Responding to Minnesota's evolving workforce needs

Final evaluation report on the Minnesota State Colleges and Universities Centers of Excellence, 2006-2008

JANUARY 2009

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January 2009

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Acknowledgments

We wish to thank many people in the Office of the Chancellor for their help in the course of this evaluation: Leslie Mercer, Todd Harmening, Michael Murphy, Mary Rothchild, Craig Schoenecker and others on the research staff, Ron Dreyer, Bruce Steuernagel, and Gail O'Kane. In addition, Dale Wahlstrom of the BioBusiness Alliance of Minnesota took time to tell us the business leader's perspective on the biosciences partnership. We also thank the Center Directors Bruce Lindberg, Jane Foote, Karen White, and Ron Bennett, as well as Judith Evans and other Center staff members, for their answers to many questions, review of draft data collection instruments, provision of many worksheets and lists, and endless patience and enthusiasm for their work.

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Summary

Background

In October 2005 the Minnesota State Colleges and Universities system selected four Centers of Excellence, with start-up funding of $5 million per year for four years:

- 360° Center for Manufacturing and Applied Engineering
- The Minnesota Center for Engineering and Manufacturing Excellence
- The Center for Strategic Information Technology and Security
- HealthForce Minnesota

Their charge is to develop best-in-class programs in critical industry sectors, ensure a highly-qualified and diverse workforce, and gain regional and national reputations. The enabling legislation identified a wide variety of hoped-for outcomes, and the Office of the Chancellor included additional expectations in the request for proposals. These include developing partnerships among the higher education partners, with industry, and with K-12 education; increasing the number, diversity, and skill level of potential workers; meeting industry needs for applied research and incumbent worker training; securing outside funding for Center operations; and testing and disseminating new approaches to higher education to accomplish all of the above. Centers were expected to select their own priorities from among this mix of possible outcomes.

All Centers' activities in the first year focused on development of relationships (academic, industry, and K-12) and the first steps in joint work based on new relationships. Challenges identified in the first year included the short time and modest funding available in the four-year start-up period, the difficulties of taking time away from regular duties to work on Center activities, and systemic incentives that appear to encourage competition among institutions more than collaboration.

In the second year, partnerships were more mature and were being incorporated more into routine work. Businesses, surveyed in fall 2007, reported they were already seeing increased access to Center resources, increased industry awareness, and more opportunities for networking. K-12 engagement activity was being ramped up through Project Lead the Way, summer camps, and new curriculum and training for teachers. Challenges identified included limitations on Centers' ability to seek and manage funds independent of host institutions, differences in institutional missions that impeded some kinds of joint work (such as articulation of programs or coordination of customized

training), and continued challenges in finding ways to facilitate participation by faculty and administrators. There was also a clear message from business representatives that, while industry might help fund equipment upgrades and special projects, it is not likely to play any significant role in on-going funding of Center operations.

From data collected during the first two years, the evaluators concluded that relatively few of the hoped-for outcomes would be evident by the end of the third year of operations. (See figure on next page.) As noted, most outcomes will take 4 to 8 years.

Third year findings reinforce this expected time frame. The partnerships set in place in the first year continue to develop and strengthen; initial strategies have been recalibrated and more fully integrated into the partner organizations' work plans; employer involvement continues to grow and deepen; outreach to pre-college students has become broader and deeper; and articulation agreements are being implemented. There is some evidence of growth in student enrollments, though with the data available at this time we cannot identify whether they are affecting student transfer and continuation rates. Centers are leveraging system funds to bring in some additional funding from outside to support department and program projects as well as Center operations.

Data sources

This is the final of three annual evaluation reports addressing implementation issues and outcomes. Third year findings are based on interviews with Center Directors, college and university administrators and faculty who have been involved with the Centers, and stakeholders involved in the similar Biosciences initiative; compilation of information on Center activities provided by the Centers; surveys of K-12 students enrolled in Center-sponsored summer camps, and of college and university students enrolled in Center-related courses; and data from the system's records on programs, students, graduates, awards, and post-graduation employment.

Findings on outcomes

A premise behind the Centers of Excellence is that change begins with the development of partnerships among higher education institutions, in the context of new or strengthened partnerships with industry and K-12 organizations. Based on mutual interests, the needs of partners, and the unique capacities of each partner, more new students are recruited to study in the fields encompassed by the Center, and higher education courses, programs, and other student and faculty opportunities are enriched. As a result of these changes, it is expected that more students will complete degree programs, and/or continue their studies at higher levels or in related fields, and will be placed in jobs, receive better jobs because of

improved skills, or both. These in turn, will benefit businesses and the overall industry sector and strengthen the state economy.

Based on the first two years' implementation findings, the 2007 evaluation report included a table presenting a likely time frame for results of the Centers' work to begin to be evident. The table below summarizes the time frame presented at that time. The presentation of outcomes follows the general expected time sequence.

Estimated sequence and time horizon for key Center outcomes

Year	Outcome of interest
1	2- and 4-year partnerships; employer involvement; growth in Center funding (initial efforts)
2-4	Articulation of curriculum (adoption of agreements)
3-6	Growth in student admissions and program enrollment
4-6	Growth in Center funding (more mature, sustainable efforts)
4-7	Diversification of student demographics; increase in graduation numbers
4-8	Articulation of curriculum (evidence of student success)
5-10	Regional recognition
6-9	Graduation outcomes such as employment success
6-10	Economic impact
6-12	Improvement of results in related programs

Source: *Wilder Research, Centers of Excellence evaluation report for second year (summary).*

Collaboration and cooperative action do not occur unless certain critical building blocks are in place. Each Center of Excellence has demonstrated success in multiple areas critical to collaboration. Moreover, the time period in which these activities have occurred is consistent with what can be reasonably expected based on the research literature. Centers followed a pattern deemed critical in the formative phases of collaborations that included the identification of appropriate partners, the clarification of expectations and the development of a shared vision with common goals.

Outcomes for and with K-12 partners

Centers are promoting a large number of events and activities to **reach out to K-12 students** and others who influence career choices. During 2008, camps and other events reached at least 7,859 youth, raising interest and enthusiasm for the Centers' fields.

Centers are also deeply involved in efforts to **strengthen K-12 curriculum,** through joint work to develop curriculum and assist K-12 faculty on its use.

Centers are demonstrating a variety of strategies to **bridge new students' transitions into college.** These include programs to offer and accept credits earned prior to college admission, and to help students from disadvantaged backgrounds prepare for and succeed in college.

Outcomes for state colleges and universities

Centers are **seeking and using input from industry**, and **modifying programs** in response. The number of firms in advisory roles has remained relatively stable since the first year, while the number involved in other ways has consistently grown from year to year, including at least 186 different firms in 2008.

Centers have helped departments and programs update their equipment and facilities. Unlike upgrades resulting from standard institution or system sources, these represent coordinated investments focusing resources of multiple institutions on jointly-undertaken priorities. The upgrades set off a series of related developments, including many of those listed next (as well as increased ability to recruit students).

Centers are promoting faculty involvement and professional development. Although relatively few faculty were identified as significantly involved in Center activities beyond teaching Center-related courses, the kinds of involvement are varied, and the involvement is leading to changes in how they and their colleagues teach, advise, or do research.

There are many new or updated courses and programs in Center-related departments. Four out of five administrators and faculty reported that there have been new courses or programs developed at their institutions, and/or modifications to existing ones, as a result of the Center. For diplomas and certificates, Centers' rate of creation of new programs has been greater than elsewhere in the system.

Some courses are being offered in more flexible formats as a result of Center activities. For example, some short-term trainings have been offered in community locations, and many have been converted in whole or in part to on-line delivery.

Centers are moving forward on program articulation. This is especially true at 360°, where this effort has been a top priority and a cornerstone of their work to develop "seamless career pathways" among their institutions and programs.

Centers are expanding efforts to raise visibility and recognition among potential students. Activities include summer camps, career fairs, after-school programs, video "virtual industry tours" for secondary classroom use, brochures for teachers and high school counselors, and web site resources.

Outcomes for the overall system

Centers have created and strengthened partnerships among institutions. Nearly two-thirds of administrators who were interviewed (54 presidents and other representatives of participating colleges and universities) believe their Center has already increased partnerships among institutions in the system, and three-quarters believe it is very likely to do so. Eighty-two percent of respondents in the faculty survey report more cross-institutional interaction due to the Centers.

New institutional partnerships, activities, and outcomes appear sustainable, if factors outside the Centers' and institutions' control remain stable. Overall, nearly 90 percent of administrators agree with the statement, "Your institution is committed to the sustainability of the Center through financial and other resources." Over 90 percent agreed that the benefits their institution got from the Center were equitable considering what they put in.

Centers and their associated departments and programs are raising significant funds, from a widening range of sources. So far, Centers (including associated programs and departments) have leveraged a total of $15.3 million dollars, and the number of different sources has been expanding each year. According to findings of the Fieldstone Alliance, (organizational development consultants working with 360° on sustainable funding options), these efforts compare well with fundraising experiences at comparable centers in other states.

Outcomes for students

For this evaluation, numbers and characteristics of current students are estimated based on enrollment in courses most closely affiliated with Center-affiliated programs of study.

More students are being served, and some of the increase is likely due to the Centers. For-credit enrollments in the identified Center-related courses rose 12 percent from the baseline year of 2006. Total *hours* of credits increased by 13 percent, with more of that growth in Center-related courses (up 10.5%) than in non-Center courses (up 2%). Half of surveyed faculty who had been involved in the Centers reported more students enrolling in their courses.

Trends in **student diversity** (of for-credit students) are consistent with system-wide trends, except for small gains in the percentage of students of color at two Centers.

Significantly more diplomas and associate degrees were awarded in 2008 than in 2006. Changes since 2006 are mixed among Centers. Overall (combining all degree levels from certificates to graduate degrees) the total number of graduates and awards in Center-related programs decreased. However, when we look separately at the different

award levels, there is evidence that some Centers are producing more credentialed graduates in the shorter-term programs (specifically, diplomas and associate degrees) where change would be expected to occur first.

Employment outcomes are positive, but difficult to attribute only to Center programs. At this time, follow-up data are available on students who graduated during 2006 and 2007, most of whom would have completed all or nearly all of their work before Centers began to affect either their studies or their job placement. Data collected to date can be used as a baseline, though we must recognize that current economic conditions will affect jobs and wages far more than the Centers will.

Outcomes for business partners and industry sectors

Business involvement is already changing academic programs, as previously described. Most outcomes for industry will only begin to be felt after the first cohorts of new students graduate. Leading indicators of what may be expected include the following:

As described above, **Centers are working to improve the image and/or visibility of their fields.**

Based on current activities and priorities, **Center efforts appear likely to produce a larger workforce pool.**

Changes made to courses and programs are likely to produce a better qualified workforce pool.

Centers are targeting diversity in future students, to develop a more diverse workforce pool for the future.

To date, there appear to be modest increases in applied research and in work with industry to improve processes.

Outcomes for the wider community and state as a whole: Economic impact

Intermediate measures of progress indicate that the Centers have reached a point consistent with a vigorous three-year start, and are moving to fulfill their potential to enhance employment and economic activity in Minnesota.

- The Centers of Excellence continue to provide valuable **customized training,** serving approximately 1,400 customized training students in Center-related for-credit and non-credit courses in 2008.

- Increases in the **numbers of associate degrees and diplomas** indicate that the Centers are having the desired impact of increasing the available pool of qualified labor for their target industries.

- Graduates of the programs continue to be hired by industry. Moreover, they are placed in **relatively high-wage jobs,** indicating they bring established and important skills to their employers.

- **Businesses in the target industries are engaged** in the Center's activities and supportive of the Centers. In the most recent reporting period, nearly 200 business partners were identified across the four Centers.

Clearly, this is not yet the end point anticipated in the authorizing legislation, but it would be judged reasonable and appropriate by outside observers including industry partners. Furthermore, none of the three other comparable centers identified in other states has chosen to measure general economic impact in their first three to five years of development.

Over the longer term, not all of the ultimate measures of economic impact should be applied in the same way or be expected to carry the same importance for different Centers. Building on the examples of centers in other states, it is clear that any assessment of the economic impact of the Minnesota centers needs to take into account the actual mix of activities at each Center and the priorities given to those activities.

Challenges and learnings in implementation

One way of summarizing the progress of the Centers is to ask the administrators who are involved how they feel about the Centers' progress to date. The vast majority name specific benefits that their own institution has gained from participation and express strong support for continued participation. This endorsement was very consistent across all types of positions and all types of institutions.

To better understand the factors that help produce this level of accomplishment, and the challenges that have and have not yet been addressed, this section compiles findings from the implementation portion of the evaluation.

Main themes: Areas of success

Across a variety of topics and stakeholders, a few main themes surface repeatedly about things that are working. These are listed below (and more fully described above).

- Leveraging of additional funds

- Upgrading equipment, facilities, and other infrastructure
- Updating and creation of courses and programs
- Increasing the amount and quality of partnership among institutions
- Creating new pathways (articulations) among programs across institutions
- Reaching out to develop and strengthen K-12 awareness and interest
- Involving and energizing faculty
- Developing strong support for Centers among institution administrators

Main themes: challenges

This section describes challenges that were found from the evaluation data, and for each *(in italics)* what has been learned about promising strategies for addressing them.

Partnerships with industry, while already good, must continue to expand and improve.

Working with more sector-level organizations is helpful.

Partnerships among institutions have sometimes been impeded by **different perspectives and missions of the partners**, and some two-year partners have not felt that four-year partners have the adaptability and inclusiveness needed from a lead institution.

It would be helpful for the Office of the Chancellor to ensure that expectations for inter-institutional cooperation are built into the system's accountability measures.

Institution staff – including administrators, but especially faculty – find it **difficult to find the time to participate** in Center activities. For faculty especially, it is difficult to obtain release time, find a qualified substitute for their teaching responsibilities, or add the activity on top of their regular load.

MNCEME administrators are impressed with the success of Center-funded technician positions that helped free up faculty time for other priorities (and also leveraged more outside funds).

After intense work in the first two years to define a common identity among the original partners, all Centers are now exploring ways to **expand to a system-wide scope** for at least some key services and resource brokering functions.

Lessons learned from other initiatives, including the Biosciences Education-Industry Partnership (discussed below) will be instructive in ways to promote this growth.

Administrators in particular feel that Centers must find **sustainable sources of funding**. Industry representatives have made it clear that they will not be such a source. Much Center effort during the year – most of it not yet completed – has been devoted to strategic planning to identify potential sources of sustainable funding for Centers. The lack of guaranteed continued funding from the system has made it more difficult for Centers to raise funds from other sources.

While public sources are stretched during economic recessions, improved workforce preparation is key to economic recovery, and no other source of funding is sufficiently reliable. Furthermore, stable public funding is a precondition for raising other sources.

Administrators also cite a need for **continued and expanded marketing** for greater Center visibility. This is easier when there is an established track record of accomplishments to promote, but it is easier to generate accomplishments when marketing has helped create interest and participation, so it is hard to harmonize these interrelated factors in the first few years of operation.

Some suggest that the work could be more effective if it had more help from industry and the system offices, such as seems likely with the Dream It. Do It. campaign to promote manufacturing careers, as one example.

Administrators commonly report that they understand their **institution's role in the Centers** as focusing on giving advice or offering the resources they have (educational programs, faculty and staff knowledge and participation). Comparatively few responses acknowledge a need to be open to innovation or to change standard operating methods. While this may be an artifact of how questions were asked, it does raise some issues for further exploration.

Change in long-established practices can best be encouraged when there is both oversight and support from higher levels – in this instance, the Office of the Chancellor.

Industry representatives, administrators, and faculty who were surveyed give a **variety of descriptions of the purposes of their Centers**, with many different priorities.

Centers are aware of this situation and are working with their stakeholder to revisit the Centers' mission and purpose. It is important for the system to recognize and

communicate that there are, and should be, differences among Centers in these priorities, and that this process of recalibration is part of healthy Center evolution.

The data collected for this evaluation indicate that the primary value added by the work of the Centers is in coordinating and brokering resources across multiple institutions, and helping students and industry partners find their way successfully to the most appropriate resources. **To measure Center success, it is important to be able to track these activities across institutions**. While the system has been building its capacity for many of these kinds of tracking, the analyses are often complicated and time consuming.

It is unlikely that Centers will be able to conduct the analyses needed on their own, and will continue to depend on the Office of the Chancellor to develop and provide analyses that are more useful to the Centers.

New perspectives on mission and services

One of the most important priorities for the Centers at the outset was what might be called a "pipeline" role: helping to promote the numbers and qualifications of future workers in the Centers' fields. Another priority area in which Centers add value to traditional academic activities might be called an "intermediary" role: helping to link system capacities to students on the one side, and employers on the other. This in turn helps students acquire skills most needed by employers, helps employers acquire the skilled workforce they need, and helps institutions in the system best meet the needs of both students and employers in the most effective, efficient way possible.

Both of these roles were within the scope of the initial charge to the Centers, but in keeping with business priorities, the pipeline role was the top priority at first. The intermediary role is now rising in relative prominence, and all the Centers are seeking ways to reach beyond their original set of institutional partners and draw all the state colleges and universities (and potentially other higher education partners) into their work. This is especially relevant because the industry sectors they serve have statewide distribution.

The creation of Centers as entities with distinct membership and identities of their own suggests an entity, an object, a *noun*, that co-exists in the same space with programs, departments, and institutions. In such a framework, a center cannot help but be a competitor for funding, an entity that violates standard operating principles because it does not behave like standard operational entities. However, if the Center is thought of instead as a function, a service, a *verb*, it can more readily be appreciated as the means by which entities respond collectively to the changing landscape of the industries they serve. It still requires funding, and in that sense it may still be perceived as a competitor, but its activities can more clearly be seen as supporting and promoting those of its partner

institutions. Hence it can be better understood as a means by which additional resources can be leveraged to the advantage of the partners.

We collected information about another system initiative, the Bioscience Education-Industry Partnership, which has emphasized this intermediary role. Lessons learned that may be applicable to the Centers, recognizing that they have different organizational structures and histories as well as missions to serve different industry sectors, include:

- Centers should continue to build relationships with faculty and administrators and expand these relationships, as opportunities permit, throughout the system. Develop and maintain regular communications with those who are interested.
- Centers should be aware of sensitivities of institutions that were not originally included. Ensure that expanded participation does not dilute benefits for current members.
- Centers are already developing more regional and sector-level industry connections. The Office of the Chancellor can help them make connections with more such organizations, and use its connections to alert Centers to new opportunities.

Discussion and conclusions

The evidence provided in this report shows that the Centers of Excellence are beginning to produce many of their intended outcomes, and are each in their own ways poised for a significant new level of energy, activity and results. Despite significant resource issues in the current economic environment, some of what the Centers have achieved will continue to bear fruit with or without ongoing financial support. This includes K-12 and college and university students who have already benefited from strengthened programs, as well as industry partners who have found compelling business reasons to stay closely connected to system programs and faculty. It also includes enhanced instructional facilities and faculty who are more closely aligned with current industry trends as well as with colleagues at other institutions.

However, the evidence to date indicates that the groundwork prepared in the first three years is just now reaching a point where the initial coordination and relationship-building is ready to begin bearing fruit on a larger scale. For the Centers to achieve the long term benefits that initial results indicate are now possible, it is important to consider how to help them continue to carry out the important purposes with which they are charged. An essential part of this, confirmed by experiences of comparable Centers in other states, will be an assurance of continued funding, even if at a somewhat reduced level.

The transformative part of the Centers' mission, to spark adaptive and innovative approaches to meeting the evolving needs of industry, involves what are essentially system-level goals, and they likely will only be achieved with ongoing system support. Center leaders can do – and are doing – much to promote this mission through activities that help institutional staff and community leaders identify needs and issues and jointly develop and share promising approaches.

The role for college and university leaders in this transformation is not widely agreed upon. For innovation to take root beyond a narrow cohort of the most involved faculty and staff will require some attention to how institutional and system structures can create meaningful incentives to organize and work in new ways.

The Chancellor's office also has a key role to play in establishing accountability standards for institutional leadership that reward inter-institutional partnership; creating more opportunities for relationships with regional, statewide, and national organizations of industry; and developing methods to track progress in enrollments, achievements and movement across institutions.

In this final report of the initial evaluation cycle, we find significant initial accomplishments. However, the most exciting part of the Centers' ultimate outcomes remains to be told over the longer term. Building on a solid start, the main objectives for which Centers were created are likely to take up to ten years to reach maturity. With more time to continue the work, the Centers have considerable potential to help the Minnesota State Colleges and Universities system better realize its mission of providing a coordinated system, with distributed and varied capacities that enable it to provide an education responsive to the needs of its communities.

Background

Introduction

One of the purposes made clear in bringing together the community and technical colleges and state universities into the Minnesota State Colleges and Universities System is described in statute. In part, it reads that the job of the System's trustees is……

> …….to develop administrative arrangements that make possible the efficient use of the facilities and staff of the technical colleges, community colleges, and state universities for providing these several different programs of study, so that students may have the benefit of improved and broader course offerings, ease of transfer among schools and programs, integrated course credit [and] coordinated degree programs……

Add to this purpose the system's goal of providing new opportunities for incumbent workers and for supplying top talent for Minnesota's industries and you arrive at a concise statement of why the Centers of Excellence were created.

Established in 2005, Centers of Excellence in health care, manufacturing and engineering, and information security began the process of creating new relationships among 4 state universities and 18 community and technical colleges. From the beginning, their focus has been on meeting industry needs with qualified students and providing focused educational opportunities for an increasingly diverse student population.

The Centers are:

- 360° Center for Manufacturing and Applied Engineering
- The Minnesota Center for Engineering and Manufacturing Excellence
- The Center for Strategic Information Technology and Security
- HealthForce Minnesota

Today these initiatives are operating within a completely different fiscal environment than was present at the birth of the Centers. Today the post-secondary institutions of Minnesota are expecting tough fights on budget and program and high stakes administrative decisions about what may be cut and where existing dollars will go. In this environment the Centers of Excellence will be judged. Do they have promise? Will they provide a return on investment? Will they offer pathways for the diverse student and incumbent worker

population in our state to become part of the future workforce of Minnesota? This document is one of several sources of information to guide decision-makers in the tough choices ahead.

Charge to the evaluators

The evaluation includes two main components:

- An implementation evaluation, to help the Centers a) document their challenges and successes in setting up the Centers, b) capture and share the lessons learned, c) identify and share best practices, and d) improve operations and strategic decisions, including those that may be made concerning potential future Centers.

- An outcome evaluation, to document short-range, medium-range, and long-range outcomes relating to a) student admissions, enrollments, graduation rates and outcomes, and employment success, b) Centers' leverage of external funding, employer participation, and other indicators of successful and sustainable operation, and c) in the third year of operation, impacts on the local economy.

The evaluation goals specified above are part of the expectations included in the authorizing legislation. The cluster evaluation focuses on the goals that all the Centers share in common, and the learnings from implementation that are applicable to current Centers as well as possible future Centers.

Recapitulation of findings from the first two years

All Centers' activities in the first year focused on development of relationships (academic, industry, and K-12) and the first steps in joint work based on new relationships. Challenges identified in the first year included the short time and modest funding available in the four-year start-up period, the difficulties of taking time away from regular duties to work on Center activities, and systemic incentives that appear to encourage competition among institutions more than collaboration.

In the second year, partnerships were more mature and were being incorporated more into routine work. Businesses, surveyed in fall 2007, reported they were already seeing increases in access to Center resources, increased industry awareness, and more opportunities for networking. K-12 engagement activity was being ramped up through Project Lead the Way, summer camps, and new curriculum and training for teachers. Challenges identified included limitations on Centers' ability to seek and manage funds independent of host institutions, differences in institutional missions that impeded some kinds of joint work

(such as articulation of programs or coordination of customized training), and continued challenges in finding ways to facilitate participation by faculty and administrators. There was also a clear message from business representatives that while industry might help fund equipment upgrades and special projects, it is not likely to play any significant role in on-going funding of Center operations.

From data collected during the first two years, the evaluators concluded that relatively few of the hoped-for outcomes would be evident by the end of the third year of operations (see Figure 1, page 31).

Third year findings reinforce this expected time frame. The partnerships set in place in the first year continue to develop and strengthen; initial strategies have been recalibrated and more fully integrated into the partner organizations' work plans; employer involvement continues to grow and deepen; outreach to pre-college students has become broader and deeper; and articulation agreements are being implemented. There is some evidence of growth in student enrollments, though with the data available at this time we cannot identify whether they are affecting student transfer and continuation rates. Centers are leveraging system funds to bring in some additional funding from outside to support department and program projects as well as Center operations.

Sources of data for this report

During this third and final year of the evaluation the Wilder Research team:

- Met in person and by conference call on several occasions with Center Directors and staff from the Office of the Chancellor to discuss a variety of implementation and measurement issues
- Worked with the Office of the Chancellor to use existing data systems to measure outcomes related to student enrollments, student demographics, numbers of graduates and awards, graduates' employment outcomes, and the rate of new program creation
- Worked with Center and institution staff to administer a paper-and-pencil survey to 214 K-12 students attending Center-sponsored summer camps (covering most such camps offered during the summer of 2008)
- Conducted in-depth telephone interviews with 53 presidents and other administrators of the associated institutions who have been involved with Center activities
- Conducted in-depth telephone interviews with 66 faculty of the associated institutions, specifically selected to include those who have been most involved with Center activities

- Administered a web-based survey to a sample of students who were enrolled during 2007-08 in courses that suggest they were likely to have been affected by Center activities (due to scheduling, limited opportunities for promotion of the survey, and the need to use the previous year's student list, only 410 of 5,559 eligible students responded, for a response rate of 7%)

- Collected funding and industry involvement data from each of the four Centers

- Collected copies of all articulation agreements that Centers have helped to develop

- Collected documentation from the Centers about outreach efforts to K-12 students, schools, and other potential students

- Carried out key informant interviews with three academic and industry representatives who have been involved in the system's Biosciences Education-Industry Partnership, to compare and contrast different ways of accomplishing similar purposes

- Carried out key informant interviews with the Directors of each Center

Further information about data sources and methods of analysis can be found in the Appendix.

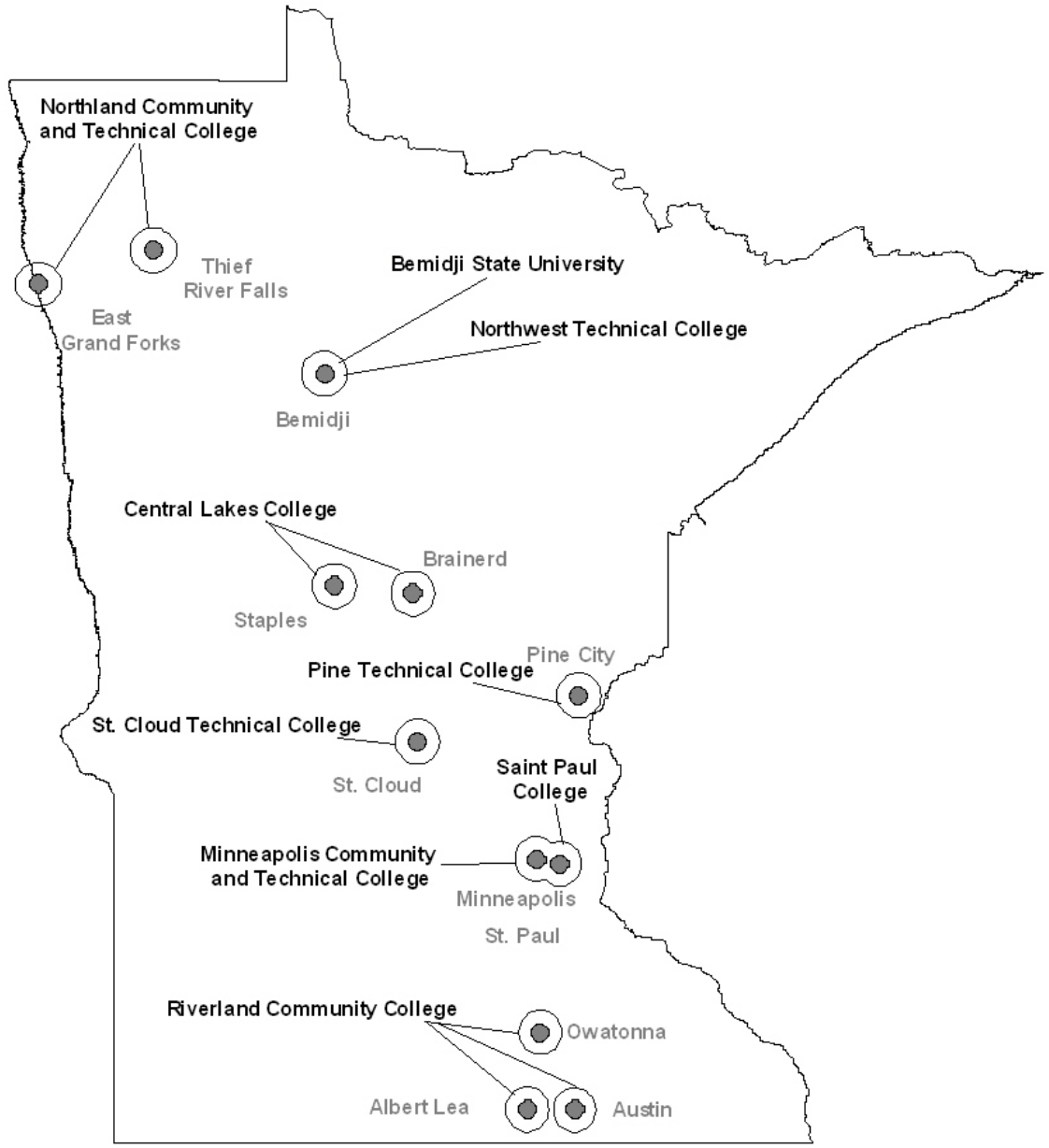
The first two year's evaluation reports focused mainly on implementation issues, while laying a foundation of baseline information against which outcomes could be compared as they become apparent. This final report focuses primarily on documentation of outcomes, to the extent that three years of operation is enough to show them, or leading indicators that suggest the potential for longer-term outcomes. The discussion section reflects on implementation challenges and successes and their role in shaping outcomes. The Conclusions section contains key lessons learned that can be of use in shaping future decisions for the four current Centers of Excellence as well as thoughts about approaches for potential future Centers of Excellence.

First we begin with a current (December 2008) update on the recent activities and priorities of each Center and some perspectives on the unique factors associated with the development of each.

View from the helm

During November and December 2008, each Center director was asked to provide an up-to-date assessment of their Center's accomplishments, current directions and challenges. During the phone interviews conducted for this purpose and the subsequent follow-up, directors also described what they considered unique about their centers. Here is what each director had to say:

360° Center for Manufacturing and Applied Engineering



Director Karen White believes the needs of industry should be the driving force behind 360º. "We should be asking what does industry need from a Center of Excellence and then look to our collaboration of institutions to develop solutions to fill those needs." This belief has led to a significant focus on *Dream It. Do It.,* a national campaign to raise the visibility of and interest in manufacturing careers. With support from DEED, the Tri-state Manufacturers' Association and individual business leaders, White and her colleagues will fully launch this campaign in west central Minnesota using new online tools to facilitate connections between diverse educational programs and potential workers including those already connected to industry. "Dream It. Do It. helps manufacturers see that they have a role to play in solving this problem. Now they have contributed money to help purchase marketing to get out the message that manufacturing is not a dead industry in their region and in their communities."

"One of the things we fight constantly is the impression that we are losing all types of manufacturing jobs in this country. In fact what is happening is that manufacturing jobs that require higher technical skills and leadership ability are increasing in the United States and that these jobs are among the hardest to fill in our workforce."

During 2008, 360° continued to provide funds for capital equipment to support education programs at all participating institutions. The Center has also maintained a strong Directors Council which includes representation from all of the original partner institutions as well as a new two-year technical and community college. The Seamless Career Pathway, accessible through the Center's website, expands career paths from Project Lead the Way high school curriculum to college and university programs. Recently, the online BAS degree in applied engineering has helped strengthen the pathway from industry to the University.

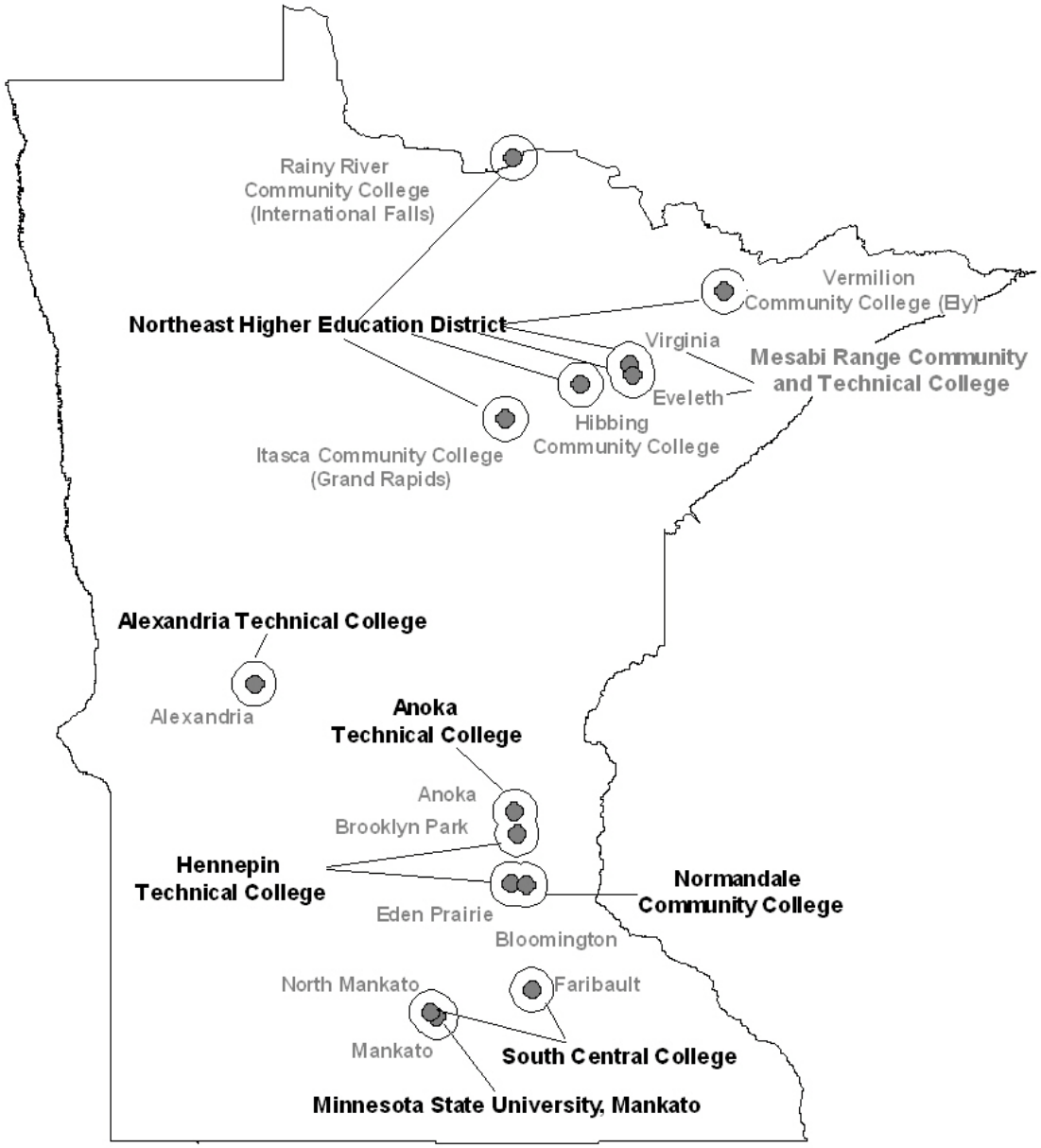
The Center hired a new assistant director in 2008 who has brought fresh ideas to the table, especially in the areas of K-12 outreach and distance learning. "We are pushing for some of our programs to be 100 percent online and to have many access points. These educational offerings will be on the books at each of our partner institutions. While we are starting with our current partners, there is no reason that we need to be limited to only this set of relationships in the future." White notes huge improvements in computer technology and the creation of realistic simulations now allow technical education to be delivered online with only occasional companion elements that require weekend or evening labs. "With today's computer technology you can train someone through simulation to understand and operate a milling machine."

This year the Center has gained new understanding about the importance of regionalizing its message. The Center has worked to stay connected to local manufacturers in their region to ensure that programs are consistent with their needs. A new connection has been the Great Lakes Manufacturing Council which encompasses all of the states and provinces that border on any of the Great Lakes. White notes the Council is particularly interested in partnering with the Center to improve the image of manufacturing throughout the Great Lakes region and to develop integrated workforce development programs. Consistent with the legislative intent to have Centers receive broader recognition outside of Minnesota, manufacturing interests in western Wisconsin have now asked the Center for permission to use some of their copyrighted marketing concepts.

Another key area of growth in 2008 has been the alignment of articulation agreements across schools so students can move across institutions seamlessly. There are now memorandums of understanding in place across all eight of the affiliated institutions that define the transferability of courses and credits from high school to college, from two-year institution to two-year institution, and from two-year institution to four-year university. According to White, "…it is now possible for a high school student to come to one of our institutions having already completed a key online digital electronics course that is part of our new pre-automation program." [Anecdotally, faculty members are now beginning to report that students are showing up in their programs who were campers at a 360º sponsored summer camp event.]

A key challenge, according to White, is that new partnerships and the new relationships they have fostered with academic institutions and industry will be difficult to maintain if the Centers can not assure they have a long-term future. The program must be clear about its niche and scope of operations.

Minnesota Center for Engineering and Manufacturing Excellence (MNCEME)



Director Ron Bennett and Associate Director Judith Evans report that when the Centers were formed, each responded to the initial call to 1) meet a demonstrated and critical industry need, 2) leverage the program strengths and other resources of institutional partners, and 3) provide adaptive and innovative approaches to the evolving needs of industry and society. There was great interest in the promise of the Center from the beginning, and MCEME responded by trying to be all things to all people. As a result, MNCEME's first group of partners and industries stretched across southern and northern

Minnesota and included a wide range of programs from customized courses to ABET accredited engineering programs. In addition it took a lead role in establishing K-12 programs through Project Lead the Way as well as supporting a variety of summer camps to interest youth in science, technology, engineering and mathematics. Within the constraints of resources available, this was not a sustainable strategy. Realizing the need to focus and measure results for sustainability, the Center began recalibrating their strategic plan in the second half of 2008.

To accomplish this recalibration work, the seven presidents of the partner schools spent a full day tightening the Center's plan and bringing greater focus to the efforts to engage industry, reach into the pipeline of potential students, and initiate new projects that would bring value not only to manufacturing companies and the state of Minnesota but also to the students, faculty, and other partners involved in the Center. During this time the participating presidents made a number of observations regarding MNCEME including the fact that in their view the Center had served as a reform agent in leveraging funding and building capacity, and was seen as a catalyst in building K-12 partnerships. One president said MNCEME was "transformative" in building greater depth to curricular discussions. Another president said it helped build their school's reputation and cement relationships with corporations. Overall, the presidents felt MNCEME was instrumental in enhancing credibility for partner schools, played a significant role in helping focus on STEM (Science, Technology, Engineering, and Mathematics) and increase STEM enrollment, and generally provided more focus on the engineering area.

From the fall planning work, the Center developed a more focused new vision to *"Maximize Minnesota's manufacturing competitiveness through innovation,"* and its revised mission is to *"…lead and stimulate innovative collaboration among industry, education and allied organizations to equip Minnesota manufacturers with an educated and inspired workforce to compete worldwide."* New supporting strategies are to 1) Lead collaborative efforts to increase pipeline flow across the full spectrum of people pursuing or employed in STEM career paths, 2) Assist Minnesota industry in meeting critical technical needs of the 21st century and 3) Create an environment where MNCEME can succeed.

During 2008 the Center expended significant effort in supporting STEM pipeline projects. The Center engaged young people in science by offering 13 summer camps across the state and also held two events with Anne Bancroft, the Antarctic explorer, to engage students in grades 3 through 12 in discussions of science and nature. Bennett indicates that they have moved from a traditional view of the prospective student pipeline toward a more inclusive view in which incumbent workers, including men and women who have left the work force as well as retirees interested in reentering the work force, are thought of as part of the potential pool of students needed to meet industries' need for skilled workers.

A second important area of development during 2008 was support of both partner and non-partner programs through a Request for Proposal process. Funding was also used to develop a shared position with Alexandria Technical College and their Automated Motion Control Center. The shared position has allowed MNCEME to offer customized training in multiple locations specific to the needs of industry partners. It has also introduced the idea of sharing resources with schools throughout the Minnesota State Colleges and Universities system.

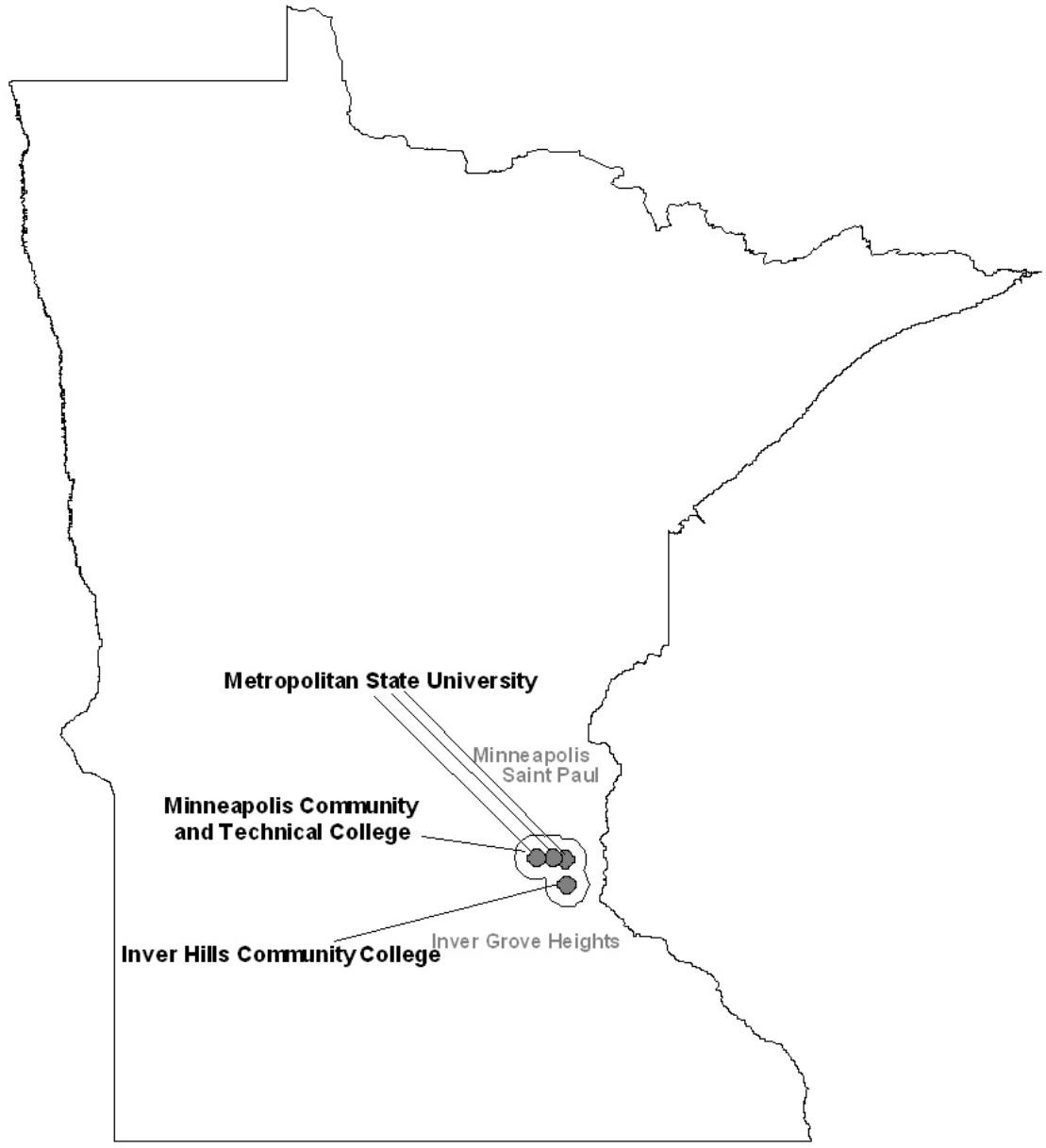
A key benefit is that members of partner schools see that building relationships among each other helped meet their goal to be more accessible. "The pilot project represented by MNCEME is really for the whole state. We have more than 30 schools and 50 campuses. We should make what we are doing accessible throughout the state and not simply through a small cadre of schools." According to Bennett, there has been a shift in thought among partner schools from considering themselves customers of the Center to seeing industry as the customer, students as the clients, the state of Minnesota (represented by subgroups like legislators, the Minnesota State Colleges and Universities system and the governor) as the owner, and the Center of Excellence itself as the orchestra leader trying to coordinate the contributions of many. "While the development of the Center as a pilot is important, we need to be able to partner with anyone in the system to help the system become the dynamo that it could be."

The biggest challenge they see in moving ahead is the need to develop a sustainable model of a Center of Excellence that provides opportunity for involvement by many or even all schools within the system. There is also a need for better measurement and tracking. "We don't have really good data to base decisions on at this point. We need to know the extent to which each of our initiatives is making a difference and this requires tracking across programs and students. We are hiring a graduate student to help us do that tracking, but there is a need for more comprehensive longitudinal studies on programs like Project Lead the Way and summer camps to know to what extent student choices are affected by these initiatives. The same is true with our articulation agreements. While we have developed many of these agreements, it is difficult for us to track across schools the specific ways in which students are using them to make progress toward the goals that the Center has and which industry shares. Getting data and tracking results is one of the biggest challenges we face."

Another key challenge is to make sure that the accountabilities of the president at each institution encompass partnership measures that will make a difference. "For example as the system considers adding the seventh out of 10 dashboard indicators related to external partnerships, it is important that presidents be able to get credit for the partnerships that they create **with** other institutions."

Another challenge is to identify companies that want to improve. "While everyone in industry will say that they are interested in innovation and growth, there are many pathways to achieving this. In one stamping shop that we are working with, the president is building innovation into the program by requiring that each employee obtain 100 hours of continuing education each year. In this way, the president looks to the employees for innovation and empowers them to effect it. MNCEME sees itself in an ideal situation to help with these kinds of industry initiatives. In industry, larger companies especially, there are particular qualities expected of suppliers. In the current economic environment, they will expect suppliers to develop ways to adopt technologies needed for global competition. They will also look for qualities like flexibility, skill in the coordination of work, rapid turnarounds, product reliability, corporate responsibility, financial soundness, and training for workers at all levels. MNCEME staff feels that they are in a great position to help industry meet these expectations.

Center for Strategic Information Technology and Security



According to Executive Director Bruce Lindberg, the Center's vision is to make Minnesota a top ten IT workforce region in the U.S. in terms of both supply and demand for IT talent as measured by total employment. Currently the Twin Cities region is ranked about 14th in this category. According to Lindberg, "we want to bridge the gap between higher education, information technology, and industry by connecting students and faculty to industry opportunities and by connecting industry representatives to partnerships with education. In this model, industry is not just a customer but also a co-producer of learning. The most valuable thing our Center is doing right now is making higher education more

responsive to industry needs by building bridges. We haven't hit the home run yet but we are getting into position to do so."

The original RFP for the Centers envisioned the creation of a new type of entity within the system that would concentrate and extend the current expertise of Center academic partners to better meet the needs of specific industry sectors important to the state economy. This intent was initially interpreted by the CSITS charter partners in a way that focused on building institutional academic capacity in emerging areas of technology like IP telephony, advanced network design, risk management, forensics, utilization of open source applications, and the integration of IT with business strategy.

While these competencies are in demand as evidenced by enrollment growth and placement rates in newer program areas, it has also become apparent that IT employers are urgently concerned about both quantitative and qualitative aspects of the overall IT workforce in Minnesota. Lindberg notes, "We discovered that no one is playing the vital role of 'mediator' for the IT sector of the labor market currently characterized by misperceptions of demand, rapidly changing requirements, lack of coordination, and lack of consolidated measures for supply, demand and qualitative requirements."

In short, the basic market need for good information broadly shared is not present. This results in fewer participants with the relevant competencies demanded by employers. Even during the current economic downturn, many positions remain unfilled due to a lack of qualified candidates. For example, there were over 500 openings for software-related positions on the electronic job board Minnesota Works at the end of December this year.

CSITS' recalibration process began during the fall of 2008 and was facilitated by Fieldstone Alliance. The new plan outlines three primary roles for the Center and identifies a variety of potential revenue sources that leaders believe will contribute to sustainability. Lindberg believes that these roles blend nicely with the revenue sustainability study conducted by Fieldstone for 360°. The three primary roles are:

1. **System Agent** acting on behalf of the system and the broader Minnesota workforce system to promote alignment of education with industry needs and to encourage development of a robust IT workforce in the region and state. Potential revenue sources: system and legislative allocation, grants, contracts.

2. **Partner Broker** providing shared services (career development, advising, curriculum development, equipment, et. al.) for an expanded base of academic partner institutions who share a vision for excellence in IT-related education. Potential revenue sources: shared position funding, revenue sharing, licensing, and partner allocation.

3. **Independent Producer** of educational and research products (courses, conferences, training programs, etc.) in partnership with academic, professional and business partners. Potential revenue sources: fees, contracts, grants.

In order to fulfill these roles, the Center has embraced four strategies. These strategies are:

1. Alignment of student learning outcomes with emerging IT industry needs

   One of the important changes articulated by IT industry representatives is the evolution from specialized technical positions to roles that require broader workplace and business competencies. This is clearly revealed in the recent release of a new IT Industry Competency Model by the U.S. Department of Labor. Based on over two years of research and validation with leading companies, the model combines traditional discipline-specific and academic skills with another layer of foundation-level competencies called "workplace skills." CSITS is now working to embed these competencies in existing curriculum and to engage faculty from many institutions and disciplines to develop a shared repository for all system faculty to use across IT-related disciplines.

2. Expand IT career interest, readiness and preparation

   CSITS has already launched MnITCareers.org, a website designed as a portal to IT careers for secondary students, college students and their advisors. The website consolidates information from several sources, provides new tools for learning about careers and educational options, alerts students to career development events, and offers additional community-building features. The site will soon have a specific assessment that will provide individuals with IT career choice guidance based on unique profiles of interests and preferences. Within the next year, an IT career development course is planned using the website as the content source. Students will be able to take the course independently at no cost, or they can register for credit at colleges that adopt the curriculum.

3. Co-produce educational and research products to meet current employer needs

   Based on observations offered by IT industry advisors and validated by additional industry inquiries, CSITS formed a development team to produce a new IT Leadership Academy program for current workers who have been identified by employers as having leadership potential. The program combines seminars with on-the-job assignments within coaching sessions designed to produce measureable performance improvement in the context of the individual's work environment. The participant's supervisor and co-workers will be the primary "evaluators" of learning outcomes; a

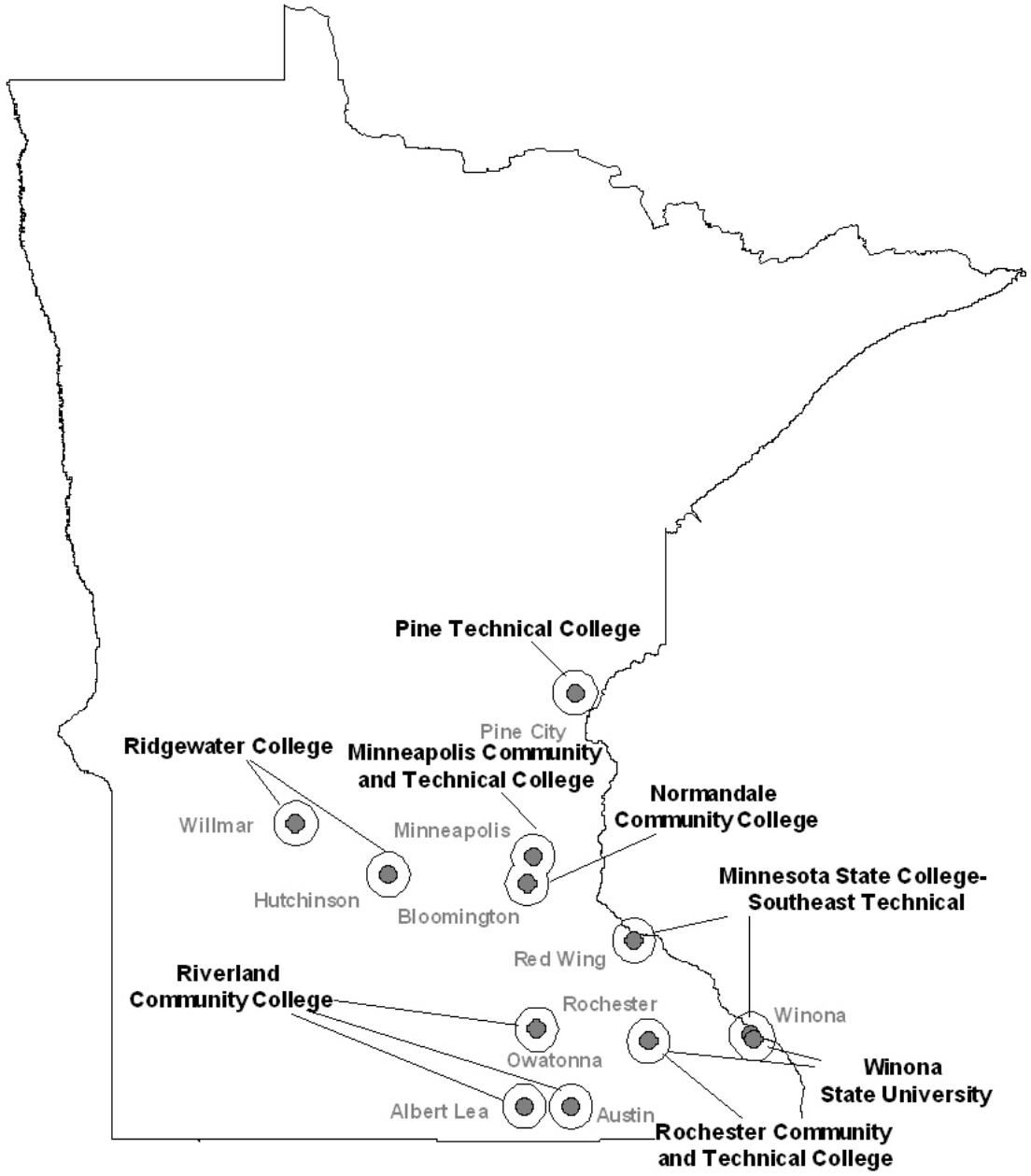
unique departure from grades assigned by an instructor. The design team includes faculty, a member of the IT advisory board, and an executive coach.

4. Provide coordination and support for workforce development efforts

   The idea for the Minnesota IT Workforce Collaborative grew out of a "summit" meeting that CSITS, DEED and Minnesota High Tech Association sponsored in June 2008 that brought together over 100 representatives from industry, education and the workforce system to review the "brutal facts" about the projected IT workforce shortage and begin exploring possible solutions. Shortly after the summit, and in the midst of pondering the best next steps to sustain the momentum generated by the event, DEED announced the next round of RFPs for their FIRST Grant program. Previous work along with a recent IT industry "cluster analysis" coalesced into a successful proposal that helped launch the Collaborative, which despite being in its formative stages, is already launching projects of its own.

Lindberg concludes that while CSITS has a specific physical location and a defined set of affiliated programs, courses, and resources that reside primarily within the academic partner institutions, it is also accurate to portray the added-value of the "Center" as residing outside of itself entirely. To use an IT-related metaphor, CSITS can be thought of as a computer server, linking with and coordinating a growing network of resources that can be employed to produce many outcomes; both those initiated by CSITS and those initiated by others and made possible by the presence of new relationships formed through connections with CSITS. After three years of working to build the initial infrastructure, Lindberg says, "We have just begun to glimpse the future potential of a fully evolved inter-network organized to promote workforce development on regional level."

HealthForce Minnesota[1]



HealthForce Director Jane Foote says, "On a daily basis, the media reports that the rising costs of healthcare are a top concern for both employers and citizens. The ability of health educators to co-create with industry partners innovative solutions that address both workforce needs and healthcare costs is essential. I think we're in a position now to

[1] In addition to the Minnesota state college and university partners shown in this map, HealthForce Minnesota also partners with the the Healthcare Education-Industry Partnership (Mankato) and the University of Minnesota Center for Allied Health.

innovate and do what we need to do to build collaborative models that can bring hope to this industry."

According to Foote, the Center's work during 2008 positioned it for creating a new vision and plan. This year HealthForce Minnesota and the HealthCare Education Industry Partnership co-hosted an all day planning and visioning meeting with 13 other healthcare organizations. This stakeholder meeting will be concluded with a second day in January, 2009, and is on track to produce a shared vision and common plan for what health care education and service delivery could look like in the future. "We are beginning to see conversations and relationships developing between healthcare providers who used to compete with one another. They know that the challenges are too great to solve alone and that by working together there is a greater potential to create a sustainable workforce that can deliver quality health care for all Minnesotans. Our success in bringing partners together, identifying innovative educational solutions, and establishing connections with institutions that can fill the pipeline with diverse and qualified students, gives us reason to believe that the Center model we have begun to build is worthy of continued investment."

During the most recent period, the key activities of HealthForce include, 1) new initiatives with K-12 schools including new strategies to engage with postsecondary education programs, 2) focused activities that have promise for recruiting and retaining diversity among the workforce within health care, and 3) new educational pathways that use innovative educational techniques to prepare people for healthcare careers.

One of the program investments during 2008 was Scrubs Camp. This program brought diverse rural and urban youth together on a residential university campus for a week-long exploration of health care careers. Another initiative, in partnership with the Healthcare Education-Industry Partnership, developed a medical anatomy and physiology curriculum for secondary students that will become part of the Health Science Pathway for students interested in following a health care-related career path.

Another example of the excitement generated by the program, cited by Foote, is the co-location of the program within the Minneapolis Community Planning and Economic Development Office. The City of Minneapolis knows that health care is one of its leading industries with 18 percent of Minneapolis jobs in health care or a related field. The city would like to make it possible for more Minneapolis residents to be connected with these job opportunities. The staff at Minneapolis Community Planning feels that their close connections with HealthForce will help facilitate opportunities for workers to get the training that they need.

A significant part of the Center's focus in 2008 is on individuals who may already be involved in health care careers or who want to change positions or strengthen their skills. Of the project funds awarded last year, the largest single award was to support the creation of a new category of worker known as a Health Support Specialist, by helping a health care association with a focus on older adults to define the scope of work and key skills needed by workers in this new kind of position. This grant to Aging Services of Minnesota is intended to give incumbent workers within health care as well as workers in other fields a chance to receive training that will advance career opportunities and help to fill the many health care jobs that are now available. Center staff members also recognize that it is important to build additional pathways for the creation of multipurpose health care workers. Future efforts to provide chronic care at home for individuals with multiple and complex health needs can be done, according to Foote, more efficiently and effectively with the use of multipurpose health workers. "When insurance companies realize that they can save millions by identifying health problems earlier and by harnessing the skills of community health workers and health support specialists, they will begin to reap the benefits which include avoiding costly surgeries and treatments and earlier intervention that can reduce emergency room and hospital admissions. When this happens, reimbursement for these services in community settings will begin to make a lot of sense."

A key goal and marker of increased collaboration is the current effort to work more closely with the Healthcare Education-Industry Partnership (HEIP). This has resulted in completion of a joint work plan that has been endorsed by staff in both organizations. Looking forward, Foote notes, the current circumstances may dictate that the two programs end up being part of a new or combined organization. She cautions, however, that HealthForce and HEIP currently have two distinctive types of leadership, one that involves direct practice nursing skills combined with faculty and academic administrative expertise, and the other which uses and requires health care consulting and policy development skills. "As a nurse I lead differently than someone who has a health service and policy administration background but both are necessary if we're going to create the innovations and experiences necessary to attain a high-quality workforce needed for health care in the future."

Findings on outcomes

A premise behind the Centers of Excellence is that change begins with the development of partnerships among higher education institutions, which occur in the context of new or strengthened partnerships with industry and K-12 organizations (including teachers and guidance counselors, schools, school districts, and youth-serving organizations). Based on mutual interests, the needs of partners, and the unique capacities that each partner offers, more new students are recruited to study in the fields encompassed by the Center, and higher education courses, programs, and other student and faculty opportunities are enriched. As a result of these changes, it is expected that more students will complete degree programs, will continue in their studies at higher levels or in related fields, and will be placed in jobs, receive better jobs because of improved skills, or both.

Based on the first two years' implementation findings, the 2007 evaluation report included a table presenting a likely time frame for results of the Centers' work to begin to be evident. The table below (Figure 1) summarizes the time frame presented at that time.

1. Estimated sequence and time horizon for key Center outcomes

Year	Outcome of interest
1	2- and 4-year partnerships; employer involvement; growth in Center funding (initial efforts)
2-4	Articulation of curriculum (adoption of agreements)
3-6	Growth in student admissions and program enrollment
4-6	Growth in Center funding (more mature, sustainable efforts)
4-7	Diversification of student demographics; increase in graduation numbers
4-8	Articulation of curriculum (evidence of student success)
5-10	Regional recognition
6-9	Graduation outcomes such as employment success
6-10	Economic impact
6-12	Improvement of results in related programs

Source: *Wilder Research, Centers of Excellence evaluation report for second year (summary).*

Collaboration and cooperative action do not occur unless certain critical building blocks are in place. So far, each Center of Excellence has demonstrated success in multiple areas critical to collaboration. Moreover, the time period in which these activities have occurred is consistent with what can be reasonably expected based on the research

literature.[2] It is clear that Centers followed a pattern deemed critical in the formative phases of collaborations that included the identification of appropriate partners, the clarification of expectations, and the development of a shared vision with common goals.

The presentation of outcomes in this section follows the expected sequence of changes. First it describes outcomes related to outreach and partnership with K-12. Second it describes changes for academic institutions, including strengthened relationships with industry and changes in courses and programs. The third section describes findings for groups of institutions and for the overall system. Changes for students, businesses, and the economy are expected to be the last to become evident, and the currently available evidence for each of these are described last.

Outcomes for and with K-12 partners

Centers are promoting a large number of events and activities to reach out to K-12 students and others who influence career choices

Each of the Centers has organized, or partnered with other institutions to organize, a variety of summer camps and single-day events. In general, these both promote interest in their field and help K-12 students understand what potential careers might be and how they can prepare themselves for such careers. Some have promoted visits to high school classes for the same purpose. High-tech workplaces are often reluctant to host student tours because of the liability risks; to help students see for themselves what such a workplace would be like, 360° has produced and distributed a streaming video "virtual tour" for classroom use. CSITS has distributed brochures not only to high school teachers and guidance counselors but also at workforce centers and nonprofits that work to help adults gain career awareness and job training. "Scrubs Camp," organized by HealthForce, hosted 66 diverse high school students on the Winona State University campus where, in addition to experiencing college life, they also learned about health-related careers and participated in hands-on healthcare activities.

The total number of youth reached through these activities totals at least 7,859 (Figure 2).

[2] *Collaboration: What makes it work, a review of research literature on factors influencing successful collaboration* (2nd ed.), Paul W. Mattessich, et.al, Amherst H. Wilder Foundation, May 2001.

2. Estimated numbers of outreach activities and youth reached by them

	360°		MNCEME		CSITS		HealthForce		Total	
	# held	(Est.) # of youth	# held	(Est.) # of youth	# held	(Est.) # of youth	# held	(Est.) # of youth	# held	(Est.) # of youth
Multi-day camps or events	9	218	11	269	1	32	2	107	23	626
One-day (full day) camps or events	14	1,029	22	1,876	9	426	1	1,500	45	4,873
Meetings, visits, class presentation, etc. (less than a full day)	1	?	15	1,500	Many	860	-	-	At least 20	At least 2,360

Source(s): *Documents from Centers and personal conversations with Center and institution representatives; tabulated by Wilder Research.*

Survey responses show that the summer camps sparked high levels of enthusiasm among parts. Moreover, significant numbers of youth reported that the camps increased their level of interest and enthusiasm for the fields, and helped them learn about new related topics of interest and gain new awareness of potential career opportunities. Such exposure to career information, and guidance on what is needed to prepare for the careers, are especially important for students who do not have a college-educated parent (14% of campers), or who have not yet spoken with anybody about preparation for college (13% of campers) (Figure 3).

3. Summer campers' reports of changes in career awareness, confidence, and interests, and prior exposure to help with college preparation

	360° (N=34)*		MNCEME (N=90)*		CSITS (N=28)*		HealthForce (N=61)*		Total (N=213)*	
As a result of this camp I am more aware of possible careers in [field]										
Yes, a lot	16	50%	38	43%	12	44%	49	80%	115	55%
Yes, some or a lot	25	78%	84	94%	25	93%	60	98%	194	93%
As a result of this camp I have more confidence in my abilities?										
Yes, a lot	7	22%	30	34%	10	37%	26	44%	73	35%
Yes, some or a lot	27	84%	77	87%	24	89%	51	86%	179	87%
As a result of this camp I am more interested in [field]										
Yes, a lot	10	31%	45	51%	10	36%	35	58%	100	48%
Yes, some or a lot	26	81%	79	89%	26	93%	56	93%	187	90%
As a result of this camp I have discovered new areas of interest										
Yes, a lot	8	25%	22	26%	6	24%	30	51%	66	33%
Yes, some or a lot	18	56%	47	56%	18	72%	47	80%	130	65%
Did your parent(s) or guardian(s) attend college?										
Yes, both	27	82%	50	63%	12	52%	28	47%	117	60%
Yes, one	3	9%	25	32%	4	17%	18	30%	50	26%
No, neither	3	9%	4	5%	7	30%	14	23%	28	14%
Do you expect to go to college?										
Yes	33	97%	85	94%	26	93%	61	100%	205	96%
Have you talked about college preparation with…?										
A parent or guardian	29	85%	66	73%	21	75%	57	93%	173	81%
Teacher	8	24%	22	24%	15	54%	43	70%	88	41%
School counselor	0	0%	10	11%	10	36%	41	67%	61	29%
Friend	6	18%	10	11%	4	14%	19	31%	39	18%
Other family/ relatives	5	15%	8	9%	4	14%	10	16%	27	13%
Student has not talked with anyone about college preparation	5	15%	16	19%	3	10.7%	2	3.3%	26	13%

Source: *Campers' responses to surveys distributed on the last day of camp; calculations by Wilder Research.*

Note: *Numbers vary because not every camper answered every question. Percentages shown are based on number of valid responses for each individual question.*

Centers are also deeply involved in efforts to strengthen K-12 curriculum

In addition to efforts to engage students and their teachers, other efforts have been gaining in momentum to work with K-12, state, and professional organizations on the development of curriculum, as well as training K-12 faculty on its use. This includes several major activities through HealthForce as well as the work of MNCEME and 360° to promote and extend Project Lead the Way in middle schools and high schools. The two manufacturing centers have significantly increased the number of Minnesota school districts that offer this high-tech curriculum for middle and high school students, from 78 in 2006 to 181 in 2008. This in turn is likely to increase the number of high school graduates continuing into college studies in science, technology, engineering and mathematical (STEM) fields.

Surveys completed by a subset of summer camp attendees suggest that there are opportunities to strengthen the impact of curriculum at Minnesota's K-12 schools: 16 percent of this group who self-selected to attend math and science-related camps reported that math classes at their school are "pretty boring," and 12 percent said the same of their usual science classes. Students with no college-educated parents held lower opinions than this overall average (and gained more new interest and confidence in their abilities in STEM as a result of the camps).

Centers are demonstrating a variety of strategies to bridge new students' transitions into college

Centers have implemented a variety of strategies to make it easier for students to make successful transitions into college from high school, and sometimes from lower-level jobs. Similar to the inter-college articulation agreements, both MNCEME and 360° have formalized relationships with K-12 programs to recognize and accept credits earned in Project Lead the Way (PLTW) classes. CSITS offers high school students high-level course work through out-of-school enrichment opportunities, for which they can earn college credits through an exam after they enter college. In cooperation with a non-profit partner, HealthForce created a bridge program to help low-wage incumbent workers and individuals from disadvantaged backgrounds prepare for and succeed in a college-level certification for nursing assistants. This is now being replicated on a wider scale through a grant from the Job Skills Partnership. Another kind of bridge program is Anoka Technical College's STEP Academy, which offers college-level courses to secondary students through an on-campus high school. St. Cloud Technical College's Discovery Academy is similar, but offers advanced technical college courses at students' high schools. Both are being examined by Centers for possible replication.

Outcomes for state colleges and universities

Although the faculty who were surveyed were hand-picked as those most involved in the Centers, the survey asked them whether they felt that "most professors in your department are aware of the Center's work." Overall, 74 percent agreed with this statement, and 40 percent strongly agreed. Nearly all 360° faculty (93%) agreed. The work of the Centers has led to a number of changes in college and university offerings and activities.

It may be asked whether it is necessary to set up Centers of Excellence to accomplish the kinds of changes described here (for example, modernizing equipment, or providing additional professional development opportunities for faculty). The open-ended survey responses suggest that the added value derived from the Centers is in the extent to which the Centers coordinate these and other activities around focused, shared priorities. In response to the question, "What would you say has been the biggest benefit of the Center to your department or program so far?" in addition to mentioning specific things they have been able to do, several faculty specifically added that these things would not have been possible without the Center. For example:

> It has let us do a lot of things that we have been waiting for a lot of years to do, especially in terms of interacting with the business community [such as] holding education events, meeting with IT executives, etc.
>
> Development of new programs that we would not have been able to develop without the funding – for example, critical care; culturally-based experiences; clinical simulation activities.
>
> Being able to offer a curriculum of study for nurses in practice. We would not have been able to do this without the funds. It would never have been designed or offered.

Certainly activities such as these do occur in state colleges and universities without special Center funds, but nobody would suggest that there are enough funds to do all that is considered important. The Centers help provide a strategic means of identifying and prioritizing those activities that will make the most difference for a range of key system stakeholders, and coordinating these across multiple institutions for maximum impact.

Centers have helped departments and programs update their equipment and facilities

All Centers have used at least a part of their funds to update and upgrade equipment, laboratory facilities, technology, and software. This priority has also been a significant source of donations (of funds or equipment directly) for the two manufacturing Centers.

The results are apparent to a majority of administrators and faculty who were surveyed: 68 percent of administrators, and 66 percent of faculty, report that they have seen this outcome already occurring at their institution, and an additional 11 percent of administrators (and 6% of faculty) consider it "very likely" to occur. The single most common theme in open-ended responses by faculty to a question about the benefits of the Center to their own department or program is that of updated or new equipment, facilities, or technology (Figure 4).

Open-ended survey responses indicate that the investment in upgraded infrastructure has enabled many other benefits to occur. Just over half (55%) of faculty respondents reported that they have observed changes in how faculty teach, advise, or do research. Among this group, the single most common change described (by 44% of that group, or 24% of all respondents) was the use of new or updated technology or equipment. Many of these mentioned other changes as a result, including changes in what is taught, how it is taught, professional development for faculty, and the program's ability to recruit students. It is also one of the most commonly cited factors in contributing to the strengthening of courses and programs, and in contributing to faculty being better able to prepare students for careers in the field.

4. Administrator and faculty reports of the presence and value of new or upgraded equipment, facilities, or technology

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report that upgrade of equipment or facilities "is already happening"	(N=16) 10	63%	(N=17) 14	82%	(N=11) 9	82%	(N=9) 3	33%	(N=53) 36	68%
"Very likely" or already happening	15	94%	14	82%	9	82%	4	44%	42	79%
Administrators who view upgraded equipment as "critical"	14	88%	5	29%	4	36%	2	22%	25	47%
"Very important" or critical	16	100%	14	82%	8	73%	7	78%	45	85%
Faculty who report that upgrading of equipment or facilities "is already happening"	(N=14) 12	86%	(N=17) 11	65%	(N=10) 7	70%	(N=24) 13	54%	(N=65) 43	66%
Faculty who report that upgraded equipment or facilities are part of how they do their work differently (open-ended responses)	6	43%	3	18%	2	25%	4	17%	15	24%
Faculty who report that new or updated equipment is a primary benefit of the Center to their dept/program (open-ended responses)	12	86%	6	35%	0	0.0%	5	21%	23	35%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

- The sense of urgency is greatest at 360°, where the largest proportion of administrators identify this potential benefit as "critical" or "very important," and the largest proportion of faculty report that this change is already happening. In response to open-ended questions, faculty at 360° are also the most likely to mention that this is one of the benefits of the Center to their department or program, and to report that this kind of change is part of how faculty are doing their work differently.

- HealthForce has made significant investments in the development of simulation technology and applications in several different kinds of settings.

- Faculty and administrators at two-year institutions are most likely to cite the importance and benefits of upgraded technology. To some extent the lower frequency of reports on this topic at CSITS and HealthForce reflects their higher proportion of four-year faculty in the group that has been most involved and who were part of the survey. It may also reflect the presence of more technology to begin with, or a less urgent need for updates to stay current with industry.

Centers are promoting faculty involvement and professional development

The survey of faculty focused on those individuals known to be most involved in Center activities – although many respondents had been involved only in limited ways, so the responses are representative of a variety of levels of exposure to the Centers' work. Many survey respondents (42%) had been involved with the Center very early, beginning in 2005, and 64 percent had been involved by the end of the first year of Center operations. In addition to Center committees and working groups, on which 55 percent of respondents had worked, they had also participated in curriculum meetings organized by the Center (24%), professional development activities funded by the Center (30%), activities or projects involving potential future students (53%) or industry partners (56%), or worked on a Center-funded project (55%) or directly with Center staff on a Center-related activity (58%). Most (85%) reported that their program had received financial support from the Center.

Over half of faculty respondents (55%) reported that they had observed changes in how faculty teach, advise, or do research as a result of the Center. In response to an open-ended question about the kinds of changes they had observed, 85 percent of this group reported changes in curriculum (including updated technology, new or expanded courses or programs, more applied or industry-focused content, and more on-line or interactive instruction); 21 percent mentioned other changes affecting students (including improved career pathways or ability to transfer credits, opportunities for student projects, internships, or connections with industry); and 53 percent reported benefits to faculty or their institutions (including professional development, heightened faculty awareness of

new opportunities or perspectives, new research opportunities, and increased participation or collaboration with industry). Overall, 25 percent reported that the Center had fostered collaboration between departments at their school, 45 percent that the Center had disseminated recent innovations in the field to faculty members, and 78 percent that the Center had contributed to their capacity to help students learn (Figure 5).

5. Faculty reports of Center impacts on professional development

	360° (N=14)		MNCEME (N=15-17)		CSITS (N=9-10)		HealthForce (N=22-24)		Total (N=60-65)	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Program has received financial support from the Center	13	93%	13	77%	9	90%	20	83%	55	85%
Center has disseminated recent innovations in the field to faculty members (agree or strongly agree)	6	43%	6	40%	4	44%	11	50%	27	45%
Center has contributed to my capacity to help students learn (agree)	12	86%	6	38%	4	40%	10	42%	32	50%
-- Agree or strongly agree	12	86%	10	63%	8	80%	20	83%	50	78%

Source: *Wilder Research, telephone survey of faculty involved in Center activities, fall 2008.*

Note: *Numbers vary because not every respondent answered every question. Percentages are based on the valid responses per question.*

- 360° faculty were most likely to report that the Center had contributed to their capacity to help students learn. In open-ended responses they most often mention how upgraded equipment and facilities helped them do this.

- In identifying types of involvement from a list of possible activities, MNCEME faculty were least likely to report being involved, and most likely to report that they had not had the opportunity to be involved. None had been involved in strategic-level groups. They were also least likely to agree that the Center had contributed to their capacity to help students learn.

- In open-ended responses to a question about the biggest benefit of the Center to their department or program, HealthForce faculty were the most likely to volunteer comments relating to professional development and opportunities to enhance their own skills and knowledge (17%).

Centers are seeking and using input from industry, and modifying programs in response

Industry partners play a critically important role in each of the Centers. The advisory committees continue to be active at all four Centers (including industry partner representation on HealthForce's Executive Alliance). At 360° and CSITS, more industry participation is occurring in a variety of working groups addressing specific projects and planning priorities. At MNCEME, these task-focused groups are subcommittees of the Advisory Board, and at HealthForce, involvement is approximately equally divided among the project-level work and the governance role.

Across the Centers as a group, the number of firms in the advisory role has remained relatively stable (although it grew during the third year at HealthForce), while the number involved in projects and working groups has consistently grown from year to year, from 97 in the first year, to 137 in the second year, to 153 in the third year. The total number of firms and hours per year is shown below (Figure 6).

In addition to advisory board meetings and other committees and work groups, business representatives make presentations at summer camps and in K-12 school classrooms, represent the Center (and their industry) at conferences and career fairs, and coach or judge student competitions. A few have hosted the filming of "virtual industry tours" to help students picture what the workplace and occupations are like.

Based on documentation provided by Centers, at least 186 different firms have partnered with the four Centers just in this past year. In this context, "firms" includes customers for any kind of products or services of the Centers, including public entities who are potential employers of graduates, and state colleges and universities institutions who have received CSITS security audit and training services. The number in any given year depends greatly on the particular activities of the year. For example, during 2007-08 CSITS organized a major IT Workforce conference that involved a large number of businesses in planning, participating, and follow up.

Other ways in which businesses supported the Centers during 2008 include hosting interns and providing other kinds of field placements (at least 36 firms in 2008); requesting research, consultation, or other services or products from the Center (at least 17), donating equipment, space, scholarships, and other goods or services, and sponsoring events.

6. Industry involvement, 2006-2008: Number of firms and types of involvement, by year

		2006	2007	2008
Center Advisory Board (including subcommittees)	Number of firms (Number of hours)	34 (626)	68 (1,660)	59 (1,239)
Other Center working group(s)	Number of firms (Number of hours)	97 (9,263)	137 (2,405)	153 (3,011)
Total firms (unduplicated)	***Number of firms***	172	172	186

Source: *Reports prepared by Center directors with assistance from associated department and college representatives; calculations by Wilder Research.*

Over the three years of implementation combined, the unduplicated total number of firms involved in each Center ranges from 48 at HealthForce and 53 at MNCEME to 118 at CSITS and 170 at 360° (Figure 7).

Administrators are pleased with the role of industry in the Centers. One hundred percent of administrators in our survey agreed with the statement, "Partnership with industry adds value to the Center," and 79 percent agreed with the statement, "The Center serves as a model for higher education and industry collaboration." In general, representatives of four-year institutions are more likely to cite gains and advantages related to industry partnerships, whereas this kind of activity was already more common at two-year institutions.

7. Industry involvement, by Center

	360°	MNCEME	CSITS	HealthForce	Total
Number of business partners in 2008	59	29	79	20	186
Number not previously involved*	17	16	70	4	105
Hours donated – Advisory Board and subcommittees	94	856	170	119	1,239
Hours donated – other activities	649	183	1,952	159	2,943
Number of partners in 2007	38	25	48	64	172
Number of partners in 2006	63	31	45	35	172
Unduplicated number over three years	170	53	118	48	339

Source: *Data provided by Centers, with calculations by Wilder Research.*

Note: ** Estimated number of firms not previously involved with any of the colleges or universities before the Center began.*

Representative faculty comments on the value of industry partnership (in response to a question about the benefits of involvement in the Center) include:

> [A benefit is] the ability to lead interesting projects that will help us extend our faculty expertise into the community. On the personal level, it has increased the ability to interact with the [advisory] board to get their ideas that have helped us to improve our work. (4-year faculty member)
>
> It gives us more options; it expands what our students can be involved in. For example, the team project that every student has to participate in. Students experience a new software and have access to the designers of the software – it's a post implementation review of the software. We are also trying to develop more relationships with businesses in the field for our students to access. (4-year faculty member)
>
> It has helped us to create a connection with regional high school science teachers and the supporters of the collaborative research with the Mayo Clinic. (4-year faculty member)

There are many new or updated courses and programs in Center-related departments

Overall, 81 percent of administrator respondents report that there have been new courses or programs developed at their institutions as a result of the Center, and 60 percent report that existing courses or programs have already begun to be updated or strengthened. Two-thirds (66%) of faculty respondents report that they have modified their course curriculum as a result of a Center influence, funding, or other activity, and 80 percent report that their school has created new courses or programs, or modified existing ones, as a result of the Center. In an open-ended question about the biggest benefit to their institution, more than half of faculty respondents mention changes to curriculum (including equipment upgrades) that the Centers made possible.

The student survey included a list of potential benefits that the Centers of Excellence might produce, and asked to rank the three that were most important to them. "New or improved curriculum to match with industry needs" was the top rated item from this list, included in the top three by 50 percent of students overall (Figure 8).

8. Administrator and faculty reports of curriculum change, and student views on its importance

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report new courses or programs at their institution due to the Center	(N=15)		(N=13)		(N=11)		(N=9)		(N=48)	
	11	73%	11	85%	10	91%	7	78%	39	81%
Administrators who report updating or strengthening existing courses or programs "is already happening"	11	69%	10	59%	8	73%	3	33%	32	60%
Faculty who "strongly agree" they have modified course curriculum due to Center	(N=14)		(N=17)		(N=10)		(N=24)		(N=65)	
	9	64%	5	29%	4	40%	9	38%	27	42%
--Agree or strongly agree	12	86%	8	47%	7	70%	16	67%	43	66%
Faculty who report that new or updated courses or programs "are already happening"	8	62%	8	47%	4	40%	13	52%	33	51%
--Already happening or very likely	9	69%	9	53%	5	50%	17	68%	40	62%
Students who rate new or improved curriculum as one of top 3 priorities for a Center	(N=37)		(N=114)		(N=28)		(N=202)		(N=381)	
	22	60%	65	57%	22	79%	81	40%	190	50%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008, and web survey of 2007 students enrolled in Center-related courses.*

- In many different open-ended questions, 360° faculty repeatedly mentioned the impact of equipment upgrades on course content, pedagogy, and their ability to offer new programs or concentrations, and pointed out how this has helped their students to be better prepared for employment in the field.
- MNCEME faculty are least likely to report new or updated courses or programs at their schools.
- CSITS administrators are most likely to report development of new courses or programs, and their students most often rate curriculum among their top three priorities for a Center of Excellence.
- HealthForce students are least likely to rate curriculum among their top three priorities for a Center.

For diplomas and certificates, Centers' rate of creation of new programs has been greater than elsewhere in the system

Departments that are associated with the Centers of Excellence educate students in fields that are in high demand in the labor market. It seems likely that such departments might be expected to respond to such demand by creating new programs in the ordinary course of their operations, with or without help from a Center of Excellence. We explored whether the rate of new program creation was greater than might have been otherwise expected by comparing the rate at Center-affiliated institutions with the rate in other institutions in the Minnesota State Colleges and Universities system that offer the same programs but are not part of a Center. With the help of the system's labor market analyst, we also identified another cluster of occupations that are similarly in high demand, have relatively high wages, and offer career ladders with entry points at several different educational levels: public safety and security, including police officers, fire fighters, and security guards. We compared the rate of new program creation for this field, across the entire system, with the rate among Center-affiliated programs.

Considering the Centers overall, these two comparisons do not allow us to conclude that the Centers in general have contributed to more new program creation overall than would be expected to occur in the absence of Centers. However, when only diplomas and certificates are considered, the Centers have created more new programs than either of the groups of programs they were compared with. In addition, HealthForce consistently shows more program creation than either comparison group, across all degree levels.

Some courses are being offered in more flexible formats

Compared to other potential Center benefits, greater flexibility in the availability of courses is a relatively low priority among both administrators and faculty members associated with the Centers. Nevertheless, 29 percent of administrators rate it as "critical" and another 36 percent rate it as "very important." Faculty rate it slightly lower, with 18 percent rating it as "critical" and another 49 percent "very important." This change also did not make the top five priorities as rated by the students who completed the survey.

While not a top priority, both administrators and faculty survey results suggest that Centers are contributing to making courses available in more varied and flexible formats. Overall, 41 percent of administrators, and 44 percent of faculty, say this change is already starting to happen. Among both groups, those at four-year institutions are more likely to report the change occurring, while those at two-year schools are more likely to report it as "very likely" or "somewhat likely" to happen (Figure 9).

Examples include offered some short-term trainings in community locations, and the conversion of many courses, in whole or in part, to on-line delivery. One entire two-year bachelor completion program has been developed that can be completed on-line.

9. Administrator and faculty perceptions of current and likely increases in flexible delivery of courses

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report that more flexible delivery of courses "is already happening"	(N=15)		(N=17)		(N=10)		(N=9)		(N=51)	
	4	27%	7	41%	6	60%	4	44%	21	41%
--Already happening or very likely	12	80%	8	47%	8	80%	5	56%	33	65%
Faculty who report that more flexible delivery of courses "is already happening"	(N=14)		(N=16)		(N=10)		(N=22)		(N=62)	
	7	50%	5	31%	5	50%	10	46%	27	44%
--Already happening or very likely	9	64%	8	50%	5	50%	13	59%	35	57%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

- Administrators at 360° are least likely to report the change is already happening, but both they and their faculty most often report that they consider the change "very likely."
- Both administrators and faculty at MNCEME are less likely to report that they are seeing greater flexibility in course delivery. However, there is a Memorandum of Understanding between Arrowhead University Consortium and Minnesota State University, Mankato for extended learning/distance classwork.
- Both administrators and faculty at CSITS most often report that they are already seeing more flexible course delivery.

Centers, and especially 360°, are moving forward on program articulation

All four Centers have developed new articulation agreements, but at 360° this effort has been a top priority and a cornerstone of their work to develop "seamless career pathways" among their institutions and programs. An articulation is a pathway from an award at one institution to another, higher-level award at a different institution, and includes an agreement for the block transfer of credits to meet degree requirements for the later degree. Counting each possible new combination of programs, the new pathways created are one each at HealthForce and CSITS, four at MNCEME, and 274 at 360°, including multi-institution agreements in each of Electronics, Machine Tool Technology,

Mechanical Design, Pre-Engineering, and Welding. The scale of the difference between 360° and the other Centers appears to reflect multiple factors, including the degree to which 360° partners prioritized this action, and the decision to base the arrangements on more informal memoranda of understanding rather than the system's official process for articulation agreements.

In addition to these college-to-college and college-to-university pathways, each Center has also developed programs to bridge the transition from high school into post-secondary study, some by understandings to accept certain high school credits through Project Lead the Way, some through Post-Secondary Enrollment Options, and in one case through a credit-by-exam arrangement.

Survey responses from administrators and faculty at 360° reflect that Center's major accomplishment of seamless career pathways linking all partner institutions. Progress is less advanced at other institutions, but over half of administrators, and two-thirds of faculty, perceive that gains are already happening (Figure 10).

10. Administrator and faculty perceptions of the current and likely increase in program articulation and ability to transfer credits

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report that an increase in articulation or ability to transfer credits "is already happening"	(N=16)		(N=17)		(N=11)		(N=9)		(N=53)	
	14	88%	9	53%	5	45%	3	33%	31	58%
--Already happening or very likely	16	100%	11	65%	8	73%	4	44%	39	74%
Faculty who report that an increase in articulation or ability to transfer credits "is already happening"	(N=13)		(N=17)		(N=9)		(N=22)		(N=61)	
	13	100%	11	65%	4	44%	12	55%	40	66%
--Already happening or very likely	13	100%	11	65%	6	67%	16	73%	46	75%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

Centers are expanding efforts to raise visibility and recognition among potential students; visibility is higher within participating institutions

Among students who were enrolled in Center-related courses during the third year (2007-08) and who responded to the web survey, their reported awareness of the Center prior to the survey varied greatly among Centers, from 8 percent at HealthForce to nearly two-thirds at 360° and CSITS. Among those who had heard of the Center before, very few had heard of it before enrolling in their current school or program, and even fewer reported that their decision to enroll there had been influenced by their awareness of the Center. However, most of these students likely enrolled before the Centers had started, or in the early start-up period. As previously detailed, Centers are now actively reaching out to pre-college audiences, including secondary students, their parents, teachers, and counselors, and others such as WorkForce Center staff who are in positions to advise people about potential careers. Recognizing the time required for word to spread about new and strengthened programs, we would not expect wide-spread recognition of the Centers until some time between 5 and 10 years after their formation.

Visibility of the Centers is higher within the institutions, according to the faculty who were surveyed. Two-thirds or more of the faculty respondents report that most faculty in their departments are aware of the Center's work (Figure 11).

11. Student and faculty awareness of the Centers

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Students in Center-related courses who were aware of the Center before being surveyed	24	62%	44	38%	18	64%	16	8%	102	27%
Students who had heard of the Center before enrolling in current school or program	5	13%	4	4%	1	4%	5	3%	15	4%
Students whose decision to enroll (in school and/or program) was influenced by awareness of the Center	3	8%	6	5%	1	4%	1	0.5%	11	3%
Faculty who agree or strongly agree that "most professors in your department are aware of the Center's work."	**(N=14)**		**(N=17)**		**(N=10)**		**(N=24)**		**(N=65)**	
	13	93%	12	71%	7	70%	16	67%	48	74%

Source: *Wilder Research, web survey of students enrolled during 2007-08 in Center-related courses, and telephone survey of faculty involved in Center activities, fall 2008.*

Outcomes for the overall Minnesota State Colleges and Universities system

Centers have created and strengthened partnerships among institutions

Nearly two-thirds of administrators overall believe the Center they are involved with has already increased partnerships among institutions in the system, and three-quarters believe it is very likely to do so. Faculty also report more cross-institutional interaction. Perhaps because of their different vantage point, faculty are less likely to report that the Center has increased collaboration among departments within their institution (Figure 12).

As described earlier, research on collaborations supports a finding that the Centers are on track in the development of factors needed to form and maintain strong partnerships. In turn, the increase in partnership is felt by many faculty and administrators to have helped promote the strengthening of instructional methods, courses, and programs, and the development of articulation agreements.

12. Administrator and faculty perceptions of the current and likely increase in partnerships as a result of the Centers

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report that increased partnerships among MnSCU institutions is already happening	(N=16) 15	94%	(N=11) 9	53%	(N=6) 4	36%	(N=6) 5	56%	(N=39) 33	62%
"Very likely" or already happening	16	100%	11	53%	6	55%	6	67%	39	74%
Faculty who report the Center has fostered "significantly more" collaboration among departments at their school	(N=12) 4	33%	(N=16) 3	19%	(N=9) 1	11%	(N=23) 7	30%	(N=60) 15	25%
"More" or "significantly more"	7	58%	10	63%	3	33%	17	74%	37	62%
Faculty who report the Center has cultivated "significantly more" cross-institution interaction	(N=13) 8	62%	(N=16) 4	25%	(N=8) 5	63%	(N=25) 7	28%	(N=62) 24	39%
"More" or "significantly more"	11	85%	10	63%	7	88%	23	92%	51	82%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

New institutional partnerships, activities, and outcomes appear sustainable, if factors outside the Centers' and institutions' control remain stable

Overall, nearly 90 percent of administrators agree with the statement that "Your institution is committed to the sustainability of the Center through financial and other resources." Over 90 percent agreed that "The benefits your institution gets out of its involvement with the Center are equitable, considering what it puts into the Center," and nearly as many agreed that "Resources are fairly shared among the Center's partners and activities."

Slightly over half of administrators told us that there had been something they had expected as a result of the partnership that had not happened. The most common kinds of unmet expectations related to the extent of industry outreach, and competition among partners (and sometimes of the Center with partners, such as in seeking customized training contracts). Some comments related to the level of support available from the system, such as for advocacy and support for innovation, amount or stability of funding, or help with functions such as public relations. However, responses to open-ended questions indicate that most of those participating in the work of the Centers find the partnership beneficial to their institutions and students, as well as rewarding despite – and sometimes because of – its challenges, and feel that continued effort will help resolve current sticking points.

The development of the articulation agreements is one example of the institutionalizing of change. By their nature, such agreements are susceptible to becoming outdated and forgotten. All the Centers have recognized and protected against this, via formalized mechanisms for updating or canceling the agreements as needed (such as through provisions for updating the agreement with every program cycle) and identifying key contacts at each institution. HealthForce also clearly states that institutions need to collaborate with each other to "develop counseling, advising, and registration procedures to facilitate the successful transfer of students under this agreement." Spelling out these expectations also creates a norm that institutions can use to coordinate future agreements.

13. "Your institution is committed to the sustainability of the Center through financial and other resources"

	360°		MNCEME		CSITS		HealthForce		Total	
Administrators	Num. (N=15)	%	Num. (N=15)	%	Num. (N=11)	%	Num. (N=9)	%	Num. (N=50)	%
Strongly agree	5	33%	7	41%	4	36%	2	22%	18	35%
Agree or strongly agree	14	93%	15	88%	8	73%	8	89%	45	87%

Source: *Wilder Research, telephone surveys of administrators involved in Center activities, summer and fall 2008.*

System practices and incentive structures, designed for independent and competing institutions, do not always encourage innovation

Half of administrators, and one-third of faculty, agree with the statement "There are policies and standard practices in place that limit the Center's ability to innovate." Responses to open-ended questions most often mention institutional priorities that recognize teaching as faculty members' primary or sole responsibility, and that do not provide means to enable their participation in the kinds of innovative work that Centers are promoting – such as outreach to K-12 students and teachers; meeting with industry representatives to develop joint projects or assess how course work relates to industry needs; or meetings with colleagues at other schools to review, update, and develop pathways among partner institutions' courses and programs. Most comments on this theme focus primarily on the lack of time for activities other than teaching; some mention the possibility of buying release time, but point to a lack of funds, the length of advance notice required, or difficulty finding qualified alternative instructors. Representative comments include:

> Not enough time. I'm employed teaching a full load and to put more time into HealthForce – there is just not enough time for our staff. We give up a lot of our free time to be involved.
>
> Release time. [How is that a barrier?] If they don't get release time on it, it has to be free, extracurricular. You would basically be asking faculty to work overtime for nothing, unless their institution sanctions it somehow, allowing them to have fewer classes or some substitution for class time.
>
> We need something where faculty could do an entire semester with the Center, with it just being your regular time rather than being sabbatical or leave time.
>
> The time factor; it's that we don't get paid to do research, etc. We here at the 2-year colleges are mainly here to teach.
>
> I am a one man show. I have nobody that can cover a class for me to go to a conference, etc. If the Center could help with getting another body here, then our institution could be more involved.
>
> The best way would be to develop a formula for release time that would not shift the budget burden to that institution but could be absorbed by money from MnSCU or the legislature.

At the administrative level, no such formal restrictions apply. However, comments in open-ended responses indicate that the amount of time and energy available for Center activities can depend on the level of priority given to the Center by top leaders at the institution.

14. Extent of administrator and faculty agreement that "There are policies and standard practices in place that limit the Center's ability to innovate"

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators	(N=15)		(N=15)		(N=11)		(N=9)		(N=50)	
Strongly agree	2	13%	2	13%	3	27%	1	11%	8	16%
Agree or strongly agree	8	53%	6	40%	7	64%	4	44%	25	50%
Faculty	(N=13)		(N=15)		(N=8)		(N=22)		(N=58)	
Strongly agree	2	15%	1	7%	2	25%	1	5%	6	10%
Agree or strongly agree	4	31%	3	20%	4	50%	10	45%	21	36%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

Responses to the question about "policies and standard practices" may indicate a variety of differences among Centers. For example, 360°'s priorities build on and strengthen the regular work of the institutions but do not challenge them to transform it. Such work may encounter fewer instances where work is limited by standard practices, and may find that enthusiasm from earlier work helps overcome barriers to more transformative work later. Other Centers set earlier priorities that were based on a new vision of how higher education does its work. For example, at Health Force all projects required joint proposal development and execution by academic and industry partners together, and for at least the first year also expected a significant level of communication to be exchanged with other Center groups. Centers that began with early expectations for major new departures from prior practice may have been more likely to encounter difficulties persuading institution representatives of the value of that work, and of the likely rewards from finding ways around usual practices.

Centers and their associated departments and programs are raising significant funds, from a widening range of sources

Over the first three years of operation, the four Centers (including associated programs and departments) leveraged a total of $15.3 million dollars from a variety of public and private sources. The largest amount per single year was the first year. After a drop in the second year, the amount has risen again in the third.

Funding sources are not consistent. There is considerable variability in the amount per year from each type of source. The amount received from state agencies has decreased since the first year, while the amount from local units of government (city, county, and school district) has increased. Combined, public sources have accounted for about two-

thirds of the total amount, but this has varied from a high of 88 percent in one year to a low of 41 percent.

The base of sources has been expanding each year. In the first year, leveraged funding came from a relatively few large sources. Since then, although the total dollar amount has decreased, the number of sources has increased. While the broader base is a potential strength, it is more challenging – and time-consuming – to identify, solicit, and manage funding from many smaller sources.

Many of the grants and contracts shown are for more than a single year. They are shown in Figure 15 below with the entire amount represented in the year during which the grant or contract was awarded. The net impact for the second and third (and later) years may thus be greater than is evident from the numbers as shown, because part of the amount shown for earlier years is actually available for use during later years.

15. Leveraged funds and number of sources, by year

	2006		2007		2008	
	Dollars	Number of sources	Dollars	Number of sources	Dollars	Number of sources
Office of the Chancellor special projects funds (e.g. on-line courses)	$860,490	1	$761,000	8	$424,486	4
Other MnSCU colleges and universities	$859,623	11	$84,525	4	$568,856	9
Local (school, city, county)	$5,000	1	$91,600	5	$306,065	5
Other state agencies (e.g., MnDOT, Job Skills Partnership)	$1,968,731	5	$549,283	5	$417,050	5
Federal	$2,303,373	5	$0	1	$1,695,043	4
Public sources, sub-total	$5,997,217		$1,486,408		$3,411,500	
Private sources, combined	$794,908	15	$2,122,850	73	$1,827,114	44
Total amount	$6,792,125	28	$3,609,258	95	$5,238,614	71

Source: *Data provided by Centers, with calculations by Wilder Research.*

Most funds leveraged by Centers go to support department and program activities, with 15 percent supporting Center activities

As Figure 16 below shows, the majority of additional funds brought in, at least in part because of the Centers, are supporting the work of associated departments and programs. The proportion of funds supporting supporting Center operations varies considerably from Center to Center. Overall, 15 percent of leveraged funds flow through the Centers' own budgets and help to support its work. While this is a relatively small proportion, it is a respectable fraction for such young organizations, and Fieldstone Alliance, an independent consultant, has found that it is in keeping with the experiences of comparable Centers elsewhere, and is a positive accomplishment for organizations at this stage of development.[3] The amount leveraged by associated departments and programs illustrates the role the Centers are playing in adding value to their partner institutions. At present, most of the Centers are only able to realize a small part of that value in the support of their own activities that produce the value.

[3] *Funding sustainability for 360° Manufacturing and Applied Engineering Center of Excellence: Draft final report.* T. Triplett and Stephanie Jacobs, Fieldstone Alliance (forthcoming).

16. Leveraged and matched funds received in 2008, by Center and whether funds flow through Center budgets or not

	Overall leveraged funding		360°	MnCEME	CSITS	Health Force	TOTAL
Public sources of funding	Office of the Chancellor special projects funds	Center		$15,000	$347,486		$362,486
		Non-Center	$10,000	$52,000			$62,000
		Total					$424,486
	Other MnSCU colleges and universities	Center					
		Non-Center	$142,993			$425,863	$568,856
		Total					$568,856
	Local (school, city, county)	Center				$1,050	$1,050
		Non-Center				$305,015	$305,015
		Total					$306,065
	Other (non-MnSCU) state agencies	Center	$25,000		$50,000		$75,000
		Non-Center		$142,000	$198,000	$2,050	342050
		Total					$417,050
	Federal	Center	$335,043				$335,043
		Non-Center	$460,000	$900,000			$1,360,000
		Total					$1,695,043
	Total from public sources	*Center*	$360,043	$15,000	$397,486	$1,050	$773,579
		Non-Center	$612,993	$1,094,000	$198,000	$732,928	$2,637,921
		Total	973,036	$1,109,000	$595,486	$733,978	$3,411,500
Private funding	Scholarships or sponsorship (e.g. camps or seminars)	Center			$6,500	$7,000	$13,500
		Non-Center	$44,000	$89,660	$10,000		$143,660
		Total					$157,160
	In-kind donations or equipment	Center					
		Non-Center		$85,125			85125
		Total					$85,125
	Other grants, contracts, or funding	Center		$6,800			6800
		Non-Center	$300,000	$1,179,700		$98,329	$1,578,029
		Total					$1,584,829
	Total from private sources	*Center*	$0	$6,800	$6,500	$7,000	$20,300
		Non-Center	$344,000	$1,354,485	$10,000	$98,329	$1,806,814
		Total	$344,000	$1,361,285	$16,500	$105,329	$1,827,114
Total		Center	$360,043	$21,800	$403,986	$8,050	$793,879
		Non-Center	$956,993	$2,448,485	$208,000	$831,257	$4,444,735
		Total	$1,317,036	$2,470,285	$611,986	$839,307	**$5,238,614**
		Center%	27%	1%	66%	1%	15%
		Non-C%	73%	99%	34%	99%	85%

Source: *Data provided by Centers, with calculations by Wilder Research.*

Outcomes for students

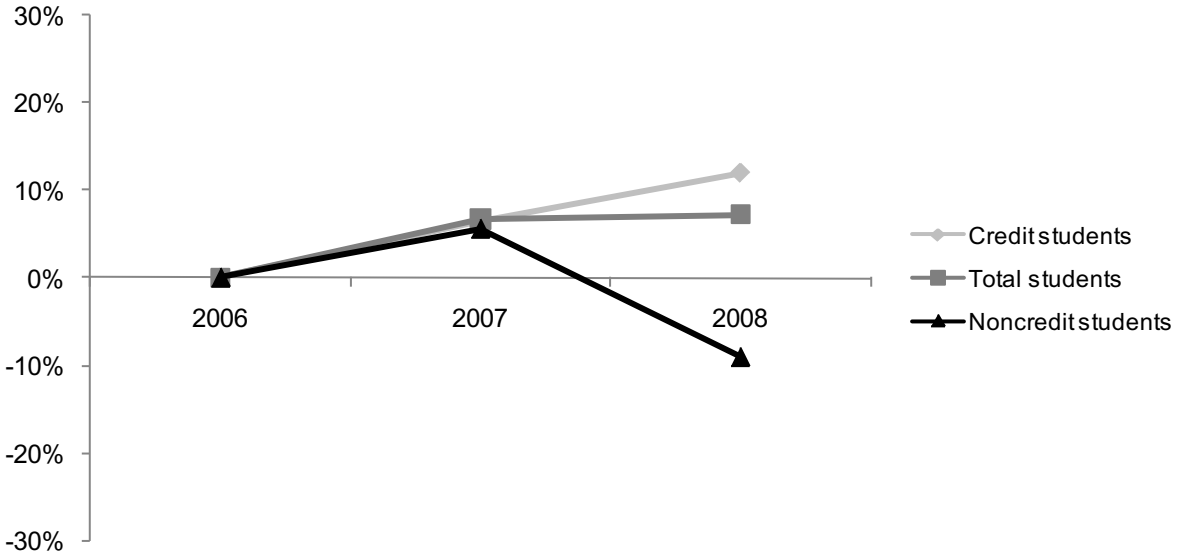
Student outcomes as they relate to the Centers of Excellence are difficult to track because students do not enroll in Centers. Students who are studying in Center-related programs do not always identify their program affiliation in official system documentation, so official numbers by program do not necessarily reflect actual levels of engagement with Center-affiliated courses of study. As an approximation of student counts and characteristics, we worked with Center staff (and through them with program and department faculty and administrators) to identify the for-credit and non-credit courses that would include the students most likely to be affected by Center activities, excluding general courses that were likely to also enroll large numbers of other, unrelated students. Statistics in this section are based on this method of identifying students based on enrollments in specific Center-related courses.

More students are being served, and some of the increase is likely due to the Centers

For-credit enrollments in the identified Center-related courses rose 12 percent from the baseline year of 2006. In contrast, non-credit enrollments decreased by 9 percent in the same time period. Combined, this represents an increase of 7 percent overall. However, the rate of increase among credit students has been steady over the time period examined (including going back to 2005), showing an increase that began before the Centers were formed and continuing at the same rate after their formation (Figure 17).

17. Change in student enrollments, 2006 - 2008

	2006		2007		2008	
	Number	Change since 2006	Number	Change since 2006	Number	Change since 2006
Total students	18,384	baseline	19,607	6.7%	19,703	7.2%
Credit students (those taking any for-credit courses)	15,122	baseline	16,092	6.4%	16,929	11.9%
Non-credit students (those taking any non-credit courses)	4,842	baseline	5,110	5.5%	4,407	-9.0%



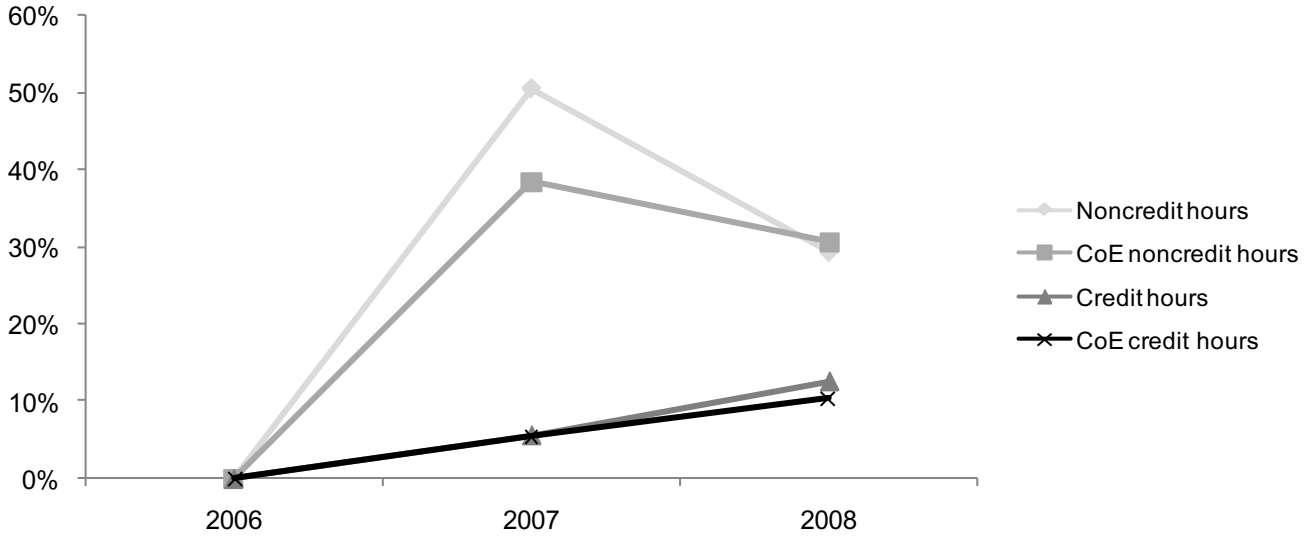
Source: *Data maintained and selected by staff in the Office of the Chancellor; calculations by Wilder Research.*

Total credit hours taken by Center-related students increased by 13 percent from 2006 to 2008, with more of that growth in Center-related courses (up 10.5%) than in the non-Center courses (up 2%) in which the same students were also enrolled.

With non-credit enrollments, although the numbers of students declined, the total number of hours taken by those students increased by 29 percent. (However, the number has fluctuated too much from year to year to identify this as a trend.) (Figure 18.)

18. Change in credits and hours per year for students in Center-related courses, 2006 – 2008

	2006		2007		2008	
	Number	Change since 2006	Number	Change since 2006	Number	Change since 2006
Total credit hours	297,785	0.0%	314,675	5.7%	335,548	12.7%
CoE credit hours	141,222	0.0%	148,912	5.4%	155,986	10.5%
Total non-credit hours	69,996	0.0%	105,311	50.5%	90,482	29.3%
CoE non-credit hours	58,454	0.0%	80,901	38.4%	76,408	30.7%



Source: *Data maintained and selected by staff in the Office of the Chancellor; calculations by Wilder Research.*

Information from Center staff and associated administrators and faculty suggests that increases in enrollment related to Center activities may be seen first in a more narrowly targeted set of courses and/or programs, and that it may not be possible to predict in advance which these will be. To the extent that new courses and programs have been created, these clearly represent areas of growth. In addition, enrollment gains may also be concentrated in courses or programs that have been converted to on-line or other more flexible modes of delivery, or those that are significantly affected by major investments in more up-to-date technology. Information collected by 360° from their associated faculty has documented specific focused areas that are showing significant increases in enrollment. In our survey of faculty, half reported that the number of students enrolled in their courses had increased since the Center began, and 17 percent reported that they had seen "significantly more" students enrolled (Figure 19). These survey responses are only

with a small group of individuals who are most closely involved in Center activities. They are based on recollection rather than review of records. While they may be accurate for the individuals surveyed, we cannot assume that the same changes would be found if a different group of faculty in the same departments and programs were asked the same question.

19. Faculty who report increased enrollments in their classes

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Faculty who report "significantly more" students in classes since Center began	4	31%	3	20%	0	0%	3	13%	10	17%
Faculty who report "more" or "significantly more" students	8	62%	8	53%	5	63%	6	38%	30	50%

Source: *Wilder Research, telephone survey of faculty involved in Center activities, fall 2008.*

To date, Centers do not appear to have affected student diversity, except possibly for small gains in students of color at two Centers

System data on students most likely to be affected by the Centers show stable average student ages, and stable ratios of men to women students, with minor year-to-year fluctuations. There are consistent decreases in the proportion who are first-generation college students.

Overall there is a slight increase in the proportion of students of color, which mirrors that of the system overall. However, there are slight decreases in the proportion of students of color at 360° and HealthForce. The increases at MNCEME and CSITS are somewhat larger than that of the system overall, and may reflect some recruitment efforts on the part of the Centers. Figure 20 below shows these changes in demographics. It includes only for-credit students, because demographic information is less complete for non-credit students.

20. Demographic changes of for-credit students most likely to be affected by the Centers

	2006		2007		2008		Change	
	Num.*	%	Num.*	%	Num.*	%	Num.*	**
360°: Total students	3,448		3,451		3,151		-297	-8.6%
Students age 25 or older	1,616	50.1%	1,495	45.7%	1,144	41.1%	-472	-8.9
Female students	720	21.4%	641	18.8%	481	16.8%	-239	-4.6
Students of color	260	10.5%	249	9.2%	248	9.6%	-12	-0.9
First-generation students	541	29.9%	512	27.3%	460	25.0%	-81	-4.9
MNCEME: Total students	3,537		3,941		4,359		822	23.2%
Students age 25 or older	1,313	38.4%	1,513	39.9%	1,584	37.7%	271	-0.7
Female students	314	9.0%	289	7.6%	377	8.8%	63	-0.2
Students of color	313	10.3%	419	12.7%	554	14.3%	241	4.0
First-generation students	723	28.9%	791	27.8%	871	26.5%	148	-2.4
CSITS: Total students	1,404		1,464		1,455		51	3.6%
Students age 25 or older	842	68.5%	867	66.6%	883	65.6%	41	-3.0%
Female students	456	37.1%	491	37.4%	479	35.2%	23	-1.9
Students of color	276	24.3%	333	26.6%	376	28.7%	100	4.4
First-generation students	321	32.0%	335	29.6%	343	29.0%	22	-3.0
HealthForce: Total students	9,995		10,751		10,738		743	7.4%
Students age 25 or older	4,138	46.8%	4,061	45.1%	4,316	45.1%	178	-1.7
Female students	7,654	82.4%	7,550	80.9%	7,796	80.6%	142	-1.8
Students of color	1287	17.6%	1414	18.4%	1345	16.9%	58	-0.7
First-generation students	2,488	36.1%	2,361	32.5%	2,181	29.1%	-307	-7.0
All-Center Total: Total students	18,384		19,607		19,703		1,319	7.2%
Students age 25 or older	7,909	47.3%	7,936	45.7%	7,927	44.3%	18	-3.0
Female students	17,368	52.6%	17,835	50.3%	18,159	50.3%	791	-2.3
Students of color	2,136	16.4%	2,415	17.3%	2,523	16.9%	387	0.5
First-generation students	4,073	33.4%	3,999	30.5%	3,855	27.9%	-218	-5.5
System-wide: Total students								
Students age 25 or older	79,213	35.1%	81,206	35.2%	84,476	35.3%	5,263	0.2
Female students	131,164	56.3%	134,105	56.3%	136,768	55.7%	5,604	-0.6
Students of color	29,815	14.0%	32,862	14.8%	36,323	15.7%	6,508	1.7
First-generation students	52,098	29.6%	50,576	27.6%	50,477	26.3%	-2,666	-5.0

Source: *Data maintained and selected by staff in the Office of the Chancellor; calculations by Wilder Research.*

* *Percents may not match numbers shown due to records with missing data. All percents are shown as proportions of records with known values. The number of these varies by type of information and year.*

** *Change in demographic characteristics shown as the difference in percentage points from 2006 to 2008. Change in total students is shown as percent change from 2006 to 2008.*

All key stakeholder groups (industry, administrators, and faculty) are committed to increasing student enrollments, and increasing the diversity of those students. Current student data shown above include a high proportion of students who were already enrolled, or had made the decision to enroll, before the Centers began, and thus show little or no change in diversity. However, some of the faculty we surveyed indicate that they are starting to see more diversity among students in their classes.

Significantly more diplomas and associate degrees were awarded in 2008 than in 2006

Overall (combining all degree levels from certificates to graduate degrees) the total number of graduates and awards in Center-related programs decreased. In three Centers, the total number of graduates is higher than at baseline. However, all of the increase was between 2006 and 2007, with level or falling numbers from 2007 to 2008, so we cannot conclude that the increase is related to the Centers.

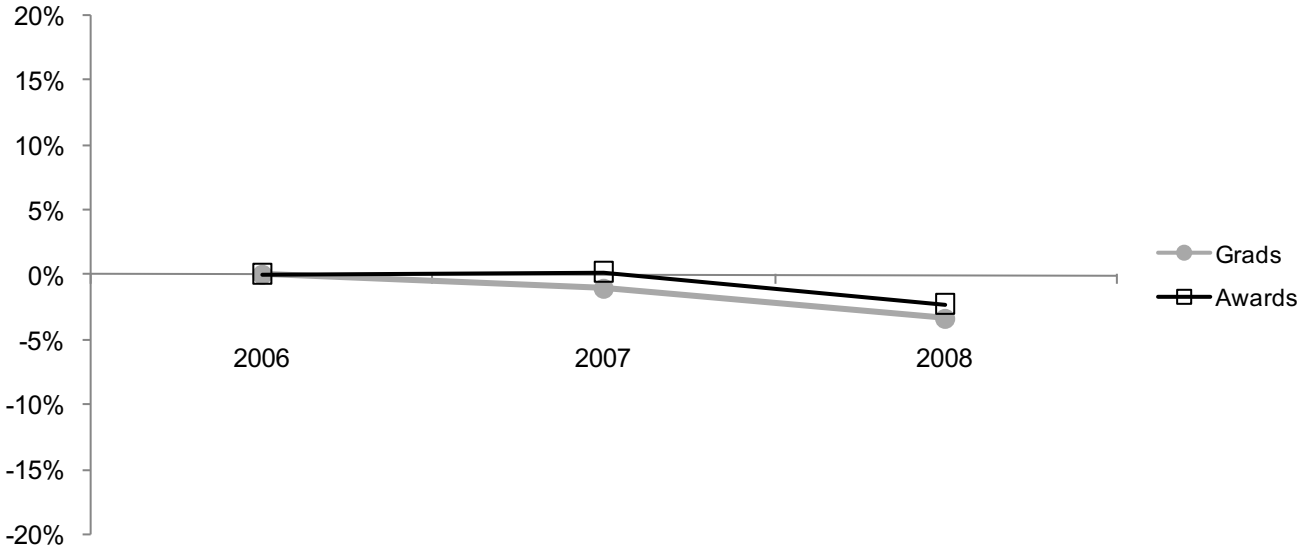
However, when we look at trends separately by the level of the award, the evidence is more mixed, and does include evidence that programs associated with some Centers are producing more credentialed graduates in the shorter-term programs where change would be expected to occur first.

As Figure 21 below shows, only two levels of awards increased in number in each of the two years after 2006: associate degrees and diplomas (which are typically between a certificate and associate degree in the number of credits required). The number of certificates, which typically require the fewest credits, decreased in each year over the same period. Only one Center, 360°, showed no decrease in awards at any of the award levels, and programs associated with 360° awarded 207 percent more associate degrees in 2008 than in 2006 (83 compared to 27) as well as 34 percent more certificates and 25 percent more diplomas, for a total of 39 percent more awards (and 31% more graduates). Other Centers had increases in individual award levels, but these were largely offset by declines in other award levels. (See detail table of award levels by Centers in the Appendix.)

Data for 2008 graduates and awards conferred are preliminary. Final numbers may be slightly higher.

21. Changes in numbers of graduates and awards in Center-related programs

	2006	2007	2008	Change from 2006
Graduates				
360°	274	360	360	31.4%
MNCEME	443	472	457	3.2%
CSITS	132	148	138	4.5%
HealthForce	2,262	2,098	2,051	-9.3%
Total	3,111	3,078	3,006	-3.4%
Awards				
360°	277	384	384	38.6%
MNCEME	480	531	503	4.8%
CSITS	163	185	162	-0.6%
HealthForce	2,315	2,142	2,112	-8.8%
Total	3,235	3,242	3,161	-2.3%
Awards by level				
Certificate	1,259	1,006	836	-33.6%
Diploma	698	787	801	14.8%
Associate	734	930	988	34.6%
Bachelor	466	452	461	-1.1%
Graduate level	78	67	75	-3.8%
Total	3235	3242	3161	-2.3%



Source: *Data maintained and selected by staff in the Office of the Chancellor; calculations by Wilder Research.*

Lower enrollments are not always bad in institutions dedicated to meeting workforce needs. For example, the large drop in the number of certificates from 2006 to 2008 can be almost entirely accounted for by decreases in Certified Nursing Assistants, at Ridgewater College from 2006 to 2007, and at MCTC from 2007 to 2008. These reflect deliberate actions to restrict program enrollments in response to decreased job openings.

Given the current economic recession, it is likely that market demand for many of the jobs in the Centers' sectors will be lower for the next several years than has been previously projected. In such an environment, increased graduations in the short term (assuming graduates sought immediate jobs and not further education) would serve neither students nor employers well.

It is too early to know whether Center programs help students receive better jobs

Follow-up data on graduates are collected during the year after an award is given. At this time, follow-up data are available on students who graduated during 2006 and 2007. Students who received awards during 2007 would have had only the last year of their studies affected by the Centers in any way. This would have been the Centers' first year, in which they were beginning to develop partnerships and strategic plans and take the first small steps toward implementation of new practices. As a result, we expect to see few or no changes that could be attributed to Centers, and the information available at this time should be considered two years of baseline information, for comparison against later years.

Using responses to the system's graduate follow-up survey, we used the same outcomes defined in standard system reporting for graduation outcome groups, including the key distinctions between graduates who are continuing their education, those who are employed (in related or non-related fields), and those who are not employed. We also follow the system's usual practices in defining those who are and are not available for employment or related employment.

In both years, slightly over one-third of graduates who responded to the survey were continuing their education in the year following their award. Of those who were available for employment (not continuing their education and either working or seeking work), 90 percent in 2006, and 96 percent in 2007, were employed. Of those who were available for related employment (seeking work, or employed in a non-related job and seeking a related job, or employed in a related job), the percent working in a related field rose from 86 percent in 2006 to 91 percent in 2007 (Figure 22). These changes may indicate increasing job competitiveness for graduates of Center-related programs, but there are many factors that contribute to employment rates and the employment market has seen many substantial changes during this time period.

22. Employment status of 2006 and 2007 graduates of Center-related programs

	360°		MNCEME		CSITS		HealthForce		Total	
	N	%	N	%	N	%	N	%	N	%
2006										
Graduates	277	100%	480	100%	163	100%	2,315	100%	3,235	100%
Responded to the survey	272	98.2%	475	99.0%	126	77.3%	2,302	99.4%	3,175	98.1%
Continuing education	41	14.8%	109	22.7%	38	23.3%	948	41.0%	1,136	35.1%
Employed										
Available for employment	187		318		62		1,094		1,661	
Employed	179		312		46		961		1,498	
Employment rate		**95.7%**		**98.1%**		**74.2%**		**87.8%**		**90.2%**
Available for related employment	185		309		59		1,072		1,625	
Employed in a related field	172		278		36		913		1,399	
Related employment rate		**93.0%**		**90.0%**		**61.0%**		**85.2%**		**86.1%**
2007										
Graduates	384	100%	531	100%	185	100%	2,142	100%	3,242	100%
Responded to the survey	375	97.7%	502	94.5%	134	72.4%	2,115	98.7%	3,126	96.4%
Continuing education	54	14.1%	133	25.0%	46	24.9%	908	42.4%	1,141	35.2%
Employed										
Available for employment	274		326		63		946		1,609	
Employed	268		316		53		904		1,541	
Employment rate		**97.8%**		**96.9%**		**84.1%**		**95.6%**		**95.8%**
Available for related employment	265		324		62		928		1,579	
Employed in a related field	252		298		47		846		1,443	
Related employment rate		**95.1%**		**92.0%**		**75.8%**		**91.2%**		**91.4%**
Change from 2006 to 2007										
Graduates	107	38.6%	51	10.6%	22	13.5%	-173	-7.5%	7	0.2%
Responded to the survey	103	37.9%	27	5.7%	8	6.3%	-187	-8.1%	-49	-1.5%
Continuing education	13	31.7%	24	22.0%	8	21.1%	-40	-4.2%	5	0.4%
Employed										
Available for employment	87	46.5%	8	2.5%	1	1.6%	-148	-13.5%	-52	-3.1%
Employed	89	49.7%	4	1.3%	7	15.2%	-57	-5.9%	43	2.9%
Employment rate		**2.1%**		**-1.2%**		**9.9%**		**7.7%**		**5.6%**
Available for related employment	80	43.2%	15	4.9%	3	5.1%	-144	-13.4%	-46	-2.8%
Employed in a related field	80	46.5%	20	7.2%	11	30.6%	-67	-7.3%	44	3.1%
Related employment rate		**2.1%**		**2.0%**		**14.8%**		**6.0%**		**5.3%**

Source: *Data maintained and selected by staff in the Office of the Chancellor.*

Note: ** Change in the number of graduates per year is shown as a percent change of 2007 compared to 2006. Change in the number and proportion who were employed is shown in terms of the difference in the number, or number of percentage points, from 2006 to 2007.*

Median earnings were significantly higher in 2007 than in 2006; it is not clear in what way the change is related to Center efforts

Figure 23 below shows median hourly wages for 2006 and 2007 graduates of Center-related programs. Overall, after controlling for inflation (using constant 2006 dollars), 2007 graduates' median hourly earnings increased by $1.20, or 7.0 percent.

However, the increases are seen in only two of the four Centers. Moreover, in one of these two, the number of graduates is small, which makes year-to-year fluctuations more likely and thus more difficult to interpret. In the manufacturing Centers there was essentially no change in median earnings. Earnings can be strongly influenced by many different factors, including economic changes as well as differences among sectors and geographic regions. Few of the graduates, even in 2007, are likely to have been significantly affected by Center activities. For these reasons, it is important to view these two years as baseline data showing the range of variation that can be expected even in the absence of Center activity to strengthen skills and job placements.

23. Comparison of median hourly wages* of 2006 and 2007 graduates, by Center

Center	Year	N	Median quarterly earnings
360°	2006	171	$16.56
	2007	204	$16.71
	Difference	33	$0.15
	Percent Difference	19.3%	0.9%
MNCEME	2006	307	$18.76
	2007	342	$18.74
	Difference	35	-$0.02
	Percent Difference	11.4%	-0.1%
CSITS	2006	99	$25.37
	2007	103	$26.59
	Difference	4	$1.22
	Percent Difference	4.0%	4.8%
HealthForce	2006	1,785	$16.26
	2007	1,666	$17.81
	Difference	-119	$1.56
	Percent Difference	-6.7%	9.6%
Total	2006	2,362	$16.99
	2007	2,315	$18.18
	Difference	-47	$1.20
	Percent Difference	-2.0%	7.0%

***Source**: Wage Detail records maintained by the Department of Employment and Economic Development, provided by the Office of the Chancellor. Calculations by Wilder Research.*

***Note:** Computed differences may not exactly match the base numbers due to rounding. * Hourly wages are computed from employer reports of total hours per quarter and total wages per quarter. Dollars are adjusted for inflation to 2006 values using the Consumer Price Index. Extreme values were excluded.*

To help identify where the changes in wages are appearing, we examined the distribution of hourly wages in ranges (Figure 24). The main changes behind the overall wage increases were a shift from the $8.01 to $15.00 ranges and toward the $15.05 to $30.00 ranges. Patterns varied among Centers, however, and at two Centers (360° and CSITS), the trend was a slight shift from the center of the distribution both upward and downward.

24. Comparison of hourly wages,* in ranges, for 2006 and 2007 graduates, by Center

Center	Year		$5.15 – $12.00	$12.01 - $15.00	$15.01 - $20.00	$20.01 - $30.00	$30.01 or more	Total
360°	2006	N	25	37	63	36	10	171
		%	14.6%	21.6%	36.8%	21.1%	5.8%	100%
	2007	N	39	35	62	35	33	204
		%	19.1%	17.2%	30.4%	17.2%	16.2%	100%
MNCEME	2006	N	38	45	97	100	27	307
		%	12.4%	14.7%	31.6%	32.6%	8.8%	100%
	2007	N	39	47	106	117	33	342
		%	11.4%	13.7%	31.0%	34.2%	9.6%	100%
CSITS	2006	N	9**		17	37	36	99
		%	9.1%		17.2%	37.4%	36.4%	100%
	2007	N	6	8	13	33	43	103
		%	5.8%	7.8%	12.6%	32.0%	41.7%	100%
HealthForce	2006	N	456	340	338	340	311	1785
		%	25.5%	19.0%	18.9%	19.0%	17.4%	100%
	2007	N	315	288	349	454	260	1666
		%	18.9%	17.3%	20.9%	27.3%	15.6%	100%
Total	2006	N	523	427	515	513	384	2362
		%	22.1%	18.1%	21.8%	21.7%	16.3%	100%
	2007	N	399	378	530	639	369	2315
		%	17.2%	16.3%	22.9%	27.6%	15.9%	100%

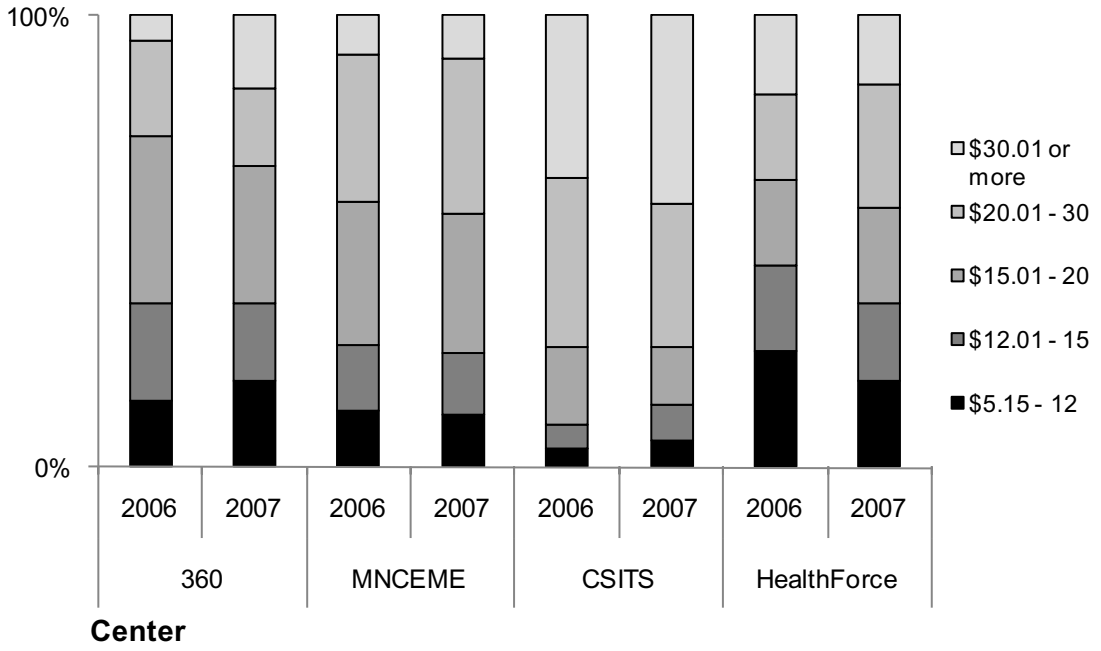
***Source**: Wage Detail records maintained by the Department of Employment and Economic Development, provided by the Office of the Chancellor. Calculations by Wilder Research.*

***Notes:** * Hourly wages are computed from employer reports of total hours per quarter and total wages per quarter. Dollars are adjusted for inflation to 2006 values using the Consumer Price Index. Extreme values were excluded.*

** *Small cells are merged to protect student privacy.*

The same data are shown below in graphic form to make it easier to visualize the changes.

25. Comparison of hourly wages,* in ranges, for 2006 and 2007 graduates, by



***Source**: Wage Detail records maintained by the Department of Employment and Economic Development, provided by the Office of the Chancellor. Calculations by Wilder Research.*

***Note:** * Hourly wages are computed from employer reports of total hours per quarter and total wages per quarter. Dollars are adjusted for inflation to 2006 values using the Consumer Price Index. Extreme values were excluded.*

As stated before, it is early in the history of the Centers to expect significant changes on a measure relating to graduates. The earliest changes would be expected for students who have completed the shortest degree programs and hence were most likely to have the content of those programs affected by Center activities. We therefore examined wages separately by award level (Figure 26). There is no consistent association of length of program to increase in wages.

26. Comparison of median hourly wages* of 2006 and 2007 awards, by award level

Center	Year	N	Median quarterly earnings
Certificate	2006	922	$12.37
	2007	702	$12.95
	Difference	-220	$0.58
	Percent Difference	-23.9%	4.7%
Diploma	2006	492	$16.78
	2007	551	$16.38
	Difference	59	-$0.40
	Percent Difference	12.0%	-2.4%
Associate	2006	570	$27.95
	2007	709	$26.32
	Difference	139	-$1.63
	Percent Difference	24.4%	-5.8%
Bachelors	2006	319	$26.86
	2007	303	$27.81
	Difference	-16	$0.95
	Percent Difference	-5.0%	3.5%
Graduate	2006	57	$34.23
	2007	50	$38.28
	Difference	-7	$4.05
	Percent Difference	-12.3%	11.8%

***Source**: Wage Detail records maintained by the Department of Employment and Economic Development, provided by the Office of the Chancellor. Calculations by Wilder Research.*

***Note:** Computed differences may not exactly match the base numbers, due to rounding. When the same individual earned multiple awards in a year, only the latest or highest award in the year was used. * Hourly wages are computed from employer reports of total hours per quarter and total wages per quarter. Dollars are adjusted for inflation to 2006 values using the Consumer Price Index. Extreme values were excluded.*

The figures below show the breakdown of earnings by award level in the same ranges as shown above – first in tabular form, then in chart form. The data show the expected progression of higher wages at higher award levels, in both years.

27. Comparison of hourly wages,* in ranges, of 2006 and 2007 awards, by award level

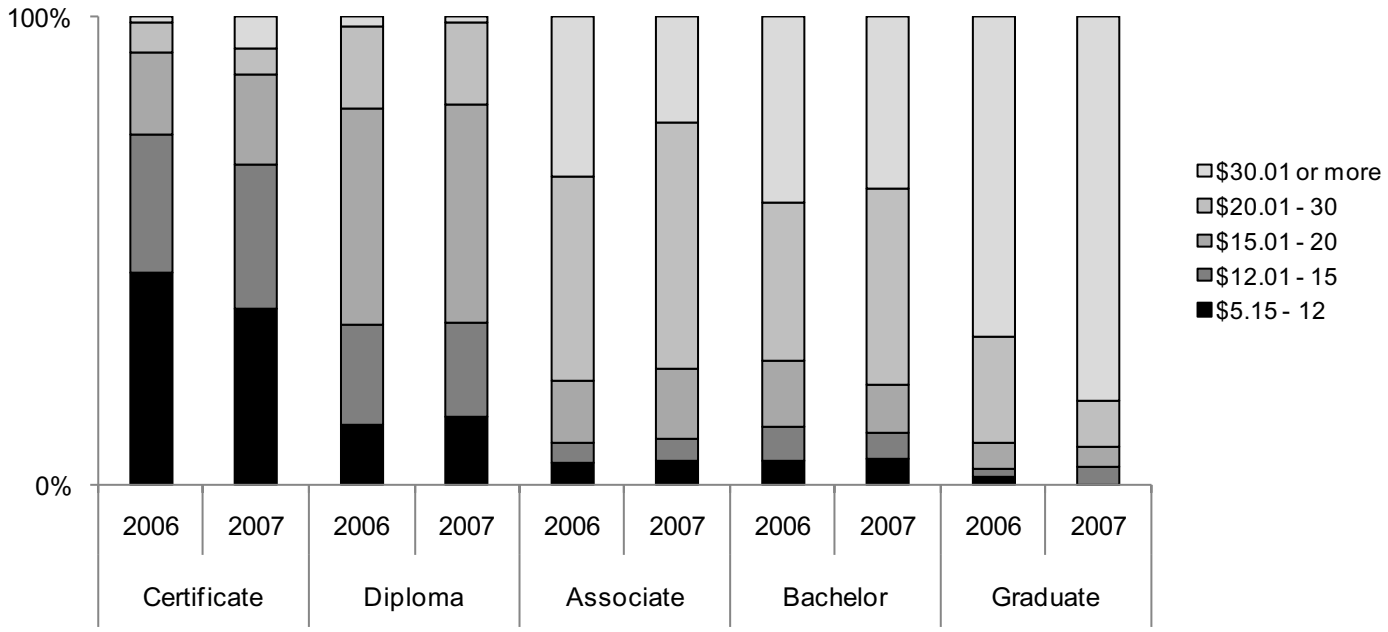
Center	Year		$5.15 - $12.00	$12.01 - $15.00	$15.01 - $20.00	$20.01 - $30.00	$30.01 and over	Total
Certificate	2006	N	417	271	165	58	11	922
		%	45.2%	29.4%	17.9%	6.3%	1.2%	100%
	2007	N	263	216	136	38	49	702
		%	37.5%	30.8%	19.4%	5.4%	7.0%	100%
Diploma	2006	N	62	105	228	86	11	492
		%	12.6%	21.3%	46.3%	17.5%	2.2%	100%
	2007	N	81	111	255	97	7	551
		%	14.7%	20.1%	46.3%	17.6%	1.3%	100%
Associate	2006	N	26	25	75	248	196	570
		%	4.6%	4.4%	13.2%	43.5%	34.4%	100%
	2007	N	38	33	105	372	161	709
		%	5.4%	4.7%	14.8%	52.5%	22.7%	100%
Bachelors	2006	N	16	24	44	108	127	319
		%	5.0%	7.5%	13.8%	33.9%	39.8%	100%
	2007	N	17	16	32	127	111	303
		%	5.6%	5.3%	10.6%	41.9%	36.6%	100%
Graduate	2006	N	6**			13	39	57
		%	10.5%			22.8%	68.4%	100%
	2007	N	9**			5	41	50
		%	18.0%			10.0%	82.0%	100%

***Source**: Wage Detail records maintained by the Department of Employment and Economic Development, provided by the Office of the Chancellor. Calculations by Wilder Research.*

***Notes:** * Hourly wages are computed from employer reports of total hours per quarter and total wages per quarter. Dollars are adjusted for inflation to 2006 values using the Consumer Price Index. Extreme values were excluded.*

** *Small cells are merged to protect student privacy.*

28. Comparison of hourly wages,* in ranges, of 2006 and 2007 awards, by award level



***Source**: Wage Detail records maintained by the Department of Employment and Economic Development, provided by the Office of the Chancellor. Calculations by Wilder Research.*

***Note:** * Hourly wages are computed from employer reports of total hours per quarter and total wages per quarter. Dollars are adjusted for inflation to 2006 values using the Consumer Price Index. Extreme values were excluded.*

The tables show substantial variation by award type, with higher wages (as expected) for higher award levels. However, it is important to bear in mind that there are many different sources of influence on wage levels, and the two data points available to us at this time should not be over-interpreted. There are many influences besides the Centers' work that will affect wage changes from year to year. These include not only the level of the degree earned, but also the industry, and geographic region (especially Twin Cities compared to greater Minnesota). Based on just two years of data, it is not possible to separate out the relative contribution of the Centers compared to these other influences.

Outcomes for business partners and industry sectors

As previously shown, at least 339 businesses have been actively involved with the Centers to date. As more relationships are built with industry associations, as well as individual businesses, the potential sphere of influence of the Centers extends well beyond this number. Earlier we discussed the benefits of this partnership to the state colleges and universities. This section describes what data are available on the benefits to industry.

Centers are working to improve the image and/or visibility of their fields, but outcomes are not yet available

In open-ended discussions of Center activities and expected outcomes, Center staff and affiliated administrators and faculty commonly mention efforts to improve the visibility of the field and public perceptions of it as a valued and worthwhile career area. This is a large part of the outreach work to K-12 schools, but is also increasingly being targeted to adults already in the workforce who might be interested in switching careers.

Center efforts appear likely to produce a larger workforce pool

Although it is too early to expect increases in numbers of graduates, Centers are focusing a variety of efforts on increasing recruitment and enrollments to build the pipeline of future workers. Two-thirds of administrators regard this effort as critically important for the Centers, and both administrators and faculty commonly include it in their definitions of the purpose of the Center and the benefits that they expect the Center to produce. Except at 360°, fewer than half of administrators feel that this outcome is already beginning to occur. However, 6 in 10 feel it is very likely to happen as a result of current Center activities and strategies (Figure 29). This assessment is supported by the evidence of substantial outreach to raise interest and future enrollments among current school children and other potential new students.

29. Administrators' opinions on the current or likely production of a larger workforce pool as a result of Center activities

	360° (N=16)		MNCEME (N=13)		CSITS (N=9)		HealthForce (N=9)		Total (N=47)	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
An increase in the number of workers available to employers "is already happening"	8	50%	3	23%	3	33%	3	33%	17	36%
Is "very likely" or already happening	14	88%	6	46%	5	56%	3	33%	28	60%

Source: *Wilder Research, telephone survey of administrators involved in Center activities, summer and fall 2008.*

Center faculty and administrators are confident their efforts will produce a better qualified workforce pool

The most meaningful measure of the qualifications of graduates will be their level of competitiveness in the labor market. This can be assessed in future years in the graduate follow-up data, but cannot be expected at this date. However, as with increased numbers of workers, it is an effort that is highly prioritized by administrators and faculty. About 4

in 10 of administrators feel that student qualifications are already increasing, and 7 in 10 feel this outcome is very likely given current Center priorities and activities (Figure 30).

In discussing how courses and programs have changed, faculty describe a variety of ways in which curriculum and equipment are more closely aligned with industry needs and expectations. Current activities and priorities appear to be well poised to meet this goal. Besides the work to ensure that courses and programs are closely aligned with workplace needs, each Center is also working with accrediting groups either to help define skills needed in relevant job classifications, align content with those skills, or both.

30. Administrators' opinions on the current or likely availability of a better qualified workforce for industry, as a result of Center activities

	360° (N=16)		MNCEME (N=15)		CSITS (N=10)		HealthForce (N=9)		Total (N=507)	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
A better qualified or educated pool of available workers "is already happening"	8	50%	5	33%	5	50%	3	33%	21	42%
Is "very likely" or already happening	14	88%	11	73%	6	60%	4	44%	35	70%

Source: *Wilder Research, telephone surveys of administrators involved in Center activities, summer and fall 2008.*

Centers are targeting diversity in future students, to develop a more diverse workforce pool for the future

Greater diversity in the future workforce is the third highest ranked benefit that industry representatives look for, according to the 2007 survey. It is also regarded as critically important by 55 percent of administrators and 38 percent of faculty. Summer camps organized or sponsored by the Centers have worked to recruit more diverse students to attend (which is not always easy in some parts of greater Minnesota), and students whose gender is not the majority in the field (females in IT and engineering and manufacturing, and males in health care). Female and minority campers were more likely than males to report that the camp helped them gain increased interest in STEM fields, and minority campers were more likely to report that camp increased their awareness of careers in the field.

Data on current students includes a high proportion who were already enrolled before the Centers began, and does not show increases in diversity (Figure 20, page 59 above). However, slightly over one-quarter of faculty most closely involved in Center activities report that they are beginning to see more diverse students enrolled in their courses since the Centers started (Figure 31).

31. Administrators' and faculty opinions on the current or likely increase in diversity of the workforce as a result of Center activities

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report more student diversity "is already happening"	(N=14)		(N=17)		(N=11)		(N=8)		(N=50)	
	2	14%	3	18%	5	46%	2	25%	12	24%
Administrators who report it is "very likely" or already happening	11	79%	9	53%	7	64%	3	38%	30	60%
Faculty who report the amount of diversity among students in their programs has increased	(N=8)		(N=17)		(N=24)		(N=13)		(N=62)	
	2	25%	3	18%	9	38%	4	31%	18	29%
Summer camp students whose primary racial identify is other than White	(N=85)		(N=31)		(N=27)		(N=60)		(N=203)	
	9	11%	3	10%	15	56%	27	45%	54	27%
Campers whose gender is not the majority in the field	8 girls	9%	9 girls	27%	6 girls	22%	9 boys	15%	32	15%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

There appear to be modest increases in applied research and work with industry to improve processes

In the Centers' early discussions with industry representatives, it was clear that industry's top priorities for Centers were focused on production of a skilled workforce. While industry expressed some interest in applied research, the urgency of this interest was considerably lower. Nevertheless, over the course of three years of strengthened relationships with a variety of industry partners, opportunities and strategies for applied research, including some joint research opportunities, are beginning to become more apparent. Relatively few administrators or faculty report that they are already seeing increases in this kind of activity, but slightly more view it as very likely to happen as a result of current Center strategies and activities. Except at CSITS, the faculty are more likely than the administrators to report that it is already happening (Figure 32).

32. Administrator and faculty opinions on the current or likely provision of applied research to advance the field and provide new industry practices

	360°		MNCEME		CSITS		HealthForce		Total	
	Num.	%	Num.	%	Num.	%	Num.	%	Num.	%
Administrators who report an increase in applied research "is already happening"	(N=14)		(N=16)		(N=10)		(N=8)		(N=48)	
	3	21%	2	13%	4	40%	1	13%	10	21%
Administrators who report it is "very likely" or already happening	6	43%	6	38%	5	50%	3	38%	20	42%
Faculty who report an increase in applied research "is already happening"	(N=8)		(N=15)		(N=21)		(N=12)		(N=56)	
	2	25%	6	40%	7	33%	3	25%	18	32%
Faculty who report it is "very likely" or already happening	4	50%	6	40%	12	57%	7	58%	29	52%

Source: *Wilder Research, telephone surveys of administrators and faculty involved in Center activities, summer and fall 2008.*

Outcomes for the wider community and state as a whole: Economic impact

The next section summarizes information provided in the economic impact report (included in the appendix) and identifies the rationale for establishing a focus on intermediate indicators.

Main finding

Intermediate measures of progress indicate that the Centers are moving to fulfill their potential to enhance employment and economic activity in Minnesota. However, in many respects it is too early for the Minnesota State Colleges and Universities Centers of Excellence to be having significant impact on the Minnesota economy.

Intermediate indicators

The Centers of Excellence continue to provide valuable **customized training** to businesses in their sectors of focus, even though the economy is weakening in the near term. Over 1,400 incumbent workers enrolled in Center-related for-credit and non-credit customized training courses in 2008.

Increases in the **numbers of associate degrees and diplomas** indicate that the Centers are having the desired impact of increasing the available pool of qualified labor for their target industries. The number of associate degrees awarded in Center-related programs increased by 35 percent from 2006 to 2008, and the number of diplomas increased 15 percent.

Graduates of the programs continue to be hired by industry. Moreover, they are placed in **relatively high-wage jobs** indicating they bring established and important skills to their employers. Center graduates who are employed in industries related to their Center programs are earning close to or above the industry median wage in the year immediately following graduation.

Businesses in the target industries are engaged in the Center's activities and supportive of the Centers. In the most recent reporting period, nearly 200 business partners were identified across the four Centers.

These intermediate indicators show that the Centers have reached a point consistent with a vigorous start as measured in the third year of operation. Clearly, this is not the end point anticipated in the authorizing legislation, but it would be judged reasonable and appropriate by outside observers including industry partners.

Background

A report on the economic impact of the Minnesota State Colleges and Universities Centers of Excellence is mandated by the legislation which established the Centers of Excellence program. As described in authorizing legislation, the Centers of Excellence are expected to have a statewide economic impact rather than a concentrated impact in a specific region. Moreover, as described in previous years' reports, we conclude that the potential statewide impact of the Centers will develop over time and it is too early in their life cycle to expect to see significant impact on employment and economic activity in the sectors of the economy on which the Centers focus.

Comparisons

A survey of three established centers of excellence in other parts of the country showed only one which measured economic impacts in the way envisioned for the Minnesota centers.

Building on the examples of other centers, it is clear that any assessment of the economic impact of the Minnesota centers needs to take into account the actual mix of activities at each Center and the priorities given to those activities.

Minnesota's economy

The Minnesota economy, like the nation's economy, faces substantial challenges in the upcoming years and the industries served by the Centers of Excellence will be important to Minnesota's future economic success.

- For the first time since 1990, it appears that unemployment in Minnesota is closely matching unemployment in the U.S. as the country endures a recession. In the last two recessions, Minnesota unemployment peaked significantly lower than U.S. unemployment and the difference grew as the recession deepened.

- Manufacturing and applied engineering employment in Minnesota has dropped back to about the 1990 level after rising from 1990 to 2001. That is a much better performance than U.S. employment in this sector which fell 25 percent since 2001 after being essentially flat during the previous decade.

- Healthcare employment in Minnesota shows strong growth, especially since 2002. Over the time period since 1990, Minnesota's employment growth in health care has outpaced the nation's despite being behind through the 1990s.

- Information systems and security employment has fallen faster in Minnesota than in the U.S. as a whole since its turning point early in this decade.

While Minnesota enjoys the highest per capita personal income among states in the Plains region according to the latest Survey of Current Business, it also has the lowest growth rate in personal income. Minnesota needs to seek ways to enhance its competitiveness both vis-à-vis other states and versus international competitors as well.

Assessing economic impact

The Centers of Excellence can have potential impact on the Minnesota economy through at least five main channels:

- Training existing workers

- Producing more and better trained graduates

- Consulting with existing businesses and anticipating workforce needs

- Applied research

- Entrepreneurship, innovation, and the formation of new enterprises

The ultimate measures of the final economic impact of the Centers should include these quantities for the statewide sectors that the Centers serve:

- Employment growth

- Estimated higher incomes for program graduates working in those sectors

- Production and exports (in goods producing sectors only)
- Investment in research and development
- Survival of businesses and, possibly, establishment and growth of new ones

Not all of these measures will be applied in the same way or will carry the same importance for different Centers.

At this early stage in the development of the Centers, it is most appropriate to consider intermediate indicators of progress in building impact through the channels listed above.

Challenges and learnings in implementation

One way of summarizing the progress of the Centers is to ask the administrators who are involved whether they believe the Centers are making adequate progress to date. The vast majority, 85 percent felt that the Center they were involved with had made adequate progress up to this point. These proportions were very consistent across all types of positions, and all types of institutions. The level of commitment of college and university presidents is illustrated by the following representative comments (covering all four Centers), volunteered when the interviews were over:

> We have supported the Center and we will continue to support the Center. We need to give them more time to see how they produce. We would like to be a part of improving the Centers as they move forward.
>
> The inception of the Center of Excellence coincided with [institution]'s strategic planning and strengthening which rolled into the inception of [the Center]. It clearly has become a strategic objective for [our institution]. If [the Center]'s sustainability is threatened it will impact our sustainability.
>
> I think we have covered it all. I am very supportive of [the Center]. We have gained significant new energy based on the relationships we've had. It has taken staff time and that has been costly, but it is becoming more of a cost-benefit to us. We want to continue to streamline the grant processes and access the services more readily.
>
> We are now moving into the next stage of evolution. Look for great strides to occur in the next year or two. Look for all the members to take an active role in focusing on the needs of our partners and the needs of Minnesota. Go to the next level. Work with much larger corporate groups. We need to continue to push hard with Project Lead the Way. We will discover that we can't privately raise all the funds for the Center of Excellence. We can raise some of the funds but will also look to MnSCU to look at sustained-based funding to keep the centers alive.
>
> Personally, I've gained an incredible amount of experience and knowledge. I give high marks to the Center for the work they've done to advance the Center and the work they do to keep us as partners. Keeping our eyes on the most important part which is the students and the pipeline of new learner workers.
>
> I want to quote a colleague: "Minnesota is sometimes the land of 10,000 pilot projects." We should try to sustain the efforts for enough years so it becomes a part of the way we do business. The level of collaboration has been remarkable and unusual for what I have experienced.
>
> We are still hopeful that a lot of positive and good will come out of it. There could be a lot of good things happening, we just don't know what it is.

> Given the limited time in operation, we have done a remarkable job in a short amount of time and stay the course to watch it mature further. Address the rapidly changing world of [Center's industry sector] and move with it.

To better understand the factors that help produce this level of accomplishment, and the challenges that have and have not yet been addressed, this section compiles findings from the implementation portion of the evaluation. In particular, we add to the findings from the first two years' reports with the open-ended responses of faculty and administrators in the fall of 2008, and insights into the operations of the Biosciences Education-Industry Partnership, which is charged with many of the same purposes as a Center of Excellence but operates out of the Office of the Chancellor with no formal Center designation.

This section has two main parts. First is a summary of key themes about aspects of the Centers that have worked well and aspects that have posed challenges. This is followed by a discussion of the factors that appear to be associated with different kinds of success and challenges.

Main themes: Areas of success

Across a variety of topics and stakeholders, a few main themes surface repeatedly about approaches that are working. These are:

- Centers have **leveraged additional funds** from a variety of sources. Leveraged and matched funds received in the first three years total $15.3 million dollars.
- Center and leveraged funds have enabled significant **updating and upgrading of equipment**, facilities, technology, software, and other instructional infrastructure.
- This in turn has led to **updating of curriculum**, including both courses and entire programs, which provide students with skills and knowledge that are more applicable in the current workplace. Partnership with industry has helped guide the type of curriculum change and has led to the inclusion of more current and "real-world" material. In addition to many new and modified courses, 92 new programs have been created in Center-related fields (though not all of these can be ascribed to the activity of a Center).
- The Centers have increased the amount and quality of **partnerships among institutions**. This has not always been smooth, but institutional representatives overwhelmingly express continued support for the Centers, and expectations for continued benefits from the association. One measure of this partnership is the creation of articulation agreements. Including each new possible pair of before and

after institutions, for each possible field of study, a total of 280 new pathways have been facilitated.

- The Centers have increased **partnering with industry and employers** and the incorporation of current workforce needs into a wide range of college and university courses, programs, and other student and faculty opportunities.

- **Outreach to K-12**, through Project Lead the Way, summer camps, career fairs, and a variety of other career awareness and content enrichment, is one of the strategies considered key to Center success. In the 2007-08 year, Centers hosted 23 multi-day camps or events, 44 day camps or full-day events, and over 20 other meetings, visits, and presentations. These reached at least 7,859 youth. In addition, through the development of curriculum and training of K-12 faculty, the Centers have indirectly reached many more students through professionals who work with them.

- **Faculty are energized** by the increasing visibility of their fields that Center marketing helps promote, as well as by the updating of curriculum and the opportunities for professional networking and sharing ideas and practices with colleagues at other institutions.

Main themes: Challenges

Similarly, there are a few common challenges that are most often mentioned:

- While **partnerships with industry** are numerous and seen as key to each Center's current success, they are also commonly mentioned as connections that **must continue to expand** and improve.

- Partnerships among institutions have sometimes been impeded by **different perspectives and missions** of the partners, and some two-year partners have not felt that four-year partners have the adaptability and inclusiveness needed from a lead institution.

- Institution staff – including administrators, but especially faculty – find it hard to find the **time to participate** in Center activities. It is not part of their regular teaching responsibility, and they report that it is hard either to obtain release time (or a qualified substitute for their teaching responsibilities) or to add the activity on top of their regular load.

- After intense work in the first two years to define a common identity among the original partners, all Centers are now exploring ways to **expand to a system-wide scope** for at least some key services and resource brokering functions.

- Administrators in particular feel that Centers must find **sustainable sources of funding**.

- Administrators also cite a need for **continued and expanded marketing** for greater Center visibility.

Other challenges can be inferred from what is not said. When administrators are asked what they consider their institution's role in promoting the success of the Centers, most responses focus on giving advice and guidance to the Centers, or offering the resources they have (educational programs, faculty and staff knowledge and participation). Comparatively few responses acknowledge a need to be open to innovation and changing the way they are accustomed to operating. Change in long-established practices may be best encouraged by having both oversight and support from higher levels – in this instance, the Office of the Chancellor.

Another challenge relates to the Centers' purposes and strategies. Overall, 81 percent of administrators believe that all or most of their Center partners share their own understanding of the Center's purpose. However, an examination of the descriptions of this purpose given by different individuals shows a wide variety, with many different priorities.

The original charge to the Centers included many different expectations. Among these were:

- Recruitment of new students into the field and creation of a seamless "pipeline" into and through a sequence of educational levels and leading to job placement

- Partnership with industry to better understand and meet workforce needs

- Academic innovation to update courses, facilities, and programs and make them more accessible

- Partnership among institutions to share and leverage each others' resources and strengths and provide industry with a one-stop source for a variety of assistance

For many of these goals, full implementation may require institutions to place system-level priorities above immediate institution concerns. For example, a pooled approach to customized training, as part of a one-stop strategy, may threaten a vital revenue source, at least in the short run before larger shared markets can be established. Similarly, the creation of articulation agreements among institutions, to promote a seamless career pathway, requires a level of concentrated effort and faculty time that may be hard to place above other institutional priorities.

Centers are aware of the varied perceptions of priorities, and are working with their stakeholders to revisit the Centers' mission and purpose. It is important for the system to

recognize and communicate that there are, and should be, differences among Centers in these priorities, and that this process of recalibration is part of healthy Center evolution. Moreover, having concentrated initially on industry's top priority to create a pipeline of more skilled workers (primarily through the first three of the goals listed above), attention is now increasingly being turned to exploring how to address the fourth goal of linking and brokering system capacities.

Time and other system rewards and incentives

Despite frustrations trying to find time to participate, the vast majority of faculty and administrators feel that the value they get from participation is worth the time. Faculty participation especially appears to be mainly based on voluntary dedication of time outside of ordinary duties. Their survey responses indicate that they perceive the rewards as coming mainly from seeing the higher education system strengthened, and from the opportunities to develop new relationships – with K-12 representatives, industry representatives, and especially colleagues in other departments and institutions. Many also cite the personal satisfaction of accomplishing work that is enjoyable and important. Reliance on those who are willing to do the work on their own time, however, is likely to severely restrict the capacity of Centers to expand their sphere of influence outside an initial, narrow circle.

One promising solution has been explored at MNCEME, where Center funds were used to pay for technician positions to free up some faculty time. Among the seven surveyed administrators whose institutions had this position, five reported that the creation of the position had allowed faculty to develop other projects, and three reported that it had allowed the program to bring in additional funding (in one case, a dean reported that the faculty member whose time was freed up was thereby able to generate $600,000 in NSF scholarship funding and $2.5 million in private foundation funding for the college's engineering program). Other benefits mentioned include more time to work on curriculum, work with K-12 partners on Project Lead the Way, and be more flexible for industry partners. The level of enthusiasm for the value of this strategy is better conveyed by the following reply to the question, "Are there any other ways in which [the position] has added to what the program is able to do?"

> The technician position, by maintaining lab equipment, has allowed our faculty and staff to work more on curriculum and follow up on other projects. It has freed up time for faculty and staff. Also, the technician headed up project to build a trainer prototype. As a result, we have a contract to build more trainers for [company name]. The technician position has been very important and has allowed us to do things we wouldn't have been able to do.

Faculty networking and sharing

Faculty who have had the opportunity to exchange ideas and resources with colleagues appear to be energized by the experience. Several benefits appear to be more likely as a result, including adaptations to curriculum and better articulation of programs, as well as a more intangible gain in openness to new ways of looking at their work.

One frustration among faculty appears to be difficulty in keeping informed about what the Center is doing and what their opportunities are for participating. It appears that there are ways that institutions themselves as well as Centers might be able to improve on communication to faculty to help them stay up to date with new ideas and opportunities. Examples suggested by survey respondents include periodic emails from the administrative representatives to the Center, or a Center-wide email newsletter about opportunities for participation and progress on existing projects.

Standard operating procedures

There is no consensus about the extent to which red tape and standard policies or procedures are impediments to innovation. Different representatives from the same Center, and even the same institution within the same Center, perceive these as having greater or lesser effect on what Centers are able to do. The limits on faculty time and availability are probably the single greatest point of agreement. Based on suggestions for resolving barriers, problems with institutional inertia seem to occur more often within institutions than at the system-wide level, and more often at four-year than two-year institutions.

Benefits of Centers to institutions

Despite the challenges that Centers may cause by stretching accustomed boundaries and pathways, administrators as well as faculty told us that they find them valuable and worth the effort. Benefits that institutions have already realized include the opportunity to bring both equipment and curriculum more up-to-date, and increased visibility and recognition. They also find the partnerships with other institutions, and with industry, are valuable to their own institutions' operations. Potential benefits that they anticipate also include increased enrollment and greater ability to adapt to changing needs.

Visibility and marketing

Public relations to promote the Centers depends in part on the development of a track record of accomplishments, and the ability to produce accomplishments depends in turn on promoting general awareness of the Center. It has sometimes been a challenge to get

these two complementary activities harmonized well with each other – it is important for marketing messages to be able to point to concrete examples of structure and accomplishments, but it is also important to have recognition (based in part on marketing) to be able to build participation (and hence an organizational structure) and generate accomplishments. For example, once 360° had developed a comprehensive set of career pathways capped off with a few new degree programs, this effort provided a very attractive feature to market and enabled a major advertising effort to promote a very specific and tangible "product." Other Centers have invested in a wider range of activities, some with longer time lines, and have thus had less specific material to highlight in promotional campaigns.

Furthermore, different fields must overcome different barriers in recruiting and preparing students for careers in the field. While northern Minnesota manufacturers are mainly interested in securing an adequate number of quality workers, many employers elsewhere and in other fields are more concerned about changes in the kinds of skills that their employees need. Moreover, nursing programs are already stretching their limited capacity for enrollments due to shortages of clinical settings, so marketing the Center to increase applications would be counterproductive.

With some exceptions, mainly at HealthForce, administrators see marketing as an important function of the Centers, and one that benefits their own institutions, as well as the system overall. Some suggest that the work could be more effective if it had more help from industry and the system offices, such as seems likely with the Dream It. Do It. campaign to promote manufacturing careers, as one example.

Data for tracking and monitoring Centers' work

The data collected for this evaluation indicate that the primary value added by the work of the Centers is in coordinating and brokering resources across multiple institutions, and helping students and industry partners find their way successfully to the most appropriate resources. It is important, to measure Center success, to be able to track these activities across institutions. Especially for student outcomes, it is important to be able to follow students in a variety of ways:

- From K-12 and other sources into post-secondary institutions, to track the success of partnerships with K-12 and recruitment efforts in other places (such as nonprofit workforce organizations and WorkForce Centers)
- From year to year within their college or university, to measure retention

- From institution to institution, to track the success of new articulation agreements and see where, if anywhere, students become stuck along their program and career pathways

- From graduation into employment, to see whether they are successfully using their educational preparation

The Minnesota State Colleges and Universities data system has been building its capacity for these kinds of analysis, and currently is able to do all but the first of these:

- The system has developed a persistence and completion rate measure that reports retention, graduation and transfer of entering cohorts of students for six years after entry.

- Student transfer is tracked both within the system and throughout the United States through internal and external data systems.

- By a combination of an annual graduate survey and data sharing agreement to use data from the unemployment insurance system, it is possible to identify whether graduates continue into studies elsewhere or get jobs, and whether those jobs are in fields related to their studies, and (for groups of students, not individuals) what their wages and number of work hours are.

In each of these cases, while the system has the capacity to do the needed analysis, the actual process of analysis can be complicated and time-consuming. Measuring the impact of the Centers of Excellence is further complicated by the difficulty of identifying which students should be included in the analysis, since the Centers themselves do not offer courses, manage programs, or award degrees.

Data sources and reports to track students from K-12 and other external training programs into higher education are much more limited. This type of analysis for K-12 students also requires an agreement with the Department of Education to share student records across state agencies. To assess the effectiveness of outreach efforts, the Centers and their partners also must obtain permission from participants, or their parents, if they are under 18, and collect unique identifiers (such as Social Security numbers or student identification numbers) from them.

It is unlikely that Centers will be able to conduct the analyses needed on their own, and will continue to depend on the Office of the Chancellor to develop and provide analyses that are more useful to the Centers.

Funding for Center operations

Much Center effort during the 2007-08 year has been devoted to strategic planning to identify potential sources of sustainable funding for Centers. These efforts have not yet been completed and released. The start-up funds expire at the end of this fiscal year (June 30, 2009), with no guarantee of any continued funding from the Minnesota State Colleges and Universities system. This uncertainty in itself has made it more difficult for Centers to raise funds from other sources. No single source is prepared to provide the entire amount needed to sustain current Center activities or help them develop new ones, and sources that might pay for part are reluctant to commit funds to an entity that may not continue. When public sources are stretched during economic recessions, improved workforce preparation is key to economic recovery, and no non-public source of funding is sufficiently reliable.

New perspectives on mission and services

One of the most important priorities for the Centers at the outset was what might be called a "pipeline" role: helping to promote the numbers and qualifications of future workers in the Centers' fields.

Another priority area in which Centers add value to traditional academic activities might be called an "intermediary" role: helping to connect and/or broker the various resources and capacities of the system. The Center can serve as a one-stop shop or entry point for any of a variety of stakeholders seeking information and connection to system resources. It can help employers more efficiently connect with potential employees, consultants, or partners for applied research. It might help students access the most up-to-date career information for a specific field, learn where in the system they can go for the programs they need, and learn of and connect with employment opportunities. For the academic institutions in the system, it can help facilitate the sharing of curriculum or ideas about instructional methods, help faculty identify potential collaborators for research projects, or potentially connect with enterprises in externship opportunities.

Both of these roles were within the scope of the initial charge to the Centers, but as the 2007 evaluation found, the pipeline role was the top priority for business partners in all of the Centers' sectors. The evaluation data clearly show diligent and creative work with K-12, academic, and industry partners to promote the pipeline goals, as well as evidence that these are in a position to bear fruit.

To varying extents, each of the Centers has also undertaken the intermediary role, but this role now appears to be rising in relative prominence. Indeed, one of the main learnings of the first three years of Center operations is seen in the recognition on the part of all four

Centers that they need to find ways to reach beyond their original set of institutional partners and draw all the state colleges and universities into the work they are doing. This is especially relevant because the industry sectors they serve have statewide distribution.

While many of the activities, relationships, and outcomes of the two roles can overlap, in some respects the intermediary role requires different kinds of activities and relationships – and in particular, different relationships among the academic institutions. These differences raise certain kinds of challenges for Centers as they shift to a greater emphasis on the intermediary role, but it can also be a way of helping resolve other challenges. One of these, identified in an earlier evaluation report, has been the inherent tension between establishing a Center identity that includes all the partners, while not detracting from partners' own unique identities.

Some competition was inevitable while this process was being worked out. The creation of Centers as entities with distinct membership and identities of their own suggests an entity, an object, a *noun*, that co-exists in the same space with programs, departments, institutions – even the overall system, depending on which of the Center's several levels of operation is considered. In such a framework, a center cannot help but be a competitor for funding, an entity that violates standard operating principles because it does not behave like standard operational entities. However, if the Center is thought of instead as a function, a service, a *verb*, it can more readily be appreciated as the means by which entities respond collectively to the changing landscape of the industries they serve. It still requires funding, and in that sense it may still be perceived as a competitor, but its activities can more clearly be seen as supporting and promoting those of its partner institutions. Hence it can be better understood as a means by which additional resources can be leveraged to the advantage of the partners. Greater recognition of the intermediary role may help to shift the emphasis to this way of appreciating the Centers' relationship with partner institutions.

However, a greater emphasis on this role requires a greater departure from the original vision of establishing a central node at which the strongest capacities of the system are concentrated. Instead, in order to fully realize the intermediary role, a Center must become familiar with existing strengths wherever they exist in the system. Ultimately, to fulfill their missions, Centers must help link these system capacities to students on the one side, and employers on the other. This in turn will help students acquire skills most needed by employers, help employers acquire the skilled workforce they need, and help institutions in the system learn to meet the needs of both students and employers in the most effective, efficient way possible.

CSITS has begun to reformulate itself in this way by setting up the IT Workforce Alliance. Rather than attempting to link businesses, one at a time, to the Center, and through the

Center to partner institutions, CSITS has become the convening partner in the Alliance. In this role, it does not have to be pivotal in how, where, or through what representatives partners come together. Instead it becomes an expediter of relationships that are free to develop on their own and in other contexts: it facilitates and supports new connections that can take on lives of their own and thereby enrich the input into Center activities.

It may not be easy to communicate this new vision to partners, and the effort may not help to clear up current differences of opinion about Center priorities, where these exist. Assuming a statewide intermediary role represents a slight shift from what was defined in the original request for proposals, which emphasized the creation of an entity that was made up only of a limited number of partnering institutions.

It may help to examine another entity, the Biosciences Education-Industry Partnership [BEIP], which began its existence doing this kind of networking and brokering work, rather than starting by building an organization among specific institutions. The partnership comprises a broad range of activities, closely aligned with needs expressed by industry groups. Started in 2005, it is coordinated with staff support provided through the Office of the Chancellor, and largely funded from the Chancellor's Strategic Initiative Funds.

According to its coordinator, "BEIP is more an *initiative* than an *organization.*" Unlike the formal Centers, there has been no attempt to define institutions that are and are not part of the partnership; any institution that has a particular capacity relating to some aspect of biosciences and biotechnology will be drawn into whatever activities are relevant to that capacity. Similarities and differences are shown in Figure 33 below.

33. Comparison of features of Centers of Excellence and the Biosciences Education-Industry Partnership

Feature	Centers of Excellence	Biosciences Education-Industry Partnership
Membership	Defined in the original RFP process; subject to change as new institutions may be admitted as affiliates or partners.	Open; includes any institution with capacity relevant to a particular effort or need
Leadership and organization	Managed by a Director housed at a four-year university, with advisory input from a variety of different groups, depending on the individual Center's organization, and accountable to the administration of the host university.	Managed by a staff person in the Office of the Chancellor, advised by Work Group of institution representatives, and accountable to the Associate Vice Chancellor
	Led by institution(s), with advisory group(s)	Led from the system office, with advisory group
	Academic partners originally included only MnSCU partners	Academic partners include other higher education organizations (UM, private higher education)
Partnership expectations	Required the identification of a specific set of institution partners, including only one 4-year institution, and with the 4-year institution as the lead partner	Identifies and draws upon sector-related capacity wherever it exists in the system, drawing on different institutions for different needs. No lead institution is singled out.
Geographic presence	Focused on specific, but multiple, campuses	Distributed widely throughout the MnSCU system wherever relevant capacity exists
Purpose(s)	K-12 outreach, focused on STEM	K-12 outreach, focused on STEM
	Partner with industry to keep instruction up to date with innovations and generate a skilled workforce	Partner with industry to keep instruction up to date with innovations and generate a skilled workforce
	Bring education in the field in line with changing industry needs	Bring education in the field in line with changing industry needs
	Applied research, as needed	Applied research, as needed
	Establish recognition for place-based, regional expertise	Broker and leverage resources of a fluid and evolving set of academic programs statewide; establish recognition for capacity of entire system
Disciplinary and industry focus	Specific identified disciplines that are included; industry sectors are well established (though IT is newest)	"Discipline" not yet fully defined, associated fields are varied and not always related; industry sector is new and rapidly emerging
Institutional role	Participation is by institutions and their departments/programs	Participation is by interested individuals and institutions
System-level role	Can ask for help as needed (e.g., review of grant proposal) but not directly connected to system-level resources; system sets framework for collaboration and innovation as carried out by institutions	Close familiarity with, hence ability to tap into, a variety of support services; more readily able to "run interference" when needed and facilitate connections between academics and industry (in both directions)
Industry representation	Mainly (not exclusively) individual firms, but with increasing alliances with industry associations (especially 360°)	Mainly (not exclusively) with industry associations and consortia

Source: *Document analysis and interviews with Center and Biosciences representatives.*

The Centers and the Partnership each have advantages and disadvantages, depending on the roles and outcomes that are prioritized. Some of the tradeoffs are described below, and each is followed by some implications for how Centers can incorporate some features that appear to be working well for the Partnership.[4]

Potential for introducing and diffusing new practices

Centers: The "local ownership" of the Centers may position them better to pilot new approaches and help them gain acceptance among institutions in the system. In addition, the formal role of institutions in the Centers creates opportunities for them to provide support and involvement, which may help institutionalize and diffuse change (such as might be begun through development of articulation agreements, joint appointments, or simultaneous registration arrangements); Centers may thus be better able to *strengthen* member institutions' capacity.

Partnership: Ideas for change that come out of the Partnership might tend to generate more resistance due to perception of being imposed from the top down. Moreover, while the Partnership's strategy of more informal participation by interested individuals (and institutions) may avoid some bureaucratic barriers, it may create fewer opportunities to bring additional colleagues into innovative opportunities. (On the other hand, despite its leadership from the Office of the Chancellor, the Biosciences Education-Industry Partnership is in some ways more bottom-up, and less top-down, than the Centers of Excellence. This is because it stimulates, identifies, and links current energy in diverse places in the system, rather than counting on a Center to concentrate the energy in a certain pre-determined place. In this respect, its activities may thus have greater potential over the longer term to become seeds for further innovation and energy.)

Potential learning for Centers: Continue to build relationships with faculty and administrators and continue planning to expand these relationships, as opportunities permit, throughout the system. Develop and maintain communications to inform interested faculty and administrators of Center activities, successes, and opportunities for involvement.

Potential for linking and networking existing capacity

Centers: When Centers were created, proposals had to specify which institutions were to be included, and these could only include one university. Evaluation data suggest that these restrictions may have created some hard feelings through excluding some institutions with strong interest in the Center concept. Any such feelings will have to be overcome in the transition to a more statewide vision for the Centers as one-stop shops for industry, and

[4] In this section, the term "Partnership" is used to reference the many related activities of the system-wide initiative that includes the Biosciences Education-Industry Partnership.

additional partners. In addition, founding Center members may need to be persuaded that they will not lose resources by sharing Centers with a wider pool of partners.

Partnership: In the shorter term, its founding focus on activities rather than members may allow the Partnership more opportunities to link and deploy existing capacity and make it more accessible to industry. Its headquarters at the system office rather than at an individual institution may give it more freedom to link industries to whatever part of the system is best able to respond to immediate needs.

Potential learning for Centers: Be aware of sensitivities of institutions that were not originally included in Centers. Ensure that expansion of participation to more institutions benefits all institutions involved with the Center, including current members.

Links to individual or sector-level industry representatives

Centers: Centers are mainly on their own to establish links to statewide, regional, and national organizations. They are increasingly making these connections, but it has taken them time to be able to make these connections. On the other hand, they have a strong network of individual businesses (and other enterprises) with whom they have developed on-going relationships.

Partnership: The Partnership can tap into larger-scale business networks and organizations that already connect to the Office of the Chancellor. It began in close partnership with The BioBusiness Alliance, a sector-level employer-led organization. However, it depends mainly on people in the system's institutions to develop and maintain links to individual businesses.

Potential learning for Centers: To the extent that the Office of the Chancellor has connections with regional and sector-level business organizations that Centers have not already developed, it would be helpful for it to help Centers gain introduction to these networks. It can also use its connections to be aware of and alert Centers to new opportunities that come to its attention.

Use of system funds

Centers: The system funds to start the Centers were explicitly granted to promote the formation of *structures,* headquartered at a specific campus, and responsible for coordination of Center functions.

Partnership: Other than the staff position in the Office of the Chancellor, system funds granted to support the Partnership so far have been granted to develop replicable models of *activities,* with system-level coordination.

Potential learning for Centers: Through experimentation, Centers have already learned that a certain level of organization (Center staffing beyond just a Director) is necessary to maintain effective operations under the Center model. At the same time, there may be room for Centers to move slightly more funding from staffing and into grant-type initiatives to encourage institution representatives to take the lead in developing new programs or ways of operating. The balance between direct Center staff and grants to others will depend significantly on the kinds of priorities that each individual Center develops in the context of its own sector and the needs of its stakeholders.

Discussion and conclusions

The evidence provided in this report shows that the Centers of Excellence are beginning to produce many of their intended outcomes. These include enhanced recruitment and development of K-12 student interest and preparation; strengthened facilities and curriculum; and enhanced inter-institutional partnerships that are promoting exchange of best practices and the development of articulation agreements; as well as new, closer relationships with industry that allow higher education to be more responsive to industry needs. It also appears that more of these relationships with industry are at a higher organizational level and that Centers are now working not only with individual firms but also with industry associations or consortia. This provides a more widely representative and consistent voice to the input Centers receive from industry. It also helps Centers gain visibility and access to a wider pool of potential partners, and allows their message to members of the sector to be carried by sources that are known and trusted in the field.

All of the Centers appear poised for a significant new level of energy, activity and results. And despite significant resource issues in the current economic environment, some Center achievements will continue to bear fruit with or without ongoing financial support. This includes students whose lives have been touched by summer camps or other K-12 engagement strategies as well as industry partners who have found compelling business reasons to stay closely connected to system programs and faculty. The Centers have also made their mark through enhanced instructional facilities and equipment as well as faculty who are more closely aligned with current industry trends and with colleagues at other institutions. And those students on state college and university campuses who have already engaged with and been supported in their career development by Center activities will also be part of each Center's legacy.

However, the evidence to date indicates that the groundwork prepared in the first three years is just now reaching a point where the initial coordination and relationship-building is ready to begin bearing fruit on a larger scale. For the Centers to achieve the long term benefits that initial results indicate are now possible, it is important to consider how to create favorable conditions to help them carry out their mix of different roles and purposes with which they are charged. An essential part of this, confirmed by experiences of comparable Centers in other states, will be an assurance of continued funding, even if at a somewhat reduced level.

The most significant accomplishments already evident are in two kinds of tasks: those that involve supporting and coordinating – but not changing – what departments and institutions do as part of their regular business (such as developing new curriculum or programs, or purchasing new machinery to keep up with the field); and managing

additional, less traditional tasks that do not require substantial institutional leadership (such as training Project Lead the Way teachers, or convening conferences or discussion groups with industry representatives to identify emerging issues).

The transformative part of the Centers' mission, to spark adaptive and innovative approaches to meeting the evolving needs of industry, involves what are essentially system-level goals, and they likely will only be achieved with ongoing system support. Center leaders can do – and are doing – much to promote this mission through activities that help regular institutional staff and community leaders identify needs and issues and jointly develop and share promising approaches.

The role for college and university leaders in this transformation is somewhat less clear. There does not appear to be a widely shared agreement on how institutions themselves should adapt, other than through encouraging Centers to remain active. For innovation to take root beyond a narrow cohort of the most involved faculty and staff will require some attention to how institutional and system structures can create meaningful incentives to organize and work in new ways.

The Chancellor's office also has a key role to play in establishing accountability standards for institutional leadership that reward inter-institutional partnership; creating more opportunities for relationships with regional, statewide, and national organizations of industry; and developing methods to track progress in enrollments, achievements and movement across institutions.

In this final report of the initial evaluation cycle, we find significant initial accomplishments. However, the most exciting part of the Centers' ultimate outcomes remains to be told over the longer term. Building on a solid start, the main objectives for which Centers were created are likely to take up to ten years to reach maturity. With more time to continue the work, the Centers have considerable potential to help the Minnesota State Colleges and Universities system better realize its mission of providing a coordinated system, with distributed and varied capacities that enable it to provide an education responsive to the needs of its communities.

Appendix

A. Further information on sources and methods

B. Detail tables on students and awards

C. Economic impact of the Centers of Excellence

A. Data sources and methods

Administrator survey

Center staff were asked to provide names and contact information for any college and university administrators who had been involved in the Center. The total sample, including presidents of each participating college and university, included 57 individuals. Of these, two presidents were considered ineligible because they were too new in their positions. Of the 55 eligible administrators, Wilder Research staff completed telephone interviews with 54 for a response rate of 98 percent.

The primary Center associations of these 54 respondents were 16 with 360°, 11 with CSITS, 9 with HealthForce, and 17 with MNCEME. Half (50%) had been involved in the development of the initial proposal, with others beginning their involvement over a range of times. Eleven were from universities, 13 from community colleges, 16 from technical colleges, and 13 from community and technical colleges. The group included presidents of 21 of the 23 participating institutions, as well as two vice presidents or provosts, 24 deans, and 6 directors or other lead representatives to the Center on behalf of their institutions.

Interviews were done between August 20 and September 15 and lasted on average about 40 minutes. The survey included a mix of closed-ended and open-ended questions. Most presidents were asked a slightly shorter version that excluded questions depending on a high level of detailed knowledge of Center operations. Three presidents represented institutions involved in more than once Center. They were asked to reply mainly about the Center they were most familiar with, but a short set of questions at the end asked about their experiences with the other Centers in which their institution also participated.

Open-ended responses were analyzed to understand the main themes, and these themes were coded so that frequencies could be reported.

Faculty survey

Centers were asked to provide names and contact information for any college and university faculty who fit any of the following categories:

- Helped develop the Center proposal
- Been part of a Center committee, task force, working group, or funded project
- Helped develop a Center-instigated new course or program

- Attended a Center-organized curriculum summit or Center-sponsored or -organized conference
- Worked with the Center on outreach to potential students and/or outreach to business
- Taught a Center-related customized training
- Directly involved in any other Center-related activity

Centers provided names for 92 faculty, with varying depths of involvement and familiarity with the Center. Of this list, Wilder set aside those who had been interviewed already as part of the administrator survey and further shortened the list to 69 who had been more involved. Of these, after initial telephone calls we found that two were unavailable because they were out of state or out of the country on sabbatical. Of the 67 we determined were eligible, 66 completed interviews with Wilder Research staff, for a response rate of 99 percent.

Center affiliations of these respondents were 14 with 360°, 17 with MNCEME, 10 with CSITS, and 25 with HealthForce. Twenty-seven were with four-year universities, and 39 were with two-year colleges. Twenty-eight (42%) had first been involved in the Center in 2005 (during or immediately after the development of the initial proposal). The month of first involvement for others was spread over the remaining time period from 2006 through 2008.

Interviews took place between September 17 and October 3 and lasted on average about 30 minutes. The survey included a mix of closed-ended and open-ended questions. Open-ended responses were analyzed to understand the main themes, and these themes were coded so that frequencies could be reported.

Summer camper survey

With input from Center staff, Wilder Research developed a short survey with 22 closed-ended questions and 3 open-ended questions. With the help of Center staff and staff responsible for summer camps, these were completed by students on the last day of multi-day camps held during the summer of 2008. A total of 212 surveys were completed, including 90 from 360° (61 middle school & 29 elementary students), 34 from MNCEME (33 middle school and 1 elementary student), 28 from CSITS (26 high school and 2 middle school students), and 60 from HealthForce (56 high school and 4 middle school students). Wilder Research tabulated the closed-ended responses and identified the main themes in the open-ended questions.

Industry involvement

As in each of the previous years, Center staff provided a list of businesses involved in the Center during the year and identified each business's types of involvement. For the sake of this documentation, the term "business" included nonprofits or government agencies that are customers for the Center's customized training, research, consultation, graduates, or other products. Types of involvement included:

- Membership on the Center Advisory Board
- Participation in other Center working group(s)
- Host for student interns or provision of other field/practicum placements
- Request for research, consultation, or other Center expertise or products
- Financial contribution to the Center or a Center project
- Donation of equipment, use of space, time, or other value in ways not covered above
- Other type of involvement

In addition to the above information, Centers were also asked to identify whether or not the business had been involved with any partner program prior to the organization of the Center. Wilder Research staff compiled the information from the four Centers. For this report we also compiled information from the three years and computed unduplicated numbers of businesses.

Leveraged funding

Each year (FY 2006 through FY2008) Center staff, with assistance of representatives from their associated programs and departments, provided information to Wilder on funds raised during the year. Specifically, they were asked to identify funds that were secured either entirely for the direct benefit or use of the Center, or were leveraged for a department or program because of its association with the Center.

In 2008, Centers provided additional information to separate these funds into two distinct categories:

- Funds that flow through the Center's budget, including grants or contracts applied for by the Center itself, and donations in support of activities the Center administers (such as HealthForce's Scrubs Camp or the IT Center's after-school programs)

- Funds that go to and stay in the individual departments or programs, including grants or contracts that an associated department or program received that may have been because of their connection with the Center, but which stay within the department/ program budget

Wilder Research staff compiled the information from the four Centers and also from all three years of the evaluation.

K-12 outreach activities

Centers provided Wilder Research with descriptions of their efforts to reach out to K-12 and other potential sources of students during FY 2008. These included efforts made by associated institution staff that were facilitated by the Centers or directly connected to Center programs. Where needed, documentation was supplemented by telephone and email contacts from Wilder.

Wilder Research compiled the information, grouped types of outreach efforts into categories, and computed totals.

Articulation agreements

Center staff provided Wilder with documents relating to any new articulation agreements, formal or informal, that the Center had been involved in arranging since the start of the Center. Wilder Research compiled the information and computed the number of new pathways (unique combinations of a field of study, a pair of sequential programs within that field, an originating institution, and a receiving institution).

Integrated Statewide Record System (ISRS) data

Wilder Research has worked closely with the Office of the Chancellor to identify the data maintained by the state colleges and universities and the Office of the Chancellor in the Integrated Statewide Record System (ISRS) that can be used to measure the effects of the Centers of Excellence. Based on the program and course lists updated by Center Directors, the Office of the Chancellor developed four data sets for Wilder analysis.

- One was a set of records for students who enrolled during any of the three years of the study (FY 2006, 2007, and 2008) in courses identified as being most likely to be affected by Center activities.

- The second was a set of records about every degree or other credential ("award") given during those years in Center-affiliated programs, and the students who received these awards.

- The third data set included follow-up information about graduates during FY 2006 and 2007, including information from the graduate follow-up survey as well as information that the system accesses from Unemployment Insurance program records on employment, wages, and hours. (Data on FY2008 graduates were not available in time for the report.)

- A fourth data set, on customized training classes and enrollments, was also provided for Wilder's analysis for the companion report on economic impact.

The figures and tables in this report reflect Wilder Research's calculations based on these records. Data may include multiple records per student if a student received more than one award in the same year. When data are reported grouped by Center, only the later or higher award was included in the analysis for each year. When data are reported grouped by award level, no more than one award at a given level is included.

Graduate employment outcomes: Wages shown in this report are based on Unemployment Insurance records from the third quarter following degree completion. This follow-up point was picked because it was the longest follow-up available for every FY2007 graduate. To avoid including erroneous data, each record that included wages but no hours, or hours but no wages, was discarded prior to analysis. In addition, both prior to and after aggregation of records from multiple employers, any record where the computed hourly wage exceeded $200 per hour was also disregarded.

New program creation

Office of the Chancellor staff provided information on 2005 and 2008 programs in the system's roster for each of the CIP codes identified by the Centers, and for the same CIP codes in institutions not associated with the Centers. This information formed one comparison group.

From a list of high-demand, high-wage, high-skill occupations prepared by the system's labor market analyst, Wilder Research identified one cluster of occupations that did not overlap with any of the Center sectors or with the Biosciences sector, and that shared the Center sectors' characteristic of having job entry points at a variety of educational levels from diploma through graduate. This sector was the only one that fit all these qualifying criteria. It includes fire fighters, correctional officers and jailers, and police and sheriff's patrol officers, which we grouped as a "Public Safety" sector. The Office of the Chancellor provided 2005 and 2008 data on programs in these fields offered by all institutions in the system, and this information formed our second comparison group.

Wilder computed the number of new programs created and the number of baseline programs that were discontinued, and calculated a rate of program change. The rates of

change for Centers were compared with those of the non-Center same-programs group and with the Public Safety group.

Interviews with Center Directors and representatives of the system's Biosciences initiatives

Wilder Research staff interviewed each Director by telephone in early December to ask about Centers' current priorities, challenges, and plans. These were supplemented in early January with additional detail, and form the basis for the "View from the helm" section of this report.

In addition, Wilder research staff interviewed three key representatives in industry and the Office of the Chancellor who are involved in the system's Biosciences initiative. Questions included information about how the initiative is structured and governed, its purposes and activities, its accomplishments and challenges to date, and how each of these features compares with those of the Centers of Excellence. Interviews lasted from one to two hours.

Student web survey

Research staff in the Office of the Chancellor worked with Wilder Research staff to identify students who were enrolled in Center-related courses during 2007-08 and whose Center-related credits represented at least half of their enrollment during that time. (Final enrollment data for fall 2008 were not ready in time for this survey.) Messages were emailed to these students (N=5,559) inviting their participation in the survey and providing a link to the web site where the survey was available. Students were informed that those who completed the survey would be entered in a drawing for ten $100 gift cards (from the student's choice of ten grocery, big-box retail, outdoor goods and book/music merchants). The survey was open from October 28 to November 10, 2008, and two reminder emails sent during this period.

Complete or nearly-complete responses were received from 389 students, or 7.0 percent of those in the sample. Due to the low response rate, only one observation in this report is based on this survey: that these respondents' awareness of the Centers prior to enrollment was low, and had very limited impact on their decision to enroll. This observation is based on a very strong response pattern that is unlikely to be explained by self-selection factors related to the low response rate.

B. Detail tables: Number and characteristics of students and graduates

The Centers of Excellence do not enroll students. To identify students most likely to be affected by Center activities, Wilder Research had the help of Center staff, associated programs, and Office of the Chancellor staff in a two-stage process. First we developed lists of programs most closely associated with each Center. Based on these lists, we then identified lists of courses that each Center considers most likely to include students in Center-affiliated programs, while not being of such general applicability as to also enroll a high percentage of other students.

Students identified by this method provide the best estimation of students likely to be affected by Center activities. However, these data should not be thought of as representing an exact count, or exact identification of "Center students." The method will unavoidably include some students who are not very closely associated with the Centers but who happen to be enrolled in one of the courses, and omit others who are closely involved in Center-associated programs, but are not taking any of the list's core courses during the year. In addition, identification of programs, courses, and students is more difficult for HealthForce, where because of their competitive, project-based selection of activities it is sometimes difficult to know in advance what programs or courses are most likely to be involved in the Center in any given year.

The tables below were prepared by Wilder Research using student data maintained and selected by staff in the Office of the Chancellor.

Numbers for 2006 and 2007 may not match those reported in prior reports, for two reasons. First, 2007 data reported last year was preliminary and final 2007 data differs slightly. Second, Centers updated course lists during 2008 based on our experience using the initial lists, and therefore the selection of students (going back to 2006) may be slightly different.

A1. For-credit students and their course loads, by associated Center and institution

	FY 2006				FY 2007				FY 2008			
	Students	Credits	CoE Credits	% CoE	Students	Credits	CoE Credits	% CoE	Students	Credits	CoE Credits	% CoE
360°	**2,695**	**50,843**	**26,863**	**53%**	**2,918**	**53,575**	**27,982**	**52%**	**2,896**	**54,527**	**28,207**	**52%**
Bemidji State University	1,067	23,517	8,629	37%	1,151	25,447	8,900	35%	1,112	25,849	8,489	33%
Pine Tech. College	41	989	354	36%	55	1,024	441	43%	62	1,003	462	46%
Saint Paul College	824	11,667	7,907	68%	888	11,521	7,979	69%	916	12,043	9,018	75%
Saint Cloud Tech. College	238	4,814	2,977	62%	312	4,820	3,386	70%	303	4,863	3,649	75%
Northwest Tech. – Bemidji	91	1,937	1,413	73%	79	1,557	1,131	73%	70	1,575	923	59%
Central Lakes College	158	4,199	2,596	62%	162	4,563	2,947	65%	165	4,573	2,475	54%
Minneapolis Com./Tech.	33	629	500	79%	47	872	733	84%	47	786	702	89%
Riverland Com. College	44	909	798	88%	48	1,130	789	70%	38	951	820	86%
Northland Com./Tech.	199	2,182	1,689	77%	176	2,641	1,676	63%	183	2,884	1,669	58%
MNCEME	**3,268**	**71,994**	**39,200**	**54%**	**3,546**	**78,322**	**42,321**	**54%**	**4,178**	**91,614**	**48,236**	**53%**
MSU Mankato	898	24,691	9,116	37%	1,005	27,819	10,528	38%	1,274	35,099	12,943	37%
Itasca Com. College	185	5,365	1,230	23%	178	5,335	1,172	22%	175	5,133	1,247	24%
Vermilion Com. College	-	-	-	-	-	-	-	-	-	-	-	-
Normandale Com. College	78	1,486	344	23%	116	2,389	515	22%	164	3,331	848	25%
Anoka Tech. College	335	5,954	4,080	69%	278	4,904	3,727	76%	220	4,364	3,020	69%
Alexandria Tech. College	226	5,943	4,534	76%	223	6,158	4,730	77%	210	6,032	4,578	76%
Hennepin Tech. College	1,051	15,749	10,936	69%	1,192	17,725	11,868	67%	1,442	21,204	15,152	71%
South Central College	280	6,513	4,048	62%	293	6,363	4,164	65%	323	7,137	4,027	56%
Hibbing Com. College	87	2,498	1,730	69%	89	2,466	1,755	71%	153	3,011	2,088	69%
Mesabi Range Com./Tech	128	3,795	3,182	84%	172	5,163	3,862	75%	217	6,303	4,333	69%
CSITS	**1,404**	**26,396**	**8,693**	**33%**	**1,464**	**27,895**	**9,032**	**32%**	**1,455**	**28,026**	**8,847**	**32%**
Metro State University	1,051	20,825	5,683	27%	1,048	21,317	5,491	26%	1,007	21,114	5,272	25%
Inver Hills Com. College	189	2,716	1,200	44%	234	3,555	1,791	50%	231	3,239	1,609	50%
Minneapolis Com./Tech.	164	2,855	1,810	63%	182	3,023	1,750	58%	217	3,673	1,966	54%

A1. For-credit students and their course loads, by associated Center and institution (continued)

	FY 2006				FY 2007				FY 2008			
	Students	Credits	CoE Credits	% CoE	Students	Credits	CoE Credits	% CoE	Students	Credits	CoE Credits	% CoE
HealthForce	**7,755**	**148,548**	**66,466**	**45%**	**8,164**	**154,884**	**69,577**	**45%**	**8,400**	**161,381**	**70,696**	**44%**
Winona State University	1,708	43,763	16,992	39%	1,778	44,986	17,884	40%	1,951	48,075	18,896	39%
Normandale Com. College	1,315	26,334	8,966	34%	1,389	26,880	8,662	32%	1,398	27,997	8,752	31%
Pine Tech. College	290	4,974	3,459	70%	429	5,846	4,137	71%	444	5,955	4,332	73%
MN State College – SE Tech.	686	12,238	7,318	60%	597	12,245	7,281	59%	653	13,364	7,826	59%
Minneapolis Com./Tech.	1,517	22,959	12,596	55%	1,669	25,664	13,628	53%	1,595	26,320	13,548	51%
Rochester Com./Tech.	647	11,964	7,234	60%	660	11,745	7,447	63%	684	11,861	7,760	65%
Riverland Com. College	522	7,367	4,759	65%	532	7,335	4,604	63%	534	7,242	3,963	55%
Ridgewater College	1,070	18,949	5,142	27%	1,110	20,183	5,934	29%	1,141	20,567	5,619	27%

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

A2. Non-credit students and their course loads, by associated Center and institution

	FY 2006				FY 2007				FY 2008			
	Students	Hours	CoE Hours	% CoE	Students	Hours	CoE Hours	% CoE	Students	Hours	CoE Hours	% CoE
360°	**821**	**23,047**	**18,987**	**82%**	**617**	**21,558**	**14,254**	**66%**	**274**	**10,777**	**5,593**	**52%**
Bemidji State University	*	-	-	-	*	-	-	-	*	-	-	-
Pine Tech. College	54	1,401	987	70%	*	-	-	-	0	-	-	-
Saint Paul College	111	4,403	2,424	55%	89	3,601	2,112	59%	0	-	-	-
Saint Cloud Tech. College	199	2,790	2,397	86%	200	7,339	4,783	65%	126	5,853	2,432	42%
Northwest Tech. – Bemidji	0	-	-	-	0	-	-	-	0	-	-	-
Central Lakes College	45	1,062	984	93%	34	1,159	240	21%	*	-	-	-
Minneapolis Com./Tech.	34	1,014	840	83%	15	547	336	61%	0	-	-	-
Riverland Com. College	*	-	-	-	27	1,003	944	94%	52	1,679	1,644	98%
Northland Com./Tech.	345	11,169	10,176	91%	246	7,835	5,839	75%	88	3,219	1,517	47%
MNCEME	**400**	**4,375**	2,681	61%	**547**	**7,052**	5,007	71%	**396**	**4,622**	1,409	30%
MSU Mankato	0	-	-	-	*	-	-	-	0	-	-	-
Itasca Com. College	11	171	0	0%	*	-	-	-	*	-	-	-
Vermilion Com. College	32	164	96	59%	23	87	71	82%	78	669	316	47%
Normandale Com. College	*	-	-	-	0	-	-	-	0	-	-	-
Anoka Tech. College	*	-	-	-	*	-	-	-	*	-	-	-
Alexandria Tech. College	210	2,826	2,316	82%	301	4,629	4,194	91%	121	1,396	796	57%
Hennepin Tech. College	14	176	0	0%	19	494	0	0%	45	1,012	0	0%
South Central College	55	292	0	0%	56	490	0	0%	16	197	0	0%
Hibbing Com. College	25	154	0	0%	5	76	0	0%	63	649	9	1%
Mesabi Range Com./Tech	47	521	269	52%	133	886	742	84%	61	529	289	55%
CSITS	**12**	**110**	**0**	**0%**	*	**-**	**-**	**-**	**5**	**68**	**0**	**0%**
Metro State University	0	-	-	-	0	-	-	-	0	-	-	-
Inver Hills Com. College	0	-	-	-	0	-	-	-	0	-	-	-
Minneapolis Com./Tech.	12	110	0	0%	*	-	-	-	5	68	0	0%

A2. Non-credit students and their course loads, by associated Center and institution (continued)

	FY 2006				FY 2007				FY 2008			
	Students	Hours	CoE Hours	% CoE	Students	Hours	CoE Hours	% CoE	Students	Hours	CoE Hours	% CoE
HealthForce	**3,609**	**42,464**	**36,786**	**87%**	**3,942**	**76,587**	**61,640**	**80%**	**3,732**	**75,016**	**69,407**	**93%**
Winona State University	16	68	0	0%	6	22	0	0%	11	212	0	0%
Normandale Com. College	51	498	0	0%	40	285	0	0%	57	338	0	0%
Pine Tech. College	192	3,521	2,865	81%	154	3,051	1,927	63%	153	2,075	1,301	63%
MN State College – SE Tech.	738	6,875	5,248	76%	683	28,727	17,872	62%	912	38,403	36,683	96%
Minneapolis Com./Tech.	1,519	19,868	19,327	97%	2,281	33,424	32,849	98%	1,533	19,466	19,098	98%
Rochester Com./Tech.	197	2,324	2,095	90%	49	1,844	1,644	89%	148	2,185	1,883	86%
Riverland Com. College	120	2,601	2,529	97%	122	2,780	2,622	94%	66	2,293	2,247	98%
Ridgewater College	776	6,709	4,724	70%	607	6,455	4,726	73%	852	10,045	8,195	82%

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

Note: ** Small but non-zero number, suppressed to protect privacy.*

A3. Total students and proportion for-credit and non-credit, by year, Center, and institution

	FY 2006				FY 2007				FY 2008			
	N	Credit only	Non-credit only	both	N	Credit only	Non-credit only	both	N	Credit only	Non-credit only	both
360°	**3,448**	**76%**	**22%**	**2%**	**3,451**	**82%**	**15%**	**2%**	**3,151**	**91%**	**8%**	**1%**
Bemidji State University	1,067	100%	0%	0%	1,151	100%	0%	0%	1,112	99%	0%	1%
Pine Tech. College	95	43%	57%	0%	55	98%	0%	2%	62	100%	0%	0%
Saint Paul College	899	88%	8%	4%	938	91%	5%	4%	916	100%	0%	0%
Saint Cloud Tech. College	429	54%	45%	2%	500	60%	38%	2%	424	70%	29%	1%
Northwest Tech. – Bemidji	91	100%	0%	0%	79	100%	0%	0%	70	100%	0%	0%
Central Lakes College	199	77%	21%	2%	191	82%	15%	3%	165	99%	0%	1%
Minneapolis Com./Tech.	65	48%	49%	3%	61	75%	23%	2%	47	100%	0%	0%
Riverland Com. College	71	55%	38%	7%	64	58%	25%	17%	84	38%	55%	7%
Northland Com./Tech.	532	35%	63%	2%	412	40%	57%	2%	271	68%	32%	0%
MNCEME	**3,537**	**89%**	**8%**	**4%**	**3,941**	**86%**	**10%**	**4%**	**4,359**	**91%**	**4%**	**5%**
MSU Mankato	898	100%	0%	0%	1,005	100%	0%	0%	1,274	100%	0%	0%
Itasca Com. College	185	94%	0%	6%	178	98%	0%	2%	175	98%	0%	2%
Vermilion Com. College	32	0%	100%	0%	23	0%	100%	0%	78	0%	100%	0%
Normandale Com. College	78	99%	0%	1%	116	100%	0%	0%	164	100%	0%	0%
Anoka Tech. College	335	99%	0%	1%	278	99%	0%	1%	220	96%	0%	4%
Alexandria Tech. College	420	50%	46%	4%	475	37%	53%	10%	260	53%	19%	27%
Hennepin Tech. College	1,051	99%	0%	1%	1,192	98%	0%	2%	1,442	97%	0%	3%
South Central College	280	80%	0%	20%	293	81%	0%	19%	323	95%	0%	5%
Hibbing Com. College	87	71%	0%	29%	89	94%	0%	6%	154	59%	1%	40%
Mesabi Range Com./Tech	171	73%	25%	2%	292	54%	41%	4%	269	77%	19%	3%
CSITS	**1,404**	**99%**	**0%**	**1%**	**1,464**	**100%**	**0%**	**0%**	**1,455**	**100%**	**0%**	**0%**
Metro State University	1,051	100%	0%	0%	1,048	100%	0%	0%	1,007	100%	0%	0%
Inver Hills Com. College	189	100%	0%	0%	234	100%	0%	0%	231	100%	0%	0%
Minneapolis Com./Tech.	164	93%	0%	7%	182	98%	0%	2%	217	98%	0%	2%

A3. Total students and proportion for-credit and non-credit, by year, Center, and institution (continued)

	FY 2006				FY 2007				FY 2008			
	N	Credit only	Non-credit only	both	N	Credit only	Non-credit only	both	N	Credit only	Non-credit only	both
HealthForce	**9,995**	**64%**	**22%**	**14%**	**10,751**	**63%**	**24%**	**13%**	**10,738**	**65%**	**22%**	**13%**
Winona State University	1,708	99%	0%	1%	1,778	100%	0%	0%	1,951	99%	0%	1%
Normandale Com. College	1,315	96%	0%	4%	1,389	97%	0%	3%	1,398	96%	0%	4%
Pine Tech. College	404	52%	28%	19%	471	67%	9%	24%	471	68%	6%	27%
MN State College – SE Tech.	1,167	37%	41%	22%	1,153	41%	48%	11%	1,410	35%	54%	11%
Minneapolis Com./Tech.	2,574	41%	41%	18%	3,397	33%	51%	16%	2,640	42%	40%	18%
Rochester Com./Tech.	797	75%	19%	6%	682	93%	3%	4%	795	81%	14%	5%
Riverland Com. College	627	81%	17%	2%	636	81%	16%	3%	585	89%	9%	3%
Ridgewater College	1,403	45%	24%	32%	1,245	51%	11%	38%	1,488	43%	23%	34%

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

A4. Graduates and award majors,** by Center and year

	FY06		FY07		FY08		Change (06 to 08)		
	N	%	N	%	N	%	N	%	% pt
360° Total Graduates	**274**		**360**		**360**		**86**	**31%**	**-**
Certificates award majors	55	20%	94	24%	73	19%	18	33%	-1
Diplomas award majors	125	45%	162	42%	156	41%	31	25%	-5
2-year degree award majors	25	9%	56	15%	81	21%	56	224%	12
4-year and graduate award majors*	72	26%	72	20%	74	21%	2	3%	-6
Total award majors **	277	100%	384	100%	384	100%	107	39%	0
MNCEME Total Graduates	**443**		**472**		**457**		**14**	**3%**	**-**
Certificates award majors	61	13%	49	9%	62	12%	1	2%	0
Diplomas award majors	110	23%	169	32%	128	25%	18	16%	3
2-year degree award majors	160	33%	182	34%	190	38%	30	19%	4
4-year degree award majors	133	28%	111	21%	102	20%	-31	-23%	-7
Graduate award majors	16	3%	20	4%	21	4%	5	31%	1
Total award majors **	480	100%	531	100%	503	100%	23	5%	0
CSITS Total Graduates	**132**		**148**		**138**		**6**	**5%**	**-**
Certificate and diploma award majors*	36	27%	46	41%	28	27%	-8	-22%	0
2-year degree award majors	20	12%	27	15%	33	20%	13	65%	8
4-year degree award majors	83	51%	94	51%	82	51%	-1	-1%	0
Graduate award majors	24	15%	18	10%	19	12%	-5	-21%	-3
Total award majors **	163	100%	185	100%	162	100%	-1	-1%	0
HealthForce Total Graduates	**2,262**		**2,098**		**2,051**		-211	**-9%**	**-**
Certificates award majors	1,112	48%	820	38%	677	32%	-435	-39%	-16
Diplomas award majors	458	20%	453	21%	513	24%	55	12%	5
2-year degree award majors	529	23%	665	31%	684	32%	155	29%	10
4-year degree award majors	179	8%	176	8%	206	10%	27	15%	2
Graduate award majors	37	2%	28	1%	32	2%	-5	-14%	0
Total award majors **	2,315	100%	2,142	100%	2,112	100%	-203	-9%	0

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

Note: **Small cells have been combined to protect privacy. **Some awards include two different majors. In such cases, both are reflected in the number of award majors shown in this table.*

A5. Change in for-credit enrollments and credits, by Center and institution

	2006			2008			Change (2006-2008)					
							Students		Credits		CoE Credits	
	Students	Credits	CoE Credits	Students	Credits	CoE Credits	N	%	N	%	N	%
360°	**2,695**	**50,843**	**26,863**	**2,896**	**54,527**	**28,207**	201	7%	3,684	7%	1,344	5%
Bemidji State University	1,067	23,517	8,629	1,112	25,849	8,489	45	4%	2,332	10%	-140	-2%
Pine Tech. College	41	989	354	62	1,003	462	21	51%	14	1%	108	31%
Saint Paul College	824	11,667	7,907	916	12,043	9,018	92	11%	376	3%	1,111	14%
Saint Cloud Tech. College	238	4,814	2,977	303	4,863	3,649	65	27%	49	1%	672	23%
Northwest Tech. – Bemidji	91	1,937	1,413	70	1,575	923	-21	-23%	-362	-19%	-490	-35%
Central Lakes College	158	4,199	2,596	165	4,573	2,475	7	4%	374	9%	-121	-5%
Minneapolis Com./Tech.	33	629	500	47	786	702	14	42%	157	25%	202	40%
Riverland Com. College	44	909	798	38	951	820	-6	-14%	42	5%	22	3%
Northland Com./Tech.	199	2,182	1,689	183	2,884	1,669	-16	-8%	702	32%	-20	-1%
MNCEME	**3,268**	**71,994**	**39,200**	**4,178**	**91,614**	**48,236**	910	28%	19,621	27%	9,036	23%
MSU Mankato	898	24,691	9,116	1,274	35,099	12,943	376	42%	10,408	42%	3,827	42%
Itasca Com. College	185	5,365	1,230	175	5,133	1,247	-10	-5%	-232	-4%	17	1%
Vermilion Com. College	-	-	-	-	-	-	-	-	-	-	-	-
Normandale Com. College	78	1,486	344	164	3,331	848	86	110%	1,845	124%	504	147%
Anoka Tech. College	335	5,954	4,080	220	4,364	3,020	-115	-34%	-1,590	-27%	-1,060	-26%
Alexandria Tech. College	226	5,943	4,534	210	6,032	4,578	-16	-7%	90	2%	44	1%
Hennepin Tech. College	1,051	15,749	10,936	1,442	21,204	15,152	391	37%	5,455	35%	4,216	39%
South Central College	280	6,513	4,048	323	7,137	4,027	43	15%	624	10%	-21	-1%
Hibbing Com. College	87	2,498	1,730	153	3,011	2,088	66	76%	513	21%	358	21%
Mesabi Range Com./Tech	128	3,795	3,182	217	6,303	4,333	89	70%	2,508	66%	1,151	36%

A5. Change in for-credit enrollments and credits, by Center and institution (continued)

	2006			2008			Change (2006-2008)					
							Students		Credits		CoE Credits	
	Students	Credits	CoE Credits	Students	Credits	CoE Credits	N	%	N	%	N	%
CSITS	**1,404**	**26,396**	**8,693**	**1,455**	**28,026**	**8,847**	51	4%	1,630	6%	154	2%
Metro State University	1,051	20,825	5,683	1,007	21,114	5,272	-44	-4%	289	1%	-411	-7%
Inver Hills Com. College	189	2,716	1,200	231	3,239	1,609	42	22%	523	19%	409	34%
Minneapolis Com./Tech.	164	2,855	1,810	217	3,673	1,966	53	32%	818	29%	156	9%
HealthForce	**7,755**	**148,548**	**66,466**	**8,400**	**161,381**	**70,696**	645	8%	12,833	9%	4,230	6%
Winona State University	1,708	43,763	16,992	1,951	48,075	18,896	243	14%	4,312	10%	1,904	11%
Normandale Com. College	1,315	26,334	8,966	1,398	27,997	8,752	83	6%	1,663	6%	-214	-2%
Pine Tech. College	290	4,974	3,459	444	5,955	4,332	154	53%	981	20%	873	25%
MN State College – SE Tech.	686	12,238	7,318	653	13,364	7,826	-33	-5%	1,126	9%	508	7%
Minneapolis Com./Tech.	1,517	22,959	12,596	1,595	26,320	13,548	78	5%	3,361	15%	952	8%
Rochester Com./Tech.	647	11,964	7,234	684	11,861	7,760	37	6%	-103	-1%	526	7%
Riverland Com. College	522	7,367	4,759	534	7,242	3,963	12	2%	-125	-2%	-796	-17%
Ridgewater College	1,070	18,949	5,142	1,141	20,567	5,619	71	7%	1,618	9%	477	9%

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

A6. Change in non-credit enrollments and hours, by Center, institution, and year

	2006			2008			Change (2006-2008)					
							Students		Hours		CoE Hours	
	Students	Hours	CoE Hours	Students	Hours	CoE Hours	N	%	N	%	N	%
360	**821**	**23,047**	**18,987**	**274**	**10,777**	**5,593**	-547	-67%	-12,270	-53%	-13,394	-71%
Bemidji State University	*	-	-	*	-	-	-	-	-	-	-	-
Pine Technical College	54	1,401	987	0	-	-	-54	-100%	-	-	-	-
Saint Paul College	111	4,403	2,424	0	-	-	-111	-100%	-	-	-	-
St. Cloud Technical College	199	2,790	2,397	126	5,853	2,432	-73	-37%	3,063	110%	35	1%
Northwest TC - Bemidji	0	-	-	0	-	-	-	-	-	-	-	-
Central Lakes College	*	-	-	*	-	-	-	-	-	-	-	-
Minneapolis Community and Technical College	34	1,014	840	0	-	-	-34	-100%	-	-	-	-
Riverland Community College	32	1,208	1,180	52	1,679	1,644	20	63%	471	39%	464	39%
Northland Community and Technical College	345	11,169	10,176	88	3,219	1,517	-257	-74%	-7,950	-71%	-8,659	-85%
MnCEME	**400**	**4,375**	2,681	**396**	**4,622**	1,409	-4	-1%	247	6%	-1,272	-47%
Minnesota State University, Mankato	0	-	-	0	-	-	-	-	-	-	-	-
Itasca Community College	*	-	-	*	-	-	-	-	-	-	-	-
Vermilion Community College	32	164	96	78	669	316	46	-	505	-	220	229%
Normandale Community College	*	-	-	*	-	-	-	-	-	-	-	-
Anoka Technical College	5	68	0	8	55	0	3	60%	-13	-19%	-	-
Alexandria Technical College	210	2,826	2,316	121	1,396	796	-89	-42%	-1,430	-51%	-1,520	-66%
Hennepin Technical College	14	176	0	45	1,012	0	31	221%	836	475%	-	-
South Central College	55	292	0	16	197	0	-39	-71%	-95	-33%	-	-
Hibbing Community College	25	154	0	63	649	9	38	152%	495	321%	9	-
Mesabi Range Community and Technical College	47	521	269	61	529	289	14	30%	8	2%	20	7%

A6. Change in non-credit enrollments and hours, by Center, institution, and year (continued)

	2006			2008			Change (2006-2008)					
							Students		Hours		CoE Hours	
	Students	Hours	CoE Hours	Students	Hours	CoE Hours	N	%	N	%	N	%
CSITS	**12**	**110**	**0**	**5**	**68**	**0**	-7	-58%	-42	-38%	-	-
Metropolitan State University	0	-	-	0	-	-	-	-	-	-	-	-
Inver Hills Community College	0	-	-	0	-	-	-	-	-	-	-	-
Minneapolis Community and Technical College	12	110	0	5	68	0	-7	-58%	-42	-38%	-	-
HealthForce	**3,609**	**42,464**	**36,786**	**3,732**	**75,016**	**69,407**	123	3%	32,552	77%	32,621	89%
Winona State University	16	68	0	11	212	0	-5	-31%	144	212%	-	-
Normandale Community College	51	498	0	57	338	0	6	12%	-160	-32%	-	-
Pine Technical College	192	3,521	2,865	153	2,075	1,301	-39	-20%	-1,446	-41%	-1,564	-55%
MSC - Southeast Technical	738	6,875	5,248	912	38,403	36,683	174	24%	31,528	459%	31,435	599%
Minneapolis Community and Technical College	1,519	19,868	19,327	1,533	19,466	19,098	14	1%	-402	-2%	-229	-1%
Rochester Community and Technical College	197	2,324	2,095	148	2,185	1,883	-49	-25%	-139	-6%	-212	-10%
Riverland Community College	120	2,601	2,529	66	2,293	2,247	-54	-45%	-308	-12%	-282	-11%
Ridgewater College	776	6,709	4,724	852	10,045	8,195	76	10%	3,336	50%	3,471	73%

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

Note: ** Small but non-zero number, suppressed to protect privacy.*

A7. Average and median age of for-credit students, by Center, institution, and year

	2006		2007		2008	
	Average	Median	Average	Median	Average	Median
360°	26.8	23	26.2	22	25.9	22
Bemidji State University	26.7	22	26.3	22	26.0	22
Pine Tech. College	28.3	23	23.8	20	24.2	21
Saint Paul College	27.9	25	27.9	25	27.7	26
Saint Cloud Tech. College	23.0	20	20.5	18	21.2	18
Northwest Tech. – Bemidji	21.7	20	22.5	20	21.9	21
Central Lakes College	22.6	19	22.6	19	22.7	19
Minneapolis Com./Tech.	33.0	32	34.4	33	35.0	33
Riverland Com. College	26.9	23	25.0	21.5	29.6	26
Northland Com./Tech.	31.7	30	30.2	28	-	-
MNCEME	25.8	22	25.6	21	25.6	22
MSU Mankato	21.8	21	21.9	21	21.7	21
Itasca Com. College	20.4	19	19.5	19	19.6	19
Vermillion Com. College	-	-	-	-	-	-
Normandale Com. College	24.5	22.5	25.3	23	25.4	23
Anoka Tech. College	24.2	20	23.6	19	24.6	20.5
Alexandria Tech. College	23.9	19	22.1	19	21.4	19
Hennepin Tech. College	32.2	31	31.8	29	31.6	29
South Central College	24.6	21	24.4	21	24.2	21
Hibbing Com. College	21.3	20	21.9	20	20.1	19
Mesabi Range Com./Tech	23.4	20.5	24.1	21	25.7	24
CSITS	30.1	28	29.7	28	30.1	28
Metro State University	30.3	28	30.0	28	30.2	28
Inver Hills Com. College	27.9	24	28.5	26	29.5	26
Minneapolis Com./Tech.	30.6	28.5	29.5	27.5	30.1	27
HealthForce	26.6	23	26.2	23	26.3	23
Winona State University	23.0	20	23.0	20	23.1	21
Normandale Com. College	26.0	23	25.6	23	25.3	23
Pine Tech. College	28.8	26	25.3	22	26.8	24
MN State College – SE Tech.	27.4	24	28.1	25	27.8	24
Minneapolis Com./Tech.	30.8	28	29.5	27	30.1	27
Rochester Com./Tech.	27.5	24	27.2	24	28.0	26
Riverland Com. College	28.2	25	27.3	25	27.6	25
Ridgewater College	24.8	21	25.1	22	24.7	21

Source: *Courses identified by the Centers, data maintained and selected by the Office of the Chancellor, calculations by Wilder Research.*

C. Economic impact

Economic Impact of the Centers of Excellence

A report to the Minnesota State Colleges and Universities

January 2009

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Acknowledgments

We wish to thank many people in the Office of the Chancellor for their help in the course of this study, chiefly Leslie Mercer, Todd Harmening, Craig Schoenecker and others on the staff. We also thank the Center Directors, Bruce Lindberg, Jane Foote, Karen White, and Ron Bennett, as well as Judith Evans and other Center staff members, for sharing data and their thoughts with us.

The study benefited immensely from helpful comments from the Wilder team leaders, Greg Owen and Ellen Shelton. Other Wilder Research staff who contributed to this report are Mark Anton and Louann Graham.

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Summary

Intermediate measures of progress indicate that the Centers are moving to fulfill their potential to enhance employment and economic activity in Minnesota. But in many respects it is too early for the Minnesota State College and Universities Centers of Excellence to be having significant economic impact on the Minnesota economy.

Intermediate indicators

The Centers of Excellence continue to provide valuable ***customized training*** to businesses in their sectors of focus, even though the economy is weakening in the near term. Over 1,400 incumbent workers enrolled in Center-related for-credit and non-credit customized training courses in 2008.

Increases in the ***numbers of associate degrees and diplomas*** indicate that the Centers are having the desired impact of increasing the available pool of qualified labor for their target industries. The number of associate degrees awarded in Center-related programs increased by 35 percent from 2006 to 2008, and the number of diplomas increased 15 percent.

Graduates of the programs continue to be hired by industry. Moreover, they are placed in ***relatively high-wage jobs*** indicating they bring established and important skills to their employers. Center graduates who are employed in industries related to their Center programs are earning close to or above the industry median wage in the year immediately following graduation.

Businesses in the target industries are engaged in the Center's activities and supportive of the Centers. In the most recent reporting period, nearly 200 business partners were identified across the four Centers.

These intermediate indicators show that the Centers have reached a point consistent with a vigorous start as measured in the third year of operation. Clearly, this is not the end point anticipated in the authorizing legislation, but it would be judged reasonable and appropriate by outside observers including industry partners.

Background

A report on the economic impact of the Minnesota Centers of Excellence is mandated by the legislation which established the Centers of Excellence program. The four Centers of Excellence funded by the legislative initiative and appointed by the MnSCU Board of Trustees are:

- 360° Manufacturing and Applied Engineering Center of Excellence
- Minnesota Center for Engineering and Manufacturing Excellence (MNCEME)
- Center for Strategic Information Technology and Security
- HealthForce Minnesota

A complete list of the partner organizations for each Center is available in the full evaluation report.

As described in authorizing legislation, the Centers of Excellence are expected to have a statewide economic impact rather than a concentrated impact in a specific region. Moreover, as described in previous years' reports, we conclude that the potential statewide impact of the Centers will develop over time and it is too early in their life cycle to expect to see significant impact on employment and economic activity in the sectors of the economy on which the Centers focus.

Comparisons

A survey of three established centers of excellence in other parts of the country showed only one which measured economic impacts in the way envisioned for the Minnesota Centers.

Building on the examples of other centers, it is clear that any assessment of the economic impact of the Minnesota Centers needs to take into account the actual mix of activities at each center and the priorities given to those activities.

Minnesota's economy

The Minnesota economy, like the nation's economy, faces substantial challenges in the up coming years and the industries served by the Minnesota State College and Universities Centers of Excellence will be important to Minnesota's future economic success.

- For the first time since 1990, it appears that unemployment in Minnesota is closely matching unemployment in the U.S. as the country endures a recession. In the last

two recessions, Minnesota unemployment peaked significantly lower than U.S. unemployment and the difference grew as the recession deepened.

- Manufacturing and applied engineering employment in Minnesota has dropped back to about the 1990 level after rising from 1990 to 2001. That is a much better performance than U.S. employment in this sector which fell 25 percent since 2001 after being essentially flat during the previous decade.

- Healthcare employment in Minnesota shows strong growth, especially since 2002. Over the time period since 1990, Minnesota's employment growth in health care has outpaced the nation's despite being behind through the 1990's.

- Information systems and security employment has fallen faster in Minnesota than in the U.S. as a whole since its turning point early in this decade.

While Minnesota enjoys the highest per capita personal income among states in the Plains region according to the latest Survey of Current Business, it also has the lowest growth rate in personal income. Minnesota needs to seek ways to enhance its competitiveness both vis-à-vis other states and versus international competitors as well.

Assessing economic impact

The MnSCU Centers of Excellence can have potential impact on the Minnesota economy through at least five main channels:

- Training existing workers
- Producing more and better trained graduates
- Consulting with existing businesses and anticipating workforce needs
- Applied research
- Entrepreneurship, innovation, and the formation of new enterprises

The ultimate measures of the final economic impact of the MnSCU Centers should include these quantities for the statewide sectors that the Centers serve:

- Employment growth
- Estimated higher incomes for program graduates working in those sectors
- Production and exports (in goods producing sectors only)
- Investment in research and development

- Survival of businesses and, possibly, establishment and growth of new ones

Not all of these measures will be applied in the same way or will carry the same importance for different centers.

At this early stage in the development of the Centers, it is most appropriate to consider intermediate indicators of progress in building impact through the channels listed above.

Background

The legislation that granted funds to the Minnesota State Colleges and Universities System (system) for the establishment of up to four new centers of excellence in state educational institutions required that a report be prepared to assess and document the impacts of the centers on the regional economies in which the centers were located. The report is to be made to the legislature in January 2009, during the third academic year of the operation of the centers. Based on the implementation of the Centers of Excellence inside the system, we conclude that the centers are more likely to have impact on certain sectors of the statewide economy rather than in particular geographic areas. Moreover, the main impact will not be felt until several years, perhaps even a decade, after this first impact assessment. This report describes the logic used in reaching those conclusions and then reports on several intermediate indicators of Center impact.

Two models

Any evaluation of the economic impact of the Centers must be based on a model of the operation of the Centers and their connection to the economy. There are two main competing conceptual models that could be applied to describe the workings of the Centers of Excellence. They can be described as the Concentrated Model and the Dispersed Model.

Concentrated model

The Concentrated Model imagines a geographically-focused center housed inside a larger system. This model includes several important elements:

- Faculty and other resources are housed at a single institution inside the larger educational system or, possibly, a small number of related or coordinated institutions located near one another.
- The institution offers a unique, and often advanced, curriculum in the chosen field or fields, unduplicated within the system.
- Undergraduate and graduate students from across the state or region enroll at that institution, either initially after high school or later as they seek specialized training.
- The educational focus is on the initial training of post-high-school students who earn degrees and then move into industry.

- The institution is located near an existing concentration of related industries and employers or such a concentration is encouraged to develop in proximity to the center, in order to facilitate interchange that includes curriculum change, consulting, and applied research.

According to this model, the concentration of academic resources will complement and encourage the accelerated development of a narrow set of industries that locate near the centers in order to hire students, consult with faculty, and develop products and services based on research conducted at the centers.

The desired outcome of implementing a center of excellence following the concentrated model would be the growth of an industry concentration like Silicon Valley in California or the electronics industry that developed outside Boston along Route 128. Another well-known example would the Research Triangle in North Carolina where three educational institutions supply and serve a concentration of technologically-based industries.

Closer to home, it appears the University of Wisconsin System has implemented a Centers of Excellence program along the broad organizational outlines of this model. However, the Wisconsin Centers are not focused on industrial sectors of the state's economy and, thus, are unlikely to have easily traceable economic effects. In particular, Wisconsin has Centers of Excellence focused on cancer communication, developmental disabilities, women's health research, family studies, neutronics, teaching, and the study of the European Union. Of these seven Centers, only the neutronics center could possibly have the direct industry impact envisioned for the Minnesota Centers.

If a state were to implement an excellence program along the lines of this concentrated model, it would be natural that the economic effects of the centers would be concentrated in the geographic areas near the centers. The chief measures of success would be the number of firms in the particular industries being served, the total sales of those firms, and the total employment at those firms in that geographic area. In addition, it would be reasonable to consider measures of overall economic activity in the region surrounding the center – measures such as total employment, retail sales, and, possibly, home prices. Additional measures might include the exports of those firms to the rest of the United States and the world (if known) and the investment by area firms in physical facilities and research.

Dispersed model

A second model of educational excellence and technology transfer is what we will call the Dispersed Model. This model has attributes that are very different from the Concentrated Model:

- Faculty and research facilities are housed at a larger number of institutions which may be located at some distance from one another, regionally or even nationally.
- The institutions offer a coordinated curriculum in the chosen field or fields.
- Undergraduates, graduate students, and other adult learners may receive certificates and degrees from any one of a number of institutions in the specialized network.
- The coordinating institutions offer a variety of degrees as well as provide training and retraining to existing workers in the selected industries.
- The institutions interact with businesses in the targeted industries that may be located over a broad geographic area.

In contrast to the concentrated model, the dispersed model need not foster the development of geographically concentrated industries unless there are other economic reasons for those industries or firms to cluster in a certain location, such as access to natural resources or transportation services.

Therefore, the success of this dispersed model is most likely to be reflected not in the economic health of a particular geographic area, but rather in the relative performance of the particular industries being served on a statewide basis. Therefore, the approach to evaluating the economic impact of such a dispersed program would be to examine the performance of the targeted industries in the state, looking at data on their employment, sales, and exports.

Obviously, the two models set forth here are two ends of a spectrum of possible ways for colleges and universities to use a focus on excellence to support specific sectors of the state economy.

The Minnesota State Colleges and Universities Centers of Excellence

In implementing its program of Centers of Excellence, the system chose a strategy that approximates the dispersed model quite closely. The choice of a dispersed rather than a concentrated model fits the economic and educational situation in Minnesota well for two reasons.

First, the four Centers were established to serve existing, relatively well-developed industries rather than to support and develop new fledgling industries. Manufacturing and healthcare facilities are spread across the state rather than concentrated in narrow corridors or islands. And, while information systems firms may be centered in the Twin Cities area, information systems serve enterprises across the entire state.

If, on the other hand, the goal of the Centers had been to begin or nurture an infant industry, a case could have been made for implementing a more concentrated model. In that case, the establishment of a center at a specific institution might have been coordinated with favorable tax treatment for the target industry and, perhaps, other incentives to locate facilities in the geographic area of the host institution.

Second, the system serves a very diverse student body. The average age of students in the system is 29 years and many have families and established jobs or careers as they seek additional training at MnSCU institutions. This would make it difficult for many students to enroll at a single college or university that offered unique training in a given field.

Timing of economic impact

This evaluation takes place before enough time has elapsed for the Centers to be showing impact on economic activity in the State of Minnesota. Common sense indicates that the full impact of the centers on producing bachelor's degree graduates in certain fields cannot be seen in less than four years of operation. But beyond that, economic experience and a sizable literature on economic development argue forcefully that the growth of clusters of industries take a good deal of time, five to ten years or more. This is so even when the aid to those industries includes direct subsidies rather than the more indirect route taken through fostering educational centers.

Data from surveys of businesses taken earlier in the evaluation of the Centers reinforces that view. Broadly speaking, those businesses expected that the Centers would have some impact on labor supply in their industries within three to five years, but that other effects of the Centers would take longer to develop. Therefore, in this study, we have indicated the measures that make sense in the long-term, but we have also provided some intermediate measures that can give perspective at this time.

Evaluation of other centers

To gain additional perspective on methods for evaluating the Centers of Excellence, we interviewed the executive directors of three established centers in other parts of the country. These three centers had previously been identified and surveyed by Fieldstone Alliance, a consulting group hired to conduct a study of funding strategies for the 360° Manufacturing and Applied Engineering Center (360°) headquartered at Bemidji State University. We interviewed the center executives with regard to any measurement of impact which they performed or had considered.

Three centers

The three centers surveyed were:

- The Maricopa Advanced Technology Education Center in Arizona
- The Agriculture Center of Excellence in the state of Washington
- The Polymers Center of Excellence in North Carolina

All three centers have been in existence for more than a decade and serve three different industries with widely differing services. They range in staff size from 2 to 18 people and in budget from $125,000 per year to $2.1 million dollars. All were asked how they measure their impact and/or how they have considered such measurement. Their approaches varied as much as their activities.

The Maricopa Advanced Technology Education Center

Maricopa Advanced Technology Education Center (MATEC) has been in existence since 1999 and currently has a staff of 12. MATEC develops programs, materials, and training that enable students, faculty, and technicians to continuously master the evolving competencies in science, mathematics, technology, and communications required by the workforce of the semiconductor, automated manufacturing, and electronics industries. A significant activity of the Center is the operation of Net**WORKS,** a National Science Foundation Resource Center that is focused on the advancement of semiconductor, automated manufacturing, and electronics education. The Digital Repository contains classroom ready resources. They provide a National Faculty Externship Program, Online Webinars, and TechSpectives Blog to keep individuals up-to-date with emerging technologies and educational issues.

MATEC is housed at the Maricopa Community Colleges in Phoenix, Arizona. It has partnership agreements with 129 higher education institutions across the nation, 12 of them in Arizona. In addition, it has business partnerships with three large national or international semiconductor industry groups. The Center receives about a quarter of its support from its host institution, about half from the National Science Foundations and the final quarter of its funds from providing contract training and selling training materials.

Impact measurement

MATEC does not do any formal measurement of its impact at the present time, but the director and his staff have considered alternative methods for attempting such measurement. Their favored approach would be to count or estimate the number of additional relevant associate degrees granted in Arizona and across the country as a result of their activities. This is where they feel they have the greatest impact. In addition, estimates of the number of added four-year degrees and the number of graduates of non-degree training courses would also be valuable.

Of course, implementation of such a measurement strategy would involve substantial resources and some sophisticated evaluation to estimate the number of added degrees at 129 partner institutions. Interestingly, the director feels that there is a larger economic impact from developing a large number of two-year graduates as opposed to a small number of four-year degree holders.

In March 2008, an independent consultant performed an evaluation of the largest of MATEC's programs, NetWORKS. The evaluation section of the report focused on: 1) NetWORKS' acquisition of a collection of resources; 2) NetWORKS methods to disseminate learning materials, and 3) NetWORKS methods to advance the capacity of educators to adapt as new technologies and/or learner needs change. The report did not attempt to measure the economic impact of the NetWORKS program, but the consultant recommended that the Center develop more detailed and focused measures beyond simple "body counts" in order to demonstrate the Center's impact.

The Agriculture Center of Excellence

The Agriculture Center of Excellence is located at Walla Walla Community College in Walla Walla, Washington. It is one of eleven identified centers inside the Washington State Community and Technical Colleges. The Center is a leadership concept designed to promote economic development through collaborative processes and partnerships. The Center functions as a resource to other educational institutions and industry, serving as the nucleus for development of curriculum, skill standards and promoting technological

advancements. The 11 Centers in Washington identify best practices and provide workforce training services to industry and educational institutions upon request.

The Center works collaboratively with the Eastern Washington Partnership Workforce Development Council, Walla Walla Port Authorities, Economic Development Council, and other industries and agencies in support of agriculture and agriculture related business initiatives. Among its partners are John Deere Company, Tyson Foods, and the Northwest Food Processors Association. The Center has a small staff of two and a small budget funded principally by the state.

Impact measurement

Despite the focus on supporting economic development in a particular industry, no attempts have been made to estimate the actual economic impact of Center and none are envisioned. When asked about possible impact evaluation strategies, officials talk about measuring the educational efficiencies and costs savings to community and technical college system as a perceived benefit that they might endeavor to measure. However, they do not feel the need to estimate impact in terms of jobs or economic activity.

The Polymers Center of Excellence

Begun in 1994, the Polymers Center of Excellence (PCE) is a not-for-profit organization created by the state of North Carolina to assist the plastics industry through a variety of activities:

- ***Plastics Training***: They hold one-day classes in plastics selection and polymer properties, plastic part design, injection molding and extrusion. The plastics courses are designed for engineers, technicians, and operators.
- ***Plastic Part Design and Troubleshooting****:* They assist with design and development needs as well as solve part problems.
- ***Plastic Material Property Testing:*** They have a fully equipped material testing laboratory to test plastic properties and composition.
- ***Extrusion Compounding:*** Their twin screw extrusion lines can compound research and pilot-plant quantities of specialty plastic compounds to your specifications.
- ***Injection Molding****:* They can do molding trials and small-quantity moldings on their injection molding machine.

PCE enjoys a close and mutually supportive relationship with the Society of the Plastics Industry (SPI), the American Plastics Council (APC), the Carolinas and Piedmont-Coastal Sections of the Society of Plastics Engineers (SPE), and a large number of private firms. In addition, PCE has formal working partnerships with UNC-Charlotte, NC State University and the North Carolina Industrial Extension Service.

Thus, the Polymers Center of Excellence is primarily a resource to plastics companies. With its extensive equipment and capabilities, it can help businesses to design, refine, and do molding trials of their products – acting as a true partner in bringing those products from concept to finished product. Its educational activities focus mainly on one-day classes for existing workers in the field.

Impact measurement

In the latest fiscal year, the Polymers Center of Excellence reported the following economic impact on the state of North Carolina:

- $52 million of economic activity
- 92 jobs retained
- 86 jobs created

These estimates come from evaluations that are done on a quarterly basis by the Manufacturing Extension Partnership of the North Carolina State Industrial Extension Service. The Service sends a survey to all of the firms who have done business with the Center. Firms that sell products that were developed with the help of the Center have a relatively easy time in quantifying the impact of the Center when responding to the survey. And multipliers can be applied to the sales and payroll numbers reported by the firms to estimate overall impact from the center's activities in product design and manufacture. No separate formal estimate is made of the impact of the training activities of the PCE. To the extent that the Minnesota centers, especially the two manufacturing-based centers, develop product design, troubleshooting, and process design capabilities, implementing a similar survey could be an important source of information for future economic impact estimates.

Other centers

In addition, we surveyed information on a wide range of Centers of Excellence, some at universities and some freestanding with ties to educational institutions. We also interviewed a number of administrators at these centers. Outside of the Polymers Center discussed above, we did not find any that expressed their economic impact in economic activity and jobs. Those that provided formal measurement of their operations did so in terms of businesses and/or students served and other measures.

Lessons learned

From our survey of other centers and their methods of evaluation, we draw a couple of conclusions for the evaluation of the Minnesota Centers of Excellence.

- Seeking to measure the impact of the Centers on final measures of economic activity can be done, but is quite unusual in the field.
- Any assessment of the economic impact of the Minnesota Centers needs to take into account the actual mix of activities at each Center and the priorities given to those activities.

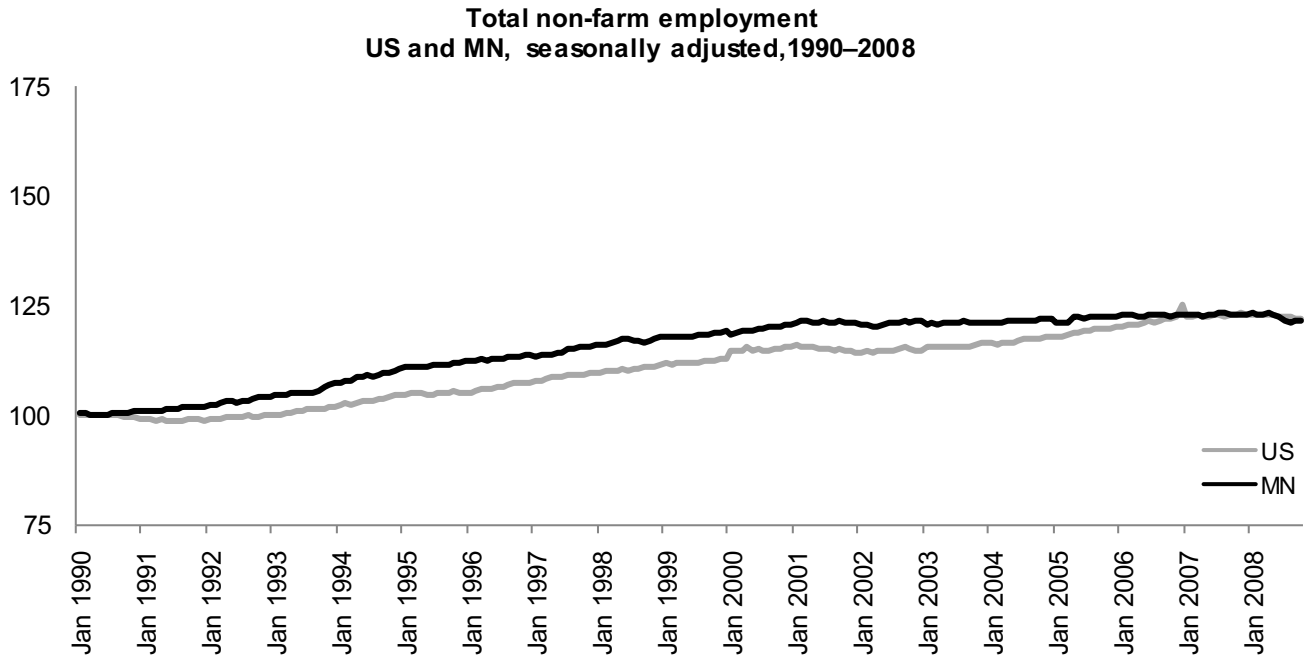
The Minnesota economic context

Minnesota and the nation

Overall employment in Minnesota grew faster than the nation throughout the 1990's, but this trend has reversed since then. This can be seen graphically in Figure 1 which shows total non-farm employment, indexed to its January 1990 level. The steeper slope of the Minnesota graph until about 2000 shows higher growth than in the rest of the nation, but the situation reversed in the current decade. In fact, the previous difference in growth in employment has been essentially wiped out – the overall growth rate over the 1990 to 2008 period is virtually the same for Minnesota and the U.S.

Similarly, unemployment was lower in Minnesota than in the U.S. until 2007, though the gap between them has narrowed since the early 1990's. Figure 2 shows the seasonally adjusted unemployment rate in Minnesota and the U.S. from 1990 through 2008. The most striking feature of this graph is that, unlike most of the previous two decades, Minnesota's unemployment rate has been essentially the same as the national rate since the beginning of 2007. The difference in unemployment that may have buffered Minnesota somewhat from the effects of the last two recessions does not seem to exist at the beginning of the current recession.

1. Total employment



2. Unemployment

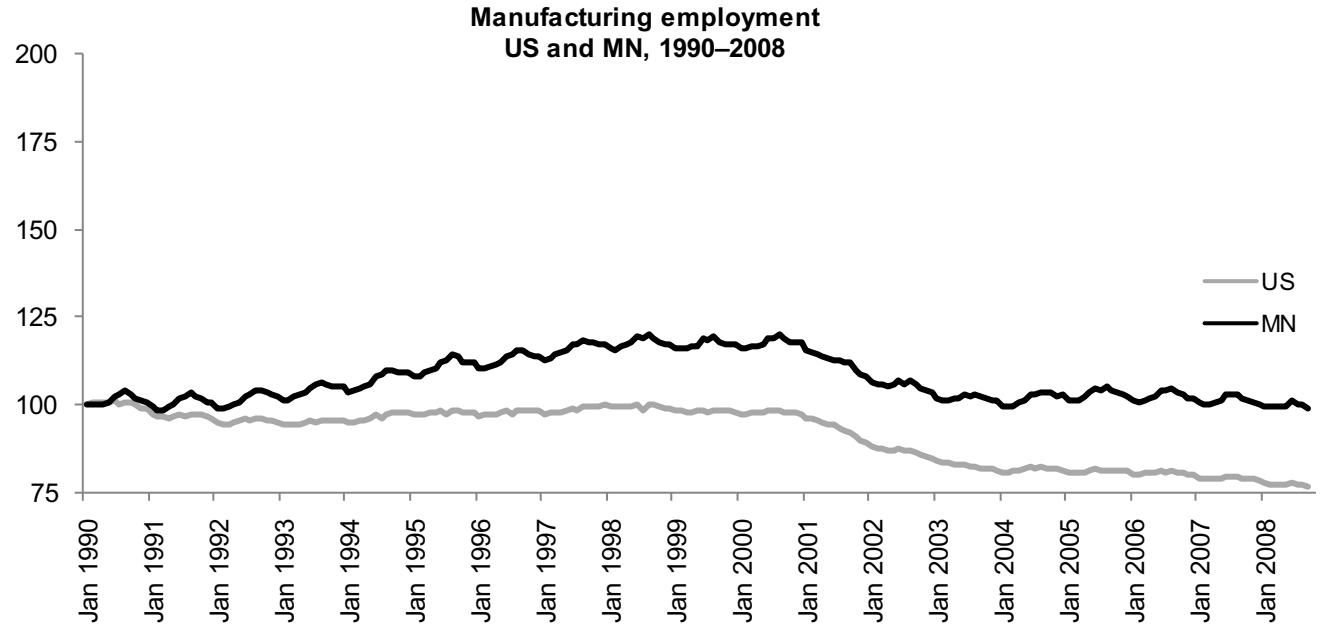
Target industries

We want to consider how employment in Minnesota has compared to the U.S. in the industries most likely to benefit from the activities of the Centers. To do this, we have used data on employment in the broad classes of Manufacturing, Information Services, and Health Care and Social Assistance. While these employment statistics are not exactly aligned to the Centers and their graduates, they do reflect the industries we believe are most likely to benefit from the activities of the Centers.

In these three classifications, Minnesota has experienced very different employment growth since 1990 and each classification showed distinct differences between Minnesota and the U.S. These trends and differences can be seen in the graphs below, where each series has again been indexed to its January, 1990 level to show growth from that point.

Unlike the U.S. as a whole, manufacturing employment grew in Minnesota during the 1990s. It has since fallen back to about 1990 levels in Minnesota while manufacturing employment in the U.S. has continued to decline since 2000. As Figure 3 shows, while manufacturing employment in Minnesota has struggled, the difference between employment growth in Minnesota and employment growth in the U.S. has been significant and in favor of Minnesota.

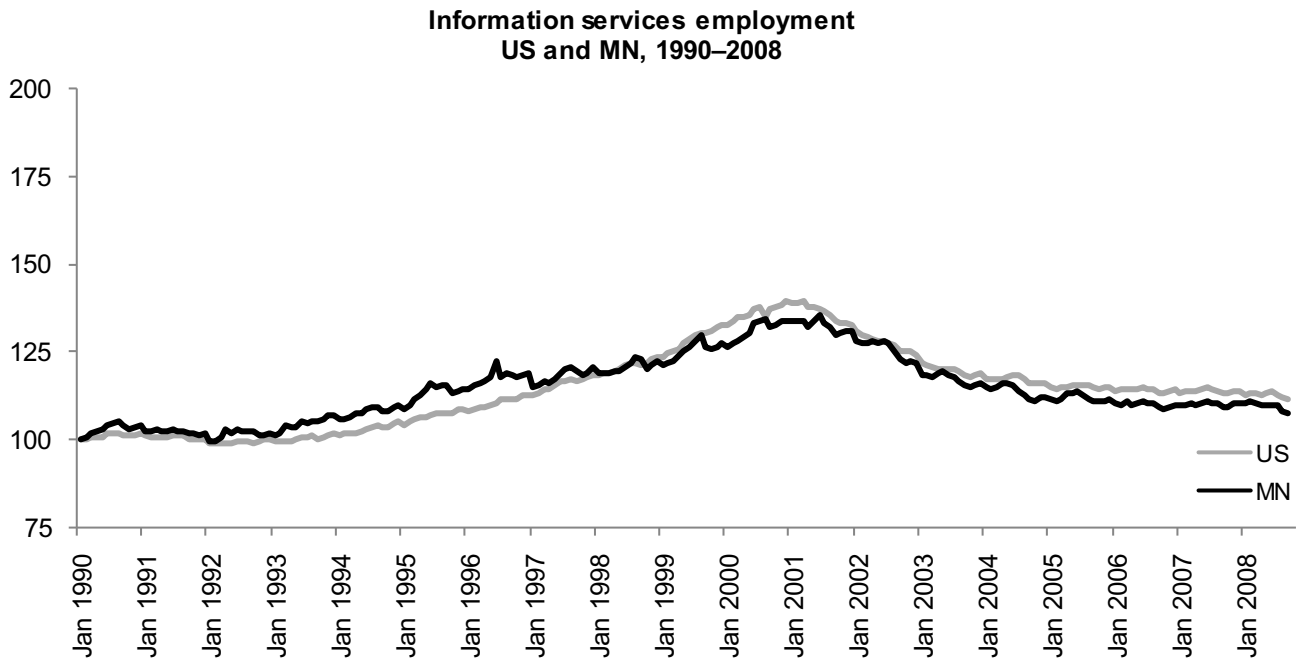
3. Manufacturing employment



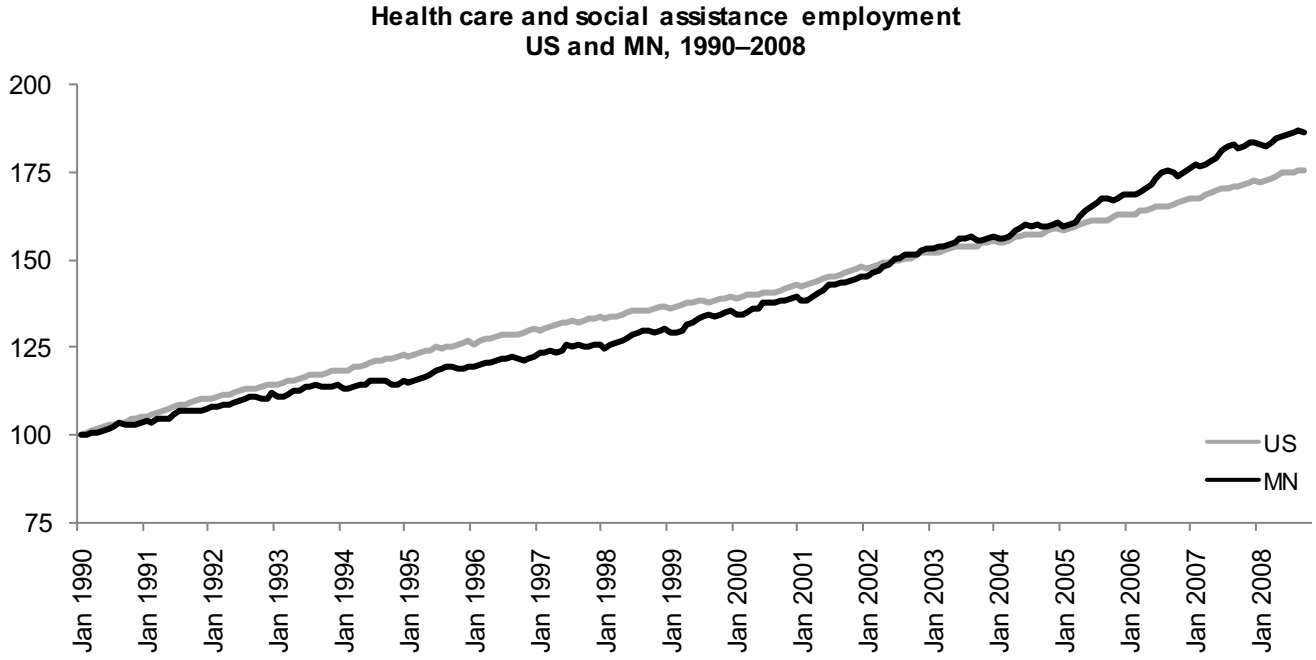
Employment in information services increased rapidly in the 1990's and has since fallen, though not quite back to the 1990 levels. This is true both for the U.S. and for Minnesota, as Figure 4 illustrates. Although the differences between the U.S. and Minnesota are not very large, there was a period in the early 1990's when Minnesota employment in these industries was growing faster than the U.S. This has since reversed and since 2002, Minnesota employment in these industries has been falling faster than the U.S.

Health care employment has seen the largest growth of these classifications since 1990. And this is true for both the U.S. and Minnesota. While growth in Minnesota was lower than the U.S. until 2002, it has since been significantly higher, as shown in Figure 5.

4. Information services employment



5. Health care and social assistance employment



Implications for the Centers of Excellence

These three areas, manufacturing, information services, and health care, are important to Minnesota's success. Together, they account for over a quarter of employment in Minnesota. While information services has the smallest employment directly, we believe that graduates with skills in this area are employed in all other sectors as well and expertise in this area is one key to future comparative advantage.

Minnesota enjoys better employment growth in manufacturing and in health care than the U.S. and relies on these industries more than the rest of the country for our economic health. It is in Minnesota's interest to find a way to better coordinate industry employment needs with training in these areas.

For the Centers, this also means that graduates are more likely to find jobs in these fields in Minnesota than in the rest of the country.

6. Employment in target industry classifications in Minnesota and the U.S., September 2008

	Minnesota	Pct	US	Pct
Total non-farm	2,769,549	100%	137,476,000	100%
Manufacturing	334,191	12%	13,443,000	10%
Information Services	56,588	2%	2,966,000	2%
Health Care and Social Assistance	384,152	14%	15,861,000	12%

***Sources**: MN Department of Employment and Economic Development – Current Employment Statistics and Wilder Research calculations.*

A model for assessing the Minnesota Centers of Excellence

An approach to measuring the impact of the Centers of Excellence needs to take into account the differing activities of the four centers and the connection of those activities to the Minnesota economy. In this section, we first discuss the different channels through which a Center's activities could affect the state's economy and the expected amount of time for effects to become visible and measurable.

Channels of influence

There are a number of potential channels through which the centers could promote the profitability and growth of businesses in Minnesota. Figure 7 includes the main ones arranged in ascending order with regard to the expected time until measurable effects would be achieved.

7. Channels of potential impact of Centers of Excellence on the Minnesota economy

Channel of impact	Timing
Training existing workers	2 to 3 yrs
Producing more and better trained graduates	3 to 5 yrs
Consulting with existing businesses	3 to 5 yrs
Applied research	5 to 10 yrs
Entrepreneurship, innovation, and forming new enterprises	10 to 15 yrs

While all of these are channels through which any of the Centers may have impact, the relative importance of these may vary as the focus and the activities of the Centers evolve over time.

Training existing workers

The constant enhancement and upgrading of the skills of the existing workforce is of concrete and immediate benefit to Minnesota companies as they cope with competitive pressures and technological change. System institutions already have numerous contracts to do customized training for Minnesota employers. The centers can expand the training of existing workers in their economic sectors in at least two ways. They could:

- encourage additional customized training through industry contacts and coordination among system institutions, and/or
- add new course offerings for which workers would register in order to build important jobs skills.

These activities will benefit Minnesota companies in a number of ways. They would raise the productivity of the existing workforce, reduce the need for companies' internal training, and reduce companies' labor turnover. Recent research has shown a connection between customized training and labor turnover at Minnesota companies. Lower turnover translates in lower costs of recruiting, hiring, and training new workers, dollars that immediately improve the bottom line of Minnesota companies.

If the center provides customized training for existing workers, the economic effects produced through this channel should be the first to emerge. Workers will be more productive at their jobs and, in some cases, move to new levels of responsibility and compensation. While it is very difficult to trace the increased productivity directly, increased wages of workers provide good evidence of this effect.

Producing more and better trained graduates

A second channel of influence is the production of more highly-trained graduates whose skills are more in line with the needs of Minnesota employers in key economic sectors. The advantages for Minnesota companies are obvious. These graduates can be more productive, require less training, and hiring costs should be lower as companies work with the Centers and come to rely on them more heavily as sources of trained workers.

The graduates produced by MnSCU could cover the whole spectrum from certificate programs, through associate and bachelor's degrees and even, in some cases, to graduate degrees. Coordination between the Centers and business partners could also mean that more internship and part-time employment opportunities are developed so that graduates would have significant real-world experience that would make them more valuable to Minnesota employers. As a matter of fact, when businesses involved with the Centers were surveyed as part of the second-year evaluation, the two potential benefits rated most critical were a better qualified pool of employees and an increase in the number of available employees.

Since all of the Centers have a strong focus on producing more quality graduates, this channel should be important to all four. Surveys of businesses connected with the Centers reflect their view that this is an important conduit through which they expect the Centers to add economic value. In those surveys, the businesses state that they expect effects in about three to five years from the beginning dates for the Centers. This accords

with common sense that it takes four years, or more, to produce graduates with four-year degrees. A measure of impact through this channel could eventually be generated by measuring the trend in graduates hired in the target industries and using appropriate multipliers to gross up their wages and business impact.

Consulting with existing businesses

The Centers could facilitate consulting contracts between college and university faculty and Minnesota companies in their chosen sectors. In particular, it would be possible that collaborations could spring up over the course of years that would provide ongoing beneficial information to Minnesota businesses, enabling them to compete even more effectively in national and international markets. These consulting arrangements could either be made directly between faculty members or through a formal entity allied with a specific institution or with the Center itself.

The expected timing for the development of these types of consulting relationships is, of course, highly variable and dependent on a matching of specific company needs and faculty capabilities. It is also plausible that the formation of such relationships will intensify as companies have more experience with the Centers, as more existing workers get training through the Centers, and as graduates are placed at businesses in the sector the Center serves. If this channel becomes an important part of a Center's activities, it is reasonable to expect measurable effects in the five- to ten-year range after the Center's inception.

Applied research

Beyond consulting which would involve the sharing of existing knowledge, it is hoped that the Centers would facilitate the production of new knowledge focused on the needs of Minnesota companies. Such research might grow out of a consulting relationship or result from a company approaching a Center with a question or problem.

It is envisioned that, over time, the faculty allied with Centers would develop expertise that would give them a comparative advantage at providing research relevant to the economic sectors that the Centers serve. This expertise and a possible research partnership with private industry could shorten the time for technology transfer to take place, thereby producing measurable impact on the state's economy sooner.

Like the growth of consulting relationships, the growth of applied research will be highly variable and dependent on a number of factors. Five to ten years is also a reasonable estimate of the time needed to produce measurable impact on the state's economy through this channel.

Entrepreneurship, innovation, and the formation of new enterprises

Finally, over time, it is conceivable that the ultimate effect of the Centers would be to foster the formation of new companies in their areas of industry focus. For this to occur there would have to be a critical mass of companies and workers in given sectors. Moreover, it would take some time for the graduates from the institutions to work in industry and potentially contribute to expansions and startups in Center-related industries.

Examples of industry clusters that develop momentum and generate formation of new enterprises are easy to identify after the fact, hard to predict, and even harder to induce through conscious, focused effort.

Effects on the state economy through this channel of influence are likely to take the longest time to become evident. A reasonable estimate would be 10 to 15 years before it might be clear that a Center was having a substantial effect on the state economy and, even then, it would be challenging to attribute the growth to the Center itself.

Final measures of economic impact

After sufficient time has elapsed for the Centers of Excellence to be having significant impact, it will be possible to measure that impact in final economic outcomes. The outcome measures should be statewide rather than regional, as discussed above. Here is our list of recommended measures for assessing statewide impact when the Centers have matured.

Employment growth

Employment should be measured in the industry sectors on which the Centers focus. In addition, employment should also be assessed in the occupations in which information services graduates work, since they will be spread throughout a large number of industry classifications. Even within more well-targeted industries, employment growth should be measured against national trends and sector employment in similar states.

Higher incomes

The incomes of program graduates should be compared with the incomes of other graduates and estimates of starting incomes of workers in the industries of focus. If the Centers are producing quality workers, this will eventually be seen in starting wages.

Production and exports

In the manufacturing sectors, it will also be possible to measure production and, possibly, exports of manufactured goods. Obviously, this is not possible for health services or information services.

Investment in research and development

Eventually, as the Centers mature, it will be possible to track research and development spending by certain industrial sectors. In particular, this information should probably be collected by surveying the businesses that have contact with the Centers through training, consulting, research, or hiring. This measure will be most applicable to the manufacturing and information services Centers. Perhaps, impact in the healthcare area can be measured by consulting if such activity develops.

Survival and establishment of businesses

Finally, the Department of Employment and Economic Development now charts the birth and death of firms in the state. Eventually, it will be useful to examine the data on firms in the areas on which the Centers focus to see whether they are having impact through this channel. As stated above, measurable impact through this channel probably takes the longest time to become evident.

Other measurement strategies

In addition, the Centers may find other ways to have impact on their chosen industries beyond the channels discussed here. For example, the Centers might become leaders in the analysis of change in their industries, providing information that helps businesses anticipate and adapt to change more quickly. The Centers could also become important partners to industry in ways that we may not fully imagine at this time.

As the Centers evolve, additional measures that capture their impact on their focus industries may be developed. It is hard to anticipate how this might happen and some of these measures might be significantly different from one Center to the next.

Intermediate indicators of economic impact

To assess the likely impact of the Center of Excellence at this early stage in their life cycle, the most appropriate strategy is to examine available data that sheds light on whether the Centers are developing in such a way as to have impact along some or all of the channels enumerated above. We present several of these intermediate measures.

Customized training

Data on the type and volume of customized training provided by the four Centers were collected and analyzed. Training is provided in both credit and non-credit classes on a contract basis with individual employers. A summary of the customized training provided by programs included in three of the Centers of Excellence is included in Figure 8. (The fourth Center reports very little training of this type.)

8. Customized training at Centers of Excellence

	2006	2007	2008	Change
360°				
Number of course sections	76	69	41	-46%
Registrations in				
Credit courses	209	162	150	
Non-credit courses	782	623	297	
Total Enrollment	**991**	**785**	**447**	-55%
MNCEME				
Number of course sections	69	43	56	-19%
Registrations in				
Credit courses	75	101	371	
Non-credit courses	642	375	366	
Total Enrollment	**717**	**476**	**737**	3%
HealthForce				
Number of course sections	33	30	32	-3%
Registrations in				
Credit courses	12	108	118	
Non-credit courses	451	439	395	
Total Enrollment	**463**	**545**	**513**	11%

Source: *Office of the Chancellor; calculations by Wilder Research.*

As the data show, total registrations in customized training classes at MNCEME and HealthForce increased, while registrations declined at 360°. It should be noted that the demand for these courses is affected by industry conditions and the business cycle in general. An economic slowdown began late in calendar year 2007 which may explain why demand for training at 360° fell off in the latest academic year.

Conversely, the economic slowdown is not reflected in demand for customized training at MNCEME. Perhaps, the employers requesting training from MNCEME are in less cyclically sensitive industries than those working with 360°. It is also interesting to note the rapid growth in enrollment in credit courses at MNCEME, a change which represents a shift in the mix of courses rather than an increase in the overall numbers.

The growth in registrations at HealthForce is not surprising given the relative strength of employment growth in the healthcare sectors of the national and state economies. There also, it appears that there is growing interest in credit courses.

In summary, it appears that the Centers of Excellence continue to provide valuable customized training to employers in their sectors of focus, even though the economy is weakening in the near term.

Degrees and other awards

We analyzed the number of awards of different types at the Centers. The total numbers of awards by Center and by type are included in Figure 9 below. Total awards declined slightly at the four Centers as a group. Total awards grew dramatically at 360°, slightly at MNCEME and declined at the other two Centers between 2006 and 2008.

9. Changes in numbers of graduates and award majors

	2006	2007	2008	Change
Awards				
360°	277	384	384	39%
MNCEME	480	531	503	5%
CSITS	163	185	162	-1%
HealthForce	2,315	2,142	2,112	-9%
Total	**3,235**	**3,242**	**3,161**	**-2%**
Awards by level				
Certificate	1,259	1,006	836	-34%
Diploma	698	787	801	15%
Associate	734	930	988	35%
Bachelor	466	452	461	-1%
Graduate level	78	67	75	-4%
Total	**3235**	**3242**	**3161**	**-2%**

Source: *Office of the Chancellor; calculations by Wilder Research.*

It should be expected that, in the first few years of operations, the Centers would have more impact on the number of shorter-term awards - certificates, diplomas, and associate degrees – than on bachelor's and graduate degrees. And that appears to be the case. Associate degrees granted grew by 35 percent between 2006 and 2008 and the number of diploma awarded rose by 15 percent. The overall number of certificates awarded dropped dramatically, but that change was the result of a policy change at one Center rather than a pervasive shift across all four.

Associate degrees

A Center-by-Center comparison of the data on these three awards, associates degrees, diplomas, and certificates yield some interesting patterns across the Centers. Figure 10 shows changes in the number of associate degrees at the four Centers.

10. Changes in numbers of associate degrees

	2006	2007	2008	Change
Awards				
360°	25	56	81	224%
MNCEME	160	182	190	18%
CSITS	20	27	33	65%
HealthForce	529	665	684	29%
Total	**734**	**930**	**988**	**34%**

Source: *Office of the Chancellor; calculations by Wilder Research.*

The numbers of two-year degrees granted to students enrolled in programs included in the Centers rose at all four Centers of Excellence between 2006 and 2008. The growth ranged from 18 percent at MNCEME to more than tripling at 360°. This result is especially promising because additional two-year degree graduates can be especially productive in the workplace, often with minimal additional training by the hiring firm. Several directors of other Centers of Excellence who were interviewed felt that their main contribution to industries in their states was in producing a large number two-year graduates rather than just a few more four-year grads.

Diplomas

The overall number of diplomas awarded by the Centers grew 15 percent and three of the four Centers showed relatively similar growth, from 12 percent at HealthForce to 25 percent at 360°.[5] Diploma programs are usually shorter than an associate degree, often one year in length. Figure 11 contains the data on the numbers of diplomas granted.

11. Changes in numbers of diplomas

	2006	2007	2008	Change
Awards				
360°	125	162	156	25%
MNCEME	110	169	128	16%
CSITS	5	3	4	-20%
HealthForce	458	453	513	12%
Total	**698**	**787**	**801**	**15%**

Source: *Office of the Chancellor; calculations by Wilder Research.*

[5] The fourth Center, CSITS, grants such a small number of diplomas that its decline is not significant and is reported here only for completeness.

The recipients of these diplomas, like the associate degree holders, will be useful and productive in industry settings and the increase in these awards is likewise an indication that the Centers are having a positive effect on the supply of qualified labor in the focus industries.

Certificates

Figure 12 shows the numbers of certificates awarded by programs included in the four Centers.

12. Changes in numbers of certificates

	2006	2007	2008	Change
Awards				
360°	55	94	73	33%
MNCEME	61	49	62	2%
CSITS	31	43	24	-23%
HealthForce	1,112	820	677	-39%
Total	**1,259**	**1,006**	**836**	-34%

Source: *Office of the Chancellor; calculations by Wilder Research.*

The overall drop in certificates was almost completely the result of a drop in certificates at HealthForce. That drop was the result of a conscious decision by the institutions in the Center to reduce enrollment in certain certificate programs because of a change in job market conditions. Certificates rose at 360° and were essentially unchanged at the other two Centers.

Taken as whole, the changes in the numbers of awards and the concentration of the growth in associate degrees and diplomas indicate that the Centers are having the desired impact on the labor pool available to their target industries. In later years, it will be interesting to see if the number of four-year graduates and graduate degrees will grow, as well.

Employment status of recent graduates

Another intermediate indicator of the effect of the Centers of Excellence is the employment status of recent graduates. We analyzed data from follow-up surveys of recent graduates done by MnSCU during the year after a student receives an award. Data from those surveys is included in Figure 13.[6]

13. Employment status of recent graduates

	2006	2007	2008
360°			
Number of graduates	277	384	384
Available for employment	187	274	
Employment Rate	96%	98%	
Related Employment Rate	93%	95%	
MNCEME			
Number of graduates	480	531	503
Available for employment	318	326	
Employment Rate	98%	97%	
Related Employment Rate	90%	92%	
CSITS			
Number of graduates	163	185	162
Available for employment	62	63	
Employment Rate	74%	84%	
Related Employment Rate	61%	76%	
HealthForce			
Number of graduates	2,315	2,142	2,112
Available for employment	1,094	946	
Employment Rate	88%	96%	
Related Employment Rate	85%	91%	

Source: *Office of the Chancellor; calculations by Wilder Research.*

Note: *Employment rates are calculated as a percentage of the graduates who responded to the survey and were available for work, i.e., not continuing their education or otherwise unavailable.*

[6] Survey data for students who graduated during the 2007-2008 academic year were not available at the time of this report.

As data in the figure show, a high percentage of graduates from all four Centers were employed within the year after graduation and almost all of them reported that they were working a field that was related to their degree or award. In fact, for three of the four centers, over 90 percent of the surveyed graduates who were available to work had found jobs related to their courses of study. Data from the surveys of 2008 graduates are not yet available and it is hard to discern a trend from the data for 2006 and 2007.

Success in the job market will always be affected by market conditions, so the percentage of graduates employed is expected to fluctuate. With the ongoing weakness in the economy, it would not be surprising to see a flattening or even a decline in the employment percentages in 2008 and 2009. As the Centers mature and businesses come to rely on them for workers, the absolute numbers will grow, hopefully, while employment percentages remain high.

Beginning wages

Another intermediate indicator of the success of the Centers is the wage levels at which their graduates are hired. We analyzed data from the Unemployment Insurance Wage Datafile maintained by the Minnesota Department of Employment and Economic Development (DEED). The System obtains actual wages and hours worked for its graduates from data that are reported to DEED for the state's unemployment insurance program.

The DEED records contain not only earnings and hours data for individuals, they also include codes designating the industries in which their employers are classified in the North American Industrial Classification System (NAICS). Using these NAICS codes, we partitioned the recent graduates of each Center into those whose records indicated they worked for employers in the industries on which the Center focuses and those who worked for other employers. We divided total earnings of each group by total hours worked to form estimates of hourly earnings. The results of our calculations are included in Figure 14.[7]

[7] The calculations of these average wage rates used the same wage data that was used to calculate the wage rates found in Table 23 in the overall evaluation report for the Centers of Excellence, Responding to Minnesota's evolving workforce needs, but are not comparable for two reasons, First, mean values were calculated here compared to medians in the larger report. Second, these calculations are weighted by the number of hours worked by each individual rather than counting each worker equally.

14. Hourly earnings of recent graduates

	2006	2007	Industry median wage 2007	Percentage of industry median wage 2007
360°				
Graduates working in manufacturing	$16.16	$17.97	$19.09	94.1%
Graduates working in other industries	$16.03	$16.65		
Difference	$0.13	$1.32		
MNCEME				
Graduates working in manufacturing	$18.79	$19.04	$19.09	99.7%
Graduates working in other industries	$17.57	$18.81		
Difference	$1.22	$0.23		
CSITS				
Graduates working in information systems	$27.12	$27.40	$23.13	118.5%
Graduates working in other industries	$22.68	$22.51		
Difference	$4.44	$4.89		
HealthForce				
Graduates working in healthcare	$19.31	$20.47	$16.23	126.1%
Graduates working in other industries	$13.83	$14.04		
Difference	$5.48	$6.43		

Source: *Office of the Chancellor and Minnesota Dept. of Employment and Economic Development; calculations by Wilder Research.*

Note: *The earning of recent graduates are mean values. Outlying observations in the DEED wage data were excluded before the calculations were made.*

Several patterns can be seen in the data in Figure 14. First, the estimated average hourly earnings for the graduates of each Center rose between 2006 and 2007. The earning of graduates of 360° and HealthForce rose more dramatically but the graduates of all four Centers posted increases.

Second, those graduates who we classified as working in firms in the target industries had higher earnings than other graduates allied with the Centers. These differences were especially large at CSITS and HealthForce. (It should be noted it is especially difficult to separate CSITS students into industry groups because information systems are used so broadly through all industry groups. Only students who worked at information systems

firms, internet related businesses and engineering and consulting businesses were counted as working in the target industry for CSITS.)

Finally, the average wages of the graduates of all four Centers who began work in their target industries were close to or above the median wages for all workers in those industries as estimated by DEED.[8] For beginning workers to start at this level is indeed a strong showing. It indicates that graduates bring established skills to their work at those firms and are valued by the firms.

Business outreach

Businesses in the target industries are engaged in the Center's activities and supportive of the Centers. In a survey of business representatives in the fall of 2007, respondents were overwhelmingly positive about the potential benefits of the Centers for their industries. Figure 15 is reproduced from the 2007 Progress Report. As the data show, these businesspeople were consistently optimistic about the potential benefits of the Centers. Extremely high percentages (in fact, at or close to unanimity for the respondents involved with three of the Centers) rated the possible benefits of better qualified workers, more numerous workers, and the chance to influence curricula as being either critical or very important.

Even the least popular potential advantages such as better information to prepare strategies, networking opportunities with industry peers, and applied research to advance the field were seen as critical or very important by approximately half of the business respondents.

[8] Strictly speaking, it would be better to compare our calculated mean wages to industry means rather than medians, but the Minnesota Department of Employment and Economic Development prefers to publish medians because wage data often include mistakenly large values that can bias calculation of means. Nevertheless, this approximate comparison shows that wages of Center graduates reflect the strength of the training they received.

15. Which of these potential benefits that the Centers of Excellence might produce would you rate as critical or very important?

	360° (N=15)		MNCEME (N=15)		CSITS (N=18)		HealthForce (N=18)		Total (N=66)	
	N	%	N	%	N	%	N	%	N	%
A better qualified or educated pool of employees available to employers	15	100%	15	100%	15	72%	18	100%	61	92%
An increase in the number of employees available to employers	14	93%	15	100%	12	67%	17	95%	58	88%
Opportunity for industry to influence college curriculum	14	93%	14	93%	11	61%	17	94%	56	85%
Upgraded skills of the workers who are currently in the industry	11	73%	12	80%	14	78%	15	83%	52	79%
A more diverse pool of qualified employees	12	80%	10	67%	12	67%	14	78%	48	73%
Opportunities for industry to interact or become familiar with the work of K-12 schools	12	80%	8	53%	6	33%	13	72%	39	59%
Applied research to advance the field and provide new industry practice	7	47%	11	73%	8	44%	8	44%	34	52%
Networking opportunities with industry peers	8	53%	4	27%	12	67%	9	50%	33	50%
Better information to make projections and preparations for future business strategies	8	53%	8	53%	8	44%	8	44%	32	49%

Source: *Wilder Research, telephone survey of business representatives, fall 2007.*

Additional data supplied by the Centers show that businesses got involved with the Centers and have remained involved in a variety of roles, including serving on advisory boards and subcommittees, donating hours to other activities, and providing other in-kind donations.

The numbers in Figure 16 show that the businesses continue to remain active and involved with the four Centers. And anecdotal evidence also supports the contention that enthusiasm for the Centers remains high.

16. Industry involvement, by Center

	360°	MNCEME	CSITS	HealthForce	Total
Number of business partners in 2008	59	29	79	20	186
Number of partners in 2007	38	25	48	64	172
Number of partners in 2006	63	31	45	35	172

Source: *Data provided by Centers, with calculations by Wilder Research.*

This continued business involvement and the outreach by the Centers holds the promise that additional consulting and research opportunities may develop as the Centers mature. To date, there has been only limited applied research and consulting, but the experience of other Centers around the country whom we interviewed supports the view that such activities may become increasingly likely as time passes and partnerships between the Center and industry businesses deepen.

For those partnerships to deepen and for the complete potential of the Centers to be realized, it is critically important that the activities of the Centers be continued and sustained in a way that builds business confidence. As businesses come to rely on the continued presence of the Centers, they will collaborate more readily and more often and start to include the Centers as permanent elements in their longer-term strategic plans.

Summary

Taken as a whole, these intermediate indicators show that the Centers have reached a point consistent with a vigorous start as measured in the third year of operation. Clearly, this is not the end point anticipated in the authorizing legislation, but it would be judged reasonable and appropriate by outside observers including industry partners.