ATE/PPE Project Evaluation
NSF Award 0603271

Submitted
May 5, 2011

Prepared by
Karen Jo Matsler, Ed.D.
Education Assessment and Training, Inc

Submitted to
Tom O'Kuma, Lee College
Dwain Desbien, Estrella Mountain Community College

Table of Contents

Background

The Advanced Technological Education Program for Physics Education (ATE/PPE) is a program for two-year colleges and is supported by the National Science Foundation. The program focuses on the education of technicians for the high-technology fields that drive our nation's economy and involves partnerships between academic institutions and employers to promote improvement in the education of science and engineering technicians at the undergraduate and secondary school levels.[1] The ATE/PPE program is directed by Thomas O'Kuma and Dwain Desbien and supports professional development of college faculty and secondary school teachers by providing workshops focused on integrating technology into the classroom.

Participants for the workshops were recruited using a variety of methods including mailings, list serves, and word of mouth from previous attendees. Applicants were expected to provide statements indicating their interest in the workshop and the expected impact. Participants were encouraged to bring more than one member from their school or institution to extend the influence/impact of the program. However, individuals were not excluded from participating if they did not have a team attending. Participants were also encouraged to apply for more than one content workshop allowing them to experience multiple areas of technological applications for their classroom.

The purpose of this report is to summarize findings of the ATE/PPE project between October 2009 and December 2010. During this time period there were five workshops conducted at sites across the nation including Ann Arbor, MI, Springfield, MA, Baytown, TX, and Lincoln, NE. Each workshop focused on different aspects of technology tools appropriate for a classroom and was led by experts in physics education including members of the business community. Experts included: Tom O'Kuma (Lee College, Baytown TX), Dwain Desbien (Estrella Mountain Community College, Avondale, AZ), Paul Williams (Austin Community College, Austin, TX), Anne Cox (Eckerd College, St. Petersburg, FL), David Vernier (Vernier Software & Technology, Beaverton, OR), Sam Swartley (Vernier Software & Technology, Beaverton, OR),

[1] Program Solicitation NSF 07-530, National Science Foundation, Directorate for Education & Human Resources, Division of Undergraduate Education, Research on Learning in Formal and Informal Settings

Martin Mason (Mt. San Antonio College, Walnut, CA), Kent Reinhard (Southeast Community College, Avondale, AZ), and Martin Mason (Mt. San Antonio College, Walnut, CA).

Workshops Conducted

- Data Visualization Techniques and Strategies – Microcomputer Based Laboratory (DVTS-MBL) Workshop, October 29-31, 2009 at Springfield Technical Community College in Springfield, MA (http://www.surveymonkey.com/s/Oct09)
- Data Visualization Techniques and Strategies – Microcomputer Based Laboratory (DVTS-MBL) Workshop, December 3-5, 2009 at Lee College in Baytown, TX (http://www.surveymonkey.com/s/Dec09)
- Programming Tools for Introductory Physics (PTIP) Workshop – September 30-October 2, 2010 at Southeast Community College in Lincoln, NE (http://www.surveymonkey.com/s/implementLincoln10)
- Stimulations Tools for Introductory Physics (STIP) Workshop – November 4-6, 2010 at Lee College in Baytown, TX (http://www.surveymonkey.com/s/2010STIP)

Workshop Descriptions

The workshops targeted different technology tools and therefore allowed participants to attend more than one if desired to get professional development in multiple areas. The workshops used tools available for both Mac and Windows computers and included extensive discussions on how to use the tools and tactics once they returned to their classrooms. In addition to the advertised descriptions below, all workshops addressed assessment of physics learning and application of research findings in Physics Education Research (PER) as applied to students' learning of introductory physics.

- DVTS-MBL: In this hands-on workshop, participants will work in areas involving force, one-dimensional linear motion, rotation, sound, heat, electricity, magnetism, nuclear radiation, and light. They will explore approaches and curriculum materials from *Tools for Scientific Thinking* and *Real Time Physics* as well as hardware, software, and sensors from Vernier Software (LabPro/LabQuest Interface and Logger Pro software) and PASCO Scientific. These curriculum materials are often used with sensors and interfaces from other vendors as well.

- STIP: During this workshop, participants will become familiar with the variety of simulations available. Participants will work with Physlets© (physics applets) and Open Source Physics resources (www.opensourcephysics.org). Included in this set of resources are tools for authoring simulations (Easy Java Simulations) and video analysis (Tracker). Participants will also become familiar with other simulations, such as PhET simulations (http://phet.colorado.edu/new/index.php), which are research-based interactive physics simulations. Participants will also develop the ability and skills to modify, adapt, and construct new materials. One of the goals of this workshop is to provide a flexible suite of resources appropriate to different levels of instruction as well as different levels of technological sophistication (from low to high) so that participants can choose what will be most successful in their home environment.
- PTIP: This workshop will show participants how they can introduce computation into their introductory courses through the use of LabView or VPython. Participants will engage in a hands-on introduction to computational modeling in the VPython programming language and learn to develop their own exercises and student projects. LabView utilizes software appropriate for pre-engineering courses or classes. A framework for computational projects will be demonstrated along with several example projects, and a discussion of how computational modeling can be implemented in a Two Year College environment.

The workshop instructors have excellent credentials, and are active in Physics Education Research (PER) as well as national professional organizations. The instructors are well known in the physics community and have vast experience in working with teachers and presenting for diverse audiences. In addition, they use the materials presented as a regular part of their own physics course or class and therefore they can model how the materials can be effectively used in the classroom. More information about the workshops and presenters can be found at the project website, www.physicsworkshops.org.

The workshops are intensive over a 3 day period starting around 8:30 A.M. and ending around 9:30 P.M. Breaks and meals are dispersed over the period and participants are encouraged to take other breaks as necessary. The long hours are due to the project leadership's efforts to minimize

the time teachers are out of their classes as well as minimize expenses associated with substitutes, travel, and accommodations.

Project Objectives

The ATE Program for Physics Faculty was created to provide a series of three-day, intensive, focused, hands-on professional and curriculum development workshops/conferences and follow-up activities over a period of three years to physics teachers in two year colleges (TYC) and high schools (HS) who serve students involved in technology-based or technical careers.[2] The workshops were to provide approximately 30 contact hours over a three-day period to limit the time participants would miss class and other duties. The workshops addressed topics, implementation strategies, workforce-related issues and education. Follow up activities included networking via list serve, electronic newsletter, and website interaction.

The activities of the project were designed to help high school and two-year college teachers in the following ways:

- Build and enhance their understanding and appreciate of the needs of students, educational programs, business and industry, and the workforce in areas dealing with physics and technology
- Provide them with knowledge of and experience with recent advances and appropriate computer technology, ATE supported centers and projects, assessment in student learning, and relevant curriculum materials and activities
- Allow them the opportunity to identify and evaluate the appropriateness of the ideas in meeting the needs of their students and programs
- Provide them with the background and incentive to develop, adapt, adopt, and implement workshop activities and materials into their physics course and programs
- Impact student learning in physics and workforce related applications

[2] ATE Program for Physics Faculty proposal as submitted to the National Science Foundation via Fastlane, provided by Tom O'Kuma project director.

- Provide them ways and ideas for building bridges and developing working relationships between TYC and HS physics and technology programs, and local or regional business and industries[3]

Evaluator and Evaluation Methodology

The proposed evaluation plan for the project focused on two elements: 1) workshop quality and classroom implementation and 2) sustainability and impact of the instructional changes. The internal evaluation plan included three components: post workshop evaluation, follow-up evaluation, and case studies and was solicited and compiled by the project leadership. The internal evaluation results are part of this report and the comments are in the appendix. The external evaluation plan included solicitation and documentation of information from participants regarding the impact of the specific workshops on their teaching and their students using on-line surveys and questionnaires.

The responsibility of the external evaluation for the ATE/PPE program for 2009-2010 was given to Education Assessment and Training, Inc. (EAT, Inc.), after the original evaluator (Momentum Group) had to resign due to health issues. Information for this report was gathered from discussions with the leadership team as well as the former evaluator in an effort to provide a seamless evaluation transition and appropriate feedback to the project directors regarding the success of the project. Discussions between the Momentum Group, project directors, and EAT, Inc. resulted in the following evaluation activities and procedures.

- A post workshop survey (i.e., final day evaluation) administered by the leadership team was left in place to determine immediate feedback on how participants felt about the facilities, presenters, and the overall workshop. Results of this survey were collected by the leadership team, tallied, and then given to the external evaluator and are included as part of this report
- An online survey was designed (similar to the paper survey used by Momentum Group) to collect information on how the participants had used the information from the workshop. The participants were asked if they had implemented any of the activities and

[3] ATE Program for Physics Faculty proposal as submitted to the National Science Foundation via Fastlane, provided by Tom O'Kuma project director.

how successful they felt those activities were in the classroom. In addition, the participants were asked to reflect on the quality of the workshop and overall extent to which the workshop influenced their interest in teaching new technology. These surveys were given to the participants a few months after the workshop to allow time for them to incorporate the activities into the classroom. Results of those surveys are part of this report.

- The external evaluator attended the ATE conference in Washington D.C. in October 2009.
- The external evaluator attended an ATE/PPE workshop in February 2011.
- The external evaluator participated in an online seminar conducted by EvaluATE.

The leadership team and the original evaluator, Karen Johnston, acknowledge that the expectations for the workshops are fairly rigorous. The expectations are:

- That 90% of the participants will exit the workshops with plans to implement activities/materials or teaching strategies from the workshop
- That 60% of the participants will attempt a significant implementation plan and follow through with their plans for implementation
- That 30% of the participants will sustain the aforementioned implementation after the project's completion.

On-line Survey Participation

The on-line surveys were anonymous and only viewed by EAT, Inc. to allow participants to freely discuss any issues or problems they encountered. Participants were reminded several times to respond to the surveys, but due to anonymity there was no way to determine who did or did not respond unless the participants chose to give their contact information. There were a few participants who contacted the evaluator and indicated they had responded to the survey twice and in those cases the duplicate entry was removed. The surveys were closed April 15, 2011 and the response rates were as follows:

Survey Response Rates

	Number of Participants	*Number Responding to On-line Survey*	*Percentage Responding*
DVTS (October 2009)	25	20	80%
DVTS (December 2009)	19	11	58%
PTIP (October 2010)	17	11	65%
STIP (November 2010)	22	9	41%

Participant Demographics

The information below was collected from the on-line surveys, therefore is incomplete since all of the participants did not complete the surveys. The information is considered useful and a good indicator of the participant demographics for all except the STIP workshop, which had fewer than half of the participants respond. It is unclear as to why the STIP workshop had so few participants respond since similar methods were employed in contacting all participants. However, the STIP workshop did have several science coaches attend from one district and it is possible that the survey did not allow them the freedom to give feedback since the survey asked participants to share their classroom implementation experiences. This possible flaw in the survey has been noted by the evaluator and will be reflected in future surveys.

Participant Gender and Attendance

	Males	*Females*	*First Time Attendees*	*Repeat Attendees**	*Actual Attendees*
DVTS (October 2009)	10	10	9	11	25
DVTS (December 2009)	6	5	8	3	19
PTIP (October 2010)	7	4	4	7	17
STIP (November 2010)	8	1	5	4	22

**Note: Attendees did not attend two sessions of the same workshop, but could attend another workshop or one in another year*

Participants' teaching positions were varied and were categorized based on their level of teaching (i.e., high school vs. college). However, some participants did not fill out the survey correctly making it difficult to determine if they were teaching high school physics or college physics. If the evaluator could not determine the level of teaching, it was not included in this report. Levels that could be identified were:

- High School = Principles of Engineering, Physics
- College = Physics, Engineering Physics
- Science coaches/coordinators

The specific courses taught by the participants are part of this report (Evidence of Results, Question 1). The number of students directly impacted by implementation of workshop skills is an estimate based on responses to the on-line survey and is reported in Evidence of Results, Question 4. It is understood that all of the participants did not respond to the survey, therefore the numbers indicated would be lower than the actual impact.

Research Questions

The questions addressed in this report are organized around the original questions developed by Momentum Group and include:

1. Did the workshop attract physics faculty interested in strengthening their capacity to better prepare students for a technology-driven workforce?
2. Did the workshops address the professional development needs of the physics faculty? In what ways did the workshops meet the criteria for high quality physics workshops?
3. How many participants indicated that they plan to implement materials/activities/teaching strategies from the workshop?
4. After participants returned to their classrooms, how many confirmed their plans to implement workshop content in their classrooms? How many students and courses are influenced by these changes?
5. What activities were implemented in the participants' classrooms and to what extent were the implementations successful? What problems were encountered during implementation?
6. Is there evidence of the participants' continued motivation to change?[4]

[4] Interim Evaluation Report, Year One, July 2007. Prepared by Karen Johnston, Momentum Group

Evidence of Results

Question 1*: Did the workshop attract physics faculty interested in strengthening their capacity to better prepare students for a technology-driven workforce?*

Faculty members who attend workshops during the school year are typically self motivated to enrich and enhance the classroom experiences. The ATE/PPE workshops solicited participants using a wide variety of resources and the result was a wide variety of participants. According to the participants who responded to the on-line survey, the participants included:

Student Impact Numbers by Level and Courses (Based on Survey Results)

	Participants/ Respondents	Courses in which Workshop Content will be implemented	Number of Students in these Courses
DVTS LC	$N_p = 19$ $N_r = 10$	**Courses for high school students:**	
		Conceptual physics	-
		General physics (algebra based)	281
		AP Physics B	380
		Courses for college students:	
		Introductory/conceptual physics	-
		College (algebra based) physics	141
		University (calculus based) physics	-
		Astronomy	-
		Courses for teachers:	
		Pre-service courses	-
		Professional development courses	60
DVTS STCC	$N_p = 25$ $N_r = 17$	**Courses for high school students:**	
		Conceptual physics	357
		General physics (algebra based)	552
		AP Physics B	40
		AP Physics C	50
		Courses for college students:	
		Introductory/conceptual physics	-
		College (algebra based) physics	52
		University (calculus based) physics	-
		Applied Physics	44
		Courses for teachers:	
		Pre-service courses	-
		Professional development courses	-

	Participants/ Respondents	Courses in which Workshop Content will be implemented	Number of Students in these Courses
PTIP	$N_p = 17$ $N_r = 7$	**Courses for high school students:**	
		Conceptual physics	-
		General physics (algebra based)/honors	240
		AP Physics B	100
		Other: Principles of Engineering	20
		Courses for college students:	
		Introductory/conceptual physics	-
		College (algebra based) physics	75
		University (calculus based) physics	66
		Intro to Engineering	12
		Applied physics	-
		Others: Chemistry, physical geography	-
		Other: Astronomy	-
		Courses for teachers:	
		Pre-service courses	-
		Professional development courses	-
STIP	$N_p = 22$ $N_r = 5$	**Courses for high school students:**	
		Conceptual physics	45
		General physics (algebra based)	195
		AP Physics B	11
		AP Physics C	-
		Other: chemistry, IB	24
		Courses for college students:	
		Conceptual physics	-
		College (algebra based) physics	114
		University (calculus based) physics	105
		Astronomy	48
		Courses for teachers:	
		Pre-service courses	-
		Professional development courses	-

Question 2*: Did the workshops address the professional development needs of the physics faculty? In what ways did the workshops meet the criteria for high quality physics workshops?*

Respondents to the on-line survey indicated they felt the workshop increased their enthusiasm for teaching and inspired them to implement new activities in the classroom. One of the objectives of the workshops was to facilitate classroom change, which has to begin by motivating the educator. It is recognized that most of the participants were likely attending these

workshops due to their desire to be better educators, however even the most dedicated teacher can be uninspired after a workshop. Therefore, it is important to note that the respondents felt the workshop met their needs even though they had attended the workshop several months, or even a year, prior to the survey. The following table summarizes the responses from the workshops regarding the question: "To what extent do you agree or disagree with each of the following statements concerning the value of the workshop regarding your efforts to implement changes in your classroom?" The response choices for the DVTS survey were: Strongly disagree (1), Disagree (2), Not Sure (3), Agree (4), and Strongly Agree (5). The response choices for the STIP and PTIP surveys were reduced to: Strongly disagree (1), Disagree (2), Agree (3), and Strongly Agree (4). Therefore, although the average for the PTIP and STIP workshops is lower than DVTS, the correlation is the same because they were all high.

Summary of responses and overall average for the various workshops

To what extent do you agree or disagree with each of the following statements concerning the value of the workshop regarding your efforts to implement changes in your classroom?	**DVTS* (N=29)**	**STIP (N=6)**	**PTIP (N=6)**
Attending the workshop increased my enthusiasm for teaching.	4.55	3.83	4.00
Attending the workshop supported my efforts to implement teaching strategies that have been demonstrated as effective into my classes.	4.69	3.67	3.83
Implementing activities/materials from the workshop increased my enthusiasm for teaching.	4.46	3.83	4.00
When I implemented activities/materials from the workshop into my classes, my students were more engaged in learning.	4.48	3.67	3.40
The workshop stimulated me to think about ways I can improve student assessments that I use in my physics courses.	4.59	3.50	3.83
When I implemented formative student assessments with a particular learning activity, the assessment provided me with valuable information about my students' learning prior to major tests.	4.32	3.17	3.75

Attending the workshop and implementing new activities/materials in my classes has increased my interest to continue participating in professional development workshops.	4.62	3.83	3.83
Implementing new activities/materials in my classes has increased my interest to continue participating in professional development workshops.	4.61	4.00	4.00

**Note: the 2009 DVTS ratings were based on a scale of 1-5 and the 2010 STIP and PTIP ratings were based on a score of 1-4.*

All but one response from the December 2009 DVTS participants either agreed and strongly agreed resulting in averages of over 4.6 on all questions and most questions had an overall rating of 4.82.

The deviation of responses was greater for the respondents from the October 2009 DVTS workshop. There were several that disagreed or were not sure. In evaluating individual comments, it appears that there were only two participants who were generally unhappy about their experience and gave the lower ratings. However, it does not appear that the issue was completely about the workshop in general, but more of a problem with implementation and prior unsuccessful experiences with technology. One of them wrote:

> "*The fact that I did not implement what I was exposed to at the workshop says more about the fact that (1) I'm at a school with few probes and only CBL's; (2) I'm struggling to learn and incorporate Smart Board technologies and on-line SIMS (like those at PhET); (3) Most of my planning time was taken up with my new, BSCS biology course since my Physics and AP physics lessons have seemed to be working well; (4) Honestly my enthusiasm for innovation in teaching has waned as my passion for retirement activities (such as wildlife photography) have grown and as I near the end of my professional teaching career (two more years economy permitting).*"

The other dissatisfied participant wrote:

> *"The teachers were good, Dr. O'Kuma was wonderful and the materials were excellent. The difficulty I face is the feeling that while I am very willing to learn a new way of teaching, I am having a very hard time relating to any of these methodologies. I don't learn via inquiry methods, at least not as it functioned (or rather, didn't function) in our group. The environment was too unstructured, too chaotic and lacked support. I have no problem exploring but when there are 4 different people with vastly different experiences, each doing things their way, someone gets left out. That is also what I see in my classroom when I try to teach this way. One student, who understands or is aggressive, takes over for everyone else. So one person learns, who probably would have learned any*

way you would have taught him/her, and the rest are frustrated. It is very hard for me to teach this way. I left the workshop feeling frustrated, isolated, out of touch and irrelevant. I found that most of participants had already accepted this methodology so I felt stifled and, to some extent, muzzled. It would be great if there were a workshop designed for an older teacher who wants to learn but is having a really hard time relating to and implementing these techniques. I also wonder if it is possible that maybe we are simply swinging the pendulum too far. Isn't it possible that this technique does NOT work for all students? What do we do then?"

Since there were 29 respondents to the DVTS surveys, the overall ratings remained high even though there were a few with low scores. Unfortunately, the STIP and PTIP surveys had fewer respondents, but the overall ratings were still very high.

The last question was designed to gather insight as to whether this workshop increased their interest in continued professional development. All of the STIP and PTIP participants indicated they strongly agreed while 19 (65.6%) of the DVTS participants rated it as a 5, eight (27.5%) rated it as a 4 (including one of the dissatisfied participants), one rated it as a 2, and one put not applicable (NA).

The workshops meet the criteria for high quality workshops based on the Guskey Professional Development Model and would be considered successful professional development experiences since the ratings on the upper end of the scale between strongly agree and agree. The workshops are still considered to be successful according to the on-line survey given to the DVTS participants a year after their participation. The following exerted tables from the survey reveal that the majority continues to feel the workshop they attended was "excellent".

October 2009

As a professional development experience for physics faculty, how would you rate the DVTS-MBL workshop?		
Answer Options	**Response Percent**	**Response Count**
Poor	0.0%	0
Fair	0.0%	0
Good	5.6%	1
Very Good	0.0%	0
Excellent	94.4%	17
Comments		8
	answered question	**18**
	skipped question	**2**

December 2009

As a professional development experience for physics faculty, how would you rate the DVTS-MBL workshop?		
Answer Options	**Response Percent**	**Response Count**
Poor	0.0%	0
Fair	0.0%	0
Good	18.2%	2
Very Good	9.1%	1
Excellent	72.7%	8
Comments		6
	answered question	**11**
	skipped question	**0**

Comments, from the DVTS workshop participants, related to the fulfillment of professional development needs are below:

- "ATE for Physics Faculty workshop are excellent organized, by the time you are accepted until you leave; all details are taking care of."
- "I learn a great deal at any of these workshops that I attend."
- "Two workshops have been more helpful in what I do than 1/2 of the undergraduate classes I had to take. In preparing to teach. These workshops should be implemented in science teaching requirements. I had a science methods course that could have been replaced with this. This would have served us much better."
- "The intensity of the three days is very challenging but highly rewarding, more so than short (2-4 hrs) workshops. More time for depth of topic coverage and for personal interaction with teachers from other regions of the country."

Question 3*: How many participants indicated that they plan to implement materials/activities/teaching strategies from the workshop?*

The DVTS participants were asked if they had implemented something they learned at the 2009 workshops during the 2010 school year. The STIP and PTIP participants were asked if they intended to implement something during the fall of 2010 or the spring of 2011. With the exception of the PTIP workshop, over 80% of the respondents to the on-line survey indicated they intended to use the materials or strategies from the workshop. The implementation for PTIP is likely influenced by the expense of purchasing the technology required, particularly for LabView. The project leadership has made arrangements with partner companies to sell

LabView at a greatly reduced rate, but it is still difficult to get large purchases approved in most educational systems, particularly if the number of students impacted is low as it would be in a single class. The high schools can purchase a 25-seat license for $1,000 (normally sells for $5,000) and colleges may obtain a 10-seat license for $5,000.

Indicators of Intent to Implement

	Yes	*No*	*% Yes*
DVTS (October 2009)	18	2	90.0
DVTS (December 2009)	10	1	90.9
PTIP (October 2010)	5	4	55.6
STIP (November 2010)	4	1	80.0

Additional comments from PTIP participants:

- "I may also use LabView in my HS physics course when I am more comfortable with the software."
- "I plan to implement some of these activities in the fall of 2011."

Question 4*: After participants returned to their classrooms, how many confirmed their plans to implement workshop content in their classrooms? How many students and courses are influenced by these changes?*

Since the DVTS participants had over a year to reflect on their use of the materials from the workshop, they were queried as to how often they used the information in the classroom. The 2010 participants will be asked the same question in their follow up surveys.

DVTS Implementation

How often have you used the information as part of your classroom instruction?	**DVTS (October 2009)**	**DVTS (December 2009)**
Once or twice a semester	5	3
3-5 times a semester	5	2
Countless times (i.e. has become ingrained)	7	4
Other (see below)	0	1

The number of students impacted by program was determined by calculating how many students were in the classes of those that said they implemented the materials. The thirty 39 teachers who responded estimated they had over 2,800 students impacted during 2010. Since all participants did not respond, it would be reasonable to assume over 3,000 students were influenced by the

ATE/PPE workshops addressed in this report. The table below indicates the impact on students based on the survey results of the participants that implemented materials from the workshop(s).

Total Number of Students Impacted

Courses for High School Students	
Conceptual physics course	412
General physics (algebra based) course	1268
AP Physics B and C courses	581
Others – IB, Principles of Engineering	44
Courses for College Students	
Applied Physics/Introduction to Engr.	56
Introductory/conceptual physics course	0
College (algebra based) physics course	382
University (calculus based) physics course	171
Courses for teachers	
Pre-service courses	-
Professional development courses*	60
Total for Typical Physics Courses *Not included in total	2914

Question 5*: What activities were implemented in the participants' classrooms and to what extent were the implementations successful? What problems were encountered during implementation?*

Respondents to the on-line survey were asked to rate the overall success in implementing what they learned at the workshop. All but one responded that the implementation was either OK, moderately successful, or very successful. The majority felt it was very successful with very few problems. The most frequently cited problems/barriers were lack of equipment, lack of time to implement, and the challenges of classroom management.

	DVTS Oct 09	**DVTS Nov 09**	**PTIP Oct 2010**	**STIP Nov 2010**
Very successful	38.9%	72.7%	50.0%	50.0%
Moderately successful	38.9%	18.2%	33.3%	50.0%
OK	11.1%	9.1%	16.7%	0.0%
Less than I hoped for	5.6%	0.0%	0.0%	0.0%

Very disappointed	0.0%	0.0%	0.0%	0.0%
Have not used it yet	5.6%	0.0%	0.0%	0.0%

The participants were asked to: "Describe or least one of the activities/materials from the workshop that you introduced to your students."

The following is a compiled list of the activities mentioned and the level of success they felt in presenting the lesson(s) for STIP and PTIP workshops. The Likert range was from 1-4 with 1 being not at all successful, 2 = slightly successful, 3 = moderately successful, and 4 = highly successful. The DVTS workshops had more responses but less variation with most of the respondents using the video analysis and Ranking Tasks. Only one mentioned another sensor (magnetic field), two mentioned the flying pig lab, and one mentioned making a car. All said they would continue to use the activities except the one who made a car. The biggest challenge appears to be the lack of good equipment since most mentioned they did not have the equipment or computers to fully implement the activities they learned. It should also be noted that none of the participants (PTIP, STIP, or DVTS) felt they were truly successful in their first attempt to implement the activities. However, those that did two different activities felt considerably more confident that those that only implemented one. It is not clear if the second activity resulted in more confidence or if they tried the second activity because they were confident.

Workshop	Activity	Level of Success	Problems	Will you continue to use this activity?
STIP	Ranking tasks	2		Yes
	Colorado PhET	2	They need structure/guidance to help them stay on task	Absolutely
	PhET Simulations	2		Yes
	PhET DC Circuits	1		Yes
	PhET AC/DC Circuits			Yes
PTIP	VPython	3	Need to structure programming activities	Yes
	LabPro	1		Yes
	Video Analysis	2	Lack of cameras	Yes

	Video Analysis	1	Time consuming	Yes
	VPython	2		Yes
	PhET	1		Yes

Comments from DVTS participants regarding problems encountered when trying to implement the activities from the workshops included:

- "Time, 1 period (50 min) of video analysis goes too quick. Use video analysis only when double period."
- "Students could only use the teachers computer, solved this by assigning them times to get their data."
- "Lack of equipments, since we could purchase only two."
- "I need to be more careful about the background because in some of the frames the rocket was very difficult to see."
- "Having enough equipment for the lab groups - need to wait for additional funding to increase number of video cameras available."
- "The lack of computer is a challenge for me. We still need to borrow mobile laptops to use the simulations."
- "Initially students didn't like it because they could not get the correct answers. Eventually, they get used to it. They are happy when they are getting the correct answers."

Other responses related to implementation or success from the participants:

- "This information was mostly non-implementable for my high school classes." (PTIP)
- "We integrated more technology techniques learned at the workshop in all classes." (PTIP)
- "I want to use LabView with more advanced students in the computer control part of the course." (PTIP)
- "I needed to integrate the use of VPython more in the course so that the students would be more competent when using it." (PTIP)
- "The workshop helped me go beyond just having students analyze other people's videos and take their videos and analyze them." (PTIP)
- "Letting them play with the simulation before providing a more structured format was helpful." (STIP)

- "Need a follow-up training." (DVTS)
- "Yes. I believe with time I can better instruct them on using the equipment. I also believe they will use equipment more efficiently." (DVTS)
- "Students really enjoyed doing the lab and seemed to have retained the information better." (DVTS)
- "I noticed that they enjoy the activities especially when it is computer simulations. Ranking tasks were initially very difficult for them but they eventually got used to them." (DVTS)
- "Students were able to quantify their work." (DVTS Video analysis)
- "Students really enjoyed doing the lab and seemed to have retained the information better." (DVTS flying pig)
- "I plan to permanently make MBL experiments on acceleration of a mass down a frictionless incline and also into the simple pendulum experiment." (DVTS)
- "After receiving grant funding, I (along with my department) have purchased a large amount of Vernier equipment to begin using in Fall 2011 in all levels of physics classes." (DVTS)

In December of 2010, the DVTS participants were asked if they anticipated continued implementation of what they learned. It is obvious from their responses (94%, 100%) that an overwhelming number feel the activities were productive and will continue adding the activities to their curriculum.

DVTS October 2009

Do you anticipate implementing some of the activities/materials from the DVTS-MBL workshop in the future?		
Answer Options	**Response Percent**	**Response Count**
Yes	94.4%	17
No	5.6%	1
	answered question	**18**
	skipped question	**2**

DVTS December 2009

Do you anticipate implementing some of the activities/materials from the DVTS-MBL workshop in the future?		
Answer Options	**Response Percent**	**Response Count**
Yes	100.0%	11
No	0.0%	0
	answered question	**11**
	skipped question	**0**

Question 6*: Is there evidence of the participants' continued motivation to change?*

Responses to the previous question is some indication of the participants' continued motivation to change and implement new technology in their classroom. Qualitatively, there were very strong statements supporting the evidence of change. Comments from the on-line DVTS respondents included:

- "It has changed the way I teach physics for the better. I used to teach it like an algebra class. Now with the probes the students can get accurate data find the relationships graph them and come up with the equations themselves."
- "Every few months I go over my curriculum and look back at the notes from the workshop."
- "I plan to use video capture in all general physics and physical science classes."
- "I plan to use formative assessments (like FCI) in my new physics courses next school year. Plan to use Vernier probes for both physics and biology next year."
- "I want to use the microphone to analyze sound of a train whistle. I would like to have them isolate the 4 notes and then calculate the depth of the holes in the whistle."
- "I will request the school to acquire logger pro so I can use most of the activities presented during the workshop."
- "I will expand these methods to chemistry class, and make more complex video analysis for physics."
- "I am constantly learning new strategies and adjusting previously learned innovative teaching strategies."

Other Relevant Data/Information

In addition to implementing activities in the classroom, participants were asked to identify particular assessment tools that they felt were appropriate for monitoring student understanding. The tools were addressed in the workshops and then participants were asked to identify which ones they use. They could choose more than one. The frequency counts are in the table below.

Assessment Tools Implemented by Participants

	PTIP Oct 2010	STIP Nov 2010
Ranking Tasks	8	5
TIPERS	6	4
FCI	6	2

Summary and Recommendations

Overall, the participants seemed very pleased with the workshop experiences and were anxious to implement the things they learned. One of the biggest detriments to implementation was the lack of equipment in the schools and colleges and/or lack of money to purchase equipment. However, it should be noted that a large percentage of the participants either did have the resources necessary or were seeking ways to obtain the resources. It would be safe to assume that all of the participants wanted to know about the technology and how to use it or they would not have applied to attend. Many teachers attend workshops such as this to find out what is available and how to justify purchasing the equipment. It is a wise investment of their time and the grant funds to allow teachers the opportunity to try out available resources before purchasing.

The workshops were well planned and followed the format as outlined in the grant and advertising materials. None of the participants expressed disappointment that this was not what was advertised or expected.

The participants felt the activities were appropriate and attending the workshop would benefit their students in due time. The DVTS participants overwhelming (94%, 100%) felt the activities were productive and will continue adding new technology and activities to their curriculum.

The workshop increased the participant's interest in continuing to seek appropriate professional development. All of the STIP and PTIP participants indicated they strongly agreed that the

workshop increased their interest in continued professional development while 19 (65.6%) of the DVTS participants rated it as a 5, eight (27.5%) rated it as a 4 (including one of the dissatisfied participants), one rated it as a 2, and one put not applicable (NA).

The workshops met the criteria for high quality workshops based on the Guskey Professional Development Model. They would be considered successful professional development experiences since the ratings on the upper end of the scale between strongly agree and agree.

Suggestions and comments from Participants

- "Allow enough time in class and set-up a common location (server) where all the files to be kept." (DVTS)
- "I think I need more training or there is a mismatch between my students and the material. Perhaps not all learners learn this way?" (DVTS)
- "I would like a workshop focused on other technologies such as graphing calculators or CAS." (STIP)
- "Offer more on video analysis and the use of phET simulations." (STIP)
- "I would certainly consider attending another technology workshop in the future. To have the benefit of Thomas, Duane, et al doing the vetting of these methods/activities, it makes the task of sifting through what's out there so much easier. The average teacher simply doesn't have the time to do this kind of research to an effective end result. All the presenters should be thanked for their top-notch instruction and enthusiasm." (STIP)
- "Keep digging around and finding the most effective implementations of tech tools for physics instruction. The NSF cannot have sponsored a more worthy project in science education." (STIP)
- "The workshop was great. Time is always a factor. More time would be great. I would love a workshop that addresses teaching College Physics(for Pre-med and Biology students)." (PTIP)
- "Separate high school and college topics, do more inquiry/basic labs/hands-on activities designed to be a part of a class, not the entire class." (PTIP)
- "More stuff from Vernier." (PTIP)

- "The workshop was excellent. If possible, it would be very helpful to have workshops on Electricity and Magnetism and Modern Physics." (PTIP)
- "These workshops really help one clarify what a teacher needs to do to help her students understand not just practice physics." (DVTS)
- "The difficulty I face is the feeling that while I am very willing to learn a new way of teaching, I am having a very hard time relating to any of these methodologies." (DVTS)

Appendix

Final Day Evaluation Summary: Data Collected by Project Directors

Workshop-Site Date	*DVTS-STCC 10/29-31/09*	*DVTS-LC 12/3-5/09*	*PTIP-SCC 9/30-10/2/10*	*STIP-LC 11/4-6/10*	**TOTAL**
Number of Participants	23	18	17	22	80
ITEM					**AVG**
Workshop Pis Presentations[1]	5.00	4.92	4.79	4.93	4.91
Workshop Leaders Presentations[2]	5.00	4.82	4.61	4.64	4.77
Workshop Format	4.91	4.83	5.00	4.95	4.92
Useful Ideas	4.91	4.94	4.24	4.95	4.76
Local Site Facilities	4.39	4.83	4.88	4.77	4.72
Food	4.65	4.94	4.75	4.55	4.72
Lodging	4.81	4.72	4.93	4.77	4.81
Workshop Organization	4.87	4.67	4.82	5.00	4.84
Workshop Worthwhile	4.96	4.94	4.47	5.00	4.84
Rate of Whole Workshop	4.96	4.94	4.65	5.00	4.89
Did Workshop Pre-materials prepare you?	4.26	4.28	3.81	4.33	4.17
Content Session - Type 1[3]	4.72	4.60	4.35	4.68	4.59
Content Session - Type 2[4]	4.87	4.89	4.53	4.68	4.74
Work Sessions	4.61	4.67	4.24	4.73	4.56
Technology Sessions	4.65	4.61	4.41	4.70	4.59
Has this workshop increased your knowledge of technician education?	4.78	4.83	4.59	4.91	4.78
Assessments and Implementation Sessions	4.74	4.56	4.35	4.55	4.55
Did you enjoy the post-workshop evening interactions?	4.92	4.64	4.86	4.95	4.84
[3]There were normally two primary topics for each workshop	MBL	MBL	LabVIEW/Sensor DAQ	PhET and Other Simulations	
[4]This was the other topic for the workshop	Video Analysis	Video Analysis	Vpython	Physlets and EJS	

DVTS-MBL Workshop, Lee College, December 3-5, 2009

1. What did you like best about this workshop? (You may list more than one)
   - Ideas fore incorporating MBL in E&M labs.
   - Amazing amount of usable information.
   - I like the video analysis and MBL integration. In addition, the assessment portion of the workshop was very useful for me.
   - New teaching ideas including assessment use of MBL & video analysis equipment/software, peer/mentor interaction.
   - MBL S. Schultz. Statistics T. O'Kuma.
   - The idea of integrating technology in the classroom is powerful. It has helped me reflect on the importance of technology in the classroom.
   - I enjoyed the collaborative nature in instruction, the relevance of the materials and technology.
   - I always leave w/ new challenges, ideas & materials.
   - The presentation of ideas and resources.
   - The hands-on approach and the availability of instructors.
   - Material (books) that give us more depth and labs to use after this workshop.
   - Developing materials for my classroom. Came with a problem and found help, now I can go back to my classroom and implement.
   - Ability to work on our own projects- really makes video transfer into a PPT – direct from camera – inquiry methods.
   - Hands on activities with time to explore, interaction with fellow teachers both secondary and post-secondary.
   - I teach pretty much on my own and every bit of help is crucial to my self-improvement. The MBL sessions will be invaluable to the success of my future (& present) classrooms.
   - Using the video analysis & having problems with it. Seeing limitations etc. Discussion of multiple classroom dynamics.
   - The presenters did excellent, sharing their knowledge and experiences. I enjoyed working with the other participants, learning from them also. I loved that it was hands-on and somewhat independent learning style.

2. What did you like least about this workshop? (You may list more than one)
   - Little downtime.
   - Too much late work, I got tired in the evening.
   - Long hours at night. Sorry.
   - None – Really!
   - Not answering the few questions that you put on overhead!
   - Nothing. Everything is helpful.
   - I always with they could last longer and then I realize that I couldn't!
   - I really enjoy these workshops. I especially enjoy the time we're given to work on projects. The only thing that I would add is …more 10-minute breaks.
   - Technology issues (unfamiliarity w/Macs).

- Evening after supper was a lot harder with a full stomach but the activities (hands-on) very helpful so not so bad.
- Diesel fumes on bus, round chair reviews, but did find useful the "pre" work w/team on whiteboards.
- Some downtime – getting others back from breaks, didn't get to some topics – optics.
- Sorry, I can't think of one!
- Using Apple's –just not familiar with them. Being frustrated (pluses & minus) would not want it any other way. Too much food!!
- It was all new to me and very enjoyable. I learned a lot and am going back home with a lot of new ideas. Currently no constructive feedback.

3. What suggestions do you have to improve this workshop? (You may list more than one)
   - Date of the year, if possible, in summer.
   - Maybe, one more day instead of 8 am-9:30 pm.
   - None. Everything is well organized and well planned.
   - I don't think that I could offer any suggestions but I have learned a lot from this and other workshops put on by this group.
   - I really enjoy these workshops. I especially enjoy the time we're given to work on projects. The only thing that I would add is …more 10-minute breaks.
   - Less downtime. Some prep work to learn basic computing on the other comps. (Macs)
   - In pre-workshop materials, include some questions to consider or answer to help guys read material. Everything was great.
   - Project for last day could use some planning time on 1st day.
   - None – just hopefully continue.
   - Fewer topics – more time on each- offer in two parts.
   - Request that the participants send in their problems before they come to the organize sessions. The pre-workshop materials are excellent in getting us thinking along the lines of the
   - Wish we had more time to do the stuff we missed.
   - Assign the groups carefully taking into consideration the veteran teachers and the new teachers. Mixing up the two. Who's attended these workshops? Who has not?

4. Are there any other workshops that we should consider offering in the future?
   - Physics at it applies to life science (Biology).
   - Some basic for new teachers.
   - Maybe offer a workshop focusing on physics concepts, which have common misconceptions or abstractions.
   - Let's do one where we create or assimilate software/program clusters that exactly suit our needs. For example, let's take the software we use here and really work out the kinks of embedding (imbedding?) videos, java applets, & simulations so we can pack them to go.
   - A good Hawaii workshop – any topic would be fine.
   - Perhaps; more E & M based workshops.

- A workshop whose focus is on electricity and magnetism would be great. (MBL, or Pedagogy)
- ALPS, E&M utilizing Paul's Spiral simulations, video, MBL at AP level.
- ALPS, Admin-teacher team training-anything you discover.
- A second part to the adaptable simulations – would like more instruction – time to learn more.
- How to successfully host a workshop.
- I would love to see a follow-up workshop on how we all implemented what we learned that incorporated creating lessons for simulations or creating our own simulations.
- A workshop for new teachers? Not sure if there already is one.

5. General comments about the workshop pre-materials.

- I loved it all.
- AWESOME!!!
- Excellent job – you get some ideas before you get here.
- This is an excellent, well-funded workshop. I have learned a lot of new ideas and strategies, which I can surely implement in my classrooms.
- Perhaps sending them a little sooner to ensure we read them.
- Very useful and affirmative.
- In pre-workshop materials include some questions to consider or answer to help guys read material.
- Adequate.
- All participants have a common background or starting point. Growing professionally is terrific.
- GRAND!! As always – I learn more & more each time. I can't believe there is any more but there ALWAYS is ___
- Good background on early use of MBL and adaptation to physics classroom.
- All were appropriate & helpful in getting us prepared mentally.
- Thank you for everything. Please let me know about future workshops!

DVTS-MBL Workshop, Springfield Technical Community College, October 29-31, 2009

1. What did you like best about this workshop? (You may list more than one)
   - Equipment to try out.
   - I liked the helpfulness of the presenters, the college faculty and the attendees. I liked the hands on experiences that can translate into actual use in my classroom.
   - Hands-on activities, equipment available, peers interactions.
   - Working with colleagues that had similar experiences as I do! The instructor's enthusiasm was contagious.
   - Hands on, relevance to classroom!
   - Networking, chance to work with variety of equipment.
   - Great presentations, abundance of USEFUL information, ideas for IMMEDIATE implementation.
   - Small classes, more single attention, focus on technology.
   - An introduction to the MBL (particularly the Labquest). An introduction to some motion sensors that be implemented with "Labquest". An introduction to the "firewire" camera and how it can be used with the "lab-pro's" software.
   - Experience in doing open-ended activities. DVA. Inside tips on getting things to work right.
   - Interaction with variety of faculty all of whom are passionate about teaching. Digital Video Analysis-particularly use of wireless.
   - The correlation of educational teaching methodologies and use/incorporation of new technology for hands-on experiences in curriculum development & lab design.
   - Networking with fellow physics teachers. Chance to try out & practice with equipment. No cost. Take away useful materials.
   - Direct use of equipment.
   - Learning new ways to use the video analysis. Meeting new people & sharing ideas. I liked the short opportunity to see the armory.
   - Learning new things. Getting ideas. Working with other physics teachers.
   - Video motion analysis, networking, having the ability to ask questions, working with quality teachers, being taught by respectable educators in physics.
   - The hands-on format gives me a lot of experience & ideas.
   - Love the amount of knowledge I gained at this workshop. Feel that it really will help me be a better teacher for my students – MBL & video analysis capture their attention and they're hooked.
   - Hands on with many of the probes, interfaces and the computer.
   - The physics material I received and the collaboration with others.
   - Got exposed to so many new things & techniques.
   - Working with MBL – learning video analysis.

2. What did you like least about this workshop? (You may list more than one)
   - The incredible heat in the classroom.

- The days were a little long. Little time to explore some local attraction or tour the campus.
- I Long days, but what can you do. I'm sure there are time requirements to fulfill and the time is needed.
- Nothing!
- I wish there could be more workshop in the future, we could have small group follow-up.
- Teacher must incorporate much prior knowledge in order to perform many of the task. (Which is expected, not very new teacher friendly.)
- I wish that I could have the time to complete all of the interesting projects. Although this may be my fault for not asking, I wish I could have better understood how assemble "moment of inertia" apparatus.
- Being exhausted before I even got here…(from travel & working prior to leaving)
- It is a very long day.
- As a local participant not enough time to network w/ entire group. (But lots of time to network in small groups)
- Had to miss work to attend.
- Limited time for lab development.
- Can't think of anything I didn't like.
- Enjoyed it all. Maybe a bit more on optics.
- Too tight a schedule. Worked on Apple platform more than the PC platform.
- I enjoyed the workshop.
- 7:30 AM. Nothing really
- Need a little more time. I would like more time with heat & temperature.

3. What suggestions do you have to improve this workshop? (You may list more than one)
   - Have it somewhere else.
   - Have a tour of the host campus.
   - I think it was run very well.
   - More to the same, more workshops!
   - More time on assessments and implementation.
   - I really cannot think of any substantial improvements that I could make to this workshop.
   - Sometimes the objective of an activity could be stated more clearly. Discussion, in detail, of group formation/resolution of group issues.
   - Start the ideas for a group project earlier in workshop to time to reflect prior to tome to put ideas to use.
   - More of the same – different levels?
   - Revolving emphases (cover same span of planned topics, but allow for extended time for varying topics across workshop iterations – or allow self selection of focus in the hands-on sessions)
   - Keep 'em going. THANKS!
   - This was a great workshop. Keep doing what you are doing.
   - A week to do the same material.
   - More time or fewer activities.

4. Are there any other workshops that we should consider offering in the future?
    - Differentiating in physics for different levels of mathematics.
    - I find each of these workshops such an instructive experience that I would certainly apply for acceptance for any future workshops that you would offer.
    - LabView, integrating some programming of the probes to triggered or triggering events.
    - LabView w/MBL; Modeling & Group Dynamics; Incorporating MBL for Middle School and Upper Undergraduates.
    - Incorporating the learning environment (lecture/lab combo; room set-up; etc) with MBL hands-on experience.
    - More of the same – different levels?
    - Physics on the "cheap". Intentional ways of incorporating technology for the schools that can't afford to implement new technologies.
    - Advanced Modeling. AP specific.
    - Discourse management. Inch wide/mile deep – which is the way to go?
    - Yes, more hands-on with the technological material.
    - Concentrate on video analysis also MBL on nuclear physics.

5. General comments about the workshop pre-materials.
    - Great people and physics concepts presented I multiple ways for all to learn.
    - Created a motivation about the use of technology in the classroom.
    - Overall an excellent job.
    - I wondered if there were any studies that were more recent. The studies were 10-12 years old and students have changed during that time frame.
    - Great insight into the workshop.
    - An excellent experience to refresh my skills in physics instruction. It also gives me exposure to how some of the modern technology can be implemented in instruction.
    - Good reading material about overall MBL topics.
    - Could have an on-line component – especially a digital Lab Pro that we could "virtually" practice with to achieve a minimal proficiency/familiarity.
    - Nice history of the development of MBL. Made me remember the ol' interface boxes & the Apple IIe computers.
    - I would have enjoyed a current article.
    - Is current research available on the topics?
    - Are there any more recent articles?
    - Good!
    - The pre-materials helped me to understand the pedagogy associated with the labs.
    - Very precise, but I guess there was lot more unnecessary statistics.

PTIP Workshop, Southeast Community College, September 30-October 2, 2010

1. What did you like best about this workshop? (You may list more than one)
   - Working on LabVIEW and VPython; interaction with participants and workshop leaders: post-workshop interactions.
   - Using the Vernier probes & developing the "software" to use them as measurement instruments.
   - Being able to choose my projects & work at my level.
   - I liked how approachable and helpful the teachers/workshop leaders were. It was great to interact with the fellow college & high school teachers.
   - Learning about sensing & programming for making teaching more effective. Gaining ideas/inspiration from other participants.
   - Organization. Time frame – use of time. No down time even though we had long days – every minute counted.
   - VPython exercises and LabVIEW exercises.
   - Learning new programs; projects with programs.
   - Networking with colleagues & making projects work. Getting equipment & software to take home & use in my classes.
   - I loved the new infusion of ideas and the ability to implement hands-on activities for students. I really liked the ability we were afforded to learn by doing. I really liked the equipment and project ideas supplied by Sam and Michele.
   - I always get useful information from these workshops. Assessment session – Vpython. HS & Two year college together.
   - Spending time with knowledgeable people on the multi platforms. Having time to get our hands dirty with the materials & feel the frustrations.
   - Interactions w/peers, new ideas.
   - VPython programming and LabVIEW. Free goodies and software! Nice college.
   - Working on the LabVIEW and VPython projects.
   - People, participants and presenters and programs!
   - Cutting edge exposure to physics lab equipment & capabilities.

2. What did you like least about this workshop? (You may list more than one)
   - Lack of time (I think the time is about right but I wish there was more time to work on some of the projects)
   - VPython went too fast for me. I missed the syntax session (if there was one) and there was no place to go look for it. I would recommend a hard copy of BASIC figures & their names. I learned by trial and error, but it took weeks. An hour & a half presentation did not make me fluent enough to use it. Vernier had many "palettes". I would use a tool and need it 30 minutes later & forget where it is.
   - Not very applicable to high school curriculum.
   - I choose a project to work on alone and had some challenges getting going.
   - The rate of expected learning for those without prior exposure. Lack of enough prior preparation for hands-on in cases where no prior knowledge or SKILL existed.
   - Only working on one LabVIEW project.
   - Not enough time to really do the VPython & LabVIEW projects.

- Not having adequate experience in programs & codes. projects. I was limited in what I learned. I was 10 steps behind everyone.
- Getting up in the morning.
- I was a bit sick and the long days really ground on my health.
- LabVIEW more detailed than I would use.
- Not enough time to finish my own work with VPython.
- With limited curricular control, the implementation will be challenging. Schedule changes were confusing at times.
- Everything was wonderful!
- Time constraints.

3. What suggestions do you have to improve this workshop? (You may list more than one)
   - These workshops (the ones you have been holding) are great.
   - One might have wall posters of the pull-down palettes.
   - Try to spend more time where you can develop & take things back (products or ideas) & use in the classroom.
   - Time constraints don't allow for attendees to explore/do the project fully.
   - More prior prep information sources.
   - I would love to actually have a session to work through complete project steps. Ex: Mouse trap car project.
   - I would like for it to be more time so that we could have time for study & reflection, but I wouldn't be able to come to a workshop taking more time, so covering less stuff is the only solution I can think of, but I don't like that either!
   - For people like me – give pre-workshop resources that gives basics on program language.
   - Some of the LabVIEW stuff needed to be better tested.
   - While I really appreciated all the hands-on opportunities, the pace of the workshop sometimes felt a bit hurried.
   - None
   - Can't think of any without expanding the amount of time. I don't think I could do more than what we do.
   - Discuss implementation earlier – gives participants a goal and vision for end of workshop.
   - Can't think of much here.
   - More time to work on projects.
   - Extend the length of the workshop so we have more time to work on the projects.

4. Are there any other workshops that we should consider offering in the future?
   - Workshop on Electricity and Magnetism.
   - Using Loggerpro, integrating technology projects in HS curriculum.
   - Teaching conceptual/trig based physics. Teaching astronomy. Implementing/teaching for pre-service education at tow-year colleges.
   - Yes: on sensing & teaching concepts, on teaching sources/uses by course level.
   - Sometime I think our design projects can get away from the math, so having a workshop that trains you on the design process & writing projects (engineering).
   - Keep adding or integrating WB discussions when possible into existing workshops.

- Using ipods, cell phones, tablet netbooks, & other new technology in physics. Any more suggestions on using GPS?
- Yes, it was a great overall experience and I would happily consider going to others.
- More with regards to the modeling/alternate approaches.
- LabPro would be nice – something more "beginner oriented". I know some of these have been offered previously but re-offering could be nice.
- Yes, keep up the good work!
- Great!

6. General comments about the workshop pre-materials.
   - Excellent workshop. Thank you.
   - I took physics 32 years ago. I never stopped to consider the effect of computers on Physics modeling & computations. One must really consider the amount of work needed to learn a program before implementing into a Physics (not computer prog.) class.
   - I liked being stretched but I would have liked more of it to be applicable to high school classroom.
   - There were great.
   - More sources need to be mentioned & suggested.
   - A set of short, simple VPython pre-workshop exercises. Ditto for LabVIEW. Great workshop guys! I intend to go home & implement every thing immediately, as usual.
   - No comment.
   - They got to me too late for m;e to do them adequately.
   - The NI information on LabVIEW was very helpful. It helped me to hit the ground running.
   - I think they will help support helping implementing these types of projects & it is a start on other materials I am sure we could find.
   - Did not explain purpose well. Provide earlier for more time to work with tutorials.
   - Only had time to read yellow packet.
   - Interesting.
   - Good read to give me an idea of what we are going to work on.

STIP Workshop, Lee College, November 4-6, 2010

1. What did you like best about this workshop? (You may list more than one)
    - The intensity – it gave us a chance to really get to know each other – I will be in touch with these folks – Dwain & Anne, but also my fellow attendees – in the future! I like the long days- it uses time so much more efficiently.
    - The PhET's are polished, ready-to-use, ready-to-share lessons. Very useful.
    - Listening to other thoughts and ideas about some instructional physics questions, the use of PhET.
    - Hands-on, very thorough
    - Focusing on a few tools and going into depth with them.
    - The hands on nature, time to practice with the materials & think about implementation.
    - Working with PhETs & physlets. It was a joy learning that I could learn how to program EJS.
    - The curriculum creation projects, very worthwhile & helpful.
    - Hands on use of resources.
    - I learned about PhET where I found some good simulations to use in class.
    - I enjoyed the num ideas and the tools that were presented. I thoroughly enjoyed meeting the different teachers and seeing how their classrooms were run. The materials presented were extremely helpful and useful.
    - I've never even seen how to do any programming, so giving me the ability & confidence to do simple changes is very exciting. I have used PhETs before but this workshop gives me a much better view of how to use them more effectively.
    - The introduction to physlets and EJS was by far my favorite.
    - Learning about physlets & EJS. Project/Presentation.
    - I liked the different approaches to use all the information that was presented. I have used some of this before but not to this magnitude. Now the ideas are endless.
    - Learning how to use the sites & getting new sites of resources.
    - Presentations by participants.
    - 1a. Interacting with the Physlets environment. 2b. Fantastic presenters, making 1a possible & effective.
    - The hands-on work. The organization.
    - It was an even split between the specific workshop topics and the collaboration time with other physics teachers. Both were immensely valuable.
    - Project. I also enjoy meeting other physics teachers and sharing what is working in their classroom.
    - The variety of multi-software technologies uses in this workshop. Specially, the PhET and the Physlets.

2. What did you like least about this workshop? (You may list more than one)
    - Hmmm… I probably gained 3 or 4 pounds. Seriously – I am trying to give you constructive feedback but I can't think of anything to write here.
    - The computer tables upstairs should have the participants facing the projection screen. It was hard to do the task at the computer and fly around & watch the presentation.

- There was a lot of information in a little bit of time.
- Duration of each day.
- Sometimes we had too much unstructured time. This was mostly at points where, for example, we were given, say, 30 min. to try something and some of us finished in 15 min.
- Long days.
- Need to turn around to see screen while following session leader using computer.
- MAC computers were hard to use for me.
- The unavoidable long periods of sitting and the long hours. But I would gladly do it again.
- I found everything useful on some level.
- The 13-hour days were taxing; the material was great.
- Lack of sleep. Late shuttle to pick up at airport. St. Arnold wheat.
- Can't think of anything.
- Paul's poor presentation abilities. He needs lots of work verbalizing what he wants to say.
- Working after dinner.
- My plane flight.
- I didn't identify anything negative; it is a fast pace, but that allows us to get a lot of content in a short time.
- There was a little more talking and less "work" time in this workshop but … it was still great. Actually … I think I liked the way we were introduced to VPython a little better. I think it may have been more investigating on your own (compared to EJS) – not sure. Both were good.

3. What suggestions do you have to improve this workshop? (You may list more than one)

- Incorporate one short session to discussing pre-workshop reading. Maybe even give us a few more articles.
- Paul has a horrible delivery. He needs to tape a small circle on the floor and stay in it. He needs to go through his slides and have them in order- so in order that someone else can toggle the next slide for him. Twenty-five people did presentations and he was the only one that circled the room.
- 1 day longer, less hours per day.
- Do some presentations on how to teach thermodynamics.
- Project time could be better with a longer time.
- More hands-on. Multiple projects versus one.
- More hours in the day. No St. Arnold Wheat. Seriously, these are always great & I can't think of anything.
- Spend more time on a specific topic rather than covering many topics.
- Would a summertime time frame work for you guys? It might be easier to schedule & not lose any student days.
- Some pre-workshop reading assignment in physlets for participants without previous knowledge of programming in open source environment.
- Some sort of pre/post workshop social connection (e.g. listserv, facebook group, etc.) to help us get to know each other and keep in touch.

- To limit the workshop for one major software technology to make sure that everyone within the group understands it, how to implement it, use it, and incorporate it into their course materials.

4. Are there any other workshops that we should consider offering in the future?
   - Maybe a follow up SimTools for folks who have now been using sim (because we were here!!) and are ready to share ideas w/ one another – refreshers, etc, instead of the nitty gritty that was presented here (note: this is NOT a negative of this workshop - but one we've been to this, we would benefit more from a "Part II" conference-
   - You might consider a low-tech workshop. I would like to see some E & M delivery activities.
   - An Assessments workshop would be interesting.
   - More on video analysis.
   - Assessment creations and analysis.
   - I would enjoy seeing a workshop focused on the E&M portion of physics to see if there are any good tools or techniques to help the students learn.
   - Another VPython and another LabVIEW.
   - Spiral Physics. Anything with distance learning/online presentation /teaching. An advanced EJS/Physlet workshop centered around exploring the code.
   - Using typical Vernier and/or Pasco tools in traditional & non-traditional ways.
   - VPython seems interesting to me.
   - I anxiously await you offerings whatever they may be.
   - Another project based learning workshop. I believe you offered it before but I did not attend. I'd like to know more about it.
   - Collection on hands-on demo that con be used in classroom instruction for both sequences Phys I & Phys II.

7. General comments about the workshop pre-materials.
   - They were good thought material, but without a discussion section about them they weren't as effective as they could have been (to clarify – articles were very worthwhile but could have implemented them into the workshop).
   - Good articles. These younger participants might benefit from early constructivist learning.
   - Good information.
   - They were interesting articles, but not discussed much during the workshop.
   - It was very interesting. I will definitely use method A & B more.
   - Long & never used.
   - Sessions didn't refer to them?
   - The materials were nice to get a good background and why we were doing the activities we did.
   - Gave me some pre-knowledge that helped one look for the concepts found in the articles all during the workshop.
   - Make available I electronic format/send out earlier.
   - I think we could have done more with these materials.

- I liked that they started the thinking process about what we would be learning. To be honest I thought the longer one was slightly over kill. I do like that everything that is done is research-based material.
- I enjoyed it.
- I did not receive them (only this time but usually they are in mail on time).
- Good background; I already had a strong sense of justification for these endeavors.
- It got me prepared for the workshop.
- I had seen a lot of them in my research & reading on my own, though they would be valuable to anyone who had not.
- Great job – once again.
- Great!