40” requirements by the end of the 11th grade to attend the first year of college with a scholarship. The Mitch Daniels Early Graduation Scholarship is an educational benefit for students who graduate from a public high school at least one year early, after December 31, 2010. The scholarship pays \$4,000 to be applied first to any remaining unpaid tuition and fees and can be used at any state aid-eligible Indiana college. The balance of the scholarship is remitted to the student. This is a great opportunity for Indiana and can be a significant steppingstone for students to jumpstart their postsecondary education and complete a

valuable one-year certificate and half an associate's degree in the same timeframe they otherwise would earn a high school diploma.

Additionally, Indiana leads the nation in Project Lead the Way programs, which are designed to give students a head start in high school toward postsecondary programs in the STEM fields. Indiana also has the largest number of *New Tech High Schools* in the country, which focus on project-based instruction that deepens learning by simulating what goes on in the workplace. At the postsecondary level, Ivy Tech has begun implementing what it calls "Institute" models, which are designed to help students accelerate their way to a strong one-year certificate in technical fields.

We see opportunity to build on these efforts to further accelerate and increase the numbers of students who earn credentials in targeted occupational areas. ***Specifically, we propose that Indiana repackage secondary school CTE such that a decision to concentrate in a CTE cluster becomes a decision to gain a postsecondary credential.***

For too many students and their families, a decision today to concentrate in a CTE field of study represents or becomes a choice not to attend college or to somehow "put it off" for a few years. They view CTE as an alternative pathway to the high school diploma and then, at best, a way to get some fundamental skills appropriate for direct and quick entry into career-oriented jobs. It is not working. This is the relic of an earlier age in Indiana, and the strategy must change to accommodate the reality of the contemporary economy.

Our analysis indicates very strongly that a career-oriented, entry-level job in the changing occupational structure of Indiana's economy demands (or will demand in the near future of students now in their early high school years) at least a year of post-high school education and skill development presently available only in postsecondary institutions. This is especially true in the technical occupations so important to Indiana's economy.

While there are some jobs available to individuals with only a high school degree, they are usually at or near minimum wage. Unfortunately, in attainment-limited Indiana, there is a lot of competition for these low-wage jobs, and they no longer represent a solid bottom rung of an upwardly mobile career ladder. They are typically bottom-end, casual jobs that will stay at the bottom, increasingly disconnected from the higher-paying, career jobs above. The employers we interviewed in high value-adding sectors who have entry-level jobs that, in fact, can lead to good family-supporting wages, do not consider a high school degree as a credential appropriate to one of those career jobs.

It is important that Indiana change both the image and the reality of CTE. We urge that CTE programs be reconfigured such that, at program entry, every student choosing CTE be presented with a rigorous sequence of quality courses that on completion results in a high school diploma and a postsecondary certificate of at least 30 semester-hours—taking the student halfway to an associate's degree or directly into a career-oriented job with advancement opportunity.

It is possible for students to begin that pathway while they are in their junior year of high school and still working to finish their core 40 requirements for a diploma in their senior year. They could graduate with that diploma and a one-year, 30 semester-hour postsecondary certificate. Alternatively, some students may defer entry to the new CTE pathway until their senior year, completing all their core 40 requirements before beginning the CTE program.

There are still other alternatives. It seems feasible to develop courses that meet core 40 requirements in some subjects while also constituting an essential course in a technically oriented CTE program. (For example, the one-semester economics course that many high school students defer to their senior year of high school could be developed and delivered in a technical context.) Some potential CTE students may see a direct path to complete their high school requirements by the end of their junior year, get their diploma, and then use the Mitch Daniels Early Graduation Scholarship to move directly into Ivy Tech's new Technology Institute where they can complete a 30 semester-hour certificate in one year.

It may be that different school districts would emphasize different pathways to this postsecondary-focused CTE program. The critical policy step is to agree that a student's decision to concentrate in a CTE program is a default pathway to at least one year of rigorous technical study that results in a postsecondary credential.

While this clearly requires some significant re-crafting of the CTE curriculum, efforts are already underway. For example, many of the CTE courses offer credit at Ivy Tech. This recommendation simply takes that to the next logical step: every CTE course in every cluster, perhaps after some initial exploratory courses that students might take in their junior year of high school, would be a postsecondary, credit-based course. In some cases, it might be advantageous for high schools to enter into cooperative agreements with Ivy Tech or Vincennes to assume full and direct responsibility for CTE. High school students would take postsecondary courses at the career centers, delivered by Ivy Tech or Vincennes faculty. In most cases, it would be more feasible for CTE instructional staff to continue to deliver courses as long as they are all fully transferrable to either Ivy Tech or Vincennes.

This recommendation is not about changing the faculty at the career centers. Rather, it is about redefining the outcome of the CTE choice, changing the structure of the CTE programs, and strengthening the rigor of the courses. And, yes, it also probably means eliminating some programs that do not lead to entry-level jobs that provide a strong platform on which to move up career ladders in occupations that pay family-supporting wages.

RECOMMENDATION #2: Create the Indiana Polytechnic Institute: A New Combination of Secondary and Postsecondary Education

We propose establishment in Indiana of a new way of organizing technical education—the **Indiana Polytechnic Institute**. The Polytechnic Institute would build an innovative educational bridge across the current wide divide between secondary education and postsecondary systems. It is more than a pathway design; it will integrate and deeply link two separate frameworks of secondary and

postsecondary education. The Institute concept responds to a clear need in Indiana for a skilled workforce to fill increasing numbers of technical jobs that require postsecondary education and postsecondary credentials. An increasing number of these jobs require technical preparation that is both wide and deep.

As we have noted throughout this report, the changing nature of education and skill requirements in the state's key industry sectors, coupled with the potential labor market growth in high-wage and high-value-adding clusters, lead to the conclusion that a high school degree in Indiana is no longer sufficient for a young person to successfully enter the workforce and build a career, nor is it enough for the state's long-term economic competitiveness. Advanced manufacturing, healthcare, and significant emerging cluster such as biosciences and aerospace all demand more technically skilled workers. Employers ask these workers to have postsecondary credentials. If employers can hire these skilled workers, their businesses can grow and prosper in Indiana. It is of utmost importance for Indiana to signal a commitment, and follow through on it, to meet the special needs of these economic wealth creators. The most important thing Indiana can offer these employers are highly educated workers with the right mix of advanced skills. The best signal of long-term commitment is demonstrating flexibility and creativity in education and training systems, showing that Indiana is prepared to create the new institutional arrangements that will support the advanced skills required in this economy.

One of the characteristics of occupational demand in these growth industries is the increasing need for middle-skilled workers with technical skills across several areas. This cadre of technicians needs education and training that builds skills in several components of industrial technology—electronics technology, computer sciences and information system management, and machine tool technology (only as examples). Along with this “cross-training” in several technical fields, the workers will require particularly well-developed critical thinking and problem-solving skills. They will need strong familiarity with several technical disciplines, developed in an applications framework, and the decision-making skills to optimize production in highly complex 21st century industrial environments.

We label this new class of highly skilled workers “renaissance technicians,” and we propose the establishment of a new institutional arrangement to produce them. Here is one way this new system of Polytechnic Institutes could work:

- Existing public postsecondary institutions could apply to become Polytechnic Institutes. If accepted, they would be supported in the development of a rigorous, multi-disciplinary, three-year curriculum that leads to a polytechnic degree.
- Key industries representing those parts of manufacturing, healthcare, and the other emerging high-value-adding clusters that have the strongest interest in these renaissance technicians would be asked to take a direct role in establishing and “sponsoring” these new Institutes in ways that include curriculum design and may also include governance, instructional, and financing responsibilities. At a minimum, the sponsoring industries would offer significant work-based learning opportunities such as paid internships and work-based curriculum placements.

- It is relatively easy to imagine some of Ivy Tech’s colleges seeking this designation; it is also possible that Vincennes and a few of the regional four-year colleges might see the opportunity to develop these programs as well.
- To be clear, this would be an additional designation for these applicant institutions. They would continue with their current missions; administratively, this would be an affiliated “school” or department with some dedicated faculty and staff, but also drawing faculty and staff support from the rest of the institution. We imagine they would be non-residential facilities and students would commute.
- Students would apply for admission to these Polytechnic Institutes at the end of their sophomore or junior year of high school. Selective admission would be based on merit, motivation, and intent. The sending school district would finance the first year of study for these students and there could be special financing advantages (full-tuition scholarships) for students’ second two years in these selective programs. The students would receive their secondary diplomas sometime in or at the end of their first year in the Institute.
- The students would be enrolled in cohorts of 20 to 25 at a time. They would move through a very structured program with a block schedule and fixed course sequences, more resembling a high school course sequence than a traditional collegiate program filled with confusing multiple electives and complex course scheduling options. These students would know their full three-year schedule and competency expectations upon admission to the program.
- While the programs of study at the Polytechnics would be especially rigorous, there is no reason to assume that first-year students would not be able to enjoy some of the traditions and activities at their “sending” high schools.
- Students completing these programs would receive a “special” degree (*e.g.*, an Associate’s of Polytechnic Sciences).
- Ideally, each student would have a guaranteed placement at the end of this three-year program.

At the outset, Indiana would not require more than five to seven of these new Polytechnic Institutes located in major population centers for commuter students. It is not possible to project precisely how many of these renaissance technicians are immediately needed in the economy, but it seems reasonable to plan for 200 to 250 graduates in the first year or two. If demand is as strong as we suspect, this program could be quickly ramped up to graduate hundreds more students in future years.

It is feasible to contemplate two kinds of Polytechnics—a three-year variety such as that recommended here, and a five-year version that might result in a Bachelor’s of Polytechnic Sciences. The extended version of this Polytechnic program might be attractive to students seeking a residential college

experience that they might start right after they finish their third year of high school. The graduates of this program might be in demand by some employers in Indiana.

We do not suggest starting with the five-year version. The most compelling need appears to be at the associate's level. However, it will be important to plan for a direct articulation into existing bachelor's degree programs for those students not ready to jump right into the labor market upon completion of their Associate's of Polytechnic Studies.

Of course, this new program would require some new funding support. This does not call for the establishment of new institutions, but rather the repurposing of existing institutions and the bridging of secondary and postsecondary divides. If carefully and collaboratively designed, this initiative should be able to count on private sector engagement and financial support. We see this as a low-risk opportunity with potentially very high returns for the Indiana economy.

RECOMMENDATION # 3: Establish Applied Baccalaureate Programs in Close Integration Between Two-Year and Four-Year Institutions

We see the potential strength of Ivy Tech's AAS programs—60 semester-hour programs leading to associate's in *applied sciences degrees*. Both nationally and in Indiana, there is strong evidence of robust labor market returns to AAS degree programs.⁸ There are many very good programs at Ivy Tech and Vincennes that are relevant to the labor market demand for technical credentials. However, as we have observed, there are just not enough students completing these programs.

One reason that students do not complete these programs is that in Indiana (and nationally) these AAS degrees do not easily transfer to or articulate into bachelor's programs in ways that give the student full credit for the 60 or 60-plus credits they have accumulated en route to that degree. It is true that both Ivy Tech and Vincennes have managed to negotiate a few specific transfer arrangements for particular programs with some four-year institutions, but these special transfer arrangements are not very apparent to students and they are not systemic. This lack of transfer potential inhibits student interest and tends to direct them into more traditional AA or AS (associate's of arts and associate's of sciences) programs that are more clearly "pre-baccalaureate." The AA and AS programs usually provide students with most of the general education requirements they will need for a BA or BS degree. They will take more program- or major-related courses in their third and fourth years at the bachelor's awarding institution, but this means they are typically not taking workforce- or employment-oriented technical courses as part of their associate program.

This is not to suggest that pre-baccalaureate programs at Ivy Tech or Vincennes are at all inappropriate. They represent a smart way for students to gain the first two years of a bachelor's program at a much

⁸ Indiana is now developing the capability to match all student unit records to Unemployment Insurance wage data to track return to all postsecondary credentials. These data, however, were not available in the course of this research study.

lower cost and often on a much more comfortable schedule. The two-year colleges are rightly focused on expanding access to and supporting success in these pre-baccalaureate programs.

However, too many of these students never complete their AA or AS or, if they do, they frequently fail to leverage it into a BA or BS degree. So, even if they complete their pre-baccalaureate program, they are left with an AA or AS degree that very rarely has provided any technical content and little occupationally relevant skill building. If students do not complete their AA or AS, they leave the program with an assortment of general education courses that offer no leverage into the Indiana labor market and are not equipped with the technical skills required for entry into intensive, high-value-adding sectors.

For students who enroll in a pre-baccalaureate program and then later come to a realization that they are not prepared to commit the additional years to the bachelor's degree, there is very little motivation to stay in a two-year institutions to complete their AA or AS degree. And, unfortunately, the data suggest these students may be making the right choice—there is simply not much labor market return to stand-alone AS or AS degrees that are not leveraged into BA or BS degrees.

We suspect, with admittedly little data to offer as evidence, that many community college students choose AA or AS programs because that is the only apparent path to a BA or BS degree. It is a good return, but high-risk choice, simply because so few students complete the programs. We believe that if the AAS had clear and direct pathways to the bachelor's degree, more students would choose these programs, more students would complete them, and more students would gain occupationally relevant technical skills. **We recommend that Indiana move quickly, systemically, and seamlessly to link AAS degrees with applied baccalaureate degrees.**

Applied baccalaureate degrees are relatively uncommon in higher education though most states authorize them, as does Indiana. This credential has been receiving more attention as states are striving to increase the educational attainment levels of their residents to respond to the growing demand of both future and projected labor market needs. In some states (Florida, Texas, Washington), community colleges are rapidly expanding into applied baccalaureate programs.

The applied baccalaureate is distinguished from the more common BA or BS degree in a couple of ways. First, it focuses on technical program areas (*e.g.*, healthcare, advanced manufacturing, information technology) as opposed to the liberal arts. Second, the content of the applied baccalaureate program is designed to address skills and knowledge needed in the workplace. For example, instead of a traditional speech course typically found in the regular bachelor's degree program, the applied baccalaureate program might offer a communications course that would include learning how to communicate through presentations or reports one would need to make in the workplace setting. Indeed, learning in an applications framework is the distinguishing characteristic of this degree. Also, the applied baccalaureate can be designed to be a seamless transfer from the AAS degree that once was considered “terminal” and non-transferrable.

We recommend the rapid establishment and expansion of an applied baccalaureate program in Indiana. We do not recommend that Ivy Tech or Vincennes plan to award these degrees. Rather, it seems more feasible for Ivy Tech to ask one or more of the public bachelor degree-granting institutions to co-locate on Ivy Tech campuses to offer an applied baccalaureate program. Students could actually co-enroll simultaneously in the AAS program and the applied baccalaureate program, but, in any case, would have the option of moving seamlessly into the applied baccalaureate program as they finish their AAS. Over the four years, tuition would be at a reduced rate from the typical bachelor degree tuition rate.

We urge Indiana to investigate a three-year accelerated option to the applied baccalaureate degree. Ivy Tech's experience with an accelerated associate's degree suggests that many students would be interested in achieving a bachelor's degree more quickly. These might be the same students most interested in an applications orientation to the program.

An applied baccalaureate degree would be much more than just a "lure" for AAS students. It represents an important potential addition to postsecondary education in Indiana. It will be attractive to potential students not now enrolling in postsecondary education, and it will be important to Indiana employers looking for employees possessing technical skills developed in an applications framework.

RECOMMENDATION #4: Provide Better Labor Market Information to Influence Smarter Student Choices

As we discuss in our analysis in this report, students are choosing program areas that do not directly relate to the occupational demands of the labor force. One of the contributing factors to the lack of college completion is the large number of unfocused students who classify themselves as "undecided" for the first couple of years in college. It often takes a few years in college for many of these students to declare a major in an area they believe might lead to a good job. This tends to prolong their time in college and can contribute to a lack of motivation and decreased persistence and success.

If Indiana is to guide students into areas that will enhance the workforce to strengthen the economic development opportunities, it must give secondary students, prospective CTE students, and recent high school graduates and their parents better information about the occupational areas that can create individual prosperity and the preparation programs for those occupations. Additionally, the state needs better labor market information as it considers approval of degree programs that by statute are brought to the Indiana Commission for Higher Education (ICHE). One of the criteria considered by ICHE in the approval of programs is labor market demand. However, there is no definitive source for that data and no consistent way it is presented to the Commission that allows ICHE to make decisions about the alignment of programs with economic and workforce development. The technology is now available to develop almost real-time labor market demand information for Indiana.

Earnings data can be a powerful tool to inform both student and policymaker decisions. The development of a system matching student records with Unemployment Insurance wage data information is underway in Indiana. It is used effectively in several other states to measure earnings

returns of individuals completing specific programs of study and different levels of credentials. For example, these data can inform a student that those who graduated with a bachelor's degree in a given program of study earned x salary one year after graduation and x salary after five years, compared with those who graduated in computer information systems who earned x salary after those same time periods.

This information is gradually being made available through the Indiana Workforce Intelligence System though it is not yet at the point where it can be made understandable and accessible to students and policymakers. We recommend that the state accelerate the development of this system to produce this kind of information. Once developed, we can envision using either existing websites or creating new ones to make this information readily available to drive student choices and inform policymakers' decision-making.

RECOMMENDATION 5: Provide Incentives to Encourage Technical Education

We recommend that Indiana invest in providing incentives to students, educational institutions, and employers to encourage creative and more intensive strategies to help students pursue technical occupational programs aligned with the state's targeted economic development sectors. If the state is successful in providing strong educational programs that contribute to the economic development of the state and can offer students and families good labor market information for decision-making, then it is appropriate to consider additional ways to encourage students to pursue these programs.

Indiana cannot push students into specific technical fields or purposely track students into specific fields of study at either secondary or postsecondary levels, nor can policymakers limit program offerings in career centers or in colleges to those programs selected by the state. School districts are locally governed, and states do not have good ability to predict the specific technical skill needs of the economy. Indiana is very good, however, at developing incentives to encourage outcomes that are related to its policy goals—this occurs now in education and in the economy through differential funding for some educational programs, performance-based funding to colleges, scholarships to encourage college-going behavior, and incentives for companies to locate in the state and hire Indiana residents. There are additional incentives offered to existing and new companies for training workers to upgrade the skills of the workforce.

We believe incentives can be used in a more well-defined and systematic way to increase the numbers of students entering key technical fields in secondary and postsecondary settings and gaining credential attainment. Students, educators, and the businesses that need technically educated workers should all participate in these incentives.

Some Indiana regions are already engaged in creating incentives for students to gain credentials in regionally important, key technical fields. In the Fort Wayne area, foundations, the regional workforce investment board, and employers partnered to create a loan program for area residents and loan forgiveness policies designed to encourage postsecondary attainment and talent retention in

engineering, advanced manufacturing, computer science, informatics, and certain technology programs, including information technology, industrial technology, engineering technology, and biotechnology. Individual employers, such as Indiana's hospitals, have long maintained loan forgiveness plans for employees who enter fields of particular importance.

The Indiana legislature created the Mitch Daniels Early Graduation Scholarship Fund to encourage early high school graduation and direct entry into a postsecondary program.

Many different kinds of state-led incentives around technical education programs are possible; however, we suggest creating incentives that:

- tie the public and private sectors together in support of technical education and attainment;
- engage local employers more deeply with local secondary and postsecondary institutions; and
- reflect regionally specific needs through state-led, but locally-administered, incentive programs.

Indiana should explore creating a statewide incentive program, the *Indiana Education Futures Fund*, administered regionally, to create and offer incentives for students to enter technical fields related to regional economic needs. At the state level, the fund could function as a public-private partnership of state and industry leadership. Industry could be represented by Indiana organizations that focus on the key sectors identified in this report, including Bio-Crossroads, Conexus Indiana, Energy Systems, and Techpoint. State leadership could come through, for example, Indiana's Education Roundtable or the Indiana Commission on Higher Education. These industry sector organizations could raise funds to provide scholarships or loan forgiveness to students enrolling in programs designed to prepare them for occupations in those sectors. The state might consider matching the money raised by the private sector through these sector initiatives, or Indiana could easily create a tax incentive for employer contributions to the fund. Either way, it is important to bring employers into any incentive system for education.

The fund could be supported and administered locally by engaging civic leadership, educators, local foundations, and employers in ensuring that the fund responds to regionally specific needs and that local students are informed and encouraged to take advantage of the incentives. In addition, we believe engaging employers on a regional basis could help support dialogue between schools and employers about program design and identification of key regional needs.

Incentives targeted to employers as they invest in education are good ways to make sure that the employer community is well represented and fully engaged. Elsewhere in this report, we describe the essential roles for employers in curricula design, offering internships for both secondary and postsecondary students, and roles in defining an applied baccalaureate. Involving employers in developing curricula, contributing funds, and distributing targeted incentives to students (including loan forgiveness programs) is another facet of engaging employers through their investment in the skills of a regional workforce and directly in the skills needed in their companies. Regionally based investments,

accompanied by appropriate state match or tax incentives, is a strategy to help employers gain relatively quick and visible returns on their investment of time and money.

Finally, more targeted incentives within already existing educational performance metrics could help postsecondary institutions increase entrance into and completion of technical programs. Indiana has one of the most well-developed incentive-based funding formulas to allocate state funds to each of its colleges and universities. The state's funding formula previously focused on allocating funds solely based on enrollment. For the past few years, more of the state appropriation for higher education is based on performance related to college completion. We are recommending that the state consider adding a metric under its performance-based funding system that takes into account enrollments and completions in high-wage technical fields.

Suggestions for additional research and analysis:

As FutureWorks gathered data from multiple sources and organized the information, we encountered several areas where further research or additional data would be very helpful. Some areas for further research are:

- Understanding how and why secondary and postsecondary students choose to enter a technical field requires further exploration. We know very little about how students (and their families to the extent they are involved) make choices on what fields to enter. What are the most important considerations to students in selecting a technical career field and what information do they use to make those decisions?
- Assessing the technically trained “talent pool” in Indiana requires more and better information about the inflows and outflows of people for both associate degree and bachelor degree holders.
- Designing data collection procedures at the secondary and postsecondary levels is necessary to facilitate the ability to track the outcomes of education into employment. Even through the Indiana Workforce Intelligence System (IWIS), the experience of students from education to employment is hard to follow. The data collection procedures are driven by metrics of several systems and are not well coordinated. The collection (and publication) of outcomes data by individual schools is inefficient and varies in the quality of the information. There are current efforts in Indiana to improve data collection across systems, and we hope these efforts will enable policymakers to understand student outcomes in a meaningful way.
- Addressing the need for better state-level information on the organization of occupations within sectors and how those are changing is essential. Many of our observations on occupations in the Indiana economy were based on inferences from national data because state-level data were not available. Yet, this is important information to understand shifting skill and educational requirements within fields.

Appendix

More Information on the Data and Analysis

What follows is a more detailed presentation of the data used in the research for this report. In the interest of providing a coherent description of the data, there is some repetition of the information presented earlier. First, we show how manufacturing, healthcare, and Indiana's emerging sectors shape both the economy and the demand for employees entering these fields. Second, we present data on the output and characteristics of technical education systems in Indiana: secondary career and technical education programs and postsecondary technical education.

Our task was to provide the Indiana Education Roundtable with a survey and analysis of the alignment between Indiana's key economic sectors and the supply of skilled workers into those sectors. In carrying out this task, we collected and assessed data that were publicly available from either published sources or from available databases, and public reports from either federal or Indiana state government or state organizations such as the Indiana Department of Education, Department of Workforce Development, Indiana Commission on Higher Education, and the Indiana Business Research Organization. We also used data provided by individual educational institutions in the state.

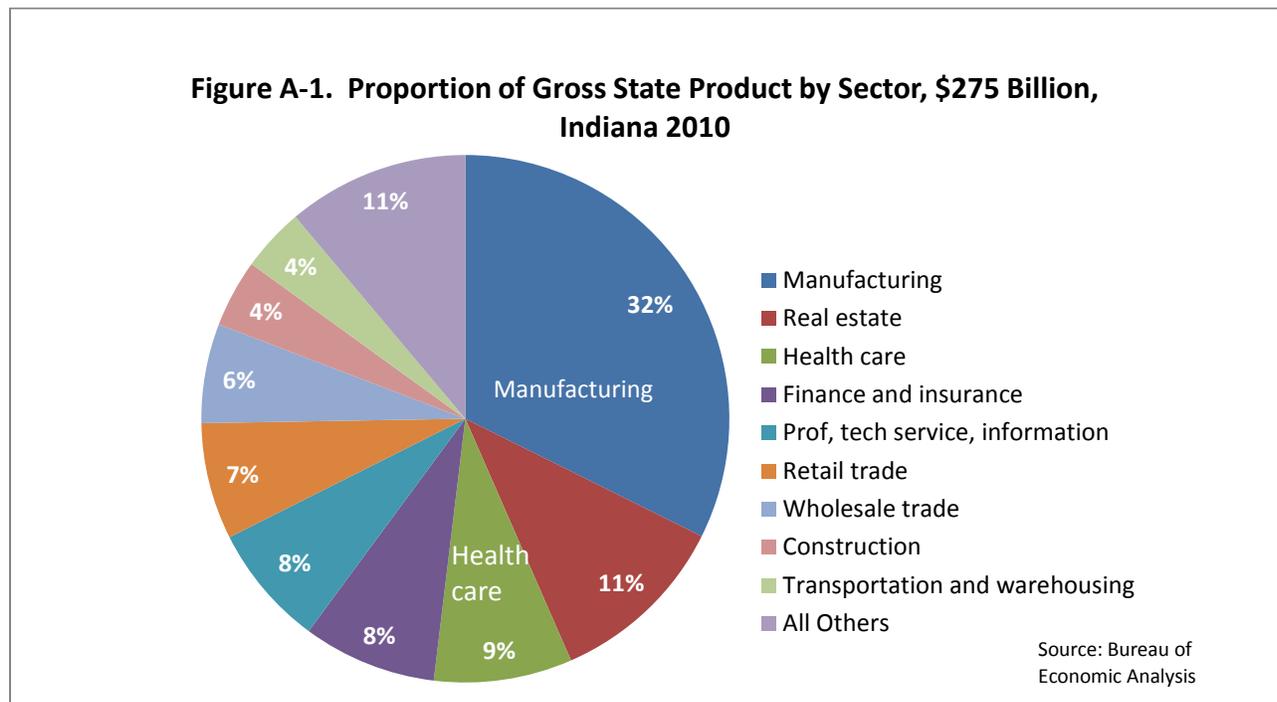
Because our research was of broad trends in the economy and in education, our analysis explores these trends at a fairly high level of generalization, and we want to urge appropriate caution in our interpretations. In all cases, we are confident of our analyses and recommendations based on our data analysis and research. At the same time, limitations of the data—either availability or data quality—also limited our analysis. We identify these points in the report and urge appropriate cautions for interpreting the data.

I. Indiana's Key Wealth-Producing Sectors....Continuity and Change.

Manufacturing and healthcare are key industrial sectors that drive Indiana's production of wealth. Manufacturing's impact in the state has slowly eroded over the last 30 years, but it by far remains Indiana's largest economic sector. Healthcare, even during the recent recession, continued to add jobs and its economic impact continues to grow. New emerging sectors, such as advanced manufacturing and life sciences, demonstrate potential for growth in contribution to the gross state product (GSP), very high wages, and significant, though smaller compared to manufacturing and healthcare, employment. At the same time, perhaps the most significant shift across these wealth-producing sectors and much of the rest of the state's economy is occupational change within each sector toward increasing proportions of skilled technicians, technical workers, and professionals. Rapid shifts toward an increase in the number of technically skilled workers and a decline in semi-skilled employment are reshaping Indiana's economic foundation and are characteristic of emerging sectors that will help drive wealth creation in the future.

Figure A-1 shows the contribution to gross state product for major industrial and economic sectors in Indiana. Clearly, manufacturing provides a very large proportion of value created in the state. Healthcare, although a slightly smaller proportion of the GSP than real estate, is the next largest contributor. In these figures, real estate includes rents and, therefore, is a measure of distribution and not value production. The predominance of manufacturing and healthcare in the GSP represents the continuity of industry in Indiana as well as change. Manufacturing has been important in the state for over a century and will be important in the future.

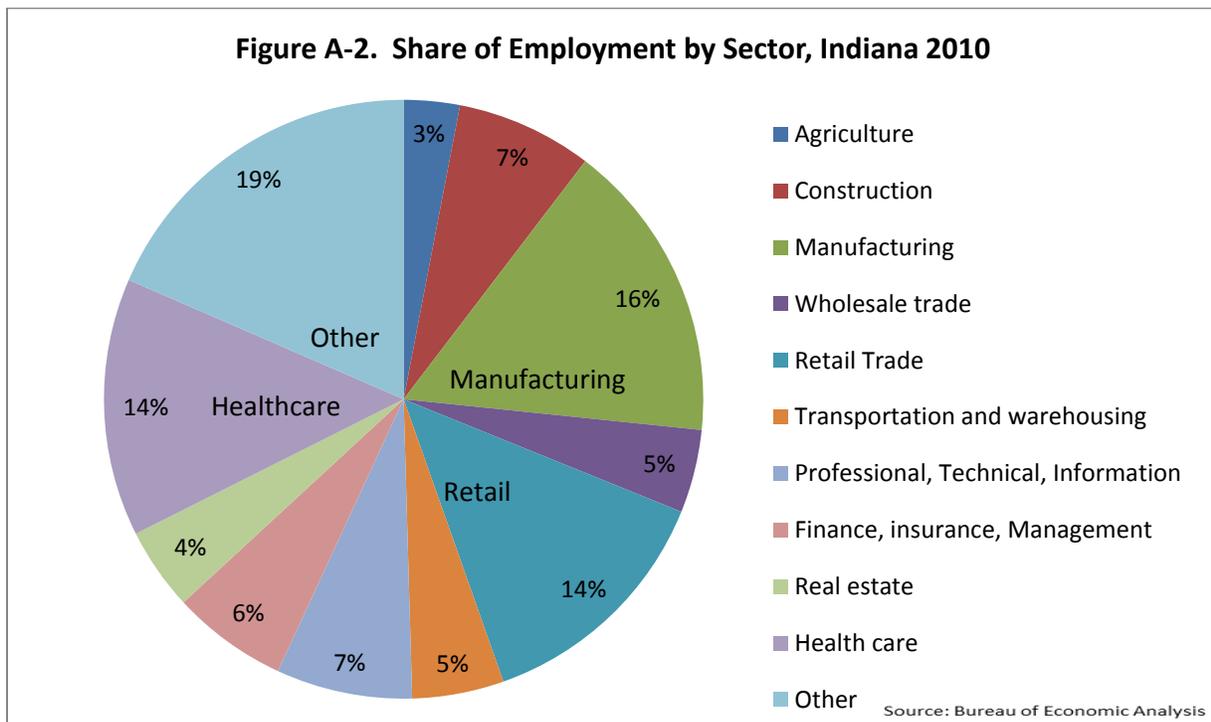
Admittedly, there are losses in manufacturing in Indiana, very large losses when seen over the past 40 years. Although manufacturing’s share of GSP has declined from over 40 percent in 1970 to 30 percent in 2010, it still accounts for one-third of the wealth produced in the state and is still extraordinarily large compared to manufacturing’s 12 percent contribution to gross domestic product nationally. Healthcare, as in many other states, steadily increased as a proportion of GSP over the last several decades and will in all likelihood continue to grow.



Together, the manufacturing and healthcare sectors account for about 41 percent of the state’s GSP. Other sectors, such as financial services, trade, and professional services, are also important sources of GSP, but they are also diffuse in terms of value creation and products and none approach such a large proportion of GSP or relative proportion of employment and wages. Manufacturing and healthcare are key drivers of the state’s GSP, and both are sustaining or increasing their importance over time.

Employment

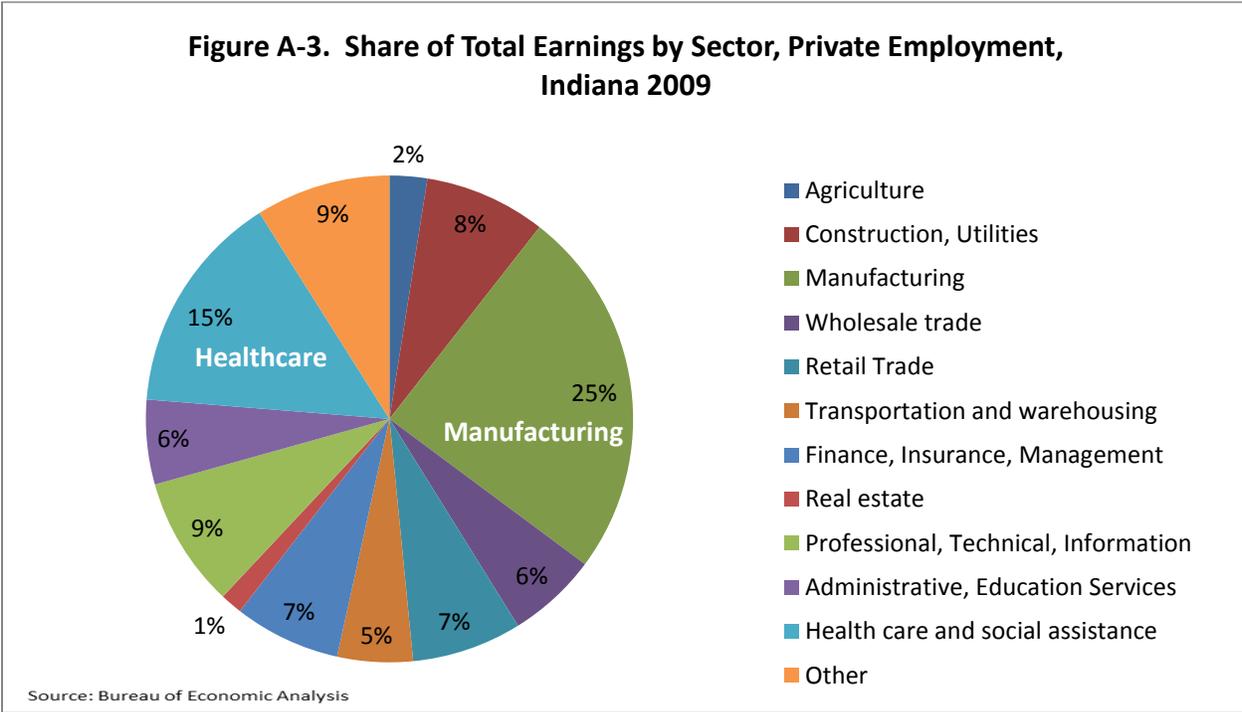
The relative importance of the manufacturing and healthcare sectors is also clear in the proportion of the total private workforce employed in those sectors. Figure A-2 shows shares of total private employment in Indiana by major industry sector in 2010. Even in that recessionary year, manufacturing and healthcare accounted for 30 percent of private employment. This high figure is a decline from a level of over 40 percent of total Indiana employment two decades earlier. Together, manufacturing and healthcare accounted for almost 800,000 jobs in 2010, representing concurrent increases in healthcare employment with declines in manufacturing employment. From 1990 to 2010, manufacturing in Indiana declined by about 250,000 jobs; at the same time, healthcare increased by somewhat over 100,000 jobs. Despite its losses, the manufacturing sector still employs 75,000 more people than does the healthcare sector, and employs approximately 100,000 more people than the next largest employment sector, retail trade. Over time, healthcare employment is increasing and will soon surpass manufacturing as the state's largest employment sector.



Wages and Earnings

Figure A-3 shows the sustained significance of manufacturing and healthcare in providing high total wages and per capita wages to the Indiana labor force. These two sectors account for 40 percent of earnings among private sector workers, and no other sector, despite significant proportions of total employment in sectors like retail trade, comes close to the impact of the manufacturing or healthcare sectors.

Figure A-3 uses the same definitions of sectors as that for Figure A-2 and so allows us to compare the share of earnings to the share of employment. Sharp differences between the two proportions suggest high- or low-wage sectors. For example, retail trade accounts for 14 percent of private employment, but only 6 percent of total earnings; in other words, this sector contains a considerable proportion of low-wage jobs. Manufacturing, on the other hand, accounts for 16 percent of private sector employment, but 25 percent of total earnings, suggesting a larger proportion of higher-wage employment. Healthcare shows a somewhat mixed picture in which the proportion of earnings is close to its proportion of total employment. This is consistent with the wage structure of healthcare—there is a broad mix of both very high-wage and lower-wage jobs within the sector. Nevertheless, its total contribution to wages in Indiana’s economy is unmatched by any other sector.



Emerging Sectors: Sustaining and Growing Wealth-Producing Sectors

Broad industrial categories like manufacturing contain a number of sub-sectors that, according to economic development trends and Indiana state economic research, comprise a set of emerging sectors that are important in the state now and hold promise for the future. These are advanced manufacturing, life sciences, logistics, information technology, defense-related and aerospace firms, and alternative energy. A variety of assessments by industry associations and sector-based associations such as Conexus and Bio-Crossroads has identified the firms within these sectors as likely to grow in the near future. State initiatives and industry organizations, such as Bio-Crossroads for life sciences, Conexus for advanced manufacturing, and TechPoint for information technology, seek to attract new firms in these

sectors and to improve infrastructure and education to support both existing and new firms. These emerging sectors are in many ways related extensions of manufacturing and healthcare. They represent long traditions of pharmaceutical research and production in Indiana through firms such as Eli Lilly Company and now many others. In manufacturing, a shift away from auto component assembly has left a strong core of advanced manufacturers in aerospace and precision machining and manufacturing technology sophistication. Indiana firms, such as Rolls Royce jet engine manufacturing and increasing numbers of advanced manufacturing firms in the medical devices field, make up the core of firms in the emerging sectors.

Figures A-4 and A-5 show employment and wages in these emerging sectors. Clearly, their impact is not yet the same as manufacturing or healthcare in terms of total employment. But while none of these sectors individually reaches the scale of contribution to GSP or scale of employment of the principal wealth drivers in the state, they are significant in terms of employment in total within the state. Total employment in emerging sectors represented about 12 percent of Indiana’s private sector employment. Apparently, the impact of the recession reduced growth leading up to 2010. Time will tell if these sectors can resume upward growth. The content of each sector is defined through identification of detailed NAICS codes related to the sector. Because these do not match major sectors used in federal data sets, their contents cut across definitions of industry sectors used in the figures above. So, the relative scale of these emerging sectors is not directly comparable to earlier sector descriptions.

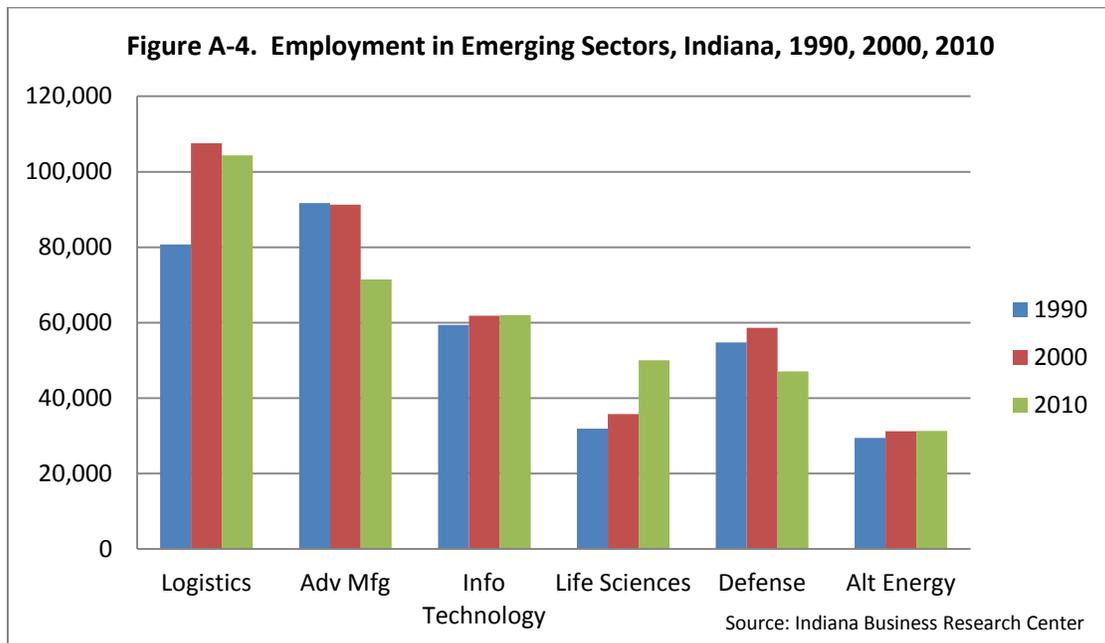
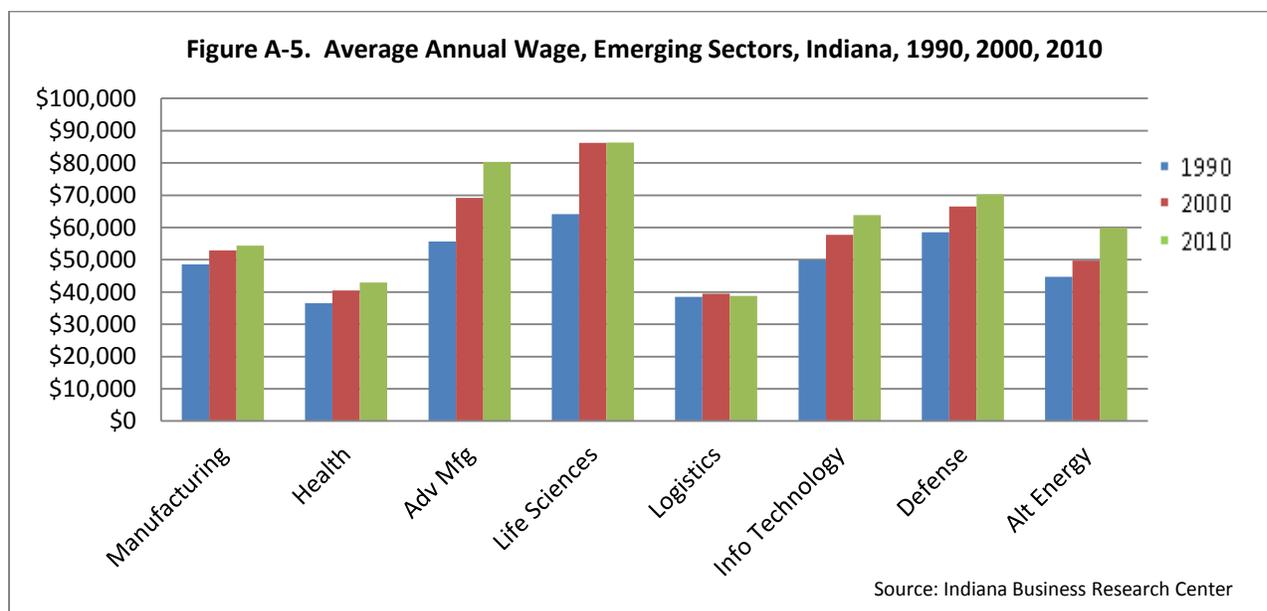


Figure A-5 shows average wages for these emerging sectors over the same time period—manufacturing and healthcare are included here for comparison purposes. Wages for the emerging sectors are above or among the highest wages for any industry in the state. All of these emerging sectors, with the exception of the logistics sector (that includes large numbers of employees and a high proportion of low-wage workers in warehousing and transportation), show average wages far above those of other sectors. Moreover, wages in emerging sectors continued to increase over the last decade, suggesting ongoing strength in the sectors. These are, in fact, promising wealth creators if the sectors can resume and sustain their growth path.



This snapshot of Indiana’s wealth-producing sectors creates a composite picture of the enduring importance of manufacturing and the increasing importance of healthcare as drivers of the Indiana economy. The indicators of wealth production in the economy across all the important economic sectors clearly demonstrate the overarching impact of manufacturing and healthcare. In addition, emerging sectors targeted by policymakers as potential sources of growth are also significant in employment now, but especially so in the scale of average wages. Though there is, of course, considerable variation within these emerging sectors, their cumulative impact in the state is significant.

In all these sectors, individuals have opportunities to earn high wages; the scale of employment, even as a promise in the future, means that large numbers of people have the opportunity to enter these fields and build a career. Importantly for our subsequent discussion of educational output, the scale of employment also means that these industries need many qualified people. Yet, sustaining these sectors and maintaining opportunities for Indiana residents is not simply a linear process of providing more support or more trained people for employment. Profound shifts are occurring within these sectors; so

while they remain the keys to wealth creation in Indiana, how that wealth is produced and by whom is changing.

Occupations Inside Sectors: The Changing Nature of Employment Opportunities

Significant change is taking place within the occupational structures of Indiana’s wealth-driving sectors; employment growth is primarily located in technical occupations. These changes indicate a profound shift in Indiana’s economy and in the ways that people build careers and incomes. With the absolute decline in unskilled and semiskilled positions in settings like manufacturing and relative declines of unskilled work in healthcare, it is increasingly difficult for those with a high school diploma or less education to find their way into entry-level positions that offer career- and income-building potential. Two trends are at play here. First, employers are hiring for jobs that require technical skills as point of entry. Second, there are fewer opportunities for transition from unskilled to skilled positions within a company. What we can see forming for those without technical skills is a ceiling that will limit earning potential and career growth.

To demonstrate the change within Indiana sectors, we rely on national data of the occupational structures within selected industries; inference to Indiana is supported by interviews of Indiana employers conducted for this research. Figures A-6 through A-9 show national data for occupational changes within industries across only the last seven years using consistent occupational definitions. The increasing proportion of employment in skilled positions and the relative decline in semi-skilled and unskilled positions is quite striking over such a short time period. For example, in manufacturing, professional and skilled positions increased by 2 percent while semi-skilled production declined; a 2 percent shift in occupations over a seven-year period is considerable. If this shift were applied in Indiana to the 650,000 jobs in manufacturing in 2010, about 26,000 positions would have changed between 2003 and 2010 with the decrease in unskilled positions and the increase in technical and skilled manufacturing jobs.

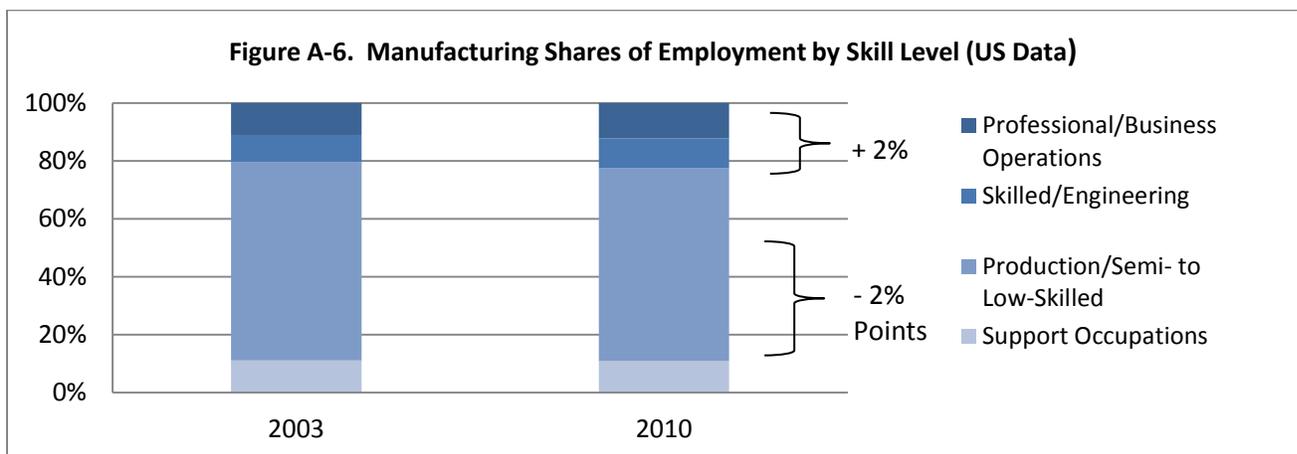


Figure A-7. Healthcare Shares of Employment by Skill Level (US Data)

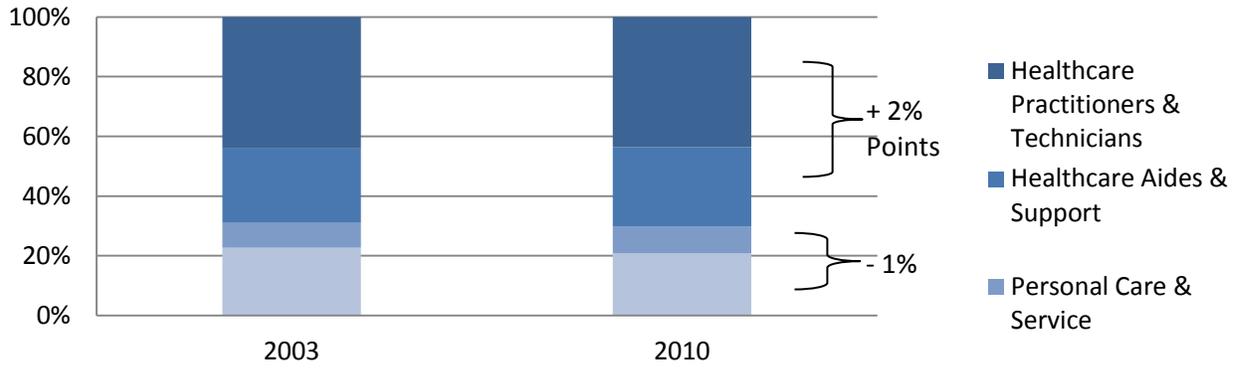


Figure A-8. Medical Device Manufacturing Shares of Employment by Skill Level

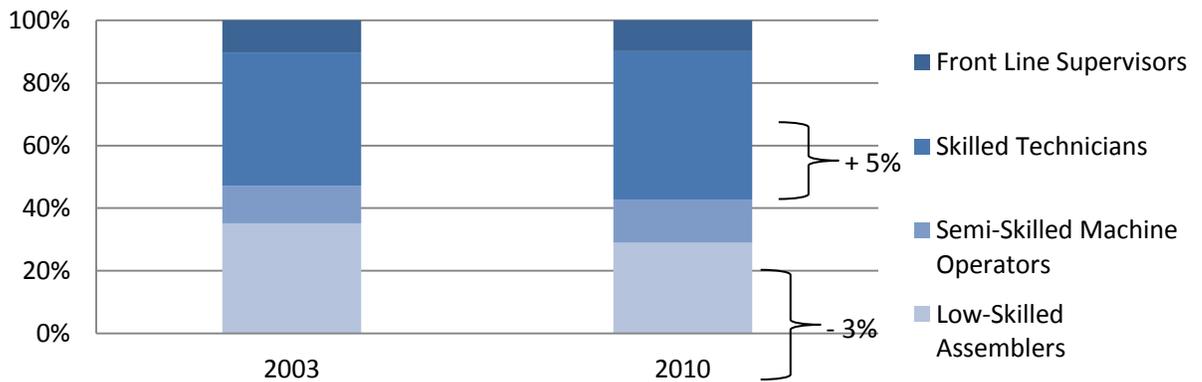
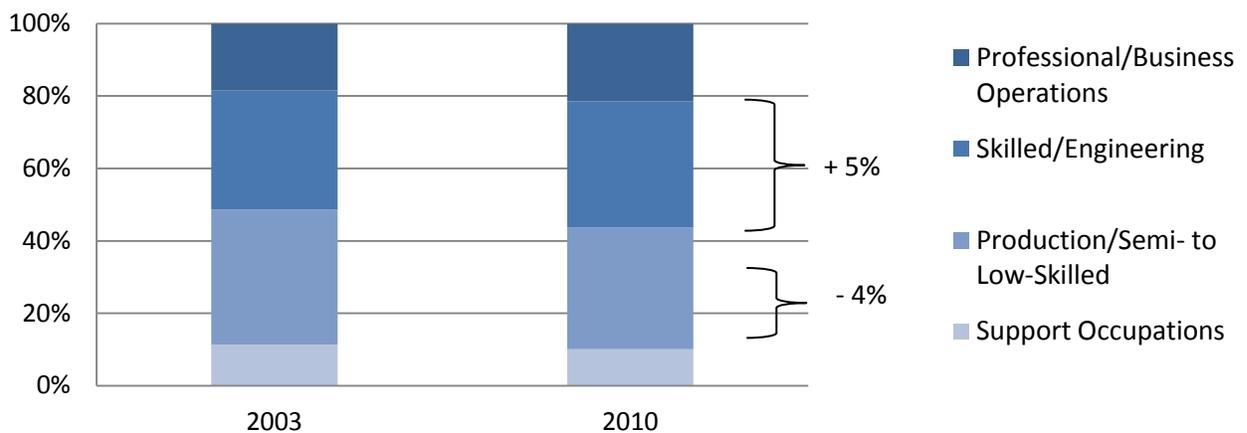


Figure A-9. Electronic Manufacturing Shares of Employment by Skill Level



We show these seven-year comparisons across different manufacturing sectors, and even in healthcare, to demonstrate that these are not isolated shifts within a single industry or technology. In healthcare, there was only a 1 percent decline in positions such as housekeeping and certified nursing assistants, but a 2 percent increase in technician and skilled positions. In electronics and medical device manufacturing, both components of an advanced manufacturing sector, there were pronounced shifts of 3 to 5 percent in the percentage increases in skilled positions versus semi-skilled production decreases.

These findings in Indiana are reinforced by analyses of middle-skill jobs and their growing importance in the economy. The Workforce Alliance and others have defined middle skill jobs as those that require more than a high school diploma but less than a baccalaureate degree. Considerable research on middle-skill jobs further reinforces this picture, and Indiana is apparently no exception.⁹ The Georgetown Center reports that about 55 percent of the new jobs created in Indiana over the next decade will be technician and skilled positions requiring some type of sub-baccalaureate postsecondary credential. (And another significant percent will require a baccalaureate degree or above.) This is projected across the entire Indiana economy. In the technology intensive, wealth-driving sectors—manufacturing, healthcare, and emerging sectors—the proportions of technical and skilled work are even higher.

II. The Future Technical Workforce: Secondary and Postsecondary Technical Education

If the health and growth of Indiana’s key wealth drivers are increasingly dependent on a technically skilled workforce then how are the educational systems in the state responding to demand for technically trained workers?

The following sections present data on the output and key characteristics of secondary and postsecondary technical education in Indiana. First, we look at secondary career and technical education programming and then at postsecondary two- and four-year technical programs. In postsecondary education, much of our analysis is focused on Indiana’s sub-baccalaureate programs in the state’s two-year public colleges, Ivy Tech Community College and Vincennes University. We do not address private or proprietary education.

Secondary Career and Technical Education: Foundations for a Technically Skilled Workforce

About one-third of Indiana’s 315,000 high school students took at least one CTE class at their high school or at one of 46 career centers in 2008 and 2009.¹⁰ Figure A-10 shows the numbers and proportions of students moving through career and technical education across Indiana high schools in the 2008-2009

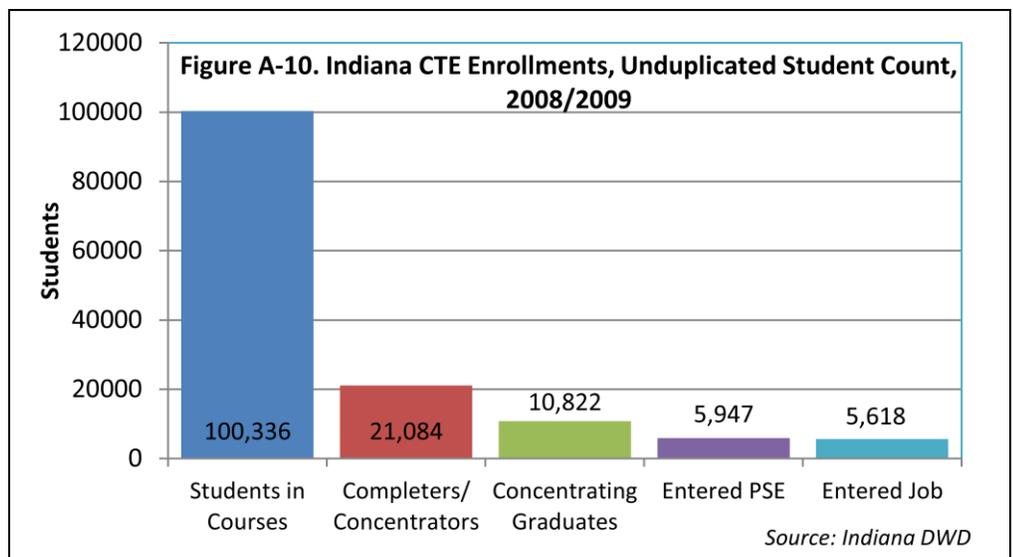
⁹ See for Example: Carnevale, Anthony, et al. Center on Education and the Workforce, *Middle-Skill Jobs, Data for States*. Georgetown University, 2010; and Holzer, Harry and Robert Lerman, *America’s Forgotten Middle-Skill Jobs*. Skills2Compete, Washington, DC. 2007.

¹⁰ Department of Workforce Development, CTE Student Enrollments and Concentrations, 2008-2009, data supplied to authors.

school year.¹¹ Most of the 100,000 students taking a CTE class were either filling an elective slot with a CTE class at their high school or exploring whether or not they would eventually concentrate in a program of study in a technical field that will lead to either postsecondary enrollment or to employment.

After that initial exploration, engagement in CTE programs of study drops sharply. In a given year, about one-fifth of the students enrolling in a CTE class, or 21,000 students in 2008-2009, also chose to enter a sequence of classes leading to a concentration in a technical field and spend one to two years attending CTE program classes at their school district’s career center. Of those students completing a concentration in a career cluster, about 10,000 students graduated with a high school diploma and a concentration in a CTE field. Finally, after graduation, about half of this group of students chose to enter postsecondary education while another 50 percent entered some kind of employment.¹²

Programs of study in CTE range from pre-engineering and biomedical sciences and engineering (often through Project Lead the Way’s curricula that are clearly designed as a gateway to college), to more job-related programs of study such as cosmetology, culinary arts, and automotive services. Career centers either serve students from a single large district, such as the McKenzie Center north of Indianapolis, or will draw students from several school districts, such as the Central 9 Career Center south of the city. The latter are independent organizations supported by “sending” school districts. Centers that enroll students principally from one district are governed and funded by that district.



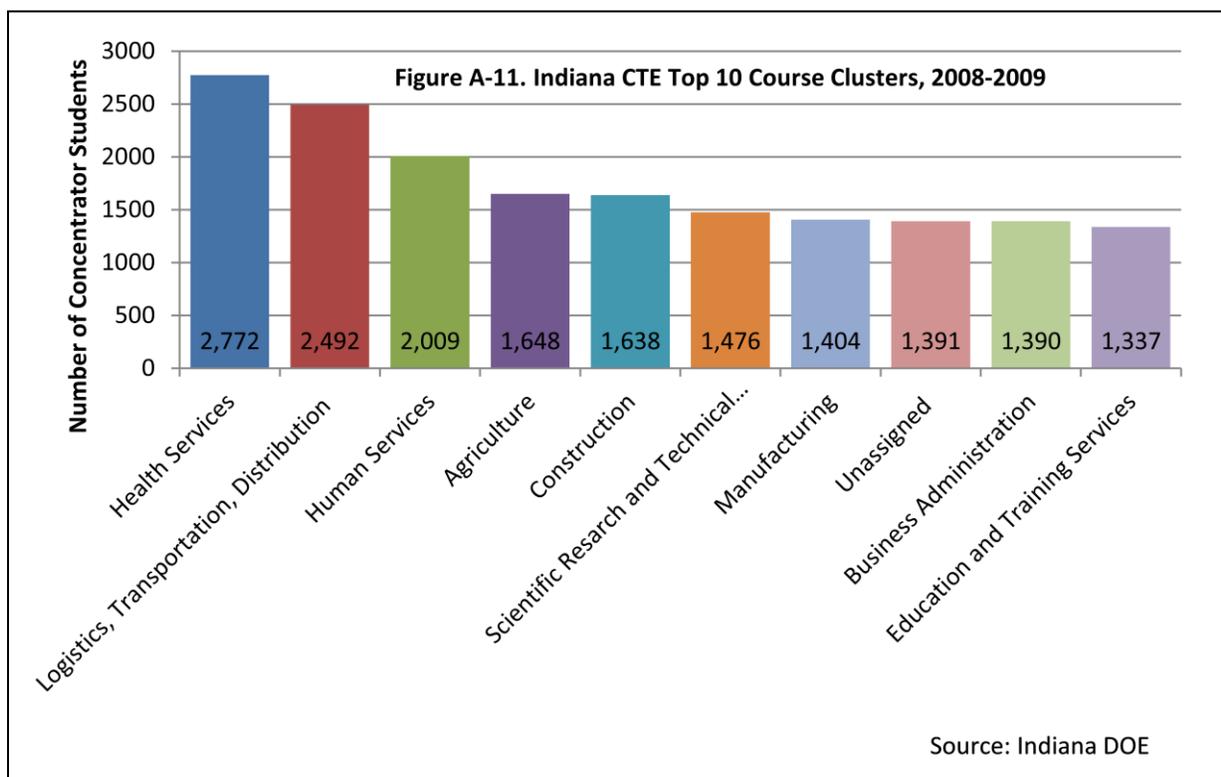
Indiana makes a significant investment in CTE at the secondary level—about \$100 million annually—to support administration and delivery of technical education in district high schools and career centers. In addition, about \$25 million in federal money (Perkins Act Funds) are awarded to Indiana for CTE and are divided between the state’s secondary schools, receiving about 64 percent, and postsecondary institutions, mainly Ivy Tech Community College.

¹¹ We use this year because it allows us to follow this group into either postsecondary education or into employment for a full year after graduation.

¹² This description and some of the terminology used to describe CTE programs of study are shifting with implementation of a new set of definitions of programs of study, concentration, clusters, and pathways beginning in 2011-2012. Our terminology here reflects 2010 usage to be more consistent with the latest data available.

What happens now as high school students decide to enter a course of study in CTE at either a high school or a career center? This is both a question about the choices students make concerning their education and a question about outcomes of the education. The proportion of student enrollments in clusters primarily reflects the choices that students are making to enter a particular field. Students make this choice just before or during their third year of high school. School administrators, guidance personnel, and others may influence student choice, but, in the end, it is the student’s decision whether or not to concentrate in a particular field. This report does not provide detailed research on how students make choices to pursue a particular program of study, although this is a very important issue to explore. We can, however, look at the consequences of those decisions as the output of high school CTE programs.

Figure A-11 shows the distribution of student graduates who concentrated in one of the clusters of CTE programs of study for 2009. Five clusters account for over 50 percent of all students who concentrated in a program within one of the clusters. Although no one would question the importance of supplying skilled workers to these sectors, or assert that job opportunities in these sectors are unimportant to the state or to individual students, only two of the top five clusters, health services and logistics, are also represented among the key wealth drivers of the economy. Comparing this distribution of cluster enrollments to the top wealth-producing sectors of the Indiana economy suggests students are not generally concentrating in clusters that are aligned with their relative economic significance in the state.



The CTE clusters themselves hold various occupational fields collected under a theme or broad technology. For example, health services includes the biomedical engineering curriculum of Project Lead the Way as well as home health aide courses. The human services cluster shown above is overwhelmingly composed of two programs of study, early childhood education and cosmetology. Scientific research and technical services is almost all Project Lead the Way programs in pre-engineering. The logistics cluster, one of Indiana's key industrial sectors, includes courses and programs of study in aerospace technology as well as auto service and auto body technology.

Within the career clusters, however, some programs of study draw far more students than others. For example, of 5,200 students who took one or more courses in fields within the logistics cluster, 4,866 took automotive service technician classes while 314 took classes in aerospace technology.¹³ This suggests that even within a cluster relevant to the state's economic development, such as logistics and transportation, the specific CTE programs of study taken by a majority of students may not be related to the sector definition used by the state's economic development office. For example, if the state's definition of logistics were applied to the logistics cluster as defined for CTE programs, that cluster would hold only a handful of students and would not appear in the figure above.

The Indiana Department of Education does attempt to steer school districts and career centers toward offering courses and programs that are high-demand and high-wage occupations. This occurs through a funding formula that pays more for high-demand and high-wage occupational programs. High-demand and high-wage jobs are identified by the Department of Workforce Development. High schools and career centers can maximize their CTE funding by offering programs leading to employment in high-demand and high-wage jobs. However, in all the programs of study in the clusters shown in Figure A-11, only seven courses or programs of study received a low ranking on either demand or wages in 2010; all of the other approximately 160 CTE courses are ranked as either high or moderate in labor market demand or high wages, thus qualifying for funding at near the formula maximum.¹⁴ It would appear then that administrators have only marginal incentive to shape their programs or career guidance functions to align their programs of study with economic development trends.

The distribution of students in Figure A-10 represents about 10,000 high school students who graduated in 2009 with a concentration in a technical field. After their choice of field and graduation, their next decision is whether to seek employment or to enroll in college. Some students choose to enlist in military service, but the most frequent choices are further education or employment. High schools report those choices, where they are known, to the Department of Education and Department of Workforce Development. These data comprise the overall placement rate reported for the state's CTE system. Over the last three reporting years, the overall reported positive placement rates for CTE students were 73, 66, and 85 percent for years 2008 through 2010, respectively.¹⁵ However, these

¹³ Source: Department of Workforce Development, 2008-2009. Duplicated headcount of students in classes.

¹⁴ Source: Indiana Department of Education. *Indiana Secondary Career and Technical Education Programs Funding Crosswalk, 2010-2011*.

¹⁵ Department of Workforce Development. *Career and Technical Education Data Profile*. Indiana, 2011.

figures mask important variation in the experiences of students as they graduate and choose to enter a college or a job.

CTE programs of study are designed to prepare students for further education or for employment. So, a fundamentally important question that must be examined is this: to what extent do students who have concentrated in a CTE program of study actually follow a path into college or employment that is *related* to their program of study? Figure A-12 provides an analysis of 2009 CTE graduates in a selected group of programs of study and the proportions of those graduates who went into related fields of study or related employment. These data were developed by linking student identification numbers to records of postsecondary institutions in Indiana and with Indiana Unemployment Insurance records in order to identify those students who were employed in Indiana, the industrial sector of their employer, and wage calculations. In each field, the numbers of students pursuing some form of education or some employment are shown as well as the proportion of those entering programs or employment that were related to their program of study.¹⁶ The data need to be taken with considerable caution and there are several caveats about too close an interpretation, but they are the best indication we have of how students are following an educational path toward careers whether into jobs or into education.

**Figure A-12. Summary of Selected Fields:
Education and Employment for 2009 High School Graduates in Selected CTE Clusters**

	Agriculture		Sciences		Health		Human Services		Manufacturing		(Manufacturing) ***	
	#	%	#	%	#	%	#	%	#	%	#	%
Graduates (2009)*	4,567		2,452		4,484		4,238		1514			
Entered PSE -- Any field	1,327	29%	740	30%	2,025	45%	1,586	37%	611	40%		
Entered PSE -- Related Field	827	18%	542	22%	1,620	36%	1,038	24%	94	6%	230	15%
Entered Employment--Any Field**	1,887	41%	163	7%	356	8%	100	2%	124	8%		
Entered Employment--Related Field**	241	5%	40	2%	158	4%	33	1%	33	2%	81	5%

* Where SSN is known and valid.

Source: Indiana DWD.

** UI record match, 4th quarter 2010.

*** These columns include Science and Technology Cluster Graduates with the Manufacturing Cluster Graduates; these both may represent manufacturing engineering related education or employment.

¹⁶ Source: Department of Workforce Development, Career and Technical Education. The department provided data on graduates and linked those with known valid ID numbers to postsecondary databases and to UI data; analysis of the data by the authors. There is some unknown amount of error in these data and in the assignment of related fields.

Apparently, the large majority of students who graduate from a CTE program do not follow their beginning career education into a related field of study or related type of employment in Indiana. In each cluster shown, there is considerable falloff of students entering a postsecondary institution in any field, and this falloff continues with a declining proportion of students who enter a postsecondary program that is related to their concentration. In some clusters, like manufacturing, the falloff is dramatic. And, while the employment figures include artifacts of declining data quality and impacts of the recession, the figures nonetheless show even more dramatic drop-offs in students entering employment in Indiana in any field.

More data refinements and additional research are needed to fully corroborate or dispute the figures in Figure A-12. Part of the problem is the difficulty of data collection and the lack of reliable procedures in place to collect and analyze these kinds of data. Yet, the suggestions of these data are supported by anecdotal accounts of career center administrators and faculty interviewed for this report. They frequently commented, with dismay, about the low numbers of students who follow their concentration into related education or employment.

An important question, for which we need additional data, is: what is the loss when students do not follow their program of study into related employment? A hint of the potential loss is suggested by the median wages of CTE graduates who were reported as employed in Indiana through UI data (those with less than \$7.00 an hour were excluded). Figure A-13 provides median wages for CTE graduates who concentrated in a program of study in a cluster (shown below) and were employed in any field, compared to those who were employed in field related to their concentration. Again, caution should be exercised in interpreting these data and assigning too much validity. These data show only suggestions of differences in the median wages of those who enter fields related to their technical education and those who do not.

Figure A-13. Median Wages of CTE Secondary Graduates Concentrating in Selected Fields, 2010*					
	Agriculture	Construction Trades and Technology	Sciences, Technical, Research	Healthcare	Human Services
Median Wage--Any Field**	\$ 9.93	\$ 10.82	\$ 9.75	\$ 8.92	\$ 9.04
Median Wage--Related Field**	\$ 12.11	\$ 17.18	\$ 12.35	\$ 9.08	\$ 8.72
*Where graduates SSN is known and valid. Source: Indiana DWD.					
** UI record match, 4th quarter 2010.					

With the exceptions of healthcare, which includes a large number of low-wage and high-wage positions, and human service fields, which is almost entirely composed of cosmetology and early childcare education, both low-wage fields, there are sharp differences in wages for related fields compared to any field. (For purposes here “any field” includes the related fields as well, so it is for all known jobs for graduated CTE students. This somewhat understates the size of the difference between related and

unrelated employment.) These figures suggest (but are not conclusive) that in some fields there is some loss of earning capacity when graduates do not enter a field in their technical concentration. It may be too strong to say this represents significant forgone earnings for the students and a loss of wealth production for Indiana, but the data point in those directions. In addition, there is also a suggestion here that many students entering the CTE healthcare and human service fields are being educated to enter the lowest paid jobs in those fields.

Postsecondary Technical Education: Sub-baccalaureate Technical Education

Once students graduate from high school, the principal sources of technical education in Indiana are the two- and four-year colleges and universities. A few states—Tennessee, Louisiana, Oklahoma, and others—maintain distinct systems of postsecondary technical institutes or technical colleges that grant diplomas or certificates for completion of programs of study in a variety of vocational and technical fields. But in Indiana, as in most states, the sources of technical training and credentials in technical fields are either certificate or associate’s degree programs in community colleges or baccalaureate programs at four-year colleges and universities. Indiana maintains a statewide system of community college campuses in Ivy Tech Community College and a relatively unique residential two-year college, Vincennes University. Baccalaureate institutions include a robust array of Indiana public and private four-year colleges and universities ranging from smaller liberal arts schools to world-class research institutions.

Postsecondary educational attainment in general in Indiana is rising from low levels of only a decade ago; still, the state ranks low in producing either associate or baccalaureate degrees. In 2000, 26.6 percent of Indiana residents aged 25 to 64 held a bachelor’s degree or higher. In 2009, that proportion rose to 30.6 percent.¹⁷ Yet, the state currently ranks 40th among all states in the percentage of residents, 25 to 64, holding an associate’s degree or higher and 42nd among all states in the percentage of those with a bachelor’s degree or higher.¹⁸ Total enrollment in postsecondary education has increased at a far steeper rate, however. In particular, enrollments in Ivy Tech increased dramatically after Indiana created a comprehensive community college system in 2004. In just 10 years between 2001 and 2011, Ivy Tech’s FTE (full-time-equivalent) enrollment increased from 34,600 to 82,300, while public four-year college FTE enrollment increased from 163,000 to 189,000. The increases in enrollment and the relatively modest increases in degree attainment have meant that the rate of increase in degree attainment has been flat across the last decade. Indiana has set a goal that 60 percent of Indiana adults will hold at least a postsecondary credential by 2025 and that the state will move into the top 10 ranking of states in educational attainment. Achieving that ambitious goal means an increase of over 50 percent of the number of residents now holding an associate’s degree or higher.¹⁹

¹⁷ US Census Bureau, Census of the Population; American Community Survey, 2009. Lumina Foundation for Education, A Stronger Nation Through Higher Education, State Data, 2010.

¹⁸ National Center for Higher Education Management Systems (NCHEMS). Education Levels of the Population, 2010.

¹⁹ Indiana Commission for Higher Education. Reaching Higher, Achieving More: A Success Agenda for Higher Education in Indiana. March, 2012.

Because our main focus here is on technical education for jobs that require some postsecondary education but less than a four-year degree, we look in particular at two-year technical education programs such as that offered at Ivy Tech Community College and Vincennes. As with secondary programs in CTE, we ask the same questions of the postsecondary system in Indiana concerning the alignment with economic drivers and the level of production of graduates who have earned degrees or credentials in technical fields. The answers suggested by the postsecondary data are different than the description of what actually happens to secondary students. In postsecondary education, there are significant numbers of enrollments in technical programs in two-year colleges, and these programs are very much aligned with skills sets needed in the economy. However, in two-year postsecondary technical education, few of those enrolling in a technical program complete a credential. So the output of credentialed individuals in technical fields from two-year colleges is very low compared to the scale of enrollments.

However, in terms of credentials and degrees awarded, the data show that the degrees obtained by students are very concentrated in a handful of fields of study—healthcare, business administration, and liberal arts/general studies. These account for 67 percent of all 8,600 associate’s degrees awarded by all educational institutions that awarded associate’s degrees in 2010. This concentration holds true for Indiana baccalaureate colleges and universities though at a slightly lower percentage. Figure A-14 shows the proportions of all students graduating from associate degree awarding colleges in Indiana. The concentration in a small number of fields is quite striking.

Figure A-14. Largest Program Areas, by Headcount and Associate’s Degrees Awarded, 2010

Program Area Descriptions* All Associate Degree Awarding Institutions	Headcount 2010	Associate Degree Awards 2010	% of all Associate degrees**
Health Professions and Related Clinical Sciences	18,357	3,129	36%
Business, Marketing, and Related Support Services	18,144	1,632	19%
Liberal Arts and Sciences, General Studies, Humanities	31,039	1,038	12%
Engineering Technology	7,808	760	9%
Construction Trades	5,098	474	6%
Computer and Information Sciences and Support Services	5,597	319	4%
Security and Protective Services	5,457	271	3%
Education	6,758	264	3%
Visual and Performing Arts	2,084	136	2%
Mechanic and Repair Technologies/Technicians	2,537	86	1%
Legal Professions and Studies	1,477	113	1%
Precision Production	1,553	115	1%

* By 2 digit CICP code **Total Degrees Awarded in 2010 = 8,601 in both 2- and 4-year institutions.
Source: CHE

As we look in a little more detail at Ivy Tech’s and Vincennes University’s most heavily enrolled programs, we can see how degrees awarded are concentrated in a relatively small number of degree programs at the two institutions. Tables A-15 and A-16 show program headcount enrollments and associate’s degrees awarded in the top 15 degree programs (out of about 90 specific degree programs) for Ivy Tech and for Vincennes University in 2010. Data for Ivy Tech show both associate’s degrees and certificates awarded; only associate’s degrees are shown for Vincennes because the number of certificates awarded is simply too small to have much meaning. For both institutions, the top credential producing fields were general studies, business, and healthcare. Even among the certificates awarded by Ivy Tech, which are more frequently awarded in technical and occupational fields (as suggested in Figure A-15), 60 percent of the 1,800 certificate awards shown here were in healthcare fields.

Figure A-15. Ivy Tech Top 15 Programs by Headcount Enrollment, 2010

Ivy Tech, Degree Program Name	2010		Ivy Tech, Formal Certificate Program Name	2010	
	Headcount	Degrees Awarded		Headcount	Certificates Conferred
A.A.S./A.S. in General Studies	18,899	240	T.C. in Medical Assisting	2,690	391
A.A.S./A.S. in Business Administration	10,524	742	T.C. in Practical Nursing	1,491	624
A.A.S. in Medical Assisting	4,908	293	T.C. in Early Childhood Education	468	34
A.A.S./A.S. in Criminal Justice	4,750	201	T.C. in Automotive Technology	335	30
A.S. in Liberal Arts	4,575	76	T.C. in Industrial Technology	266	45
A.A.S./A.S. in Human Services	3,612	186	T.C. in Manufacturing Production and Operations	249	55
A.S. in Nursing	3,507	1520	T.C. in Business Administration	240	165
A.A.S./A.S. in Early Childhood Education	3,416	152	T.C. in Dental Assistant	222	74
A.S. in Education - Elementary Education	3,062	83	T.C. in Office Administration	206	72
A.A.S. in Accounting	3,036	220	T.C. in Industrial Technology	191	1
A.A.S./A.S. in Computer Information Systems	2,979	137	T.C. in Information Technology	160	25
A.S. in Computer Information Technology	2,722	167	T.C. in Computer Information Systems	157	32
A.A.S./A.S. in Hospitality Administration	2,206	74	T.C. in Construction Technology	140	35
A.A.S. in Office Administration	2,012	187	T.C. in Accounting	131	219
A.A.S. in Design Technology	1,794	125	T.C. in Apprenticeship Technology-Painter	89	NA

Source: CHE

In Vincennes University, a somewhat different distribution of associate’s degrees appears in Figure A-16. Of the 11,471 students enrolled at Vincennes, 50 percent are enrolled in a general studies program compared to about 12 percent of the Ivy Tech students. Enrollments in other programs, even those included in the top 15 headcount programs, drop off sharply in Vincennes headcount enrollments. Vincennes offers degrees in general studies for transfer-oriented students as well as for students who do not declare a specific field of study.

Part of the large proportion of Vincennes students enrolled in general studies may also be due to the large numbers of dual enrollment high school students that are included in these figures; almost half of Vincennes total enrollments are high schools students. Most of those high school students are enrolled in general education courses. Nevertheless, beyond the large enrollments in general studies, the relative concentrations of enrollments in business and healthcare are similar to those of Ivy Tech.

Figure A-16: Vincennes University Top 15 Degree Programs by Headcount Enrollment and Degrees Awarded, 2010

Vincennes University Degree Program Formal Name	2010	
	Headcount	Degree Conferred
A.A.S./A.S. in General Studies	5,782	293
A.S./A.A.S. in Law Enforcement	432	58
A.A.S. in Accounting	310	16
A.S. in Business Administration	296	22
A.S. in Nursing	286	94
A.S./A.A.S. in Conservation Law Enforcement	215	36
A.A.S. in Business Management	194	28
A.S. in Health Information Management	150	17
A.S. in American Sign Language	137	9
A.A.S. in Administrative Office Technology	134	20
A.S./A.A.S. in Electronics Technology	131	27
A.A.S./A.S. Fire Science and Safety	127	19
A.A.S./A.S. in Construction Technology	125	33
A.S. in Recreation Management/Sport Management	117	5
A.S./A.A.S. in Culinary Arts	108	8

Source: CHE

These concentrations of degrees and credentials in a handful of fields stand in sharp contrast to far fewer enrollments and degrees awarded across other fields in both Ivy Tech and Vincennes. These findings support our contention that it is important to consider the field of study when looking at overall levels of educational attainment or rates of graduation. And, the data also reinforce our central point that the two-year associate’s degree production is not aligned with Indiana’s economic drivers.

One particularly striking aspect of the figures above bears a closer examination. Despite large enrollments in some programs, the number of graduates is very low. Only nursing programs at either Ivy Tech or Vincennes show the number of associate’s degrees awarded above 30 percent of the headcount in 2010; Ivy Tech awarded associate’s degrees to 43 percent of the nursing headcount in 2010. Most of the other programs shown, among the highest enrolled programs at either college, indicate percentages of awards to headcounts that are generally much less than 20 percent. Many are in the single digits.

Healthcare attracts large numbers of students and has a relative higher proportion of its total headcount graduating each year (these data do not change much year to year). At first glance, when we look at manufacturing as the other key wealth driver of Indiana’s economy, it looks like far fewer people enter educational programs for occupations related to that sector (and also for the emerging sectors related to manufacturing). A reasonable conclusion is that too few people are choosing to enter a technical field and, therefore, there will be too few credentialed graduates. However, if we group all technical degree programs together in the same way that all healthcare programs are often grouped then a much different picture emerges.

For example, Figure A-17 compares the broad category of healthcare to a manufacturing category that includes several educational tracks related to manufacturing, like precision machining and engineering. Shown in

Figure A-17. Ivy Tech Manufacturing and Healthcare Program Categories by Headcount and Degrees Awarded, 2010

Educational Programs	Headcount	Associate Degrees	Degrees as Percent of Headcount
Manufacturing Technology Related*	14,243	799	6%
Health Professions and Related Clinical Sciences	14,583	2,480	17%

*Categories derived from 2 digit CIP codes 11,14,15,47,48. Source: CHE

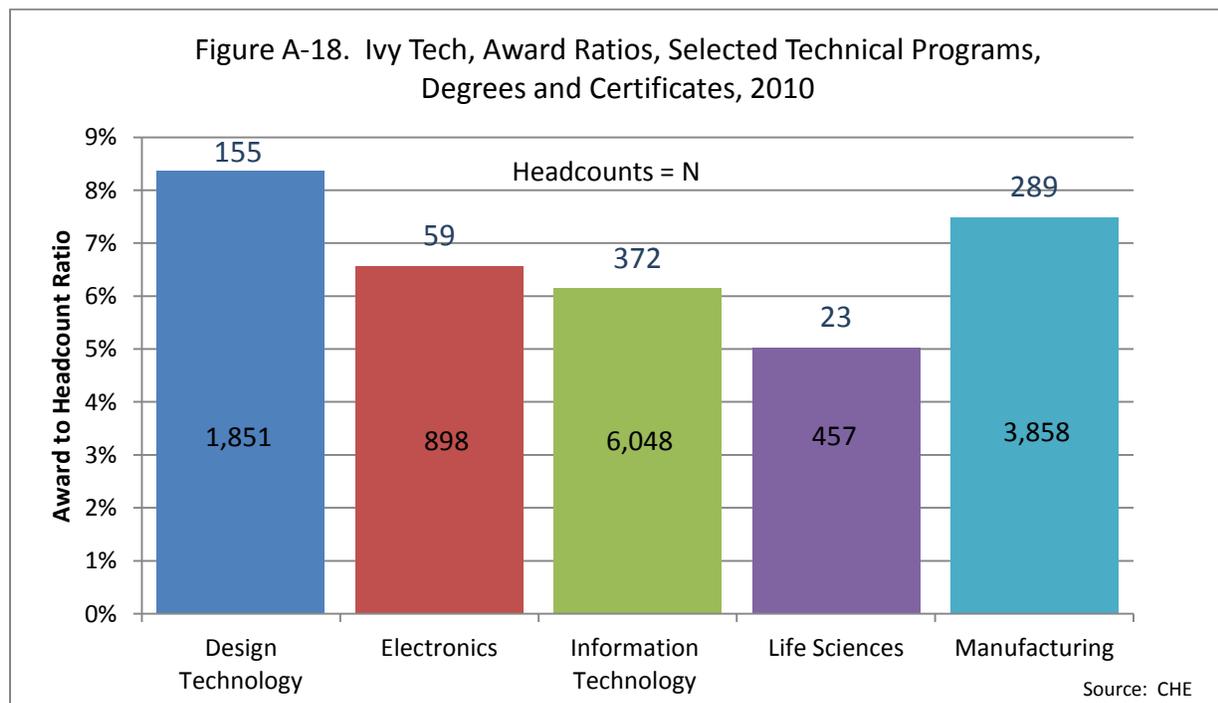
Figure A-17 are the total headcounts and associate’s degrees awarded within the broad categories of healthcare and manufacturing. For simplicity’s sake these figures are only from Ivy Tech.

Viewed in this fashion, the issue is much clearer; *large numbers* of people enroll in programs within the manufacturing category, almost as many as enroll in healthcare programs, but very few complete a degree. We may not know if the headcounts above are enough to meet the needs of either sector for skilled workers, but the difference between the outcomes for these aggregations is stark. It is not the case that fewer people are enrolling in these manufacturing technology courses. The problem is that

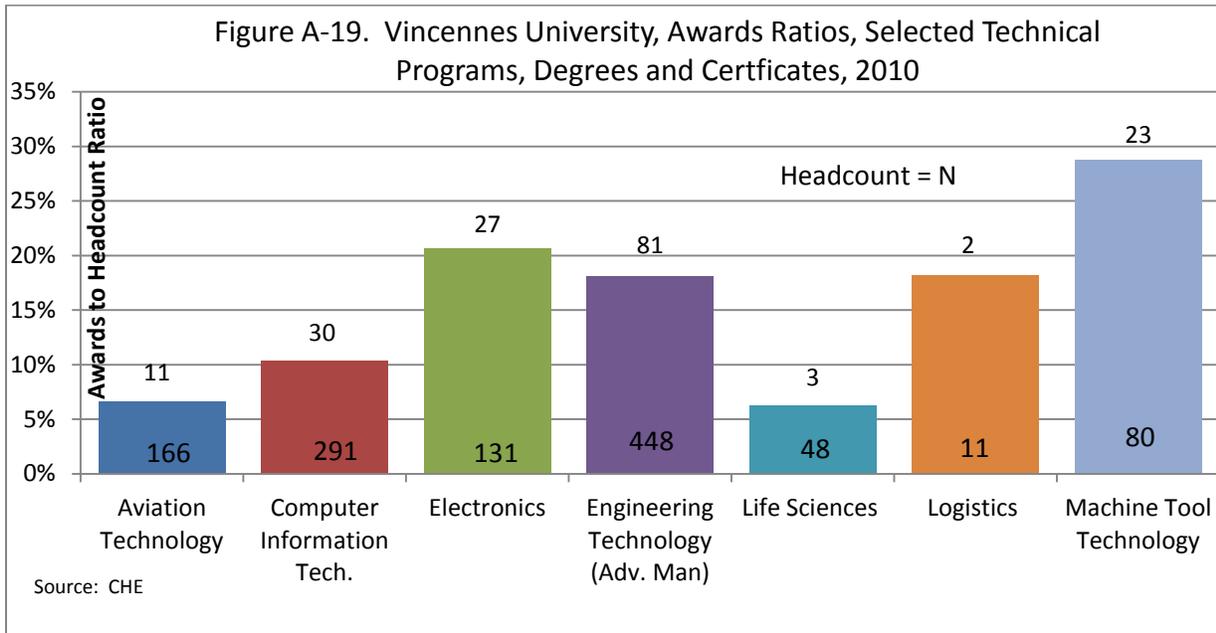
they are not finishing at anywhere near the proportion of people in the healthcare sector, and even the percentage of degrees awarded in healthcare itself may be considered low.

Raising the proportions of students obtaining degrees in these technical programs would have a significant impact on attainment levels in Indiana. If manufacturing programs awarded associate’s degrees in the same proportion as all healthcare programs, Ivy Tech would produce an additional 1,700 degrees annually and that alone is over 40 percent of the total annual increase needed to attain the *Reaching Higher* goal for associate’s degrees. And, if these manufacturing programs awarded associate’s degrees in the same proportion as Ivy Tech’s Associate of Science in Nursing program at 43 percent, Ivy Tech would produce *all* of the additional increase needed to attain Indiana’s *Reaching Higher* annual goal for associate’s degrees.

Stepping back to look at individual educational programs, we can see what happens to associate’s degree production within a specific program of study that has low percentages of completion. Figures A-18 and A-19 offer examples of enrollments, degrees and certificates awarded, and completion ratios for selected technical programs at Ivy Tech and Vincennes for 2010. Individual programs have generally small enrollments, and low ratios of completion mean small numbers of people receiving a degree in a specific field. The actual numbers of awards in each field are shown at the top of each bar in the tables. And while we saw above that substantial numbers of people were enrolled in a broad category, people generally gain employment and enter a field with a specific set of skills. Moreover, many of the Indiana employers we interviewed reported seeking higher skill levels for specific jobs within their companies. So, when few people enter a specific degree program and a much small percentage of those obtain a credential, the results can contribute to a shortage of skilled people in that field.



Comparing Ivy Tech and Vincennes University, we primarily see the effect of scale. At Ivy Tech, relatively robust enrollments but low completion ratios produce modest numbers of degrees and certificates. At Vincennes, a much smaller total enrollment leads to lower specific program enrollments and very small total numbers of awards even though the percentages of completions are higher than Ivy Tech's. In either case, production of degrees in specific skill areas related to the state's economic drivers is low.



Baccalaureate Technical Education

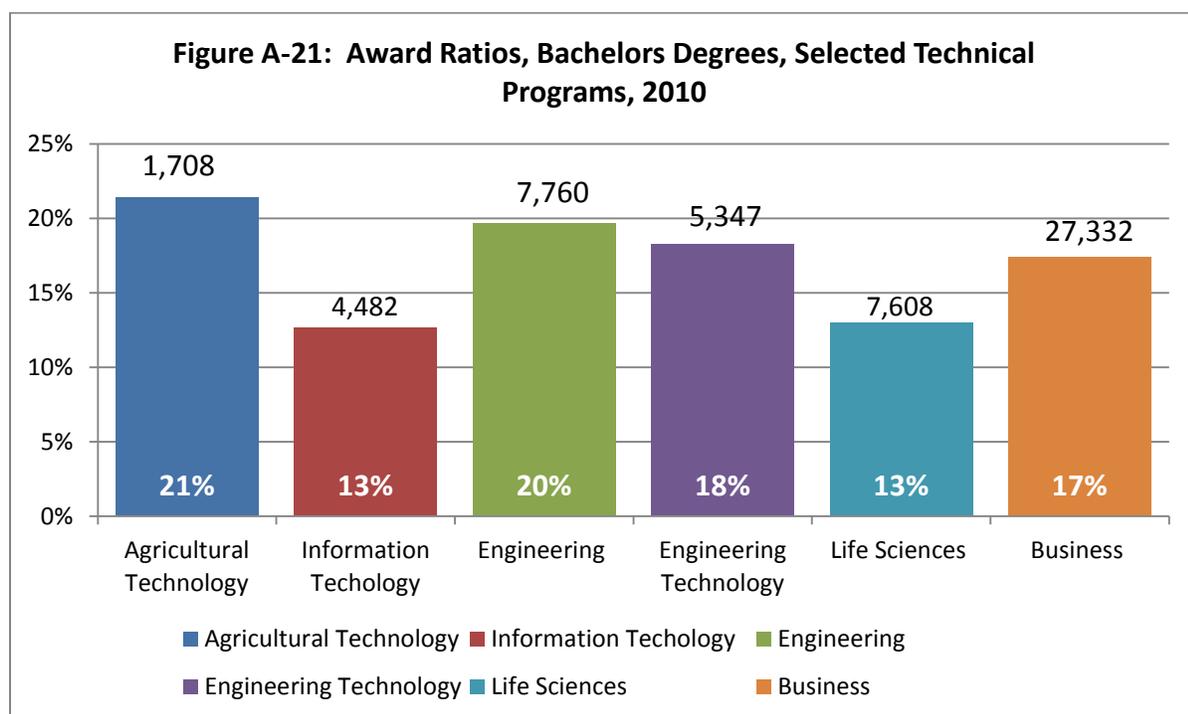
In terms of technical educational programs, the characteristics of Indiana’s baccalaureate colleges and its two-year colleges are similar, though the differences between enrollments and completions are generally less pronounced. More people who enter four-year college technical programs will complete the programs even though the percentages of completions are lower than those of other bachelor’s degree programs in Indiana. Our charge from the Roundtable was to focus on sub-baccalaureate technical education, but we also looked at data on completions and degrees in Indiana’s public four-year colleges for technical degrees as a way to view the complete educational pipeline from high school diplomas through bachelor’s degrees. We will not devote as much detail to the four-year schools, but a few characteristics are worth noting.

First, in similar fashion to two-year colleges, the bachelor’s degrees awarded at all Indiana four-year colleges and universities were concentrated in just five fields. The table below shows the top fields and the percentages of students receiving degrees in those fields as a percentage of all degrees awarded. For comparison sake, we include the top associate degree awards. While none of the top five enrollments or completions were in technical fields, four-year colleges and universities still enrolled and graduated substantial numbers of students in STEM-related and technical fields compared to two-year colleges.

Figure A-20: Top Baccalaureate Fields, Degrees Awarded, 2010

Program Area Description	Headcount 2010	Degree Awards 2010	% of all Bachelor’s degrees
Business Management, Marketing, and Related Services	27,332	4,733	18%
Education	20,628	3,044	11%
Health Professions and Related Clinical Sciences	14,676	2,383	9%
Liberal Arts and Sciences, General Studies and Humanities	10,195	1,894	7%
Communication, Journalism, and Related Programs	9,682	1,713	6%
Social Sciences	8,689	1,529	6%
Engineering	8,018	1,524	6%
Psychology	6,866	1,092	4%
Visual and Performing Arts	7,474	1,054	4%
Engineering Technology	5,173	987	4%
Biological and Biomedical Sciences	7,435	955	4%
Total Bachelor’s Degrees 2010 = 26,875			Source: CHE

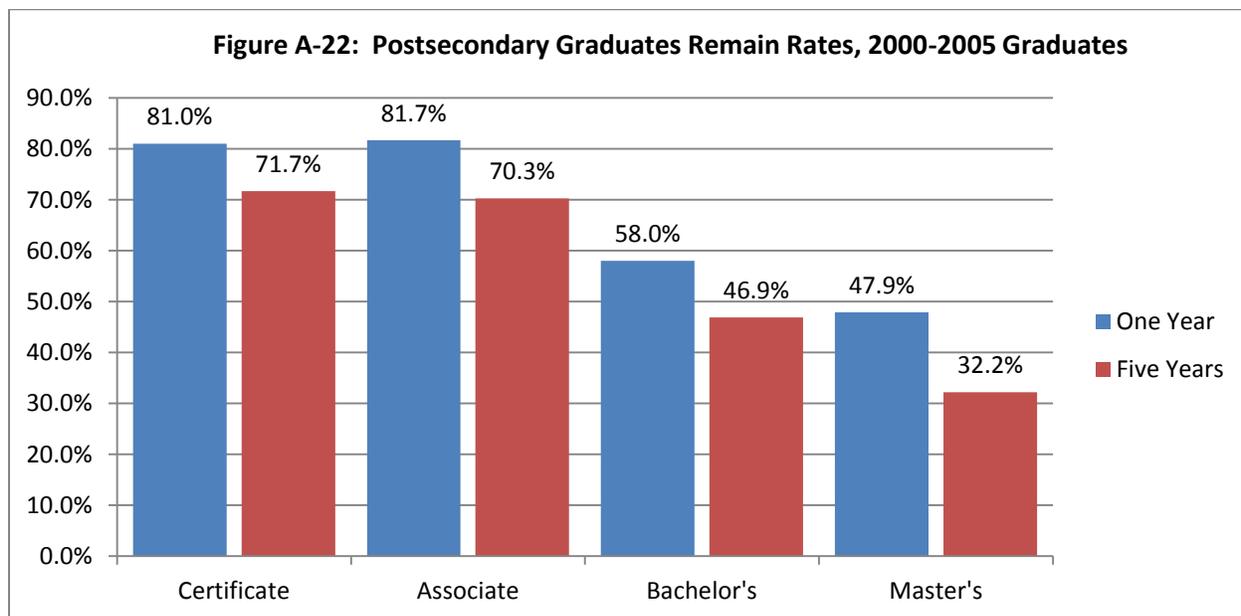
One of the differences between two-year and four-year institutions is the higher completion rate of four-year schools. In Indiana, the completion rate for bachelor degrees is 48 percent within six years and places Indiana above the median for all states. However, as with the two-year colleges, there is considerable variation between program areas in the completion ratios of students receiving degrees compared to enrollment. Figure A-21 below shows headcounts, completions, and completion ratios for Indiana bachelor degree programs in selected fields. Like the community colleges, the completion ratios for technical programs are significantly less than the overall completion rate for all programs. So not only do baccalaureate degrees come mainly from a small number of fields, but completion ratios are also lower in technical programs than in other fields. At the same time, all of these programs show both high enrollments and a higher completion ratio than the programs we looked at in the two-year colleges.



Finally, another comparison between associate degree production and bachelor degree production is worth noting and suggests a further reason why increasing two-year associate degree production is very important in Indiana. Recently, the Indiana Business Research Council released a report on the relative payoff of education in Indiana for individuals and for the state.²⁰ Figure A-22 below is taken from that report and shows the persistence in the state over a five-year period of certificate, associate degree, and bachelor degree recipients. After five years, over 70 percent of those with either an associate’s degree or a certificate remain in Indiana compared to less than 50 percent of those with a bachelor’s degree or above.

²⁰Indiana Business Research Center. “How Education Pays, The Work Outcomes of Indiana’s Postsecondary Graduates.” A Research Brief from the Indiana Workforce Intelligence System. Indiana University. November 2011

One interpretation of these data is that Indiana four-year colleges and universities are serving a national student body and a national labor market, compared to associate degree producing schools that serve students more likely to stay in the Indiana labor market.



It is beyond the scope of this research to explore all the reasons contributing to the sharp drop-offs of students pursuing a career path in CTE secondary programs or the low completion rates at two-year colleges in Indiana. However, it is important to identify implications that these low rates of completion have for the state and support of its wealth-driving sectors.

First, low numbers of credential completions in technical educational programming in Indiana means that individuals do not hold the credentials they need to enter employment in the growing numbers of jobs that demand postsecondary credentials. Without credentials appropriate for the job requirements, Indiana workers very quickly reach the limit on their ability to take advantage of opportunities for higher wages typically associated with middle-skill jobs.

Second, large numbers of adults lacking credentials to contribute to the overall level of educational attainment in the state suggest that Indiana will be unable to attract significant new business that depends on a skilled workforce. Indiana will be less able to adequately meet the workforce needs of the state's key wealth-creating economic sectors. These impacts more than justify the attention given to the percentages of people who enroll in postsecondary technical programs but do not complete them.

Finally, the issues associated with technical education in the state do not at all reside with one part of the system alone. Though the characteristics of low outcomes of those with technical degrees may vary by their location in the educational pipeline, the issues run throughout. Solutions, therefore, must take into account the full spectrum of technical education in Indiana.