

STEM EQUITY PIPELINE EVALUATION WORK – YEAR 2

The purpose of this section of the report is to describe the results of data collection from major activities during the second year for purposes of program evaluation. The evaluation was designed to accomplish three major goals: (1) to provide useful and actionable feedback for the STEM Equity Pipeline project team regarding the quality and effectiveness of training and services; (2) to synthesize feedback on the tools and processes developed as part of this project; and (3) to provide evidence of implementation success and impact on student and teacher outcomes.

During the second year, we collected feedback data on all major events (including all webinars) and reviewed and synthesized reports that documented activities in each of the seven states that received services. One new facet of the evaluation is the desire to learn about the extension of services beyond the core facilitators. That is, there is an expectation that some individuals who participate in activities conducted by facilitators (especially those who participate in “5-Step Program Improvement Process” training sessions) will go on to provide similar services in their own settings. To learn about these activities, we developed an “extension agent report” that we requested be completed by those who use what they learn from facilitators to provide extension services. A summary of our analysis of these reports is included in this report. Also as part of the second year of work, states began initiatives that we refer to as pilot or intensive sites. These initiatives are only in beginning stages, but we will eventually want to collect participation data from these individual sites to attempt to assess the effects of more focused efforts.

For the second year of the evaluation, we added the collection of interview data from state leaders and primary contacts in each of the states. (This data collection is not yet concluded and is, therefore, not included in this version of the report). This report also includes a status report on the collection of participation data from each of the states.

Table 1 presents a summary of the evaluation work during the second year. It should be noted that an evaluation form was not used for every event provided by facilitators, so the following reports represent a sample. The next section provides summary information on project activities and evaluation results. Detailed summaries of each separate national and state event (including statistics on each aspect of the events collected through feedback surveys) are included in the Appendix.

Table 1 Summary of Year 2 Evaluation Activities



	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	June 09
CA State Team Meeting	3			3	3				3	
MO State Team Meeting										
WI State Team Meeting	3							3	3	
IA State Team Meeting									3	
MN State Team Meeting					3					
Natl. Leadership Institute										
OK State Team Meeting			3		3				3	
IL State Team Meeting										
WI State Meeting on 5-Step Process										
Webinar: Step 1 of 5-Step Process			3							
Webinar: Step 2 of 5-Step Process				3						
Webinar: NAPE: Interactive Effects in the Theory of Behavior				3						
Webinar: Step 3 of 5-Step Process					3					
Webinar: Step 4 of 5-Step Process						3				
Webinar: Step 5 of 5-Step Process							3			
Webinar: Step 1 of 5-Step Process (Oklahoma)								3		
Webinar: GESA Works-Session 3								3		
Webinar: Nontraditional Career Preparation: Root Causes and Strategies										3
Webinar: Girl Tech: Mentoring Girls in STEM										3

Summary of Evaluation of State Events Conducted: Second Year of STEM Equity Pipeline Project

As with the first year of the NAPE STEM Equity Pipeline Project, surveys were distributed at the end of meetings to ascertain attendees' attitude towards the meeting, their progress towards the project goals, and topics of information they would like to learn more about. However, the second year was more diverse in



event topics and level of project involvement: some states joined the project only in the second year and were at a basic level of knowledge; others had developed pilot test sites and were already at an advanced stage. Question topics included gender equity awareness, general project information, confidence in carrying the project forward, working with data within the Five-Step Process, and knowledge about project resources available. A total of 16 state meetings were surveyed in Year Two.

Table 2 displays common questions asked within these 16 surveys. Response to these questions and most others were by and large very positive. Detailed summaries of each meeting are included in the Appendix.

Table 2. State team members’ average responses to state team meeting survey questions (1 = Strongly Agree; 4 = Strongly Agree)

Question	Average Rating
Sessions were carefully planned/organized	3.7
Content was useful for work	3.5
Root cause exercises increased understanding (CA, IL, OK)	3.5
Had good understanding of “Five-Step Process” (CA, IL, OK, WI)	3.4
Understood project purpose and goals (CA, IL, MN, OK, WI)	3.4

In addition to regular meetings, several webinars were conducted by Mimi Lufkin, Freda Walker, and other experts. These sessions allowed for people from other states not officially part of the project to gain knowledge about the Five Step Process and other issues related to gender equity in STEM fields. Data were obtained for questions asked during the webinar to participants, as well as surveys administered at the end asking about their webinar experience. All of the surveys had 3 questions in common, two of them similar to the ones asked in the in-person meeting surveys. Table 3 lists the average rating for them.

Table 3. Webinar participants’ average response to survey questions (1 = Strongly Agree; 4 = Strongly Agree)

Question	Average Rating
Webinars were carefully planned/organized	3.6
Content was useful for work	3.5
Had no logistical issues with connecting to webinar	3.2

The following section consists of summaries for each state team meeting and each webinar conducted in Year Two of the project.

State team meeting feedback: Individual state results

California

In Year Two, 4 state team meetings were held for California.



September 2-3, 2008

The first, a “Train the Trainer” session held from September 2-3, 2009, was convened by Mimi Lufkin and Freda Walker. The session, along with the other states’ Train the Trainer sessions, was intended to train local education agency and other State Team members in the implementation and facilitation of the Five Step Program Improvement Process with the goal that these individuals would use this information at either their home school or in other professional development situations. Topics included the Five-Step Process and its underlying theories. Over 35 team members attended the session. On average, survey respondents indicated that they grasped several key concepts, such as Documenting Performance Results, Gender Equity Theory, and root causes. Half of the members took the time to provide additional comments, which included:

- The hands-on opportunity was exceptional.
- I will be sharing all the information I gained with my programs – and will repeat the 5-step process again in December @ the JSPAC conference.

For the most part, the comments were positive, except that some people mentioned experiencing issues with the use of the Internet within the session.

December 2-3, 2008

The next California state team meeting was held three months later, with an audience of 43 team members. The session was another “Train the Trainer” workshop, and survey questions were more or less the same. Response to the scale questions was consistently positive; however, comments provided suggested the need for more in-depth coverage of the 5-Step Process for some people. For instance, the following comments were made:

- Since we are here for a 2½ day conference, why not include all 5 steps in training? You already have a captive, interested audience.
- It was great info that I will use; however I do not feel enough info was given on how to teach to others.
- Time allocation may not have led to fleshed-out explanation of steps and their connection.

January 15, 2009

The third meeting was titled *Addressing Nontraditional Student Participation and Performance*. This was a specific technical assistance visit from a project expert, Penny Paine, to Mt. San Antonio College. Darrow Soares, Dean of Career and Technical Education and Penny conducted training with CTE staff on the first two steps of the Five Step Program Improvement Process. The meeting included a case study of Mt. San Antonio College Core data presented by Dr. Soares and Ms. Paine presented on research based root causes that affect women’s participation in STEM related CTE programs. The survey data indicated that the training was useful to the respondents’ work related to gender equity, and that their awareness of



the specific Mt. San Antonio College Core Indicator data was raised. Less agreed upon, however, was whether the session contained a lot of new information. No survey respondent left additional comments.

May 5, 2009

The fourth and final California State Team meeting in Year Two had 58 people in attendance. The focus of this session was to update the State Team on the progress of the projects activities since its last meeting more than a year ago. The meeting included topics such as: women in STEM within California Community Colleges, how to act as extension agents for the project, using Perkins data for program improvement, and project resources available at the Virtual Learning Community. On all these topics, state team members responded affirmatively of having learned more about them, particularly the VLC resources. When asked to describe their next steps as part of the team, the majority wrote answers, ranging from perfunctory to specific. They included:

- I am writing a grant specifically aimed at bringing women into advanced manufacturing.
- Suggest a workshop for community college professional development (e.g. “flex week” at the beginning of the next semester).
- Forming a small team on campus of NT CTE professionals to review STEM materials and dialogue for hurdle credit.

Additional comments included:

- I would like to know more about specific activities to address the teacher shortage in the context of their project.
- [Counselors] are the gatekeepers for classes...so getting this info to the counselor workshops that occur @ UC/CSU each year would be very helpful.

Illinois

For July 15-16, 2008, Freda Walker, the state facilitator for Illinois, and Mimi Lufkin, project director, convened a Train the Trainer meeting hosting 15 people. Response to the scale questions, although limited to 10 people, was uniformly positive, especially for the specific activities. For instance, almost all “strongly agreed” that they found the discussion of root causes helpful, and that the exercises within the discussion helped them to understand the concept. Positive response was also reflected in the relative high response rate to the open-ended question. Comments included:

- I've been working on developing an Energy Academy as part of the Heartland Community College Youth Enrichment Program. This information has radically changed my planning and development trajectory in a very positive direction. I will now focus on nontraditional populations



and use the 5-step approach with the focus groups and administrators who will help us develop and implement the Energy Academy.

- I have appreciated the time spent to learn the "5 step process" and ways to possibly implement strategies @ colleges and consortia to address the issue of STEM. It becomes important with the new Perkins legislation to be more accountable on all measures including non-trad.

Iowa

Courtney Reed Jenkins, the state facilitator in Iowa, held two meetings towards the end of Year 2, on May 21 and May 22, 2009. Both were held at community colleges, Hawkeye and Iowa Western. The subject was expanding options for women and girls in STEM, and topics (as well as survey questions) covered included using data for identifying performance gaps, benchmarking data, and identifying root causes. 7 and 8 people attended, and although survey average ratings were somewhat higher at Iowa Western Community College, most at both meetings indicated agreement in increasing knowledge on the aforementioned topics. Two people (both from Iowa Western) indicated their next steps as part of the team. They were:

- Look better at recruitment – possible middle school ideas, etc.
- Re-read the given information and try to soak it in; look at our data more closely with a more focused perception

Minnesota

The Minnesota state team meeting for Year Two was held on January 21, 2009 and was facilitated by Howard Glasser. The session had two main objectives: to impress upon attendees the importance of gender equity in STEM in general, as well as to develop a Minnesota implementation plan as part of the NAPE STEM Equity Pipeline project. In terms of the former, respondents generally agreed that they absorbed more information on the female participation rate in STEM, on how sex-segregated careers relate to pay disparities, and on why gender issues occur. One person wrote, however, that *Under knowledge development, I think we only touched generally or tangentially on many of the topics (largely because our focus was on planning), but I still feel there were elements (however brief) of many of those topics so rated them very generally.* With regards to the state implementation plan, almost all respondents strongly agreed that the sample helped them understand the objectives for their own state plan, and that their plan's strategies devised later would lead to the desired results. However, a significant proportion of attendees did not believe the group made good progress in developing a calendar of activities and a resource directory.

Oklahoma

As part of Oklahoma's Year Two efforts, Rick Larkey convened five meetings: three for state team members, and two for audiences at the Oklahoma Department of Career Technical Education.

November 13-14, 2008



21 state team members were in attendance for this meeting. The objectives were similar to California and Illinois' Train the Trainer meetings and as such, the same survey questions were administered. All agreed or strongly agreed that they had a good understanding of the Five-Step Process, of the process of Documenting Performance Results, and Gender Equity Theory. While only three people provided additional comments, they were all positive. One wrote: *This has been one of the best conferences I've been at. Very good knowledge!*

January 12, 2009

This meeting was conducted with various representatives at the Oklahoma Department of CTE's Educational Services Division. A total of 16 people were in attendance. The purpose was to introduce gender equity concepts and the project's objectives, as well as to provide an overview of the STEM Equity Pipeline projects activities in Oklahoma and how they could get involved. Survey respondents generally felt that the information learned would be useful to their work, and that the meeting gave them ideas for how to support the STEM Equity Pipeline network. Although there was some sentiment among survey respondents that the session did not increase their awareness of data related to the lack of females in STEM careers, it was not clear whether it was because the session was not clear enough, or because they already had a substantial amount of knowledge in that area.

January 13, 2009

The following day, 9 convened a meeting with another division of the Oklahoma Department of CTE: Tech Prep. In addition to providing the project's background, underlying ideas, and goals, the meeting also focused on the Nontraditional measures under Perkins IV, and how the Five-Step Process could help with meeting its requirements. Survey respondents generally agreed or strongly agreed that the meeting was successful in conveying that information to them. On average they also agreed that the session would be useful to them; however, one person who disagreed wrote: *Tech Prep has had a strong focus on a seamless transition to college. Most of the careers that are non-trad for women are not careers that require a college degree.*

January 14, 2009

The third of the state team meetings was intended specifically for team members who were counselors, with a focus on encouraging females to enroll in STEM courses and choose STEM careers through the Five-Step Process. Respondents generally agreed that the presentation succeeded in conveying that information, as well as of information and training resources available. One person commented that the meeting will change the way he/she recruits for the pre-engineering program, and another wrote that he/she would conduct one-day workshops as part of the NAPE STEM Equity Pipeline effort.

May 27, 2009

A second Train the Trainer session was held in spring of 2009. This one focused on root causes, implementing solutions, and evaluating those solutions. On average, they agreed that the session gave



them a better understanding of consideration for developing solutions, how to match solutions to root causes, and how to pilot test solutions. For solution evaluation, respondents generally agreed that they gained an understanding of the difference between formative and summative evaluation, and between process indicators and short-term outcome measures. Survey participants also, on average, believed they could develop an evaluation plan using the resources and tools mentioned in the session. And as for the titular objective, most but not all agreed that they had the resources and skills necessary to train others in the 5-step Program Improvement Process. Among those who wrote about their next steps as state team members, two people wrote the following:

- 1st on my agenda will be to report to my principal and Carl Perkins rep the information I have learned today.
- Meet with my administration to discuss goals to implement diversity and equity training with our staff.

Wisconsin

For Year Two, Howard Glasser convened three meetings, one a more general state team meeting, and two specifically focused on pilot/target sites.

September 23, 2008

This session was a follow-up from the State Team meeting held in the spring of 2008 when the State Team received training in the Five Step Program Improvement Process and focused on data analysis. Karen Showers gave a presentation on data considerations, and afterwards the attendees split up into regional groups to analyze their own geographic region's data, as well as to identify additional work for the project. On the survey forms, several people indicated "N/A" when asked about Karen Showers' demonstration, so it is possible that some did not attend for that portion. On average, however, they found the guest speaker presentations and dividing into regional groups helpful. Some respondents still felt apprehensive about presenting data to others or playing leadership roles.

April 23, 2009

This meeting was specifically for pilot/target sites in Wisconsin with over 37 people attending. The session covered the purpose and goals of the project, as well as the importance of gender equity work in general. During the meeting, attendees learned of the data elements they were to collect and developed an action plan. While attendees generally agreed that they learned about important concepts such as Gender Equity Theory and identifying root causes, they were less in agreement on whether significant progress was made in developing an action plan or whether the steps they identified would achieve the desired goals. As for comments, one person wrote: *At the level we teach, we did not have data sets to analyze from WINSS. It would have been beneficial if our district sent us with a data set and informed us better of their goals for our participation.* Few others provided useful comments.

May 18, 2009

In the second State Team meeting, 29 people attended. A review of the past meetings' material was covered, as well as the Wisconsin STEM Portal. Respondents on average agreed that reviewing



Wisconsin data gave them ideas about how to pursue their goals; however, two respondents checked “n/a”, with one writing in, “What data?” Ratings were also favorable for the “Call to Action” review and respondents unanimously strongly agreed that the review of the “Professional Development” modules gave them ideas for strategies and practices. With regards to their own role in the project, respondents believed that the STEM Portal would be useful, and the local STEM Equity Pipeline Pilot Project would have potential to move their efforts forward. No one provided additional comment on a survey.

Webinars

A total of 13 webinars were conducted for Year Two. The following are summaries of each event, plus the first one (which was technically held during Year One).

May 21, 2008

The first webinar, hosted by Tricia Berry and Mimi Lufkin, was titled “Assessing Effectiveness: Do your program activities make a difference?” The webinar lasted one hour and touched on topics of professional development, the role of evaluation in program implementation, and Assessments of Women and Men in Engineering. On average, survey respondents felt that they learned about the latter two, but almost one fourth of respondents disagreed or strongly disagreed that the session gave them ideas for how to get involved in professional development or state-level activities. When asked for additional comment, most wrote general “thank you” messages; more revealing responses included:

- While the information presented was fine for staff who do not have any experience conduct[ing] experiments, I thought it was at an elementary level for others.
- Assessment is critical to program improvement, but it seems people generally do not know how to create quality assessment questions.

November 5, 2008

This webinar was the first in the series on the Five-Step Process (with one webinar devoted to each step). The first step, documenting performance results, had a webinar with 58 people participating and was hosted by Freda Walker and Mimi Lufkin. This webinar had two sets of survey questions: those asked during the webinar (about participants’ preexisting beliefs about Perkins data), and after (about the webinar experience itself).

Judging from the during-webinar response, there was quite a bit of variation in terms of familiarity with Perkins data: one quarter were familiar with the measures but didn’t know how it was collected, and a third knew it enough to use it for CTE program improvement. One quarter of respondents did not have access to Perkins data at all. For the post-webinar questions, response was uniformly positive. In general survey respondents felt they learned a lot about the construction Perkins measures, and would be able to use Perkins data to identify performance gaps. Few people provided additional comments, however. One person, when asked why the session was or was not useful to him/her, wrote *This session was useful to me to share with other state agency/local staff in analyzing data. The session was highly informative and I appreciated the constant feedback with the facilitator.*

December 1, 2008



The webinar on step 2 of the 5-Step Program Improvement (identifying root causes) was held about one month later. This time, 99 people attended at some point. The during-webinar questions focused on asking about participants' current beliefs about student career choice; from this, almost half of respondents believed that the most influential person of a student's career choice was a parent, but there was considerable diversity in response to the most common barrier to nontraditional career choices. The scale questions revealed that respondents generally found the information on root causes useful and actionable. When asked to describe any topics mentioned during the webinar that they wanted to know more about, comments included:

- Research within the past five years
- What tools are readily available for students and faculty to empower themselves
- Developmental psychology research relating to STEM Equity

Twenty people responded to the question "This session was/was not useful to me because..." Most responses implied that they did find it useful and included:

- Because Mimi directs participants to work locally to determine our particular root causes
- I appreciated the research/theory base of the presentation and information on assessment instruments.
- We are trying to identify ways to encourage participation in Non Trad careers.

December 17, 2008

Freda Walker, and Bettina Cassad facilitated this webinar, titled *Interactive Effects in the Theory of Planned Behavior*. Out of 103 registrants, more than 70 people participated. Topics covered included the stereotype threat phenomenon and how to help make classrooms identity-safe environments. Survey participants indicated that they increased their understanding of the concepts and would be able to help implement strategies to increase identity safety. An unusually high number of people took the opportunity in the survey to describe topics they would like to know more about. They included:

- How this topic might relate to self-fulfilling prophecy
- How cognitive behavior has an effect on interaction between the genders and races
- What the average parent could do to combat negative feelings over social inequality
- How Amy Bell's work (Virginia Tech) meshes with Bettina Cassad's. There are some contradictions.

Many people also described why the session was or was not useful, with most comments implying that the session was useful. They included:

- I especially liked the session on math.



- In a presentation, I always like to see more than powerpoint slides when possible.
- This session was useful to me because I promote STEM-related and robotics programs and we are trying to get more girls involved.
- We are promoting efficacy in our schools, and teachers are very resistant. This further reinforces the efficacy model.

January 13, 2009

This webinar was on the third step of the Five-Step Program Improvement Process: selecting best solutions for testing and evaluation, based on the locality's specific background and root causes (in other words, selecting Best Practices). It was facilitated by Mimi Lufkin. Forty-five people attended at some point. However, only seven people completed the survey. Those that did generally agreed that they gained an understanding of considerations for solution evaluation, and of how to match solutions to identified root causes. While survey response in general was low and only two provided additional comment, they were informative:

- It would have been more useful if we had been able to be on the webinar, see the questions being asked and participate in the surveys. My confirmation gave no link to the website, so we had to participate using the power point on the website only.
- You gave us many good resources, which I will save for reference. However, I may not have time to browse and spend a lot of time reading through them.

January 28, 2009

This webinar was designed for K-16 professional development staff, administrators, and STEM and CTE coordinators at the local, regional, and state levels. The topic was *Generating Expectations for Student Achievement* and was led by Dolores Grayson. The aim of the session was to give an overview of the essential elements for increasing student achievement exploring the correlation between perceptions, expectations, behaviors and achievement. Special focus was given to reducing disparities in instruction that might prevent STEM career exploration, and strategies were related to root causes identified in NAPE's 5-Step Process. Sixty-four people participated in the webinar at some point.

Judging by survey responses, the webinar succeeded in conveying knowledge about the relationships between perceptions, expectations, behaviors, and achievement status, and what observable positive, supportive, motivational interactions could counter disparities. A lesser proportion of people agreed that they could use those interactions as data sources. Topics respondents wanted to know more about included:

- Influencing attitudes and skills of teachers and support personnel so that they motivate and encourage students to risk, to achieve and to follow unique pursuits.
- More info on strategies to assist teachers
- Assessing effects on student achievement



Additional comments included:

- No new information since attending a GESA training a couple years ago.
- Great overview of GESA works. I understand the need to limit participation of the next 3 sessions to 30 individuals. However, as an evaluator, I would welcome the opportunity to audit/be a non-participatory viewer of the last session.

February 11, 2009

The webinar on the fourth step of the Program Improvement Process was facilitated by Mimi Lufkin. The webinar surveyed participants both during and after the session, in order to ascertain prior beliefs about evaluation as well as opinions on the webinar itself. Thirty-eight people attended the webinar at some point.

During the webinar, participants were asked the type of pilot test they would most likely implement; the majority that responded chose “comparing individuals against themselves” as opposed to “comparisons with similar populations.” With regards to current practice, there appeared to be quite a bit of diversity in terms of evaluation as a priority at participants’ work. The most common situation was that they did not allocate any money towards evaluation.

As for the post-webinar questions, those that responded indicated that not only did they learn information crucial to pilot testing and evaluating possible solutions, they also indicated that they would actually carry out pilot testing. Additional comments were similarly positive, and included:

- Having a full hour dedicated to this step gave me more insight about effective tools.
- This was very useful to me because I tend to go on gut feeling and anecdotal reports, rather than evaluation

March 11, 2009

The final webinar in the Five-Step Series was conducted by Mimi Lufkin and centered around the topic of implementation, including developing appropriate evaluation measures and the use of project management tools such as Gantt Charts and work breakdown structures. Respondents generally agreed that they understood the difference between process indicators and short-term outcome measures and how to use the project management tools described during the webinar. In addition, survey respondents believed that they would be able to use the resources and tools identified in the webinar to develop an evaluation plan. When asked topics they would like to learn more about, responses included:

- How these planning tools can be used for STEM Equity Pipeline Project implementation on the local level between local high schools and district tech college.
- What are the incentives/mandates for the high schools to participate in the STEM Project. It has been challenging getting support from various schools.

Additional comments people had were:

- It completed the cycle and provided more detail than any of the short courses on the 5-Step Process.
- The session was very useful to me about the NAPE involvement with PLTW to encourage middle school girls to continue in PLTW, as I will present this information in one month.



Several other comments alluded to the technical difficulties arising from the webinar, and although the majority indicated that they experienced no problem, it was not universal.

April 21, 2009

As part of the NAPE STEM Equity Pipeline project in Oklahoma, a webinar on Step One of the Five-Step Improvement Process was created specifically for state team members in that state. Eighteen people participated, and Mimi Lufkin and Rick Larkey were facilitators. Survey response rate was low, and, therefore, results should be interpreted with caution, but responses were mostly positive. Respondents unanimously agreed or strongly agreed that they understood the concept of benchmarking and sources of benchmarking data to use (average rating 3.2). Furthermore, respondents indicated that they knew how to use Perkins data for identifying performance gaps and planned to do so because of the webinar (average rating 3.0-3.2), and that they gained ideas for performance gap identification *outside* of using Perkins data (average rating 3.2). No survey respondent added additional comment.

April 22, 2009

On April 22, 2009, Dolores Grayson facilitated the third and final webinar in the GESA Works! Series, which focused on evaluation of performance and qualitative interactions. Webinar attendance was only for those who were participating in the entire series (11 people) and survey response (6 people) was low. Respondents indicated that they learned more on basic concepts of evaluation reflecting learning and motivation from the webinar and how equity concerns impact evaluation of student performance. Additionally, respondents on average agreed that they understood the importance of critical inquiry, higher level questioning and multiple teaching modalities that appeal to a variety of learning styles and analytical feedback's connection to internal motivational beliefs, locus of control and attribution theory. No one provided additional comments on the webinar.

June 4, 2009

On June 4, 2009, Mimi Lufkin conducted a webinar titled *Nontraditional Career Preparation: Root Causes and Strategies*. The event was conducted to release the new research review and the aim of the session was to introduce people to the new document and the associated online tool. Ninety people participated.

Survey respondents also indicated that they understood and learned a lot about how the new root causes and strategies web-based tool could be used. Furthermore, respondents on average agreed or strongly agreed that the document on Nontraditional Career Preparation: Root Causes and Strategies would be useful to them, and that they gained ideas on how to use it in professional development settings.

When asked for topics respondents would like to know more about, responses included:

- Detailed information on use of state and local Perkins data to ensure implementation of appropriate strategies
- any connections with other groups like NCWIT and National Girls Collaboration.

Positive comments included:

- This session was very useful to me because I gained insight on how I can provide support and assistance to our school and district in regards to improving our STEM program. Thank you!!



- Thank you so much for the root causes and strategies document which is based on research findings (plus the other 5-step resources). This was very timely - exactly what I needed!

June 18, 2009

This webinar, titled *Girl Tech: Mentoring Girls in STEM*, was facilitated by Mimi Lufkin and Freda Walker and conducted by Jessica Bullock, Girl Tech Coordinator at Francis Tuttle Technology Center in Oklahoma City, OK. Topics included the Girl Tech program, the strategies it employs to retain females, and the Programs and Practices that Work Award. The webinar had 30 participants.

With regards to specific topics taught, all respondents agreed or strongly agreed that they learned a lot about the Girl Tech program's strategies for retaining females in their STEM program. Most also indicated that they gained ideas for how to implement the strategies described in the webinar to their own educational entity, and that the content of the webinar in general would be useful to their work related to gender equity. However, some people disagreed or strongly disagreed on statements about the Programs and Practices that Work Award: about 20 percent didn't believe they learned a lot about it, and 38 percent did not believe they would apply or encourage others to apply for it. Topics that respondents would like to know more about included:

- Starting a mentoring program to increase interest in STEM related careers.
- How Perkins funds are used to benefit single parents, pregnant teens, ESL students, low income individuals, college students who are remediating, students with no GED/working on one. How are funds used across the country to impact these students?

Extension Agent Surveys

The Extension Agent Survey is a Web-based reporting tool on the STEM Equity Pipeline Project Website

<http://www.stemequitypipeline.org/StateTeams/ExtensionAgentReporting.aspx>

created in January 2009. The survey explores how so-called "extension agents" have used the information they learned through professional development provided by the project to train their colleagues at the state, district, and school levels, about nontraditional participation in STEM-related CTE programs and in using the 5-step program improvement process.

Periodic e-mail reminders ask extension agents who have attended Five Step Program Improvement Process Training or other professional development provided by the STEM Equity Pipeline project, to complete the short survey. The survey requests some basic demographic information and asks respondents to describe how they shared the information, whether through one-on-one sharing with colleagues, more formal presentations at conferences and workshops, or by offering training themselves. Respondents are also asked to describe the content of what they shared, the size and type of audience, any feedback they received, and suggestions they might have for improving the training and information offered by the STEM Equity Pipeline Project.



As of June 22, 2009, fifty-two extension agents from 14 states and Washington, D.C. had completed 66 surveys. Seven of the states (California, Illinois, Iowa, Minnesota, Missouri, Oklahoma, and Wisconsin) currently have state teams participating in the STEM Equity Pipeline Project. Individuals from other the states (Arizona, Arkansas, Colorado, Georgia, Pennsylvania, Vermont) and Washington, D.C. participate in the NAPE STEM Equity Pipeline Project listserv, and have attended Webinars or other training offered by the project.

Survey Results

Survey respondents were asked to choose an occupational category that best describes their position. Over half identified themselves as administrators. The second most popular category was state education agency staff member.

Table 4: Extension Agent Survey Respondent's Position or Role/ Responsibility

Position	Number of Respondents
Administrator	23
State Education Agency Staff Member	15
Teacher or Instructor	7
Counselor	2
Other (CTE coordinator, consultant, grant writer, community-based organization staff, etc.)	12

Survey respondents were asked to provide an estimate of the number of participants at the activity, and to describe the audience. The primary audience for the activities was school, college, or district level faculty members, administrators and other staff. Extension agents also reported events aimed specifically at teachers and students, and for representatives of business and industry.

Table 5: Number of participants and audience attending reported activities

Audience	Number Participating (% of total)
School, college, or district faculty, administrators and other staff	701 (33%)
School, college, or district faculty, administrators and other staff and business/ industry representatives	625 (30%)



Teachers or mixed groups of teachers and students	434 (21%)
Representatives from business/ industry	322 (15%)
Other (consultants, parents, community organization representatives, etc.)	34 (2%)
Total	2116

Respondents were also asked to indicate what the type of activity through which they shared information about the STEM Equity Pipeline Project. The most popular choice was one-on-one (or small group) sharing with colleagues, followed by in-service training.

Table 6: Types of Activities Described in Extension Agent Surveys

Type of Activity	Number Reported
One-on-one or small group sharing with colleagues	23
In-service training	15
Conference or workshop	13
Perkins annual or mid-year review meeting	4
Other (faculty meetings, electronic communications with colleagues, meeting with local businesses, etc.)	11

In-service training:

Representative events:

- Introduction to the work of NAPE, the STEM Equity Pipeline Project, and the 5-Step Process for Program Improvement at a college participating in the STEM Equity Pipeline Project;
- Outlined district CTE goals and their alignment with the work of the STEM Equity Pipeline Project, and made a district commitment to 5-step training district-wide for district CTE staff;
- Introduction to the STEM Equity Pipeline Project and the 5-step process offered at a meeting for school staff;
- Presentation of the STEM Equity Pipeline Project at a meeting of state postsecondary CTE staff at a statewide CTE teachers meeting.

Conferences and Workshops



Representative events:

- Presentation of the 5-step process to a district community advisory council.
- Project Lead the Way Illinois State Conference
- Statewide Architecture, Drafting, and Engineering Retreat
- International Technology Association Meeting in Louisville, KY
- Statewide conference for the Minnesota Precision Manufacturer's Association
- Wisconsin Association for Career and Technical Education Annual Conference

Activity Feedback and Suggestions for the STEM Equity Pipeline Project

For each reported activity, survey respondents were asked to briefly describe the feedback they received from participants. All but two of the surveys included participant feedback for the reported activity. Overall, attendees were positive about the activities and felt that their participation increased their knowledge of issues surrounding gender equity. Twelve respondents reported requests for additional resources, information, and assistance with STEM Equity issues following the activity, and ten noted that participants shared ways in which they planned to incorporate what they learned in their own work.

- “The participants were very impressed with the number of resources available. I did not administer a formal evaluation, but the feedback was good. One of the participants was the Executive Director of the New Jersey Technology Education Association, and he was very excited about sharing the materials with his organization’s membership.”
- “All participants found the retreat extremely rewarding and will seek our help in coordinating student field trips and other activities that will increase awareness in the areas of STEM.”
- “Students and colleagues asked questions and were interested in learning more about STEM equity issues.”
- “I had many requests for a copy of the presentation and [presentations] led to presentations at other sessions. One school to work group has my information from the STEM Equity Group as a standing agenda item for each meeting, which occur three times per year.”
- “This went very well. The group was very enthusiastic, and we hope to develop a workshop or conference to offer to technical centers next year.”

Eighteen of the surveys included suggestions for future professional development or curriculum development that would help respondents more effectively conduct their training. The majority of the responses concerned suggestions for new or revised materials on specific topics. All are reproduced below:

- “The more presentations and other resources that are ready to use, the better. I don’t have the time within my budget to spend excessive amounts of time exclusively on STEM. However, if the research is compiled for me, I have several venues to share it in an effective manner with constituents that will then disseminate the information within their school districts.”



- “[Strategies for] articulation with community colleges and higher education.”
- “How to help employers be more open to hiring non-traditional workers. We can train, but there is hesitation to train someone who will not be able to secure a job because of stereotypical ideas in the workplace.”
- “We need options for activities that occur at the postsecondary level. Perkins has 2 postsecondary performance indicators that concern nontraditional students. With pressure to meet targets, the payoff for working with high school students is not fast enough for postsecondary. We need options that can be applied to students in college now who are measured by Perkins.”
- “How do we do a 1-hour training session effectively? Often that’s all that is available at conferences.”
- “In our training, a lot of time was spent on trying to understand the spreadsheets provided and step one. I did not end up using these as they were too complicated. I developed a simpler spreadsheet using program-level data. In step 3, more concrete ideas would be helpful.”
- “Making step one more user friendly.”
- “Offer a workshop in a computer lab. More information on goal setting.”
- “Finding more resources that are minimal cost which meet academic math and national science standards, yet that teach teachers how to integrate the math into areas of engineering without being too narrow or too focused.”
- “More materials for college level. Most seem to be for the middle school level.”
- “Having the Startling Statements available was extremely helpful because the workshop leader is often confronted with the suggestion, the boys need this support as much or more than the girls do. Rather than replying and creating fertile ground for an argument, the Startling Statements are pulled, and the facts reply to the gender equity issue with clarity. For a local training with people from the same region, adding facts specific to the institution is helpful.”
- “More of the 'how to now' kind of training. We all know, at some level, when we are biased and when we are not, but giving us real tools that we can enact immediately will be more useful.”
- “Narrow in on what we need to look at for data.”
- “Facilitate seminar on using the STEM model in schools.”
- “Support in helping both CTE and academic faculty 7-16, and their administrators see multiple forms and uses of student data.”
- “When we have determined a cause for our low NT numbers I think the group would like to request some PD on what we can do collectively to combat this from reoccurring and what other schools across our country are doing and what has been proven to work. A webex conference, presentation would be perfect as the sending HS principal could participate from their schools, or we can convene as a larger group...we'll make that decision later...just know this is what we are considering.”



- “I am feeling a bit unsure about how to introduce the self evaluation tools without having a discussion about it but then wanting to be respectful to the person's personal discoveries. Has anyone done this with a group. I think this is a valuable tool.”
- “Ways to work with industry to make the workplace more open to women workers (particularly in advanced manufacturing fields).

Collection of State Program Data

The *Carl D. Perkins Career and Technical Education Act of 2006* (Perkins) mandates that states report data on individuals participating in and completing career and technical education (CTE) programs that are identified as nontraditional by the state.¹ In most instances, CTE programs assigned to the STEM Career Cluster are categorized as nontraditional due to the relatively low rates of female participation in STEM-related fields. Although differences in state population definitions and measure constructions invalidate interstate comparisons, program data can be used to identify differences in performance outcomes among individual secondary and postsecondary providers within a given state.

To collect program data, state administrators identify occupations within the state, or in some instances, nationwide, considered nontraditional for either males or females. Administrators then crosswalk these occupational field data with educational program codes to identify coursework that provides skill training to prepare individuals for employment in an identified field. Lists of CTE coursework fitting the nontraditional criteria are then circulated statewide to secondary and postsecondary program administrators, who provide data on students participating and completing identified CTE coursework within a given academic year.

The STEM Equity Pipeline Project is designed to increase female engagement in secondary STEM Career Cluster programs that prepare young adults to transition to postsecondary education and, ultimately, to complete a higher education degree. Study activities call for collecting statewide data on the number of female students participating in and completing STEM Career Cluster programs in targeted programs within study states. Student level data, in the aggregate, and disaggregated by sex, race-ethnicity, socio-economic status, and disability status are used to assess statewide outcomes and to establish baseline performance levels for identified providers.

Local educators, trained by state STEM Equity Pipeline facilitators, also use compiled information to identify performance gaps for females enrolling in STEM Career Cluster programs and to adopt program improvement strategies to close any observed gaps. The following section summarizes findings from Year 2 data collection activities and offers recommendations to guide subsequent year activities.

Data Collection Procedures

States new to the NAPE STEM Equity Pipeline initiative are required to submit baseline Perkins data on female participation in, and completion of STEM Career Cluster programs for the two academic years preceding their study involvement. Requested information includes aggregate statewide performance data, averaged across all providers in the state, and individual provider data for each secondary and

¹ A nontraditional occupation is one in which males or females comprise less than 25 percent of the workforce.



postsecondary institution receiving federal Perkins funding. States continuing their study involvement are asked to supply data collected for the most recent academic year.

To compile STEM information, beginning in December 2008, MPR researchers began contacting state Perkins data analysts to request state Perkins data on CTE participants and concentrators² within state-defined STEM career clusters,³ and on two Perkins nontraditional measures for secondary and postsecondary programs.

Specifically, MPR requested state administrators in the two newest states—Iowa and Minnesota—to supply the raw data used to calculate their state’s nontraditional participation and completion measures for the 2006-07 and 2007-08 program years. These data consist of counts of the number of underrepresented students participating in or completing CTE programs preparing students for employment in nontraditional occupations, along with the number of all students (male and female) participating in identified programs. States continuing in the project were requested to supply information for the 2007-08 program year, as well as to provide missing information for the 2006-07 program year, where available.

Data Collected June 2008 to June 2009

Findings from the first year of project implementation revealed that participating states were unable to provide complete data on female students’ involvement in CTE programs associated with nontraditional employment. Reasons for missing data varied, with states reporting they lacked management information system capacity to extract requested data, were employing methodologically flawed data collection that led to the collection of inaccurate data, lacked staff time to respond to researchers data requests, or failed to communicate researchers data requests to the appropriate individuals within either the secondary or postsecondary agency.

To overcome these reporting difficulties, MPR researchers adopted several strategies to support state data analysts in supplying requested data. One of the first improvements came in the state selection process. MPR researchers worked closely with NAPE STEM Equity Pipeline staff to develop new criteria for use in the state application process, and once possible states were identified, collaborated with the NAPE state facilitator to ensure that states accepted to the project had the capacity and will to report required data. Further, to set an early expectation for state reporting among newly recruited states, MPR researchers held a conference call with the state secondary and postsecondary data administrator and NAPE state facilitator soon after the states joined the project.

² Although state definitions may vary, a CTE concentrator generally is defined as a secondary student who has completed at least half of the credits within a state-recognized CTE program sequence. At the postsecondary level, a CTE concentrator includes students who have completed at least 12 credits of a CTE program sequence consisting of 12 or more academic and technical credits that terminates in the award of an industry recognized credential, certificate, or a degree, or who (2) completes a short-term CTE program sequence of less than 12 credit units. The federal Consolidate Annual Report (CAR) form requires that states submit unduplicated counts of CTE concentrators participating in the 16 career clusters identified by the States’ Career Clusters Initiative.

³ The federal Consolidate Annual Report (CAR) form requires that states submit unduplicated counts of CTE concentrators participating in the 16 career clusters identified by the States’ Career Clusters Initiative. States with program areas broader than the 16 career cluster areas or with programs that cut across more than one cluster are required to select an appropriate cluster in which to count the student.



To improve data reporting among existing states, MPR researchers held conference calls with state data analysts and NAPE state facilitators to review the operation of states' data system and capabilities and outline the expectations associated with the 2007-08 data request, and respond to analysts' questions. Follow-up calls and communications were conducted on a regular basis to review how the data would be analyzed and used so that data analysts would have a fuller understanding of the project.

For analysis, MPR researchers used a crosswalk developed by NAPE to identify STEM-related CTE programs that are considered nontraditional.⁴ By applying a common set of course and program areas, researchers were able to increase the comparability of data reporting across states. However, the capacity to compare data across sites is tempered by the differing course-taking thresholds that states have adopted to identify CTE participants and concentrators, the varying methodological approaches states are using to compile information, and differences in how states identify CIP courses.

As of June 2009, MPR researchers have obtained Perkins performance data from all of the seven study states. Four states—Minnesota (new), Missouri, Oklahoma, and Wisconsin—submitted complete secondary and postsecondary data for both the 2006-07 and 2007-08 program years, and two states—Iowa (new) and California— was able to provide complete records for the 2007-08 academic year, and secondary data for a single year. The remaining state, Illinois, provided secondary data for in a 2006-07.

Table 7: CTE Program Data Received from States Participating in the NAPE STEM Equity Pipeline Project for 2006-07 and 2007-08.

State	2006-07		2007-08	
	Secondary	Postsecondary	Secondary	Postsecondary
California		*	*	*
Illinois	*		*	
Iowa		*	*	*

⁴ Of the 1,664 CTE programs included in the crosswalk, 144 and 385 are identified as associated with occupations nontraditional for males and females , respectively; 804 as STEM-related; and 331 as STEM-related *and* associated with occupations nontraditional for females. (2007). Instructional Programs by Clusters/Pathways: Table 3: CIP-Nontrad-Custer Pathway. Retrieved February 12, 2009 from <http://www.napequity.org/page.php?180>.



Minnesota	*	*	*	*
Missouri	*	*	*	*
Oklahoma	*	*	*	*
Wisconsin	*	*	*	*

Careful selection of new states has allowed MPR researchers to collect nearly complete data from each of the states added to the project in the 2007-08 program year. Moreover, consultations with existing states have helped to improve the data quality among returning states. For example, both California (returning) and Iowa (new) recently revised their secondary CTE data systems, and as a result of discussions, were able to provide data for the 2007-08 program year. Unfortunately, though Minnesota was able to provide data for both educational sectors, data privacy laws required the suppression of over 90 percent of student data at the secondary, and about 67 percent of student data at the postsecondary levels.

Other data constraints beyond the scope of this project also have implications for data analyses. Oklahoma is currently implementing a new data system at the secondary level, and it is anticipated that more complete data for the 2008-09 will be available in fall 2009. Currently, the secondary data are aggregate enrollments in 14 CTE Technology Centers. Both Wisconsin and Minnesota collect secondary data using two or four-digit CIP codes, rather than the six-digit codes necessary to identify STEM-related CTE programs that are non-traditional for females. In California, postsecondary data is available by institution, but does not include enrollments by CTE program, or nontraditional enrollments by gender. For these states, the state level analysis is more limited, and the current focus is on obtaining more detailed data for the local providers participating in the STEM Equity Pipeline Project for analysis and training. At the postsecondary level, all data reports use 6-digit CIP codes, and both years were generally available.

Using Data for Program Improvement

At the secondary level, MPR analyzed female participation and concentration rates for all CTE programs and for STEM-related CTE programs associated with occupations non-traditional for women in the four states with the most complete data. Tables 8 and 9 summarize the findings from this analysis for the secondary and postsecondary levels, respectively, in 2007-08.

Female participation and completion rates were somewhat lower than for males across all CTE programs, although females were slightly more likely to be enrolled in secondary CTE programs in Missouri, and also among secondary concentrators in Oklahoma and Wisconsin. This finding is likely the result of relatively high female participation in business, and healthcare (particularly nursing) courses, which account for a substantial number of CTE program enrollments. Female participation and completion rates in STEM-related courses associated with occupations nontraditional for females generally half those of males, and prepare students for high-skill, high-wage occupations in construction, manufacturing, computer science, and engineering; many require advanced training in math and science.

Table 8: State-Level Percentages of Female Participants and Concentrators in All Secondary CTE Programs and in STEM-related CTE Programs Associated with Occupations Nontraditional for Females, 2007-08.



State	Secondary			
	Total participants	% Female	Total concentrators	% Female
California				
All CTE	1,104,445	44.7%	522,059	44.7%
Stem related nontraditional for females	417,164	30.8%	186,691	28.8%
Iowa				
All CTE	191,094	46.3%	72,399	39.8%
Stem-related nontraditional for females	76,797	23.9%	31,482	15.6%
Missouri				
All CTE	127,741	51.7%	n/a	n/a
Stem-related nontraditional for females	55,788	38.3%	n/a	n/a
Wisconsin				
All CTE	n/a	n/a	31,852	43.1%
Stem-related nontraditional for females	n/a	n/a	8,538	19.3%

Table 9: State-Level Percentages of Females Participants and Concentrators in All Postsecondary CTE Programs and in STEM-related CTE Programs Associated with Occupations Nontraditional for Females, 2007-08.

State	Postsecondary			
	Total participants	% Female	Total concentrators	% Female
Iowa				
All CTE	40,709	56.9%	25,655	56.8%
Stem-related nontraditional for females	11,722	11.2%	7,582	11%



Minnesota				
All CTE	22,536	48.4%	16,342	45.9%
Stem-related nontraditional for females	9,277	9.0%	6,738	8.3%
Missouri				
All CTE	56,063	57.0%	27,497	57.7%
Stem-related nontraditional for females	15,326	32.0%	n/a	n/a
Oklahoma				
All CTE	78,000	50.5%	16,994	63.9%
Stem-related nontraditional for females	28,684	27.6%	4,128	31.7%
Wisconsin				
All CTE	31,852	43.1%	24,394	65.4%
Stem-related nontraditional for females	8,538	19.3%	4,517	9.5%

Although female participation and completion rates are comparable within states, care should be taken when comparing outcomes across states. As described earlier, states are using different population definitions and strategies to collect data, which tend to undercut data comparability.

Analyses are more meaningful at the individual state level, where student populations, course identifications, and data collection methodologies tend to be consistent. Unfortunately, for Perkins reporting purposes, states aggregate local program data, and program data across all nontraditional programs to produce a single statistic used to describe states' overall performance on the nontraditional measures. While this analysis is useful for national accountability purposes, such aggregate measures are nearly useless to support program improvement efforts.

When controlling for state and educational sector, it is desirable to disaggregate STEM-related program data to examine program trends over time, identify the types of nontraditional courses that attract relatively higher proportions of female enrollments, and identify high-performing institutions. To assist state administrators and NAPE STEM Equity Pipeline facilitators in jumpstarting the Five-Step process, MPR researchers have developed strategies for disaggregating state data to allow team members to identify the underlying factors that affect program performance.

Disaggregate 1: Statewide Nontraditional Data



At the highest level of aggregation, state data can be used to analyze nontraditional participation in the target programs across all providers. For illustrative purposes, we have taken data from one state—Iowa—that has compiled a relatively clean set of data. Table 10 arrays the percentage of females who were participating in or concentrating in eight STEM-related CTE programs nontraditional for women in Iowa at the secondary level in 2006-07 and 2007-08.⁵ The table highlights how female enrollments vary by program and over time. With this information, states can initiate the Five-Step Process for program improvement, which begins in Step 1, with Documenting Performance Results. Unpacking the information contained within the table can provide state administrators (and NAPE STEM Equity Pipeline state facilitators), with useful data to drive program improvement efforts.

Some of the questions that state administrators may wish to consider, using Table 10, include:

- Should services be targeted on relatively low-performing programs, such as Aircraft Technology, which has very low female participation and completion rates, statewide?
- What are the root causes that might explain the relatively high rates of female participation in Animal Health Technician or Animal Production Technology programs, or in contrast, the lower rates in Architecture and drafting? Are differences due to subject area content or other factors, such as the curricular content, the composition of the teacher workforce, or economic demand for skilled workers?
- Do program areas demonstrate relatively similar participation and completion rates, or are some program areas more likely to enroll females only to have them fail to achieve concentrator status?
- How are participation and concentration rates changing over time, and do trends indicate that efforts associated with the STEM Equity Pipeline Project (or other factors) are having a beneficial (or detrimental) effect?
- How do individual providers perform on identified programs? Are statewide trends the result of relatively comparable outcomes across many programs within the state, or the result of a handful of programs that are outperforming or pulling down statewide performance?

Table 10: Iowa statewide percentage of females participating and concentrating in Postsecondary STEM-related CTE Programs Associated with Occupations Nontraditional for Females, 2006-07 and 2007-08.

CIP Code		Program Name		Participants				Concentrators			
				2006-07		2007-08		2006-07		2007-08	
				Total	% female	Total	% female	Total	% female	Total	% female
010101	AGRICULTURAL BUSINESS	12	41.7%	64	28.1%	2	100.0%	5	20.0%		

⁵ To illustrate how participation and concentration rates for females vary across programs, we have selected the first eight programs from a larger table that includes all STEM-related CTE programs offered at the postsecondary level. In practice, educators would have access to data for all of the programs.



010105	AGRICULTURAL SUPPLIES AND SERVICES TECHNOLOGY	381	34.1%	521	32.2%	246	19.9%	305	22.3%
470609	AIRCRAFT TECHNOLOGY	61	1.6%	63	4.8%	58	1.7%	59	5.1%
010903	ANIMAL HEALTH TECHNICIAN	65	95.4%	81	93.8%	47	93.6%	55	98.2%
010302	ANIMAL PRODUCTION TECHNOLOGY	53	66.0%	49	67.3%	45	62.2%	44	68.2%
011103	ARBORICULTURE TECHNOLOGY	17	35.3%	23	21.7%	15	40.0%	16	18.8%
151303	ARCHITECTURAL DRAFTING/CAD/CADD TECHNOLOGY	378	15.1%	374	14.7%	176	21.6%	183	18.0%
150101	ARCHITECTURAL ENGINEERING TECHNOLOGY	68	14.7%	60	13.3%	33	15.2%	36	8.3%

Disaggregate 2: Provider-level Nontraditional Data

Provider-level data can be used to identify relatively high performing schools and programs and sites that may have adopted promising practices that may have application in other locations. Table 11 summarizes the percentage of females participating or concentrating in STEM-related CTE programs nontraditional for women in Iowa postsecondary institutions in 2006-07 and 2007-08. This type of analysis highlights how female enrollments vary by institution and potentially over time. Although institutions vary in the types of programs offered, which can impact nontraditional enrollments, an examination of Table 11 can serve as a first step in answering questions such as:

- How do institutions vary in terms of the enrollment of females in STEM-related CTE programs associated with occupations nontraditional for women?
- What are the factors or root causes that might explain the relatively high rates of female participation at Iowa Valley Community College District or the lower rates at North Iowa Area Community College? Are differences due to the programs offered or other factors, such as strategies the institution has implemented to address nontraditional enrollments, the composition of the teacher workforce, or economic demand for skilled workers?



- Do institutions demonstrate relatively similar overall participation and completion rates in these fields over time, or are some institutions more likely to enroll females only to have them fail to achieve concentrator status?
- How are institutional participation and concentration rates changing over time, and do trends indicate that efforts associated with the STEM Equity Pipeline Project (or other factors) are having a beneficial (or detrimental) effect?
- Are statewide trends in female enrollments in these fields the result of relatively comparable results across institutions within the state, or the result of small numbers of institutions that are outperforming or pulling down the statewide performance?

Table 11: Total and percentage of female participants and concentrators in STEM-related CTE programs associated with occupations nontraditional for females in Iowa postsecondary institutions, 2006-07 and 2007-08.

Institution Name	No. of Programs (2008)*	Participants				Concentrators			
		2006-07		2007-08		2006-07		2007-08	
		Total	% female	Total	% female	Total	% female	Total	% female
Des Moines Area Community College	25	2629	11.3%	2583	12.4%	1341	9.5%	1308	9.9%
Eastern Iowa Community College District	18	816	11.5%	722	10.0%	307	12.4%	308	9.7%
Hawkeye Community College	20	922	11.0%	1024	10.6%	720	11.1%	777	11.7%
Indian Hills Community College	15	944	7.0%	889	6.3%	517	7.7%	521	5.8%
Iowa Central Community College	19	929	9.1%	947	9.4%	701	9.1%	718	9.6%



Iowa Lakes Community College	14	355	6.8%	506	6.5%	308	6.8%	365	5.8%
Iowa Valley Community College District	8	159	29.6%	134	26.1%	127	31.5%	116	25.9%
Iowa Western Community College	13	342	8.5%	451	9.8%	293	8.9%	281	9.6%
Kirkwood Community College	34	1902	16.4%	2016	17.3%	1387	16.7%	1410	18.3%
North Iowa Area Community College	17	402	2.5%	399	2.5%	290	3.1%	318	3.1%
Northeast Iowa Community College	10	241	8.3%	351	9.7%	191	6.8%	251	6.4%
Northwest Iowa Community College	18	438	11.0%	481	11.2%	338	11.5%	363	9.9%
Southeastern Community College	13	387	12.1%	366	10.1%	274	13.1%	250	13.2%
Southwestern Community College	7	252	7.5%	247	6.9%	228	7.0%	207	6.8%
Western Iowa Tech Community College	18	795	10.4%	606	9.7%	445	10.3%	389	10.0%

*The number of programs indicates the number of programs for which participants and concentrators were reported in 2006-07 and 2007-08.

Disaggregate 3: Program-level Nontraditional Data

While provider level data can provide useful information on school districts or postsecondary institutions that are performing relatively highly or are in need of support, it can be helpful to focus in on specific nontraditional program areas to assess the relative performance of all providers offering that program. Ideally, states will be selective in identifying program areas associated with nontraditional employment, for example, focusing on programs that are fundamental to the state’s economic base or that prepare students to enter high-wage, high-skill, or high-demand occupations.

As an example of the potential for analysis, Table 12 identifies Iowa’s fifteen highest performing secondary school districts in terms of female enrollments for Drafting and Design programs.⁶ An analysis by program type can support state administrators in answering questions such as:

- How does the performance of individual districts compare to the statewide average, as well as relative to one another?

⁶ For illustrative purposes, the information contained within this table is for the fifteen highest-performing school districts for one program in the state. In practice, educators would have access to data for all providers and target programs.



- Can performance outcomes be explained by provider geographical location (i.e., how do districts clustered within a given region perform)?
- Are some programs particularly adept at recruiting females to participate, or might differences be explained by other factors, such as provider size?
- How do participation and concentration rates vary across providers? Do some districts appear to recruit high levels of females and retain them so that they achieve concentrator status?

Table 12: Percentage of Females Participating in Drafting and Design Programs at the Secondary Level Statewide and in the Fifteen Highest-Performing Secondary Districts, 2007-08.

Program Name/ District	Total participants	% female	Total concentrators	% female
CIP Code 151301 Drafting and Design	8,369	19.1%	2,562	9.3%
Vinton-Shellsburg	368	46.5%	43	9.3%
Alta	63	46.0%	41	43.9%
Clarion-Goldfield	201	45.3%	59	13.6%
Odebolt-Arthur	68	42.6%	0	0.0%
Indianola	18	38.9%	16	43.8%
Marion Independent	240	37.5%	48	10.4%
Elk Horn-Kimballton	22	36.4%	9	11.1%
Creston	33	36.4%	7	0.0%



Burlington	210	35.7%	40	15.0%
East Central	32	34.4%	0	0.0%
Union	161	32.3%	62	8.1%
Mount Pleasant	79	31.6%	9	11.1%
West Monona	68	30.9%	24	45.8%
Davenport	301	28.6%	20	0.0%

Disaggregate 4: Provider-level Nontraditional Data

Provider-level data offers the highest level of detail about a single institution and the programs it offers. Table 13 summarizes the percentage of females participating in programs offered at Northern Iowa Area Community College in 2007-08. Analysis of data from this table can be used to help answer a number of questions, such as:

- How do individual program rates compare to the college- or state-wide average for nontraditional program participation and completion?
- Is the overall college performance rate explained by a few programs enrolling a relatively large number of students, or are performance outcomes relatively comparable across programs?
- If differences are noted, what might be the cause of these differences? Might variation be due to curriculum, teacher characteristics, economic demand, or other factors?
- If program improvement is to occur, in which programs might it be most cost-effective to invest resources to realize performance gains?
- Is there evidence that participants are being retained as concentrators, and if not, what factors might account for program attrition?

Table 13: Total participants and the Percentage of Female Participants at in STEM-related CTE Programs Associated with Occupations Nontraditional for Females at North Iowa Area Community College, 2007-08.

CIP code	Program Name	Total Participants	% Female	Total Concentrators	% Female
North Iowa Area Community College		351	9.7%	251	6.4%
010101	Agricultural Business and Management, General	64	28.1%	5	20.0%
110901	Computer Systems Networking and Telecommunications	47	17.0%	46	17.4%
010105	Agricultural/Farm Supplies Retailing and Wholesaling	22	13.6%	19	15.8%
010301	Agricultural Production Operations, General	19	5.3%	18	5.6%



470604	Automobile/Automotive Mechanics Technology/Technician	79	3.8%	69	2.9%
470201	Heating, Air Conditioning, Ventilation & Refrigeration Maintenance Technology/Technician	32	3.1%	30	3.3%
460201	Carpentry/Carpenter	32	0.0%	22	0.0%
480507	Tool and Die Technology/Technician	30	0.0%	26	0.0%
480508	Welding Technology/Welder	6	0.0%	0	0.0%
150303	Electrical, Electronic & Communications Engineering Technology/Technician	20	0.0%	16	0.0%

Summary

MPR researchers have used the data collected over the course of the project to establish benchmarks for statewide performance on the nontraditional measures. Though changes in the definition of a CTE concentrator and the construction of the nontraditional completion measure likely will undercut the use of prior year data for future analyses,⁷ initial collection efforts have succeeded in training STEM Equity Pipeline Project and local provider staff on the core data elements needed to assess program success over time. And now that initial data collection challenges have been identified and addressed, it is anticipated that future collection efforts will produce more accurate information provided in a timely manner.

To help drive program improvement efforts, MPR researchers have also engaged NAPE STEM Equity Pipeline staff in exercises to use data to support intervention efforts. By providing four levels of disaggregated data, and where appropriate and possible, running individual data tables, MPR has helped the project team to target services on programs and providers with the greatest need. MPR has also used data to develop resource and training materials, such as the table disaggregates illustrated above, to help educators understand the potential uses of data and thereby contribute to building the “Culture of Data” the project seeks to build.

⁷ The 2006 Perkins reauthorization lowered the threshold for CTE concentration. Under the preceding 1998 legislation, a secondary CTE concentrator was a student completing three or more courses in a CTE program sequence, which, in most cases, was synonymous with program completion. Under the 2006 Act, secondary students need only complete 50 percent of course credits to qualify for concentrator status. The 2006 Act also bases the nontraditional completion measure on CTE concentrators completing a program sequence, as compared to CTE completers (often interpreted to mean graduating CTE concentrators) in the 1998 Act.



Subsequent year evaluation activities will focus on collecting accurate data on the number of female students participating in and completing STEM programs on providers benefiting from targeted technical assistance activities. As in the current year, the project team will seek to recruit states to the project that have the capacity and will to collect data, and will invest up-front time to build understanding of the project purposes and data needs. Researchers will also continue to collect and share data, in aggregate and disaggregated forms, to support the project team in delivering services.

As multiple year data become available, MPR also will seek to analyze historical statistics to assess trends in student performance over time and relative to baseline data, where accurate and appropriate.

