

A Follow-Up Evaluation of Governor's Institute for Agricultural Sciences

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Abstract

The overall purpose of this study was to provide the Pennsylvania Department of Education (PDE) with a valid objective-based evaluation to determine the effectiveness of the 2001 Pennsylvania Governor's Institute for Agricultural Sciences. Two evaluation models and an evidence-based approach were used. A total of 110 teachers, counselors, and administrators participated in the Institute. Data were collected through a variety of methods and instruments. A follow-up evaluation of Institute participants was conducted in March 2002 to determine how participants are using and implementing what they learned at the Institute. A total of 63 participants completed the follow-up survey. Data were analyzed using descriptive statistics.

Overall, the Pennsylvania Governor's Institute for Agricultural Sciences was an overwhelming success and accomplished several goals. First, participants were highly satisfied with the overall content, management, and activities offered at the Institute. Second, significant knowledge gain, based on the results of pre/post tests suggest that the Institute was effective in teaching skills relative to standards-based curriculum. Third, positive feedback from follow-up evaluation indicated that participants did learn something and have used the information to integrate curriculum. Additionally, teachers have collaborated with other teachers (science) on projects, helping themselves and each other explore ways to integrate curriculum.

Theoretical/Conceptual Framework

Increasingly agricultural education as a profession is moving toward the integration of academic and vocational/technical information; collaborative learning arrangements and career projects that focus on career clusters, contextualized learning, accountability and career academics in programs. Agricultural education for the 21st century must prepare a more diverse group of students for a workplace that values a broader range of skills. What are not clear is how these concepts and practices should be taught to practicing teachers.

The driving force behind many school reform initiatives today is standards. Occupational, academic, and employability standards are measures of output and suggest that by “raising the bar” student performance will be increased. However, developing a standards-based curriculum, and accompanying assessment instruments, is very difficult. In June 2000, the Pennsylvania Department of Education, Bureau of Career and Technical Education authorized the planning of eight “Governor’s Institutes” with the goal of providing inservice education on strategies to integrate Pennsylvania academic standards and industrial/occupational standards into existing curriculum. Specifically, the objectives of the Institute were: 1) to provide Institute participants with opportunities to develop plans which integrate technology, academic and occupational standards, 2) to provide Institute participants with on-the-job examples of the integration of academic and occupational skills, and 3) to provide Institute participants with traditional and non-traditional assessment models that may be implemented in their instruction programs.

In July of 2001, The Pennsylvania Department of Education in collaboration with the Center for Professional Personnel Development at Penn State offered the Governor’s Institute for Agricultural Sciences at the Penn Stater Conference Center. The Institute was open to all Pennsylvania academic and vocational teachers and administrators interested in exploring agricultural sciences through standards-based curriculum development.

Since the major thrust of each of the eight “Governor’s Institutes” was to encourage teachers to accept and develop a standards driven curriculum, it was extremely important that the impact of the Institute be carefully assessed. To be sure the evaluations were not biased, the state contract specifically stated that the principal investigator could not be the primary evaluator and that a separate RFP for the evaluation component must be developed. The contract was awarded to Lufkin & Associates of Lancaster, PA.

Three independent evaluators were assigned to the Governor’s Institute for Agricultural Sciences. The independent team of evaluators participated in all planning sessions for the Institute. In addition, the evaluation team met separately and developed an evaluation plan that was approved by the state. To insure a valid and comprehensive assessment, two evaluation models—Kirkpatrick (1994) and Bennett (1975)--were used as a framework. These are two proven models and have been extensively used in training evaluation and program evaluation. These two models provided the protocol and the breadth to insure a valid and reliable evaluation of the Institute’s impact. The two models in the context of this study are briefly described in the following paragraphs.

The Kirkpatrick training model has four components—reaction, learning, behavior change and results/impact (Figure 1). Using Kirkpatrick’s model, the Institute attempted to address the first three components and while the final component will be studied later. The *reaction* component measures how well the participants liked the Institute in terms of content, objectives, presenters, methods used and facilities provided; *learning* component addresses the extent of knowledge and skills absorbed (measured by pre/post tests) by the participants; behavior change component measures the extent to which participants can apply what they have learned to classroom situations; and the final component, *results/impact* measures tangible outcomes of the Institute over the long term. The current study addresses the first three components of the Kirkpatrick’s model.

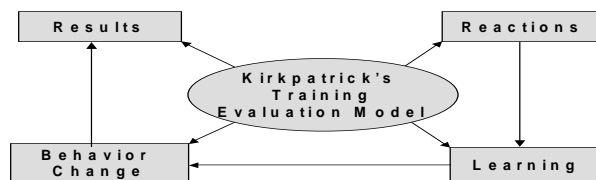


Figure 1: Kirkpatrick's Training Evaluation Model

The Bennett’s model (Figure 2) has been used extensively in extension programs. The model has seven hierarchical steps interconnected with each step. The first four steps measure the process while the last three steps measure the outcomes. The reaction component of Kirkpatrick can be linked to the process steps of Bennett’s model. Similarly, the KASA (Knowledge, Attitude, Skill, and Aspirations) and practice change steps in Bennett’s can be linked to learning and behavior components of Kirkpatrick’s model. Finally, the results or impact component can be linked to the SEEC (Social, Economic, and Environmental Consequences)/end result of Bennett’s model.

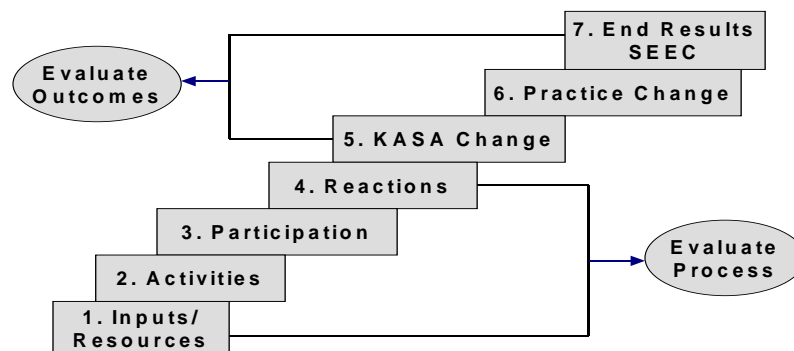


Figure 2: Bennett's Evaluation Model

Literature also supports evaluation of seminars, institutes, workshops and training programs. Several evaluation experts and agricultural educators have emphasized the

importance of evaluating seminars, workshops, and institutes: in providing useful information for improving training (Ross, Freeman, and Lipsey, 1999), in assessing training outcomes in terms of learning and satisfaction (Kirkpatrick, 1994), in documenting behavior change (McCormick, 1994), in identifying factors that led to the success or failures (Bush, Mullis, and Mullis, 1994), and in changing the workshop format to meet learner needs (Ayers, 1989).

McKenny and Terry (1995) evaluated the effectiveness of a workshop relative to xerascaping. They found that the knowledge and perceptions of workshop participants significantly increased as a result of information and skills provided at the workshop. Similarly, Mueseler, Terry, and Holcomb (2000) assessed the impact of a series of short-term small business workshops. They also found significant increases in knowledge gain of participants; however, the workshop did not change the attitudes of participants toward starting a small business.

The Pennsylvania Department of Education (PDE) wanted to know both the process and outcomes. The two models described above were most suitable to the objectives of evaluating the Governor's Institute for Agricultural Sciences.

Purpose and Objectives

The overall purpose of this study was to provide the Pennsylvania Department of Education (PDE) and the Center for Professional Personnel Development at Penn State with a valid objective-based evaluation to determine the effectiveness of the 2001 Pennsylvania Governor's Institute for Agricultural Sciences. The following objectives were formulated to guide this evaluation.

1. To describe the demographic profile of Institute participants
2. To assess knowledge gain of Institute participants relative to key subject matter topics discussed/presented at the Institute
3. To determine reactions and satisfaction of Institute participants in meeting their goals and expectations
4. To determine through a follow-up evaluation the extent to which Institute participants have used and/or applied what they learned at the Institute

Methods and Procedures

The participants for the Governor's Institute for Agricultural Sciences included agricultural educators, science teachers, guidance counselors, and administrators. The Institute was marketed in several ways. In July of 2000, announcements were made at the Pennsylvania Association of Agricultural Educators Summer Convention. In January 2001, a letter was mailed to all Pennsylvania agricultural educators listed in the state directory describing the Institute; its goals and objectives, location, time, and registration procedures. In May 2001, participants' registrations were confirmed through an information packet, which included a final registration form, tentative agenda, and highlights of site visits. Based on registration information obtained from the Institute coordinator, a total of 110 educators participated in the Institute.

The Institute used an evidence-based approach, with an overview of the topics to be discussed followed by industry visits and hands-on-practices (Eckert and Ouchi, 2000). This approach was supplemented by various types of pedagogical activities, including lectures, workshops, small group sessions, panel discussion, and hands-on exercises. In addition, teams of teachers met in small groups and developed standards-based lesson plans for use in their regular instruction. Participants took the limited down time they were given to network with colleagues, share strategies for improving their instruction, and reflect on what they were learning.

Several strategies were used to answer key evaluation objectives about the individual sections of the Institute and the overall Institute, including pre/post test for measuring knowledge gain among participants. Data were collected through a number of different types of methods and instruments. Figure 3 describes the evaluation objectives, instruments used, method of data collection, and number of participants. Each objective for the Institute was measured using one or more instruments.

In March of 2002 (six to seven months after the Institute) a follow-up evaluation was completed (Objective 4). A survey containing 11 items and three open-ended questions were mailed to all the 106 participants who attended the Institute in July of 2001. The 11 items included questions relative to integrated curriculum, program activities, and demographic questions. The open-ended questions elicited information on activities that Institute participants have done to incorporate academic, occupation, and workplace standards into the curriculum and future information needs relative to standards-based curriculum. For the follow-up evaluation, a total of 63 participants returned the survey (initial mailing and two reminders) for a response rate of 59%.

Data collected from various instruments were summarized using descriptive statistics. Paired t-tests were used to determine knowledge gain between pre and posttests. All data were analyzed using SPSS Windows Version 10.1.

Objectives	Instruments Used	Date Collection Method	# of Participants
Objective 1: Demographic Profile of Participants	Institute Participant Survey	Self-reported	106/110 -- 96%
Objective 2: Participants Knowledge Assessment	50 identical pre/post knowledge questions**	Administered by evaluation team	Pretest – 105/110 Posttest – 93/110
Objective 3: Reaction and Satisfaction of Participants	Institute participant survey	Self-reported	106/110
Objective 4: Follow-up	11 item survey and open-ended questions	Mail survey	63/106—59%
** Difference of 12 participants between pre and posttests is accounted by participants coming late and leaving early. Only those participants who took both pre and post tests (N=93) were included in the analysis of knowledge assessment. Last four digits of participant's social security numbers were used to track and/or match responses.			

Figure 3: Description of Objectives, Instruments Used, Method of Data Collection, and Responses

Findings

Objective 1: Demographic Profile of Participants

A total of 110 participants attended the Institute with a significant majority (88%) of them being agricultural teachers. Other participants also included science educators, guidance counselors and administrators. Over 60% of the participants indicated they taught more than one program area suggesting a breadth of subject matter. The majority of respondents were male (75%) and female (25%), which mirrors the population of agricultural education teachers in Pennsylvania. Close to one-half of the participants had graduate degrees (MS/PHD). The average teaching experience of participants was 15.62 years with a low of two years and a high of 37 years.

Demographic profile of follow-up participants was as follows. Of the 63 participants who returned the follow-up survey, 50 were male (79%) and 13 female (21%). Forty-nine (78%) reported graduate degrees (MS/PHD) as their highest education level. The average teaching experience was 16.09 years with a low of two years and a high of 37 years.

Objective 2: Knowledge Gain - Pre/Post Test

The pre/post knowledge test was developed by the evaluation team from questions submitted by each of the program presenters. The entire knowledge test contained seven sections (Table 1). Questions were submitted that covered material regarding scientific inquiry techniques, international agriculture, integration of academic and vocational education, compost processing, and designing challenging courses. In addition, questions were developed by the evaluation team to test the participants' working knowledge of the grade level achievement of various Pennsylvania Academic Standards in Science and Technology and Environment and Ecology. A total of 49 multiple-choice questions were included in both the tests. For scoring purposes, each correct answer was given a value of "1" so that a perfect score on the knowledge test would be 49. The pretest was administered to all participants present at the opening session, while the posttest was administered to all participants present at the closing session of the Institute.

The pre/post test results are shown in Table 1. Ninety-three participants completed both pre and post-tests. The total knowledge test score on the pretest was 23.35 (47.6%) correct answers with a posttest score of 38.48 (78.5%). Paired t-test analysis revealed statistically significant differences ($t = -19.71, p < .001$) between pretest and posttest scores for the entire test. All sections of the test with the exception of section one (scientific inquiry) showed significant increase between pretest and posttest scores (Table 1). The two sections that showed the most significant improvement were the sections dealing with the Pennsylvania Academic Standards. The Science and Technology Standards section showed an increase of 52% (25% pretest and 77% posttest), while the Environment and Ecology Standards section showed an increase of 58% (25% pretest and 83% posttest) (Table 1).

In addition to the 49-item knowledge test, Institute participants were asked, "To what extent has their participation increased knowledge and understanding of the standard-based

curriculum?” Sixty-five percent of the participants indicated “quite a bit, to very much,” while 31% said, “somewhat,” and only four percent said, “not much.” (Figure 4).

Table 1:
Comparison of Pretest and Posttest Scores

Section	# of Items	Pretest (N=93)		Posttest (N=93)		T Value
		Score ^a		Score ^a		
		Mean (SD)	% Correct	Mean (SD)	% Correct	
1	5	2.68 (0.79)	53.6%	2.83 (0.89)	56.6%	-1.42NS
2	4	1.16 (0.87)	29.0	2.27 (0.81)	56.7	-9.15**
3	5	3.63 (0.96)	72.6	4.00 (0.82)	80.0	-2.99*
4	11	2.72 (1.90)	24.7	8.43 (2.43)	76.6	-19.50**
5	9	2.29 (1.81)	25.4	7.51 (2.24)	83.4	-17.51**
6	5	3.33 (1.09)	66.6	4.52 (0.70)	90.4	-10.23**
7	10	7.46 (1.35)	74.6	8.66 (1.12)	88.6	-8.84**
Overall	49	23.35 (4.04)	47.6	38.48 (6.69)	78.5	-19.71**

^aScore is out of possible 49; * $p < .05$; ** $p < 0.001$

Sections: 1=Scientific inquiry, 2=International agriculture, 3=Integration, 4=Science and Technology standards, 5=Environmental and ecology standards, 6=Composting, and 7=Designing challenging courses.

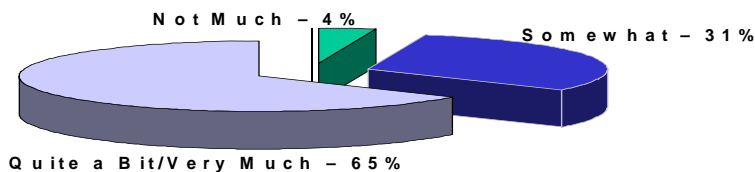


Figure 4: Participants' Knowledge and Understanding of Standards-based Curriculum

Objective 3: Reactions and Satisfaction

Reactions and satisfaction of Institute participants were assessed in several ways: 1) institute goal setting, 2) satisfaction with Institute organization and management, 3) and curriculum integration. Overall, participants rated all the four components very high (Table 2).

Institute participants “agreed” that they were given clear directions and goal expectations the very first day of the Institute (mean/sd=3.75/1.05). They also “agreed” that the Institute provided valuable information/skills that could be used in designing courses (mean/sd=3.88/1.13)

Institute participants were asked to rate on a scale (1=poor to 5=excellent) the organization of the institute in terms of communication, registration, food, accommodation, meeting rooms and equipment. Overall, the participants rated each of these items “excellent” (Table 2). Quality of food and refreshments was rated the highest (4.72), followed by hotel accommodation (4.66), registration (4.43), equipment (4.25), and overall management of the Institute (4.03). However, communication prior to the institute was rated “good” (3.85) (Table 2).

Regarding curriculum integration, a great majority of Institute participants said that they are able to develop a standards-based curriculum lesson (84%), align curriculum with workplace standards (86%), locate gaps between what students need and what they (teachers) currently teach (89%), and acquire strategies to develop student activities to accompany academic or occupational skills (86%). In addition, Institute participants indicated that they had opportunity to brainstorm ideas with other participants (80%). (Table 3).

Table 2:
Participants’ Reaction to Institute Goal Setting and Satisfaction with Institute Organization

<i>Statement</i>	<i>N</i>	<i>M*</i>	<i>SD</i>
<u>Institute Goal Setting*</u>			
Participant was given clear directions and goal expectations the first day of the institute.	106	3.75	1.05
The workbook planner, <i>Designing Challenging Courses</i> , was a helpful tool to introduce/review for the participant on how to design a course.	106	3.77	1.33
Institute provided valuable information/skills that can be used in courses that participants teach	106	3.88	1.13
<u>Satisfaction**</u>	106	3.88	1.13
Quality of food and refreshment	106	4.72	0.47
Hotel accommodation	106	4.66	0.89
On site registration	106	4.43	0.79
Overall management of the Institute	106	4.40	0.67
Audio-visual equipment	106	4.25	0.77
Overview of the Governor’s Institute	106	4.03	0.87
Communication prior to the Institute	106	3.85	1.04

*Measured on a scale 1 “strongly disagree” to 5 “strongly agree”

**Measured on a scale 1 “poor” to 5 “excellent”

Objective 4:

As required by the RFP, a follow-up evaluation of Institute participants was conducted in March 2002. Follow-up questions focused on integration of curriculum, program activities and open-ended questions. Results of follow-up evaluation are shown in Table 4.

Positive results were evidenced during a six-month follow-up. Eighty-seven percent (42% somewhat + 45% a great deal) of the Institute participants indicated that they were able to develop standards-based curriculum for the classes they currently teach. Similarly, 78% (35% somewhat + 43% a great deal) reported that they aligned their curriculum with workplace standards. Seventy-five percent (45% somewhat + 30% a great deal) changed their instructional strategies to include integration activities, while 91% (38% somewhat + 53% a great deal) developed curriculum activities that supported occupation and/or academic skills integration. Open-ended comments given by Institute participants' support that they are using the information in many ways to integrate curriculum. Some of the verbatim comments are listed below.

"Participated in a statewide curriculum project that incorporated academic standards, occupation, and workplace standards into a three-year forestry curriculum."

"I have used the information to include items into my curriculum, and standards are always good to discuss. I am enrolled in a curriculum class and often discuss standards"

"I am working with a science teacher who teaches a biology course to develop a biotech course that will be piloted next year."

"I have implemented many concepts into my teaching. The Institute helped me to be more complete in my understanding of material"

"In my ag construction class I have began using the composting information as a tie to the environmental standards. Each student builds a small compost model and then get into groups to build two large compost bins for use at home."

"Increased the number of field trips to related business within the area and emphasized employee needs in relation to skills my students need to develop."

"I identify standards weekly that my lessons are addressing. I am revising my curriculum to incorporate more of the standards."

Table 3:
Participants' Intention to Use Curriculum Integration

Statement	Yes	No	Total
<u>Curriculum Integration</u>			
Based on the skills learned during the week, will you be able to develop a standards-based curriculum lesson for your classrooms next school year	84%	16%	100
Do you have the skills to align your curriculum with workplace standards	86	14	100
Did you had an opportunity throughout the week to brainstorm ideas with colleagues to improve instructional strategies	80	20	100
Did you acquire strategies to develop student activities to accompany occupational or academic skills	86	14	100

As shown in Table 4 (Program Activities), Institute participants are yet to use various program activities that were shared at the Institute. It appears that less than one-half of the follow-up respondents have used "somewhat to a great deal" program activities presented at the Institute-- Designing a Challenging Course Workbook (41%), documenting academic and employability skills (44%), and developing compost lessons (46%). However, a little over one-half of the participants (54%) indicated that they have integrated Periodical Writing Assignment into their curriculum

Institute participants were asked to indicate future needs relative to standards-based curriculum. Select responses from participants are given below:

"Examples of exemplary lesson plan that is standards-based."

"Easier ways to incorporate science and ecology, math reading, writing standards into the ag curriculum"

"Recognizing standards contained in existing curriculum"

"A workshop that would be planned so that teachers could prepare materials prior to the workshop and take materials to actually begin writing curriculum materials."

Practical/hands on activities that help meet/address the standards"

"Develop a standard format on a word processing program that could easily be used as a curriculum writing template."

"Integration of science and technology, and environmental and ecology standards into existing agriscience curriculum."

Conclusions

Overall, the Pennsylvania Governor's Institute for Agricultural Sciences was an overwhelming success and accomplished several goals. The Institute has provided the needed foundation to develop both the occupational skill standards and Pennsylvania academic standards.

First, participants appear to be highly satisfied with the overall content, management, and activities offered at the Institute. In addition, participants learned valuable and usable skills, were able to network with other colleagues and wanted to attend again in the future. This clearly reflects the reactions, learning, and behavior change components of Kirkpatrick's training evaluation model and the process and outcomes of Bennett's model.

Second, there is evidence of significant knowledge gain, based on the results of pre/post tests, which suggests that the Institute was effective in teaching skills relative to standards-based curriculum. This clearly reflects the learning component of Kirkpatrick's training evaluation model and Bennett's level five (Knowledge) or outcome component.

Table 4:

Follow-up Evaluation Results for Integrated Curriculum

<i>Integrated Curriculum</i>	At the End of Institute July 2001 N=93	Follow Up March 2002 N=63							
		<u>Not at all/ Not Much</u>		<u>Somewhat</u>		<u>A Great Deal</u>		<u>Overall</u>	
		<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
Able to develop a standards-based curriculum for your classes	84%	8	13	25	42	27	45	60	100
Align your curriculum with workplace standards	86%	13	22	21	35	26	43	60	100
Change your institutional strategies to include integration activities	80%	15	25	27	45	18	30	60	100
Developed curriculum activities which support occupation and/or academic skills integration	86%	13	22	14	38	31	53	58	100
Program Activities									
Used the workbook planner 'Designing a Challenging Course' to improve or create a new course		36	59	22	36	3	5	61	100
Integrated the 'Periodical Writing Assignment' into my current curriculum		28	46	26	43	7	11	61	100
Developed a composting lesson on the 'Filed Guide to On-Farm Composting' & 'Composting to Reduce the Waste Stream' books		33	54	19	31	9	15	61	100
Incorporated the 'Documenting Academic and Employability Skills Needed in the Workplace and Found in the Curriculum' site visit sheets into my class trips		33	56	18	30	8	14	59	100

Third, participants have chalked out a plan to implement standards-based curriculum in their schools. This goal setting or future action reflects the behavior change component of Kirkpatrick's model and level five (Aspirations/intentions) of Bennett's model.

Fourth, positive feedback from the follow-up evaluation indicates that participants have learned something and have used what they learnt to integrate curriculum. Additionally, participants have worked with other teachers (science) on projects, helping themselves and each other explore further ways to integrate curriculum. In addition, participants have made attempts to use program materials and activities in class instruction and other school-related activities.

Finally, the Institute has helped to explore the efficacy of delivering information on both academic and workplace performance standards via an institute or workshop format. Overwhelmingly the data suggest that delivering information on standards via this medium is successful. Every state in the nation is currently developing or implementing performance based standards. The ability of agriculture programs to quickly adopt standards and integrate into the mainstream of public education is extremely important. States requiring standards driven curriculum are also in the process of developing rubrics to evaluate the performance of students in basic skills. Unfortunately, the focus of most of the developmental work is on academic skills, with little attention to the needs of agriculture teachers. The responsibility to develop standards based curriculum frameworks, and their subsequent implication, will fall on the shoulders of teacher educators and professional organizations. This study has clearly demonstrated that once standards-based curricula are developed, a good way of moving it out to teachers is through seminars and institutes.

Recommendations

Two sets of recommendations are made based on the input received from Institute participants and Institute evaluation results. The first set of recommendations is aimed at improving the Institute offering in future years, which addresses the process part of evaluation.

- Participants want more time to network and share ideas.
- Outreach to other groups such as the Pennsylvania School Counselors Association.
- Provide more hands-on skill sessions with "packaged" lessons that could be taken home to implement.
- Complete standards-based curriculum development earlier in the week.
- Prepare presenters and business/industry representatives with more direction and complete information regarding the goals of the institute.

The second set of recommendations is based on evaluation and follow-up results. Participants of the Institute provided valuable feedback. The feedback they provided should be valued in the context of improving the implementation of both occupational skill standards and the Pennsylvania academic standards. The following recommendations are made to improve the effectiveness of future institutes and increase the potential that teachers will implement standards-based educational reform:

- Assess what teachers need to fully implement both the occupational skills standards and academic standards. Specifically, incorporate the suggested needs in future inservice and/or workshop offerings
- Identify positive factors that would enhance collaborative efforts between academic and vocational teachers.
- Develop knowledge and skill needs inventory on standards-based curriculum.
- Develop a matrix of the Pennsylvania academic standards and the occupational skills standards for agricultural education to help teachers see the relevance to their curriculum.

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