VOLUME 3, NUMBER 1 Summer 1993

TYC PHYSICS TEACHER Newsletter

An AAPT supported Newsletter for Physics Teachers at Two-Year Colleges

NSF holds Workshop on the Role of Professional Societies in TYC Science, Mathematics, and Engineering Education

Curtis J. Hieggelke
Joliet Junior College
Joliet, IL 60436

On October 29-30, 1992, NSF sponsored a workshop on the role of professional societies in two-year college (TYC) science, mathematics, and engineering education in Washington, D.C. The workshop was Co-chaired by Jim Stith, President of AAPT at that time.

Discipline-based professional organizations occupy a unique position in the educational hierarchy from which to disseminate information and support innovation. The report of the May 1991 two-year college workshop, *Matching Actions and Challenges*, recognized that position and recommended that professional societies assume a leadership role in the initiation and development of a new version of the lower division, undergraduate curriculum.

This report also recognized and acknowledged the critical role of two-year colleges in this area. Recommendations were directed to two-year college faculty, professional organizations, and college administrators that would strengthen the interactions among the organizations, the faculty, and federal funding agencies.

Continued on page 10

INSIDE...

1992 CPTYC Chair Report

Curtis Hieggelke
1992 CPTYC Chair
Joliet Junior College
Joliet, IL 60436

First I want to thank the committee members who have served with me this past year or more—Roger Crawford, Leslie Dickie, Gordon Johnson, Janet Landato, Mary Beth Todd Monroe, Bob Rathie, Linda Stamper, Kenneth Stepnitz, and Myra West. I want to welcome the new committee members (Robert Speers, Carol Lucey, K.W. "Nick" Nicholson, and Sandra Fabella) and Linda Stamper as she takes over as chair for '93. Unfortunately, Roger Crawford has had a number of health challenges and has resigned. We all hope Roger recovers quickly and fully.

During the last year the committee has continued to sponsor or co-sponsor with other committees a number of invited sessions, tutorials, cracker-barrel discussions, and workshops covering a broad range of topics at the national meetings of AAPT. We need your help in selecting topics and organizing these sessions. Let Linda or any of the other committee members know what you would like to see at the national AAPT meetings.

Plans have been made for the summer meeting in Boise which include workshops on the CASTLE project and Collaborative Learning and sessions on Issues in Two-Year College Physics, Uses of Computers in Introductory Physics, and Trends and Developments in Computers in Introductory Physics—Simulations. In addition, an open house and cracker-barrel discussion session is planned. There should be enough to keep us busy the entire meeting.

We have a number of projects of the CPTYC that are in various stages. One project is to develop a recommended list of library holdings for two-year colleges which Tom O'Kuma put together. This is supposedly undergoing some review. Marv Nelson is working on a second project which is designed to produce a history of the CPTYC.

A third project, led by Mary Beth Monroe, was the development of a proposal for a yearly award which would recognize special contributions to physics education at two-year colleges. (A copy of this proposal is included in another section of this newsletter.) However, at the 1992 summer meeting and again at the 1993 winter meeting, the committee endorsed a substitute proposal from the AAPT Awards Committee for a Special Recognition Award which includes TYC, high school, and undergraduate rather than the subcommittees proposal. This was done in order to speed up the establishment of such a recognition. At the winter meeting, the CPTYC also endorsed the subcommittee's proposal as a model for the awards committee in this area. Unfortunately, the council has turned down Awards Committee proposal and the future of this seems unclear. However, outgoing AAPT president Jim Stith clearly endorsed a recognition award in his address at the New Orleans meeting (see the March Announcer for a copy of his remarks).

The PINET project which involved the networking of the two-year physics community through the AIP PINET electronic computer communication system has ended when continuation funding was not found. Hopefully most of the TYC PINET members were able to continue on PINET with some form of funding. It would appear that under the Clinton/Gore administration that such networking would expand and hopefully would include connecting two-year faculty.

Finally, there is a new project — a follow-up meeting to the Critical Issues Conference of two-year college physics teachers that was held several years ago. At the winter meeting in New Orleans, the committee endorsed this idea and a number of people volunteered to help with it. As my last official act as CPTYC chair, I appointed a small group (Jack Hehn, Tom O'Kuma, Carol Lucey, and Linda Stamper, and myself) to provide the initial leadership for this project. In April, Tom O'Kuma sent a request to the executive board of APPT to officially endorse the concept and set-up a committee. If you are interested in working on this, send your name and what role and/or contribution you might be able to provide to Linda Stamper.

We also have endorsed and supported efforts made by the other TYC committees of various discipline organizations to bring full professional recognition by the NSF for the academic programs in mathematics, science, and engineering in the two-year colleges. AAPT's support involvement in TYC's is generally far better than most of these organizations. For additional information see the report on the Oct. 1992 conference on TYCs and discipline organizations.

We have been concerned for several years about the lack of participation by TYC members at the key initial stages of several major NSF supported lower-division physics projects of AAPT (such as IUPP and the Laboratory Conference which will be held this summer). I hope that TYC's will be fully recognized

Continued from the previous page

for our significant role in undergraduate education tho not just in a token representative fashion. This would be easier if more TYC teachers would join AAPT and annually attend one or more of our national meetings. Encourage others to participate.

The CPTYC has encouraged members to write articles on physics in the two-year colleges for the *Physics Teachers*, to volunteer to serve on other AAPT committees, to complete the TYC survey of Judith Tavel, and to apply to AACC for fellow positions at NSF.

Looking to the Future — My Personal View and Concerns

In order to insure the continued and expanded participation of two-year college physics teachers in AAPT, the CPTYC should collect and submit names of two-year college physics teachers to the nominating committee of qualified interested candidates. In addition, the CPTYC should also collect names and vitae of experienced two-year college physics teachers and submit them to NSF to serve on advisory and review panels. Another task that could be undertaken is a grant mentoring program to improve the quality and number of proposals from TYC physics teachers.

Another issue that needs to be examined is the role of the CPTYC and the needs of two-year college physics teachers. The main role of most committees in AAPT is to assist in developing an appropriate program for the national meetings with an occasional special project. However, there are more needs and opportunities for TYC physics teachers than this structure provides. Thus, there is a need to study alternative ways of meeting this challenge such as forming an affiliated group of AAPT.

Another concern is the possible establishment of a Center for Physics Teaching. We support this concept providing it involves the full and active participation of TYC physics teachers and it meets the needs of the diverse nature of the two-year colleges. Linda Stamper has been appointed to a board for it. This recent development is a positive one and hopefully she will keep us informed on the issues and decisions that are being made.

Two-year colleges appear to be entering into a new era of increased opportunity (for example through the Science and Technology Act of 1992 which sets up $35 million for CCs), however this will require a great deal of wisdom and responsibility as we meet this challenge. I hope that we can gain better recognition for our significant transfer math and science role and not just increase visibility in our vocational/technical education role as a result of these efforts. If we can't

Proposed TYC Special Recognition Award

Mary Beth Todd Monroe
Chair of the Special CPTYC Awards Committee
Southwest Texas Jr. College
Uvalde, TX 78801
8/11/92

Purpose:
This award honors individuals who have made exceptional significant contributions to physics education at two-year colleges.

Nature:
The award will consist of a plaque from AAPT and other appropriate recognition.

Selection Procedure:
The AAPT Committee on Physics in the Two-Year Colleges (CPTYC)) will seek nominations and review all nominations for this award. The CPTYC shall present to the AAPT Awards Committee their recommendations for the award(s). Final decision for the award recipient(s) will be made by the Awards Committee.

Frequency:
At least one award of this type would be given each year at the Annual AAPT Awards Ceremony. However, if the CPTYC and the Awards Committee are in agreement, no award will be given for a given year.

Eligibility Criteria:
Any individual who has made significant contributions to physics education at lower divisional two-year colleges may be considered for this award.

Nominations:
The following documentation will be requested for nomination-

1. One letter of nomination citing specific contributions to physics education in two-year colleges.
2. Two independent letters of support for the individual's nomination for this award.
3. A curriculum vitae of the nominee

The nominations will be rolled over for three years after nomination.

Editor's Note:
At a recent meeting of the Executive Board of AAPT, they approved two new major awards — one for high school and the other for introductory college level physics teaching. This does not preclude the CPTYC from moving on this proposal.

Minutes of the January 7, 1992 Orlando Meeting of the Committee on Physics in the Two-Year College (CPTYC)

1. Chairman Curt Hieggelke called the meeting to order with introductions of members and visitors. Members attending were Leslie Dickie, Mary Beth Todd Monroe, Tom O'Kuma, Linda Stamper, Kenneth Stepnitz, Myra West, Roger Crawford, and Gordon Johnson. Visitors included Jack Wilson, Raymond Cyr, Sandra Harpole, Robert Speers, David Wright, Bernard Schrautemeier, Pearley Cunningham, John Hubisz, and Marvin Nelson.
2. Minutes from the June 26, 1991, meeting in Vancouver, British Columbia were read and approved.
3. The following information was presented:

- Tom O'Kuma reported on library holdings and suggested that a subcommittee be formed. Discussion followed; Roger Crawford will chair a subcommittee made up of John Hubisz, Tom O'Kuma, and Giles Shepherd.
- Curt announced that the CPTYC account with PINET might be phased out. He suggested that a committee be formed to find monetary support for this account. The committee will be made up of Kenneth Stepnitz and Linda Stamper.
- Mary Beth Todd Monroe moved that,"The CPTYC endorses continued usage of PINET for two- year college instructors." The motion was seconded by Kenneth Stepnitz. Motion carried.
- Curt reported on the "Matching Actions and Challenges: A Report on a NSF Workshop on Science, Engineering, and Math Education in TYCs". He asked that members forward copies of the report to their administrators.
- Curt announced that The Physics Teacher was regularly looking for articles for publication. He suggested that Tom O'Kuma write an article entitled "A Day in the Life of a Physics Teacher in a Two-Year College". Marvin Nelson agreed to write an article concerning the history of the CPTYC.
- Curt discussed the National Engineering Coalition CC Conference scheduled for August 14-17. This group is in the process of establishing an organization or committee similar to the CPTYC to represent community college engineering faculty.
- Curt reported on his communications with Margaret Schumm. She was interested in obtaining raw data concerning physics courses, credits, and enrollments. He suggested that she contact Judith Tavel and Beverly Porter at the AIP.
- Curt encouraged all members to send articles for the TYC Newsletter, preferably by PINET. He would like to include descriptions of workshops and other projects. Tom would like to receive descriptions of specific pieces of equipment (uses, problems, etc.) for the "Lab Reports" section.
- Curt announced the 1992 NSF-TYC Workshops. The MBL Workshops are scheduled for March 19-21 at Joliet JC in Illinois, July 9-11 at Green River CC in Washington, and October 15-17 at Seminole CC in Florida. The CE/OCS workshops are scheduled for March 26-28 at Lee College in Texas and September 24-26 at Westmoreland County CC in Pennsylvania.
- Nominating Committee representative Sandra Harpole asked for nominations for this committee.

4. The following opportunities and future directions for the CPTYC were discussed:

- Curt announced that Judith Tavel is in the process of generating another physics questionnaire to be sent to all community college presidents. He asked that members think about developing questions that would result in the collection of significant data for statistics and analysis.
- Jack Wilson asked that committee members feel free to contact him with applicable problems or concerns. He solicited comments from members regarding the gathering and distribution of information to AAPT members. A major concern is privacy. How much should AAPT know about its members and how much are they willing to reveal? He specifically requested letters of support for electronic communications (i.e., bulletin boards, PINET).
- Jack discussed media products and grants. He announced that a low-cost version of "Physics: Cinema Classics" will be available soon on laser videodisk for AAPT members. He also discussed the "Just Physics/Action Physics" program funded by the NSF and developed by Arthur Eisenkraft to train secondary physics teachers.
- Jack asked for comments regarding a standardized physics test for two-year colleges. Curt suggested that Bernard Schrautemeier write an article on the IUPT for the TYC Newsletter.
- Curt suggested that an Awards Committee be formed to write guidelines for presenting a yearly award. Mary Beth Todd Monroe will chair the committee of Curt Hieggelke, Chuck Robertson, Gordon Johnson, and Robert Speers.
- John Hubisz reported on the actions of the Executive Board. He discussed the Interdisciplinary Journal of Science Teaching which is being developed by Bill Kelly and Bob Watson. He announced that the National Academy is setting up standards and wish to have three AAPT representatives by the year 2000. He called for recommendations regarding books for reprint. Members are encouraged to submit suggestions for the anniversary covers of The Journal of Physics (60 years) and The Physics Teacher (30 years).

Continued on next page

Continued from the previous page

- Curt asked JohnHubiz to write a report for the TYC Newsletter.

5. Tentative program planning included the following:

- "Practices and Procedures in the Laboratory" planned by Pearley Cunningham for the April, 1992, meeting in Washington, D.C. has been canceled.
- Several items were planned for the August, 1992, meeting in Orono, Maine. Janet Landato will chair an invited session on "Models of Mentor Programs". Myra West will chair a "Cracker-Barrel Session on Ideas to Go". The NSF will be asked to sponsor another workshop "Preparation of NSF Proposals". Marvin Nelson will present the workshop "Electricity for the Right Side of the Brain". A session or workshop on "Amusement Park Physics" will be investigated; it was suggested that three sections be planned (elementary, secondary, and college).
- The January, 1993, meeting will be held in New Orleans, Louisiana. It will include a "Superconductivity Tutorial" by Brain Schwartz. The contributed and invited sessions will include "Outreach, Retention, and Impedance Matching", "Impact of the SPS in Two-Year Colleges", chaired by Myra West, and "Gender Differences in Physics", chaired by Tom O'Kuma. Marvin Nelson will present another workshop "Electricity for the Right Side of the Brain" and Linda Stamper will chair the "Cracker-Barrel Session on Ideas to Go".
- Curt discussed hosting a panel discussion entitled "TYC Interdisciplinary Cooperation Between Organizations" for the April, 1993, meeting in Washington, D.C.
- No plans were made for the August, 1994, meeting in Boise, Idaho or the January, 1994, meeting in San Diego, California.
- The CPTYC will sponsor an "Open House" at each meeting.

6. The meeting was adjourned.

Respectfully submitted,
Linda Stamper
Secretary pro tem

Award Nominations

Please send in nominations for AAPT Awards such as the Distinguished Service Citation — especially for fellow two-year college physics teachers. If you know of someone who deserves special recognition for their efforts in physics education, send a letter explaining why you feel they are deserving to the Past President of AAPT (currently, Jim Stith) along with a short resume, if possible.

1993 AAPT Committee on Physics in Two-Year Colleges (CPTYC)

Linda Stamper (94) 1993 Chair
Owensboro Community College
Owensboro, KY 42303
502-686-4581

Sandra Fabella (96)
Cecil Community College
North East, MD 21901
301-287-6060

Carol Lucey (96)
Jamestown Community College
Jamestown, NY 14701
716-665-5220 x379

Robert Speers (96)
Fireland College of Bowling Green St. Univ.
Huron, OH 44839
419-433-5560

K.W. "Nick" Nicholson
Central Alabama Community College
Alexander City, AL 35010
205-234-6346 x 6259

Gordon Johnson (95)
Westmoreland County Community College
Youngwood, PA 15697
412-925-4037

Bob Rathie (95)
Kwantlen College
Surrey, BC, Canada V3T 5H8
604-599-2556

Kenneth Howard Stepnitz (94)
Northwest Michigan College
Traverse City , MI 49684
616-922-1277

Myra West (94)
Kent State University-Stark
Canton, OH 44720
216-499-6900 x444

PINET

PINET which supports up to 9600 BAUD data transfer rates has returned to an 800 phone # (800-874-947) with new modem settings: 7 data bits, 1 stop bit, and

Minutes of the August 12, 1992 Orono Meeting of the AAPT Committee on Physics in the Two-Year College (CPTYC)

1. Chairman Curt Hieggelke called the meeting to order with introductions of members and visitors. Attending were the following committee members: Curtis Hieggelke, Linda Stamper, Mary Beth Monroe, Ken Stepnitz, Janet Landato, Gordon Johnson, and Myra West. Visitors included: Barbara Bates, Thomas O'Kuma, Marv Nelson , Jack Hehn, H. Nellie Mireles, Tom Damon, Robert Speers, Alex Dickison, John Hubisz, and Bernard Khoury.
2. Minutes from the January 7, 1992, meeting in Orlando, Florida were read and approved.
3. The following information was presented:

- Jack Hehn announced a workshop scheduled for October 29-30, 1992, in Washington, D.C. entitled "The Role of Professional Societies in Two-Year College Science, Mathematics, and Engineering Education." A handout outlining workshop objectives, which included the promotion of two-year college leadership in professional organizations, was presented to members. Discussion followed regarding the advantages of AAPT and the importance of establishing associations at different levels. NSF support of this type of activity was mentioned. John Hubisz discussed the importance of two-year college representation on organizational committees and boards.
- Tom O'Kuma reported on library holdings; a hard copy of the Library Catalogue System and a disk of the collection on DBase-4 was given to interested members.
- Ken Stepnitz and Linda Stamper reported on progress to obtain funding for PINET. Ken will monitor use of the network and Linda will explore possibility of obtaining joint support from NSF and AAPT. A proposal will be mailed to all members.
- Mary Beth Monroe reported on the TYC Special Recognition Award proposal that was put together by a subcommittee which included Gordon Johnson, Chuck Robertson, Robert Spears, Mary Beth Monroe, and Curt Hieggelke. Alex Dickison presented a slightly different proposal developed by the Awards Committee. Alex reviewed the procedure by which an award is established and handled through the Awards Committee. Discussion included a concern that the Awards Committee would base decisions on vitas only. Bernard Khoury suggested one way of avoiding this possibility could be done by addressing these concerns in the TYC SRA criteria.
- Myra West moved that ,"The CPTYC endorses the proposal for a TYC Special Recognition Award presented by Alex Dickison of the AAPT Awards Committee." The motion was seconded by Ken Stepnitz. Motion carried.
- Marv Nelson reported on the History of the CPTYC project. He has obtained names of all past chairmen and is putting together a formal presentation.
- Curt Hieggelke reported on the TYC Newsletter. He called for articles and other items of interest for publication.
- Curt Hieggelke reported on the success of the 1992 NSF-Joliet JC- Lee C- TYC Workshops.

4. The following opportunities and future directions for the CPTYC were discussed:

- Marv Nelson announced the upcoming topical conference "Critical Issues for the Role of Physics Laboratories." The conference will be planned at the AAPT 1993 Summer Meeting in Boise, Idaho. Attendance will be by invitation only and will include faculty from secondary schools, two-year colleges, and four-year colleges.
- Tom O'Kuma discussed a follow-up conference for the "Critical Issues in Two-Year College Physics and Astronomy."

5. Tentative program planning included the following:

January 1993-New Orleans

Workshop- "Electricity for the Right Side of the Brain" (Marv Nelson)

Tutorial-"Superconductivity" (Brian Schwartz)

Sessions- "Impact of the SPS in Two-Year Colleges" (Myra West), "Outreach, Retention, and Impedance Matching" (Leslie Dickie), "Gender Differences in Physics" (Tom O'Kuma), "Computers in Introductory Physics—Trends and Developments in MBL and Modeling" (Curtis Hieggelke), "Introductory Physics—Trends and Developments " (Curtis Hieggelke), "Open House With Ideas to Go" (Linda Stamper)

August 1993-Boise State University

Workshop-"Electricity for the Right Side of the Brain" (Marv Nelson)

Sessions- "Issues in Two-Year College Physics" (Marv Nelson) followed by a Cracker-barrel Session, "Introductory Physics—Trends and Developments" (Curtis Hieggelke), "Uses of Computers in Introductory Physics" (Tom O'Kuma), "Open House With Ideas to Go" (Janet Landato)

January 1994-San Diego

Workshop-"Electricity for the Right Side of the Brain" (Marv Nelson)

Sessions-"Issues in Two-Year College Physics" followed by a Cracker-barrel Session, "Introductory Physics—Trends and Developments", "Computers in Introductory Physics—Trends and Developments", "Open House & Cracker-Barrel Session on Ideas to Go"

6. The meeting was adjourned.

Respectfully submitted,
Linda Stamper

COOPERATIVE LEARNING IN COLLEGE SCIENCE COURSES

Mark Hollabuagh
Normandale Community College
Normandale, MN

What characterizes cooperative learning? At its most simple level, cooperative learning methods require students to work in groups. Although this is a primary requirement, it is not sufficient. Cooperative learning must be structured. The instructor must give considerable thought to the process of the group as well as the task of the group. Roger and David Johnson, of the University of Minnesota, have done extensive research in cooperative learning. (Johnson, Johnson and Holubec, 1988; Johnson, Johnson and Smith, 1991) There are five elements in their model of cooperative learning.

1. Positive Interdependence links students together so that their success in a course is dependent on one another. Group members agree on goals, problem solving strategies and answers. Frequently there are shared resources and common rewards. One technique is to give a group only one set of materials to solve a problem or answer a question. Giving bonus points based on a group's effort also promotes positive interdependence.
2. Face-to-face Interaction promotes students' support for one another to learn. It is necessary to have a classroom where students can physically face each other (" eye to eye and knee to knee"). Traditional lecture halls will not work. Moveable furniture is a must. In physics problem solving, groups of three work best (Heller and Hollabaugh, 1992)
3. Individual Accountability requires the instructor to assess each person's performance. Asking questions randomly of individuals is one means of promoting this. To help the instructor to know the students' names, name tags can be worn. Individual examinations are a means to assess a student's mastery of the material.
4. Collaborative Skills build leadership, trust, communications, conflict-management, and decision-making skills. Students come to college with few cooperative experiences and thus frequently lack these skills. Assigning specific roles to groups members (e.g., Manager, Skeptic, Recorder) and modeling these roles can promote these skills.
5. Group Processing involves an assessment by the participants of their group, what they did well and what they could do better the next time to improve the functioning of the group. Feedback can be formal and informal. Forms can be developed to give written feedback to the instructor on a given exercise. It is important to focus the student evaluation on the process of the group as opposed to the product.

Johnson and Johnson (1989) give seven reasons why cooperative learning has an effect on cognition and metacognition.

1. The expectation that one will have to summarize, explain and teach what one is learning impacts one's learning strategies. Higher level strategies are used.
2. The discussion within cooperative learning situations promotes more frequent oral summarizing, explaining, and elaborating of what one knows. This oral rehearsal consolidates and strengthens what is known and even serves to organize the concepts.
3. Heterogeneous groups stimulate divergent and creative thinking.
4. Students with incomplete information interact with others who have different perspectives and facts. This promotes greater perspective-taking ability.
5. Ideas are externalized and critically examined. This enhances learning.
6. Feedback concerning the quality and relevance of contributions improves one's reasoning or performance.
7. Structured, creative conflict promotes a reconceptualization of one's views, information, and conclusions, active searches for new information, increased motivation, higher achievement, and, most importantly, greater depth of understanding.

The results of cooperative learning in science education make a strong case for its use. In a survey of cooperative learning research Johnson and Johnson (n.d.) note several outcomes of this type of learning:

1. Cooperative learning structured classes have a greater level of mastery, retention and transfer of the material taught.
2. Cooperative interaction with peers promotes social and cognitive development.
3. Cooperative learning promotes a more positive attitude toward science and the science teacher.
4. Cooperative learning builds positive relationships among students from differing backgrounds.
5. Cooperative learning builds self-esteem, psychological health, and social skills.

REFERENCES

Patricia Heller and Mark Hollabaugh (1992), Teaching Problem Solving Through Cooperative Grouping. Part 2: Designing Problems and Structuring Groups, American Journal of Physics, Vol **60**, No. 7, July, 1992.

David W. Johnson, and Roger T. Johnson (1989), Collaboration and Cognition, unpublished manuscript,

Editors note: At the CPTYC open house discussion meeting in New Orleans, the Tech Prep program was discussed. Attendees at this meeting agreed to send information regarding this program at their college, the only letter that was received was from Mary Beth Monroe (Thanks Mary Beth) with excerpts as follows

Tech Prep

Mary Beth Todd Monroe
Southwest Texas Jr. College
Uvalde, TX 78801

On the Tech Prep matter...I do not know much. We have a director of TP and newly hired coordinator. At the last meeting of the Board of Trustees, the board approved a TP Agri-Business Program. Now I don't know what that means. Our TP Director, Dick Whipple, has told me that he wants me to be informed of the physics curriculum so that I'll be ready to teach the TP physics to high school teachers at some point in the future. The physics curriculum is Principles of Technology from the Center for Occupational Research and Development, Waco, Texas 76710. The lab is Technical Laboratory Systems, P.O. Box 218609, Houston, Texas 77218. The equipment and lab activities are modules. Who chose these sources and curriculum, I do not know.

St. Philips College in San Antonio is presently using these materials to train or retrain persons turned loose in the job market. I do not think they train teachers, but teach students who must be retrained for new industrial type jobs. Their instructor is an ex-engineer who "never got anything out of physics classes." I attended a TP workshop at St. Philip's where this instructor taught this workshop. The TP workshop was hosted by our TP program for interested high school teachers in the area. I was invited by Whipple to come (1) to see how it was done and (2) to get a look at the curriculum. I was not favorably impressed with either lecture or lab curriculum and modular lab equipment.

Hollabaugh Continued from the previous page

Minneapolis, Minnesota, University of Minnesota, Cooperative Learning Center (Prepared for *Developing Minds: A Resource Book For Teaching Thinking,* Alexandira, Virginia, ASCD)

Roger T. Johnson and David W. Johnson (n.d.), Science and Cooperative Learning, unpublished manuscript, Minneapolis, Minnesota, University of Minnesota, Cooperative Learning Center.

Roger T. Johnson, David W. Johnson, and E.J. Holubec (1988), *Cooperation In The Classroom*, Interaction Book Company, Edina, Minnesota.

Roger T. Johnson, David W. Johnson, and Karl A. Smith (1991), *Cooperative Learning: An Active Learn-*

Placement Tests

Carol Lucey
Jamestown Community College
Jamestown, New York

Help!

We're instituting mandatory placement tests for all first time college students. We already test writing skills, but now we are looking for math tests, reasoning, etc. which would be suitable for three levels of physics placement:

1 Resnick and Halliday-type course.
2 Serway and Faughn-type course.
3 Technical physics.

Anybody got any ideas? Also, if you are doing mandatory placement, what do you do with students who don't qualify for your course? What skills courses is anyone recommending? Straight math, English, etc., or something more elaborate?

Also, I'd like to know what people are requiring by way of program requirements, both for graduation as well as admission, into A.S. Mathematics and Science degree programs.

Thanks,
Carol Lucey

Unofficial Excerpts from the Workshop on the Role of Professional Societies in Two-Year College Science, Mathematics, and Engineering Education (Oct. 29-30, 1992)

Workgroup C: Leadership/Membership in Professional Societies

Jack Hehn
AAPT
Washington, D.C.

The Two-Year Colleges in America educate on the order of 50% of the science students and more than half of women and minority students enrolled in lower division college classes. Current studies forecast significant increases in their numbers and emphasize the important role that the faculties of these colleges play in undergraduate education. Although providing a pivotal role in the educational process, the science and mathematics faculty members of a typical Two-Year College are often isolated from colleagues in their disciplines and experience a lack of peer collaboration. In order to address these issues, we seek the recognition and support of professional societies whose members represent the scientific community and whose future well being rests upon the continuing flow of a diverse student populace, well educated workforce, and a scientifically literate populace.

Recommendations to professional, educational, administrative, and scientific societies

A. Involve Two-Year College faculty and administrators as leaders in professional societies through participation in association governance structures, strategic planning processes, and appropriate formal committees. This should include:

- Appropriate Two-Year College representation in the nomination process
- Development of a ladder for advancement into leadership positions
- Provision for a flow of new talents into committees and governance through aggressive outreach and limited terms
- Appropriate representation in committees and governance

B. Establish or augment a division or unit specifically devoted to the promotion of excellence in teaching in its subject discipline. The charge to this division should include the provision of educational services to each of these client populations:

- Grade levels K-12 in public and private schools
- Two-Year Colleges and Four Year Colleges
- Graduate programs and Professional schools
- Informal education groups and organizations
- Continuing education programs

C. Promote active and diversified membership among Two-Year College faculty by providing services such as:

- Local and regional meetings to encourage participation
- Publications and journal articles dedicated to pedagogy of the subject
- Sessions at annual meetings devoted to pedagogy, equity, special needs, and diversity
- Society seminars on writing proposals and papers
- Documents promoting Two-Year College teaching as a viable career option
- Specialized dues for first membership year
- Student affiliate sections
- Speakers for Two-Year Colleges and student affiliate sections
- Newsletters and electronic communication systems to facilitate communication among Two-Year College faculty members, and between other society members and Two-Year College faculty
- Updates and workshops on current topics of interest to be held at national meetings (and perhaps, made available at regional meetings)

Recognition of successful Two-Year College graduates among society membership and the community

D. Create, support, and advocate localized sections or chapters as a network to recruit and encourage Two-Year College faculty and student leadership. This should be manifested by the following:

- Encouraging multi-societal memberships and coalitions
- Fostering joint educational/research symposia
- Facilitating joint publication mechanisms and mentorships
- Utilizing local leadership as a mechanism for professional growth and involvement at the national and international level

E. Recognize, support, and involve Two-Year College leadership in appropriately informing the public and the political surround of Two Year College issues and diversities.

Unofficial Excerpts ... page 10

Hieggelke Continued from page 1

To act as a catalyst for implementation of these recommendations, a workshop for leaders in the professional societies was held. Participants included two-year college faculty, four-year and university faculty, and leaders and staff from approximately 20 professional organizations. Representing the physics community in addition to myself and Jim Stith was Tom O'Kuma (Lee College, TX), Judy Tavel (Dutchess Community College), Jack Hehn (AAPT Executive Office), and Brian Schwarz (APS).

After the opening address, we were broken down into five working sub-groups to deal with issues in different areas and to recommend actions that should be taken. The areas dealt with were:

A. Professional society actions to support the integrated teacher/scholar role of lower division science, engineering and mathematics faculty.

B. Professional society actions to encourage the formation of networks among two-year college leaders from varied scientific, engineering and mathematics organizations.

C. Promotion of two-year faculty leadership in professional organizations.

D. Professional society services to enhance lower division education, particularly those directed to two-year faculty.

E. Professional society roles in developing initiatives to increase the number and quality of proposals to NSF, and other funding agencies, from two-year college faculty.

We also met within each discipline group to make recommendations appropiate with the relationships already established with the TYC faculty in the discipline. We (the TYC physics community) have a pretty good role and relationship with AAPT. This relationship which has been in place for a considerable length of time still has room for improvement. However, there is no relationship between physics community in the TYCs and the APS.

At the end of the conference each subgroup, including the discipline subgroups, made their reports to the whole group.

The report on this conference is supposed to be published soon. However, since many TYC faculty may not see it, I have included in this newsletter unofficial reports from several subgroups. Share it with your colleagues in math, science, and engineering.

Unofficial Excerpts from the Workshop on the Role of Professional Societies in Two-Year College Science, Mathematics, and Engineering Education (10/30/92)

Physics Workgroup

Tom O'Kuma
Lee College
Baytown, TX

1. It is the recommendation of our group that professional societies establish a Center for Teaching/Learning for their respective discipline. This teaching/learning center would serve as a resource for individuals at all levels who teach in the discipline. The role of the center would be determined by the individual society and would probably evolve over the years. Two year colleges should play a leading role in the development, evaluation, and dissemination for the first two years of the undergraduate education.

2. Encourage local, state, regional, and national meetings of professional societies be held at two year college campuses.

3. Professional societies should include two year colleges and their faculty in a directory of faculty and/or institutions.

4. Professional societies should conduct a survey to assess what the society should do to serve the needs of the two year colleges.

5. Professional societies should coordinate programs that provide greater opportunities for female and minority students to participate in research.

Hehn Continued from page 9

Recommendations to two year college administrators and decision makers

F. Actively support, recognize, and reward Two Year College faculty leadership and participation in professional, administrative, and scientific societies through some of the following:

- Provide support, such as funding and release time, to advocate faculty involvement in association activities.
- Use society participation as an element in deliberations about promotions, tenure, and reward.
- Solicit official recognition from the institution's governing board for active society leaders.
- Provide local facilities and support to bring association activities to the local campus to impact and involve both full-time and part-time faculty and students.

Unofficial Excerpts from the Workshop on the Role of Professional Societies in Two-Year College Science, Mathematics, and Engineering Education (Oct. 29-30, 1992)

Workgroup E Report

Curtis Hieggelke
Joliet Junior College
Joliet, IL

In view of the major concerns and opportunities in lower divisional mathematics, science, and engineering education and the fact that over half of the students and even a larger fraction of minorities (and women) who start their study in these areas begin in two-year colleges, and also the significant role that community colleges play in the expansion and viability of our economy, it is important that two-year colleges take a leadership and partnership role in lower division curriculum improvements.

Professional Societies should play a role in developing initiatives to increase the number and quality of proposals from two-year college faculty to the National Science Foundation and other funding agencies. The ultimate beneficiaries of grants that support such curricular changes are the students, the institutions, and the communities they serve.

1. Professional societies should showcase successful programs and projects in two year college math, science, and engineering education in their national, regional, and local meetings as well as in their newsletter and other publications. These showcase sessions should be accompanied with workshops on funding opportunities, proposal preparation, and reviewer solicitation directed towards greater community college participation.

2. Professional societies should advocate suitable recognition and rewards by their respective community colleges for developing and writing grant proposals. (Examples: Released time, Travel, Summer support)

3. Professional organizations with the support of the National Science Foundation should encourage networking and collaborative efforts between persons, disciplines, and organizations in order to increase the quality & number of grants by bringing people together to meet and share ideas and by providing a mechanism for the ongoing flow and exchange of ideas via national, regional, and local conferences and voice and electronic communication.

4. Professional organizations along with the AACC and AACCT, as well as the two-year math, science, and engineering faculty, should encourage Congress to provide significant additional funds to the National Science Foundation in order to address the recently recognized needs and contributions of two-year colleges.

5. Professional organizations with their appropriate two-year college leadership should play a role in developing the future agenda for the National Science Foundation as it relates to lower division math, science, technology, and engineering education.

6. The National Science Foundation should establish with the cooperation of the professional societies, an interdisciplinary panel of TYC representatives that meets regularly to exchange ideas among themselves and inform the National Science Foundation on STEM issues in the TYC's.

7. The National Science Foundation should continue and expand the current involvement of TYC representatives on advisory and review panels and the AACC fellowship program.

8. Professional organizations working with the National Science Foundation should develop and disseminate timely and pertinent information on comprehensive funding opportunities for TYCs.

9. Professional organizations should support the National Science Foundations efforts to include TYC professionals in the review process by submitting annually names and vitas of potential TYCs reviewers to the National Science Foundation.

10. The National Science Foundation should increase the number of program directors from TYC's.

11. Professional societies should encourage the National Science Foundation to consider allowing a preproposal process for the preliminary review of projects.

Atwood's Machine and The Smart Pulley

Mark Headlee
Physics Department
Armand Hammer United World College
Montezuma, NM 87731-0248

I would like to share some of my experiences working with the new and popular Smart Pulley Photogate.

The ten slot version of the Pasco[1] Scientific Company's Smart Pulley, Model ME-9387, was connected directly to the SciMaTech[2] MI-1000 Multifunction Interface for the Macintosh. I used SciMaTech's software for processing the data but for better control over graphing I exported only the *distance* and *time* information into Cricket Graph[3].

• The first Atwood experiment was the standard one. A light string was set over the wheel and two slightly different masses, m and M, were connected to the opposite ends. The system was allowed to accelerate as the larger mass fell. Theory suggested an acceleration of $a=mg/(m+M)$ where g was gravity. The mass of the string, frictional forces, and the moment of inertia of the Smart Pulley wheel were ignored.

At first I used SciMaTech's software to give me the value of acceleration. The theoretical and experimental values were compared. After repeated attempts at this, however, I became disappointed. The computer consistently gave me a value that was about 15% off the theoretical value. Errors and uncertainties would not account for this discrepancy.

I then decided to take the raw data and construct a graph of distance *versus* time-squared. Using the slope of this graph I found that the same data yielded an experimental value of acceleration which was only 4% off the theoretical value. This was accurate.

After talking with engineers at SciMaTech it was realized that their software employed a less than perfect algorithm for calculating acceleration. My advice is to work with the *distance* and *time* quantities only.

• My second Atwood variation concerned nonlinear acceleration. A heavy string was set across and balanced midway on the wheel. It was then given a slight push and the string started to fall and rotate the wheel. As more of the string went over one side of the wheel the acceleration increased. A graph of distance *versus* time-squared revealed an increasing slop with time—which meant an increasing acceleration with time. A beaded brass light-chain also worked well (up to a 50 cm length).

• An important but often difficult concept for students is the idea that the acceleration due to gravity is always constant and directed toward the earth no matter what the motion of a body. My third variation with the Atwood Machine was once again set up in the normal way—one side had slightly more mass than the other. However, instead of simply letting go and allowing the system to move its own way, I gave the larger mass a gentle upward push. This took practice, but soon I learnt just how hard to push the system so that the larger mass moved upwards, gradually slowed down, reversed its direction of motion and then fell downwards.

The acceleration of each mass remained constant even though the masses moved in opposite directions and reversed direction in the middle of the run. The Smart Pulley detected distance and not displacement along a line. This meant that the wheel's clockwise or anticlockwise motion was not detected when the measurements were made. A graph of distance *versus* time-squared thus revealed one line of motion with a small hiccup midway. The result was a beautiful graph revealing a constant slope (uniform acceleration) for both sections of the motion. Students could now easily "see" uniform acceleration even though the direction of the motion of the mass reversed midway in the journey.

In conclusion, I found that the Smart Pulley was a fun and easy tool to use in a variety of experiments with the Atwood Machine.

1 Pasco Scientific Company
10101 Foothills Blvd.
Box 619011
Roseville, CA 95661-9011

2 SciMaTech
1620 Old Middlefield Way
Mountain View, CA 94043

3 Cricket Graph
40 Valley Stream Parkway
Malvern, PA 19355

What Does a Physics Lab Technician Do During the Summer?

James Knutson
Champlain Regional College
Lennoxville, Quebec J1M 2A1, Canada

It is no fun to start the fall semester with surprises. We don't like it when something breaks down, or is found to be inaccurate, dirty, rusty, or missing from its usual place. The summer is my time to restore the labs, to tackle the potential surprises. Here is my summer work schedule, which begins in early May and is usually finished by mid-August.

1. Clean-up labs and storerooms, returning equipment to the proper shelves.

2. Submit Maintenance Requests for repairs and construction in labs and offices.

3. Top-up lab kits. This applies mainly to electrical and electronics kits, which usually suffer minor loss or damage during normal use.

4. Check inventory. Follow-up as necessary to get everything returned, or written off. Generally I don't worry too much about Physics teachers who take equipment home for the summer, as long as they leave a signature, and plan to return. I do like to get a verbal confirmation though, that they still do have the equipment (which they might have signed for and forgotten about), and I like to have it brought in sometime during the summer for cleaning and maintenance.

5. Order capital equipment and supplies. This follows soon after a departmental budget meeting in May. I review the previous year's usage, and check my "black book" where I keep a list of things the teachers have mentioned over the past year; their wish-list. Before writing up the Requisitions, it is worthwhile to compare catalogs from several different suppliers. There are price differences. Sometimes it is best to go for the lowest price. Other times we prefer to pay a little more and stick with a certain type of apparatus because we already have that type in use.

6. Do functional checks. Everything gets checked to see that it works the way it is supposed to work for the experiment where it will be used. This can be overdone. For example, there are boards in our electronics kits that we rarely use. It would be a waste of time to check them every year. They were working when last used.

7. Repair, Clean, Calibrate, Lubricate, Adjust. This is done in conjunction with the functional checks. A good principle to follow is "If it ain't broke, don't fix it". With experience and good record keeping, this maintenance does not need to take a lot of time. Calibration need not be exhaustive. With some old signal generators for example, it is not possible to restore them to factory tolerances with a reasonable amount of time and expense. If + 5% is good enough for our labs, I simply calibrate and label to at least that tolerance. In cases where more accuracy is needed, we supply the students with digital frequency meters.

8. Build new equipment. This usually consists of making new electrical devises and electronic boards. It can also involve metal working and wood working. For example, we found the steel balls from the projectile-motion apparatus were very damaging to the wooden lab table tops. So I made arborite-covered plywood boards 1.5" x 12" x 48" for doing this experiment on. An added benefit is better lab results from the hard arborite surface.

9. Check and put away new supplies that come in.

10. Do trials with new equipment. Rarely do we find that the manufacturer's instructions fit our needs exactly. Also, there are sometimes errors, omissions, fuzzy explanations. So I try to go through each experiment as if I were a student seeing it for the first time.

11. Develop new experiments, new lab write-ups. None of our experiments are written in stone. When we buy new equipment, e.g. Digital Multimeters, our lab instructions have to be re-written. I use a word-processor for the text, and a drawing program for the sketches. I still have to paste in my sketches but that's not a big problem. Maybe I'll get Desk-Top Publishing someday, but that brings me back to "Budget" and that is another story.

12. Review. During the summer I like to spend an hour a day on review of some particular chapter or topic which I don't understand as fully as I would like. If by mid-August I have all my work done, I tackle the end-of-chapter problems, just to keep in touch with what the students are doing.

Jamestown CC FIPSE Project

Carol Lucey
Jamestown Community College
Jamestown, New York

Background:

We have anecdotal evidence that a lot of reasonably intelligent high school graduates who start engineering and physics at some of the bigger universities around here get blown out of the water in their first semester and end up switching out of science at the end of one semester. It seems likely that some of these people might be enticed into a "start over" program that brings them back home, redoes the first semester in the spring, does a catch-up semester during the summer, and then puts them into a traditional sophomore, community college sequence the following year. Our idea was that, if they succeed with us in completing our curriculum through the first two years, their original university agrees to take them back as full juniors in their original science or engineering major.

This has advantages for all concerned: (1) people who really want a science or engineering major aren't forced to choose between abandoning their university goals or abandoning their technical major goals, because of a bad start, (2) the universities salvage some upper level technical majors, without having to nurse them through expensive remedial programs in the first two years, (3) we strengthen our enrollments in traditionally light sophomore courses, (4) the country benefits by not losing people out of the tech "pipeline".

We think we can succeed with this because our transfers generally do pretty well when they get to the universities, often better than the people who spend four years at these places. I think there are a lot of other community colleges who could say the same thing.

Collecting a Class:

This fall, we visited four sites (S.U.N.Y. Brockport, Clarkson University, S.U.N.Y. Binghamton, and Rochester Institute of Technology) in our attempt to find unsuccessful science and engineering students who would be willing to attempt a "start over" at J.C.C. this spring. The stipulation of our grant was that F.I.P.S.E. would underwrite the expenses entailed in offering the course because we did not know if we could be successful in this attempt to generate a class sufficiently large to be financially viable. We also advertised in the local paper, among students home for Thanksgiving vacation.

The campus visits were rather discouraging. While the administrators at the universities we visited were excited about our project and did everything in their power to try to encourage failing students to attempt were lightly attended and we were told by students that they probably would change majors before attempting to transfer to J.C.C. Nevertheless, we continued in our efforts to attract students and, by the close of spring registration, we had attracted ten transfer students to the engineering science program at J.C.C.. These students were transfers from: University of Miami, Rochester Institute of Technology, S.U.N.Y. Fredonia, S.U.N.Y. Binghamton, and some other, smaller, regional schools.

The interesting thing about the group is that only one of them had learned about the program from our strenuous efforts at the transfer schools in the fall semester. They had instead learned via newspapers, local advertising, word of mouth, etc., and none had been attracted to Jamestown from any distance. They were, rather, our native students who had gone away to school, found the experience discouraging, and returned to J.C.C. rather than pursue a nonscience major at their original choices. Of the ten transfer students attracted to the program during the spring semester, six enrolled in Physics 171, three enrolled in Physics 172, and one is deferring enrollment until the summer session, when she plans to enroll in Physics 172.

We learned a lesson from this: our best audience is the local one, which knows our school's reputation. We probably could have expected that, but it was clearly a lesson learned from our fall effort. Aside from the problem of students at distant sites not being familiar with us, the logistics of finding housing in the middle of the winter in an old city in the rust/snow belt probably was off-putting for many of these people. A good lesson for the importance of our dissemination efforts follows from this. If the project is successful, then many community colleges will need to start a similar program, because students will generally be looking to colleges in their own hometowns to provide the "restart" experience, rather than some school which has made a specialty of this area.

A second valuable lesson concerned where we ought to invest our advertising efforts in the future. Our own high schools become more important as a tool for getting the word to our local residents that such a program is available. We are planning a dinner for high school physics teachers soon, to assist in this effort.

A third error was the fact that we did not advertise the reverse section widely enough among our own

Lucey Continued from the previous page

students. Hence, it is possible that many other transfer students to J.C.C. might have registered for the course, had they known it existed and that they could take it. This mistake will not be made again!

Early Assessment Efforts:

The following techniques have formed the basis of the experimental mechanics (Physics 171) section which is being taught with F.I.P.S.E. support:

1 Workshop Physics exercises from Priscilla Law's award-winning curriculum.
2 Videodisks assigned outside of class from "The Mechanical Universe".
3 Required tutorials on problem-solving.
4 Two afternoons per week of available "open laboratory" time, with the lab staffed by a student assistant, to give students an opportunity to repeat or finish work started in class.
5 Student-run campus tutorial service, with student tutors available in physics and mathematics.
6 Ten hours of office hours per week, with the instructor available to students.
7 "Interactive Physics" software, as well as "Mathematica", Vernier's Data Acquisition package and probes, Microsoft Excel spreadsheet, and Cricket Graph III. graphing software, all available to assist in problem-solving and lab work, both in class and in open lab time.
8 Traditional lectures have also been used, in an effort not to exclude any technique that might be useful to these students in learning physics.
9 Alan Van Heuvelen's Multi-representational and Case Study approach to developing intuitions about physics problem-solving.
10 Ron Thornton's "TST" curriculum in assisting to help students develop intuitions about physics concepts via the use of micro-based computing lab. exercises
11 Required group work, with "collaborative groups" used equally as a vehicle for reinforcing homework, providing emotional support in a difficult curriculum, and assisting in the more traditional teamwork based laboratories.

Vehicles for the evaluation of all these techniques have included:

1 Collaborative work evaluation sheets, distributed periodically.
2 Sign-up sheets supplied by the A-V department and the tutorial service.
3 Bi-weekly short assessment exercises, based on Tom D'Angelo's "clearest point-muddiest point" exercise.
4 Lab work graded by portfolio technique.
5 Pre- and post-tests on kinematics and force concepts.
6 Traditional quizzes and homework assignments.
7 Informal questioning of students during office hours.
8 A periodic questionnaire enumerating the above techniques in use and asking students to rank their effectiveness.

As the class has progressed, I have used the responses to the above assessment instruments to do "mid-course corrections" in the class. To date, of the original 12 students enrolled in Physics 171 this semester, only one has been clearly unsuccessful. He told me the first week that he needed to remain employed full-time, although he was taking nearly a full load of academic coursework, including Physics 171 and Calculus I. I tried to discourage him from attempting so much, and within three weeks economic circumstances, which had dictated the full-time job, required that he drop most of his full-time load. He dropped Physics and Calculus, but plans to return to them in the fall. Of the remaining 11 students, as I write at the seventh week, only two are doing less than "C" work, and they are both borderline "C"-"D" 's I anticipate an improvement for both, based on recent efforts.

The results of the questionnaires on effective teaching and learning techniques have been interesting. I have appended the most recent of these to this report. Students are all over the map in which methodologies they like best, reflecting I believe, merely the diversity of different students' learning strategies. What is very interesting, however, and somewhat troubling, is the recurrence among my students of a trait that Priscilla Laws has pointed out. That is, there is a gender-bias in the reaction of students to some of the new physics teaching strategies. While I only have three women in my small class, nevertheless, I can report a unanimous uneasiness which they have to the very experiential "Workshop" and MBL exercises. They react very well, on the other hand, to the Van Heuvelen methodology, which is closer to traditional lecture format.

Most disconcerting among this small group however is their consistent response on questionnaires that they clearly prefer it when I lecture. The people who respond this way are also are my most diligent students and heaviest users of office hours. This small group hardly represents a reasonable sample of opinion on new techniques in teaching physics, but ought to be viewed as a cautionary tale by any school looking for a way to develop a more experiential, albeit efficient, manner of teaching freshman physics.

By de-emphasizing lectures, one may produce more office-hour dependent students, especially among one population of people about which there is much concern lately: viz. women. If these women are using office hours to compensate for some overall "gestalt" they don't feel they are getting in the diminished lecture time, then the net effect in an environment in which they might not feel comfortable using office hours, could be to cause them eventually to be

Lucey Continued from the previous page

lost to the program. One must also worry about whether this could cause a loss of minority students who might also tend to be shy about using office hours. This will have to be watched in the future. In the meantime, right now I am encouraging my small class to ask me to lecture more often when they feel the need.

One other thing that I have observed in this group is an interesting correlation between attendance and previous enrollment. The students who have been unsuccessful in the same course in the past are among my most frequent absentees. I have never felt it necessary to have an attendance policy before. Most of my classes do not have so many repeat students, and generally, students are afraid to cut physics. This group is different, however, and I have not yet decided how I feel about it. It could be simply a sign of the fact that there is clearly material being covered they feel they know well enough to skip lecture. It could also be that I am seeing a selection effect played out: the students who tend to skip classes may get into trouble in science curriculum courses like this one.

So far, I can't tell whether they are being hurt by the attendance problem this semester, but I am starting to suspect that they are. If necessary, I have decided I will start a mid-course policy change: no more unexcused cuts. One reason I am thinking of doing so is that I have already taken some directive action with one of the repeaters, effectively warning him that I would not tolerate any more missed classes. We had this conversation three weeks ago, when he had not yet got above a "C" on a quiz. He has not been absent again and his last two quizzes have been "90" and "98" respectively. I am not above drawing the obvious conclusion!

The Future:

Nine of the twelve students enrolled in Physics 171 have expressed an interest in taking Physics 172 in Summer School, and we have consulted with the class to put together the best schedule to meet their needs this summer, consistent with good educational values. We do not feel we can teach the class adequately in less than eight weeks, and so we have scheduled the class to meet for three hours per day, four days a week, starting on May 24, with the last class scheduled for July 16 and a final exam on July 21.

On a questionnaire on future plans, none of our students indicated an interest in transferring back to their original colleges. This probably also should be viewed as an important hint in how we got our class. The students who would have chosen to transfer back probably changed majors rather than come to J.C.C. We have the committed majors with little loyalty to

Lucey Continued next column

How The TYC Workshops Help Shape My FIPSE Project.

Oshri Karmon.
Diablo Valley College
Pleasant Hill, CA

I am currently involved in developing a FIPSE funded, three year project at Diablo Valley College (DVC). This project addresses the freshman calculus and physics courses taken by engineering and science students at the community colleges. Traditionally, these courses are being taught in a way that deemphasizes their inherent interconnectedness, and are a major hurdle for beginning students, especially for women and minorities.

This project is implementing a block course which is being team-taught by a physicist and a mathematician in such a way that physics and calculus reinforce one another. We are developing a new introductory course in physics and changing the order of the calculus curricula to meet the demands of physics instruction. The students are divided into study-groups which are being tutored by upper division students. These tutors serve both as role models and as a support network for our community college students. The course incorporates field trips to local universities, engineering firms and deals with transfer and career issues.

The project evolved from DVC's commitment to increase the success-rate of students in physics and engineering. I was fortunate to attend the TYC workshops while developing the project. Through the MBL workshop I was introduced to computer applications to physics instruction, and as a result I applied for an ILI grant to complement the FIPSE project. Through the CE/OCS I was introduced to the findings of cognitive physics education research and was able to incorporate new approaches into physics instruction. I am working closely with K. Patricia Cross of the University of California at Berkeley in applying her classroom assessment/classroom research techniques to assess the impact of our project on our students.

Lucey Continued from previous column

their original college choice, and that is why they are here. In any event, these people seem to have decided to stick with us through the pre-engineering curriculum, which means that one of our objectives for the fall, making a smooth transition back to the transfer institution will be modified. We will try to provide some serious transfer help for this group, however, given their initial unsuccessful experiences.

Scientific and Advanced Technology Act of 1992 (S.1146)

Curtis J. Hieggelke
Joliet Junior College
Joliet, IL 60436

Excerpts from the text of S.1146 as approved by the House and Senate of the 102nd Congress and from a 12-92 draft of a NSF Community College Action Plan for this bill.

The Scientific and Advanced Technology Act of 1992 (SATA-92) has as its goal the improvement of science, mathematics, and technical education at secondary and post secondary schools, specifically targeting associate-degree-granting institutions.

The specific purposes of the Act are to:
- Improve science and technical education at associate-degree-granting colleges;
- Improve secondary school and post secondary curricula in mathematics and science;
- Improve the educational opportunities of post secondary students by creating comprehensive articulation agreements and planning between two-year and four-year institutions; and
- Promote outreach to secondary schools to improve mathematics and science instruction.

This act is based on the findings of Congress that —
- the position of the United States in the world economy faces great challenges from highly trained foreign competition;
- the workforce of the United States must be better prepared for the technologically advanced, competitive, global economy;
- the improvement of our work force's productivity and our international economic position depend upon the strengthening of our educational efforts in science, mathematics, and technology, especially at the associate-degree level;
- shortages of scientifically and technically trained workers in a wide variety of fields will best be addressed by collaboration among the Nation's associate-degree-granting colleges and private industry to produce skilled, advanced technicians; and
- the National Science Foundation's traditional role in developing model curricula, disseminating instructional materials, enhancing faculty development, and stimulating partnerships between educational institutions and industry, makes an enlarged role for the Foundation in scientific and technical education and training particularly appropriate.

The two major categories of programmatic activities under this Act are:

- *The National Advanced Scientific and Technical Education Program*, which is designed to strengthen advanced-technology education on a local level, by such activities as the development of model instructional programs and materials, professional development of full- and part-time faculty; the purchase or lease of state-of-the art instrumentation; and innovative public and private sector partnerships between associate-degree-granting colleges and business and industry, secondary schools, and other institutions of higher education; and

- *Ten National Centers of Scientific and Technical Education* in associate-degree-granting colleges, which have exceptional curricular offerings in mathematics and science and/or in advanced technology fields, to serve as models and clearinghouses to benefit both colleges and secondary schools.

These activities are to incorporate:
- Partnership Arrangements for articulation of students between associate-degree-granting colleges and bachelor-degree-granting institutions;
- Outreach Arrangements to strengthen the relationships between an associate-degree-granting colleges and secondary schools; and
- Coordination with other Federal Departments to enhance program effectiveness.

In addition, the Act authorized the Director to appoint an officer of the Foundation to act as a liaison between the Foundation and community colleges, in order that the Foundation may better address the needs of the community colleges and advance technology education. Bob Watson, head of the DUE of NSF, has been appointed to this position.

NSF's Response to SATC-92

A vigorous response to the Scientific and Advanced Technology Act of 1992 will require *new* NSF programs as well as substantial expansion of both the scope and magnitude of *existing* programs.

The new program initiatives and expansion comprising increased NSF attention to the needs and potential of the community colleges will emphasize:
- Collaborations between faculty at public and private community colleges, baccalaureate institutions, elementary and secondary institutions, business and industry, and other Federal Departments.

Continued on next page

Hieggelke Continued from the previous page

- Sharing of programmatic and fiscal responsibility, especially through continued interaction among alliance/coalition/consortium members, to assure continuation of project activities at the expiration of any NSF award; and
- Dissemination of materials and methods, to multiply the effects of initial NSF investment.

New programs being considered are the *Comprehensive Projects*, funded on a scale to have broad impact at many institutions in a wide variety of settings, and *Centers for Lower-Division and Technical Education Program*, funding a smaller number of large scale projects to have an impact at the regional or national level.

Comprehensive Projects

Community colleges and their faculties are eligible for all undergraduate education programs of the National Science Foundation. However, the necessity to develop science and advanced-technology education across educational levels, across disciplines, incorporating innovative partnerships and outreach activities with a strong human resource component, requires a broad spectrum of development. The NSF's role in developing model curricula, instructional materials, human resource development, enhancing faculty development, instrumentation and laboratory improvement activities and stimulating partnerships between educational institutions and industry leads to a program of comprehensive projects that integrate these activities within a single institution.

The following are among the types of comprehensive projects that might be supported-

Comprehensive Advance-Technology Education Development Program which would develop a model instructional program that would enter into innovative partnerships with business, industry, elementary secondary schools, and baccalaureate institutions; improve faculty competence in a rapidly changing technology field; and upgrade instructional laboratory equipment. The program would be laboratory based, applicable to a variety of fields, as well as offering the opportunity for further education and continuing education for those currently employed.

A Comprehensive Lower Division Programs which would be designed to serve as a model for the utilization of cooperative relationships between community college and baccalaureate level faculty., The programs would focus on recent developments in research, innovative teaching methods, and successful techniques for recruiting underrepresented groups into science, mathematics, and engineering. Funding would be for a wide range of faculty development, improvement of instructional instrumentation and curriculum development.

Centers for Lower-Division and Technical Education

A program of Centers for Lower-Division and Technical Education can respond to the philosophy, structure, special needs, and funding patterns of community colleges and other schools which emphasize lower division collegiate education. The provision of comprehensive support for integrated development of curriculum, faculty, educational strategies, and equipment for this diverse set of institutions will likely require several kinds of Centers - Centers which vary in their size, complexity, disciplinary coalitions or consortia involving community colleges, baccalaureate institutions, and elementary and secondary schools, utilizing partnerships with business and industry.

The following are among the types of Centers that might be supported-

Centers for Advanced-Technology Education: Each comprising a model institution or a consortium of institutions having very strong programs in a particular field of advanced-technology education, they would serve as regional or national centers for curriculum and instructional development and as clearinghouses for curriculum and instructional improvements and for new advances within the technology. Centers of this type would involve partnerships with elementary and secondary schools, industry and with baccalaureate institutions, as appropriate.

Centers for Lower Division Science and/or Mathematics Education: Each one would be at a community college having great curricular strength and a strong faculty — in one or more disciplines, in the field of scientific literacy, or in instructor development — and with close ties to similarly strong baccalaureate institutions. A Center would serve as a curriculum development and distribution point for faculty expertise in personalizing instruction, connection lessons to context, and creating learning communities. A Center might target a particular discipline or deal with several; some would be devoted to general science literacy improvement.

Centers for Minorities and/or Re-Entry of Women: Minority students and women seeking to re-enter the work force have many problems in common. Reentry Centers would develop outstanding programs to prepare women for return to the workforce in various fields of science, engineering, mathematics, and technology. The Minority Centers would be established in areas of substantial minority population and would coordinate their activities with those of nearby projects under NSF's K-12 and undergradu-

Continued on next page

Hieggelke Continued from the previous page

ate programs. (Career Access and Alliances for Minority Participation). Both kinds of Centers would emphasize recruitment, retention, and successful placement within the advanced-technology workforce and/or transfer of students between community colleges and baccalaureate institutions.

Centers for School Science and Mathematics: Each comprising a model community college or a local or regional consortium of such institutions, these centers would use strong curricular and faculty resources to improve K-12 science and mathematics education through teacher preparation, teacher inservice, teacher support and follow-up activities. These centers would work closely with local school districts and with state and regional Boards of Education.

Centers for Articulation: Each of these Centers would be a local or regional consortium of community colleges and baccalaureate target institutions serving students who move from the former to the latter in the course of their studies in science, mathematics, advanced-technologies, and engineering. Each Center would be a model of effective interaction and articulation among source and target institutions — designed to improve retention, recruitment, and successful transfer of students.

Changes in Existing Programs

As a result of the SATC-92, the Course and Curriculum Development program would expand to include a focus on development of advanced-technology education and improvements in the science literacy of all students — not just students in science, math, and engineering programs. The Undergraduate Faculty Enhancement program would add an emphasis on the dissemination of model curricula, teaching methods, and materials in advanced-technology. The Instrumentation and Laboratory Improvement program may include an emphasis on advanced-technology education and partnerships. Other changes are planned in the K-12 programs of NSF (eg, Teacher Prep and Materials Development)

In carrying out this SATC-92 act, NSF is supposed to — (1) award grants on a competitive, merit basis; (2) ensure an equitable geographic distribution of grant awards; and (3) ensure that an applicant for a grant awarded will make an in-cash or in-kind contribution.

The term "advanced-technology" includes advanced technical activities such as the modernization, miniaturization, integration, and computerization of electronic, hydraulic, pneumatic, laser, nuclear, chemical, telecommunication, fiber optic, robotic, and other technological applications to enhance productivity improvements in manufacturing, communication, transportation, commercial, and similar economic and national security activities;

This act authorized funds to be appropriated of $35,000,000 for fiscal year 1992 and $35,000,000 for fiscal year 1993. The hard part of getting this program moving is getting the appropriation, the expectations are that about $ 5 - 6 million will be appropriated.

Concerns

I have some concerns about the impact of this act. First, the level of funding will be lower than needed to address the focus of this act but the responsibility of NSF has been expanded to support these new efforts. In order to do this, NSF may need to divert funds from worthwhile programs that have recently been developed(or expanded) to meet the needs of science, math, and engineering (SME) faculty at CCs. It seems that at most CCs, the SME program have significantly out-of-date technology as compared with the vocational-technical programs which have Perkin funds and other special state funds.

The AACC (American Association of Community Colleges) tends to view NSF as a possible expansion of support for the vocational-technical mission of CCs rather than as support for transfer SME programs. For example, the Tech Prep has made significant inroads at NSF but there seems to be little involvement of CC SME faculty. This push by the AACC tends to reinforce the erroneous image of CCs in providing mainly job training rather than the important role of CCs in providing access to higher education for non-tradition students. NSF is the only real support for SME at CCs and I do not want to see it reduced.

What can and should we do? First, let NSF know of the important support role they can and do provide for SME at CCs. Even if you do not receive a grant, your college is more aware of the need to support your program and personal professional development, eg., attendance at national workshops and AAPT meetings in order to be competitive for these grants.

Second, if you receive a grant make sure that you actively disseminate your efforts and let NSF know about it. We have an obligation to share our results with each other.

Third, communicate with political leaders on the need for continued support for NSF and it activities at CCs. We have not done a very good job in science literacy and developing support for science education in this country.

Finally, encourage your administration to urge the AACC to actively support NSF's SME programs at CCs.

From the editor.....

Sorry this issue has been delayed in getting out. Hopefully, the next one will be sooner (and shorter). We have appreciated your comments and support. We will continue the *TYC Physics Newsletter* as long as individuals like you send material. *Please* send something today.

Submit materials to: *TYC PT Newsletter*, c/o Curtis Hieggelke, Natural Science Dept., Joliet Junior College, 1216 Houbolt, Joliet, IL 60436.

Thanks to AAPT and Joliet Junior College, which provided help in the printing, assembling and mailing of this issue. The biggest thanks, however, goes to all of you who sent information to include in this issue. Keep it up.

Included with this issue is the latest edition of the *CaFD* newsletter which is produced as part of the TYC Physics Workshop Project. Hope you enjoy it.

AAPT Summer Meeting Information

Going to the Boise meeting in August?

Just want you to know that most of the dorm rooms are not air conditioned. However, nearby are several motels which are a short 1/2 mile walk to the Union where the meeting is going to be held.

I am going to stay at the Ramada Inn (208-344-7971) which costs $ 45 for the first person and $ 7 for each additional person(+11% tax). It has a grill, country western nightclub, swimming pool, jacuzzi, sauna and membership to a local spa and health club.

Let's fill it up with CC physics teachers. Mention the AAPT physics meeting (or Brad Crown) if you decide to call. You should make reservations soon, since I expect they will be filled up for this meeting.

Curtis Hieggelke
Natural Science/PE Dept.
Joliet Junior College
1216 Houbolt Ave.
Joliet, IL 60436

JOLIET Junior College