

89

THE 89TH CONFERENCE

CHEMICAL EDUCATION: INTERFACES/INNER FACES



TWO YEAR COLLEGE CHEMISTRY CONFERENCE
DIVISION OF CHEMICAL EDUCATION
AMERICAN CHEMICAL SOCIETY

Truckee Meadows Community College

Reno, Nevada

December 6 and 7, 1985

DIVISION OF CHEMICAL EDUCATION
AMERICAN CHEMICAL SOCIETY
1985 ROSTER OF
COMMITTEE MEMBERS

Chairman	Jay Bardole, Vincennes University Junior College Vincennes, IN 47591-9986 (812-885-4372) Home 812-882-5272
Immediate Past Chair	Marion Baker, Central Piedmont Community College P.O. Box 35009, Charlotte, NC 28235-5009 (704-373-6462)
Chair Elect	Onofrio Gaglione, New York City Technical College, 300 Jay St., Brooklyn, NY 11201 (212-643-3488)
Secretary/ Editor	Ethelreda Laughlin, Cuyahoga Community College, Wester Campus, Parma, OH 44130 (216-845-4000) Home (216-884-0546)
Treasurer/ College Sponsors	John Clevenger, Truckee Meadows Community College 7000 Dandini Blvd. Reno, NV 89512 (702-673-7221)
General Membership Chair	Mike Knoll, Vincennes University Junior College Vincennes, IN 47591-9986 (812-885-4529)
Industrial Sponsors	Elliott Greenberg, Prairie State College P.O. Box 487, Chicago Heights, IL (312-756-3110)
Past Chairs	Tamar Susskind, Douglas Bond, Katherine Weissmann, Paul Santiago, John Mitchell, William Griffin, Curtis Dhonau, Cecil Hammonds, Ethelreda Laughlin.

THE EIGHTY-NINTH TWO-YEAR COLLEGE CHEMISTRY CONFERENCE

December 6 - 7, 1985

Truckee Meadows Community College
Reno, NV 89512

CONFERENCE THEME: "Chemical Education: Interfaces/Inner Faces"
PROGRAM CHAIR: Carolyn Collins, Clark County Community College
3200 E. Cheyenne, No. Las Vegas, NV 89030
Phone: (702) 643-6060 Ext. 375

LOCAL ARRANGEMENTS: John Clevenger, Truckee Meadows Community College
7000 Dandini Blvd., Reno, NV 89512
Phone: (702) 673-7221

FRIDAY, DECEMBER 6, 1985

- 9:00 - 1:00 **Registration, Exhibits, Coffee & Rolls**
- 9:00 - 1:00 **Project SERAPHIM Software Center.** Project materials will be available in Microcomputer Lab for review, evaluation and ordering.
- 9:30 - 10:30 **Committee on Chemistry in the Two-Year College.** This meeting is open to all interested persons.
- 10:45 - 11:00 **Opening: Jay Bardole, Chair 2YC;**
Welcome: Dr. James Eardley, President Truckee Meadows
- 11:00 - 11:30 **Introduction to Program: Carolyn Collins, Program Chair**
"European History of Chemistry: On Site"
Paul O'Brien, West Valley College
- 11:30 - 12:00 **"Chemistry on Postage Stamps"**
Arthur Last, Athabasca University, Alberta, Canada TOG 2RO
- 12:00 - 1:00 **Lunch Break — Exhibits**
- 1:00 - 1:30 **"Public Understanding of Science"**
Jim Bradford, ACS Office of Two-Year Colleges, Washington, DC 20036
- 1:30 - 2:00 **"Consumer Chemistry"**
Lucy Pryde, Southwestern College, Chula Vista, CA 92010
- 2:00 - 2:30 **"Teaching About The Changing Nature of the Chemical Industry"**
Ralph Petrucci, California State University, San Bernardino, CA 92404
- 2:30 - 3:00 **Coffee Break — Exhibits**
- 3:00 - 3:30 **"Bonding for Beginners: An Experiment in Articulation"**
Elizabeth Singleton, Houston Community College, Houston, TX 77006
- 3:30 - 4:00 **"MO Theory for Freshman: An Organiker's Perspective"**
Doug Bond, Riverside Community College, Riverside, CA 92506
- 4:00 - 4:30 **"Chemistry in the Allied Health Curriculum"**
Alison McPherson, Director of Science & Health, Clark County Community College, Las Vegas, NV 89030
- 6:30 - 7:30 **Banquet at the Peppermill**
- 7:30 - 8:30 **"Windows on the World of International Chemical Education"**
Marjorie Gardner, Director, Lawrence Hall of Science, Berkeley, CA 94720; 1984 Chair of the ACS Division of Chemical Education.

SATURDAY, DECEMBER 7, 1985

8:30 - 12:00	Registration, Exhibits, Coffee, Rolls
8:50 - 9:00	Announcements, Opening Remarks John Clevenger, Truckee Meadows Community College
9:00 - 4:30	Saturday Microcomputer Workshop "The Software Jungle" — 30 Participants — \$10 — This will be hands-on exercises oriented to using and evaluating samples of both chemistry (tutorials, simulations, etc.) and applications (word processing, spreadsheet, etc.) software of interests to Chemistry Faculty. Some hardware and programming considerations will be covered. No programming experience assumed. M. Lynn James, University of Northern Colorado, Greeley, CO 80631.
	Saturday Regular Session
9:00 - 9:30	"Using Computer Simulations to Train Instrument Operators" Paul Schatz, University of Wisconsin, Madison, WI 53706
9:30 - 10:00	"Project SERAPHIM Interfacing: More Data per Dollar, More Sense per Cent" Paul Groves, S. Pasadena High School, Sylmar, CA 91342
10:00 - 10:30	"Using the MacIntosh in Chemical Education" Sally Solomon, Drexel University, Philadelphia, PA 19104
10:30 - 11:00	Coffee Break — Exhibits
11:00 - 11:30	"The Video Laser Disk in Chemical Education" David Brooks, University of Nebraska, Lincoln, NE 68588
11:30 - 12:00	"Producing Video Disk Lessons in Chemistry" Loretta Jones, University of Illinois, Urbana, IL 61801
12:00 - 1:00	Lunch Break — Exhibits
1:00 - 1:30	"Issues in Two-Year College Chemistry" Bill Mooney, El Camino College, Torrance, CA 90506
1:30 - 2:30	"Panel Discussion" Participants and audience will discuss key issues of concern to chemistry instructors in two-year colleges. In particular, focus will be on questions explored in DIVCHED's Nov. Invitational Conference on this topic and on the recommendations coming out of it.
2:30 - 3:00	"Humor in Chemistry: Chemistry Professor Jokes" Leonard Grotz, U.W. Center - Waukesha County, Waukesha, WI 53186
3:00 - 4:00	"A Chemistry Lab in Your Kitchen — Suitable for Children" David Katz, Community College of Philadelphia, Philadelphia, PA 19130

EVENING

Limited reservations to the **"HALLELUJAH HOLLYWOOD"** show at the MGM Grand are available. Please indicate this in your pre-registration or check with John Clevenger, the Local Arrangements Chair.

AGENDA

Committee on Chemistry in the Two-Year College

General Meeting

Friday, December 6, 1985, Truckee Meadows Community College

- I. Introductions
- II. Approval of the Minutes, Memphis Meeting
- III. Reports
 - A. Chair - Jay Bardole
 - B. Reno Meeting Report - John Clevenger and Carolyn Collins
 - C. New York Meeting Report - Pat Flath
 - D. Membership - Mike Knoll
 - E. Treasurer - John Clevenger
 - F. College Sponsors - John Clevenger
 - G. Industrial Sponsors - Elliott Greenberg
 - H. Publications - Ethelreda Laughlin
 - I. Meeting Sites - Dick Gaglione
 - J. Programs - Len Grotz
 - K. Workshops - Sam Crawford
 - L. ACS Office of Two-Year Colleges - Jim Bradford
- IV. Old Business
- V. New Business
- VI. Information Items

Executive Committee Meeting
Thursday, Oct. 10, 1985
State Technical Institute at Memphis

Jay Bardole, Chair, called the meeting to order at 7:50 PM.

Attendees:

Jay Bardole	Elliott Greenberg
Jim Bradford	Cecil Hammonds
John Clevenger	Ethelreda Laughlin
Curt Dhonau	Wendell Massey
Onofrio Gaglione	Kathy Weissmann
	George Williams

Jay discussed candidates for chair-elect for 1987. Ralph Burns has applied. Uni Susskind wants to renominate Bill Wasserman. Since his vitae are on file, he only needs to submit a statement saying that he is interested.

Credentials of the two candidates were passed around. They were approved by those present. The entire executive committee must evaluate the credentials. Written or verbal input must be done before the Reno meeting.

The position of Membership Chair must be filled for 1987. Inquiries will be accepted until December 31. Credentials must be submitted prior to the Westchester meeting. To date there has been just one inquiry.

The term of the Secretary/Editor expires at the end of December, 1986. The announcement will appear in the Reno newsletter and inquiries will be due by January 31, 1986. The committee received notice of the coming vacancy in the interim report. Credentials will be due by April 11 (at the same time as those for the membership chair credentials).

Jay inquired about responsibilities for the editor part of the secretary/editor position. Ethel Laughlin said that the job is being done by Jim Bradford and that her responsibility has decreased over the past three years. Jay asked if the position should be removed. The consensus was to keep the job open but have the secretary part of the position filled by the chair-elect.

John Clevenger stated that travel money not used this year will not be held over to the next year. Ethel asked if funds were available if one's travel allotment ran out. Jay asked if money can be transferred. John stated that we have a good income.

George Williams asked if anything was needed for the evening. Coffee and cookies were provided for the group. He excused him-

self at that point.

Jay gave the results of the ballot to determine the allocation of \$1200 for distribution of the report of the SOCED Invitational Conference that took place in San Diego. The vote for the report of 1985 was 14 Yes and 0 No. For 1986 there were 10 Yes votes and 4 No.

Jay then called for a discussion of the funding of the Distillate. Initially, according to a communication from Uni Susskind, the money was allocated since the ACS only partly funded the publication.

John Clevenger asked about distribution of the Distillate. Jim reported that it goes to every two-year college chemistry teacher. 3700 copies are mailed. This amounts to about \$1.00 per copy.

John stated that he felt that we get a good return on the money and in future editions there will be abstracts of papers presented at conferences in addition to one full paper. He added that we couldn't do that on our own for \$2000.

Elliott pointed out that we get \$2000 from the Division and to back \$3400. High school teachers have subscriptions to their publication. Couldn't the ACS help more?

Curt pointed out that high school teachers pay no dues. 2YC3 members pay \$6.00 per year.

Elliott said that it costs \$12,000 for four conferences a year. If a chair's institution didn't help with expenses, money on hand would not last long.

Dick asked what would happen if the \$2000 was cut off. Jim said that he would try to get money from the ACS but that if money were to be decreased it would be best to do it gradually.

Elliott asked if it were possible to include the newsletter with the distillate. Jim answered that deadlines for the two were different and the combination would be impossible.

Jim suggested that if a chair's college doesn't provide funding for mail, etc., it can be decided to allocate more money for newsletter and less for the Distillate.

Jay said that we may want to consider changes for a year ahead of time and that there will be a discussion at the Reno meeting.

The method of setting the budget was then discussed. Curt suggested that the Chair, Chair-elect and Treasurer should work on the budget. The budget is presented at the last meeting of the

year. Mike Knoll and Elliott Greenberg will be consulted before the budget is finalized.

The question of raising dues came up. The consensus was that there is no need to raise dues if there is no need for extra money.

Meetings:

Should the 1988 Purdue biennial be one of the regular meetings for the year.

Jay said that we can't make a decision about a fifth meeting until after the Bozeman meeting.

Elliott suggested that, if we have it, the meeting should be just for the sake of participants, not a full scale meeting and no newsletter.

Dick felt that a fifth meeting is too difficult. Kathy asked what happens to sponsors. Will they exhibit at only three meetings if Purdue is a fourth?

Discussion will continue at Reno.

Dick: "Will we support a booth at Bozeman? Volunteers?"

Re 1987 meeting in Washington, DC:

Margot Schumm believes that the Memorial Day weekend will work out well. However the question arose as to whether or not sponsors will want to give up a holiday weekend.

97th Florida meeting: Wendell Massey is willing to do both local arrangements and co-chair the meeting. Wendell suggested that an October meeting is best, November is OK, but December is not good.

Dick said that he had received a letter from the Community College at Newton, PA. The people there would like to have a meeting in '87 or later. Jay suggested that if the Allegheny plans fall through, Newton might be considered instead.

The meeting adjourned at 10:10 PM.

Ethelreda Laughlin
Secretary/Editor

COMMITTEE ON CHEMISTRY IN THE TWO-YEAR COLLEGE
Friday, Oct. 11, 1985
State Technical Institute at Memphis
Memphis, TN

Attendees:

Paula Ballard	Jefferson State College, Birmingham, AL
Jay Bardole	Vincennes U. Jr. College, Vincennes, IN
Jim Bradford	ACS- Washington
Dale R. Buck	Cape Fear Tech. Inst., Wilmington, NC
Ralph Burns	St. Louis CC at Meremac, Meremac, MO
William E. Cheek	Central Piedmont CC, Charlotte, NC
John Clevenger	Truckee Meadows CC, Reno, NV
Curt Dhonau	Vincennes U. Jr. College, Vincennes, IN
J. Dean Elkins	Henderson CC, Henderson, KY
Onofrio Gaglione	New York City Tech. College, Brooklyn, NY
James Graham	J.C. Calhoun CC, Decatur, AL
Elliott Greenberg	Prairie State College, Chicago Hts., IL
Cecil Hammonds	Penn Valley CC, Kansas City, MO
Harry Herzer	NASA, Washington, DC
Leo Kling	Tri-County Tech. College, Fendleton, SC
Ethelreda Laughlin	Parma, OH
Wendell Massey	Florida Jr. College, Jacksonville, FL
John Mitchell	Tarrant County Jr. College, Hurst, TX
Robert R. Scott	State Tech. Inst., Knoxville, TN
Diane Sell	W.R. Harper College, Palatine, IL
Kathy Weissmann	C.S. Mott CC, Flint, MI

Jay Bardole, Chair, opened the meeting at 9:10 AM.

I. Introductions were made of all participants.

II. Since committee members received the minutes of the Waukesha meetings, no reading was made.

III. Reports

A. Chair, Jay Bardole, announced that future publications of The Distillate will contain abstracts of papers presented at the meetings plus one article from the sessions. Abstract forms have been distributed to all speakers at the present meeting.

The invitational SOCED meeting will be held in Washington the weekend before Thanksgiving. \$1200 has been allocated for the document that results. Two members from 2YC3 Jay Bardole and Dick Gaglione will attend in addition to the two-year college people who are members of SOCED.

Funding is about \$180 for each participant.

Cecil Hammonds moved that an additional representative should be sent as a representative to the conference. His motion is as follows:

That COCTYC be allowed to send a representative in addition to the chair and the chair-elect to the ACS Invitational Conference on Chemical Education in the Two-Year College.

That funds be provided from unexpended allocations to two-year college participants.

That should funds be unavailable from this source, funds shall be provided by COCTYC.

That this representative be designated by the COCTYC chair.

The motion was seconded by Elliott Greenberg.

Kathy Weissman said that 2YC3 cannot demand another person since this is an invitational meeting. Elliot said that 2YC3 is funding the conference so the motion should be approved. John Mitchell thought that the two-year colleges are already well represented. Jay cautioned that the working relationship with Chem. Education and SOCED should not be damaged.

The vote was 8 for the motion and 5 against. A copy of the motion will be forwarded to Jay Bardole.

B. Memphis meeting report:

Paula Ballard announced that Ralph Burns will be the keynote speaker for the meeting since the original speaker had to cancel. Ralph graciously volunteered.

C. Reno meeting plans. John Clevenger invited all to the Reno meeting and described the Peppermill Hotel where participants will be housed.

D. Membership: In Mike Knoll's absence, Jay reported 381 renewals and 108 new members (40 from the Miami meeting and 32 from Waukesha).

E. John Clevenger reported a balance of over \$11,000 and said that the cash flow was relatively good. Interest from a checking account and a \$10,000 savings certificate contribute. The yearly budget is \$12,000.

F. College sponsors: John reported that we have 115 college sponsors. Notices for renewals have been mailed. He urged that members get applications for their colleges.

H. Industrial sponsors: Elliott Greenberg.
Thirty-nine sponsors are not enough. One or two new sponsors should be recruited at each meeting. For \$100 a sponsor can exhibit at four meetings per year.

Jay said that the jacket raffled at the Waukesha meeting brought \$44 and that net profits from Storrs added \$429.89 to the account.

I. IUPAC Meeting, Tokyo, Kathy Weissmann:

There were 600 participants from 50 countries. Seventy were from the U.S.A., 28-30 funded by the NSF. Dave Katz, John Hill, John Clevenger, Jerry Sarchis, Doris Kolb and Kathy Weissmann attended.

A major concern was about the preparation in the sciences in elementary schools. It was agreed that science teachers must work with industry to improve public attitudes.

There was no way of knowing the kind of institution from which a participant came.

Kathy said that the masses of people in Japanese cities are overwhelming.

Information from underdeveloped countries was that most of their people have no education after age ten!

K. Meeting sites - Dick Gaglione:

1986 meetings: Because of change of ACS meeting date, there is a change of place of the NYC meeting. It will be at Westchester Community College.

The 98th meeting will be in Jacksonville, probably the first week in November.

The 97th meeting will be in Lincoln, Nebraska, late in Sept., of '87.

The 99th meeting will be held jointly with the Canada meeting in Toronto.

The 100th meeting will be in Idaho.

Plans have not been finalized for the 101st session. The biennial will be at Purdue.

The 102nd meeting will be at Allegheny in Pittsburgh in the fall of '88 or the spring of '89.

L. ACS office - Jim Bradford: Booklets will be sent to all

committee members. The box was mailed from Washington but did not arrive on time for distribution at the meeting.

Consultants to minority institutions will have ACS funding. Colleges should request a consultant from the ACS.

IV. There was no old business to discuss.

V. New Business:

Jay Bardole announced that two positions on the executive committee will be open on January 1, 1987. Mike Knoll has had the Membership Chair for six years and his term will be over at the end of '86. The secretary/editor position will also be open at the same time.

Kathy Weissmann announced the possibility that the chair-elect and secretary position may be combined but that the secretary/editor job will not be abolished until the new combination is tried.

Jay announced that committee members are needed, especially from the south.

Kathy asked about the feelings of members about the Policies and Procedures document. Are any revisions needed?

The meeting was adjourned at 10:40 AM.

Ethelreda Laughlin
Secretary/Editor

Membership Report
Reno, Nevada Meeting

There have been 383 Renewals and 132 new memberships for a total of 515 members.

The Miami meeting resulted in 40 new members.

The Waukesha meeting resulted in 32 new members.

The Memphis meeting resulted in 24 new members.

November 1, 1985
 FINANCIAL REPORT FOR COCTYC
 From: 1/1/85 To: 11/1/85

Credits

Balance forward		\$ 4322.05
College Sponsors		3325.00
Industrial Sponsors		2425.00
Individual Membership		2627.00
DIVCHED		2000.00
Interest		1232.30
C.D.'s	632.16	
Checking	600.14	
Meetings & Misc.		658.07
Storrs booth	115.00	
Miami	138.00	
Waukesha	234.57	
Reno	126.00	
Raffle, WI	44.50	

\$ 16589.42

Debits

Travel		\$ 4421.20
From 1984	702.00	
Chair	555.00	
Chair-elect	663.42	
Past Chair	494.79	
Secretary	850.00	
Ind. Sponsor		
Treasurer	755.93	
Membership	400.06	
Office Supplies		28.00
Postage		87.15
Printing		9.75
Phone		14.98
Meetings & Misc.		312.00
Waukesha	200.00	
Reno	100.00	
Memberhship	6.00	
Returned check	6.00	

\$ 4873.08

Balance \$ 11716.34

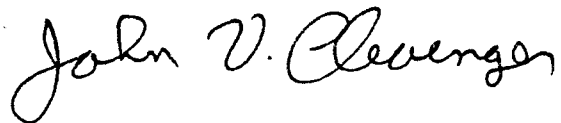
CERTIFICATES OF DEPOSIT

Nevada Savings
Keystone Branch
985 W. 5th
Reno, NV

- | | |
|-----------------|------------|
| 1. #7085538-2 | \$2,835.55 |
| Matures 7/27/86 | |
| 11.4% | |
| 2. #7085710-7 | \$3,839.03 |
| Matures 3/18/86 | |
| 9.60% | |
| 3. #7085709-9 | \$3,839.04 |
| Matures 3/18/86 | |
| 9.60% | |

COLLEGE SPONSORS

We had 115 College Sponsors for 1985. These were listed in the last report. As of November 1, 1985, we have 36 new or renewed College Sponsors for 1986. A listing, by college, follows.



John V. Clevenger
Treasurer/College Sponsors

1 Mr. W. H. Team

Amarillo College

2 P.O. Box 447

Amarillo TX 79178

Mr. Laurence G. Ladwig

Black Hawk College

6600 34 th Ave

Moline IL 61265

Mr. William Komanecky

Cayuga Community College

Franklin Street

Auburn NY 13021

Mr. Rober Brasile

College of Lake County

19351 W. Washington St.

Grayslake IL 60030

Mr. Cullen Johnson

Cuyahoga Comm. Coll.-Western Campus

11000 Pleasant Valley Rd.

Parma OH 44130

Mr. Ralph H. Logan, Jr.

El Centro College

Main & Lamar

Dallas TX 75202

Sr. Mary Erwin Huelskamp

Ancilla Domini College

Donaldson IN 46513

Katherine E. Weissman

C. S. Mott Community College

1401 E. Court St.

Flint MI 48502

Dr. William Cheek

Central Piedmont Comm. Coll.

P.O. Box 35009

Charlotte NC 28235

Dr. Ray Seitz

Columbia Basin College

2600 N. 20 th Ave.

Pasco WA 99301

Prof. C. J. Alexander

Des Moines Area Comm. Coll.

2006 S. Ankeny Blvd

Ankeny IA 50021

Dr. Paul F. Calgher

Foothill College

12345 El Monte Rd.

Los Altos CA 94022

Dr. Martin VanDyke
Front Range Community College
3645 W. 112th Avenue
Westminster CO 80030

Dr. Ray Gangi
Gloucester County College
Taynard & Salinas Roads
Lewell NJ 08080

Prof. John Henderson
Jackson Comm. College
11 Emmons Rd
Jackson MI 49201

Peter Scott
Benton Community College
100 S. W. Pacific Rd.
Benton OR 97321

William Husa, Jr.
Middle Georgia College
Sarah St.
Cochran GA 31014

Mr. John Douglas
New Mexico State University
Box 477
Alamogordo NM 88310

Mr. Garry McGlaun
Gainesville Junior College
P.O. Box 1358
Gainesville GA 30501

Mr. Fred Redmore
Highland Community College
Pearl City Rd.
Freeport IL 61032

Taylor Pancoast or Charles Brininger
Jamestown Community College
525 Falconer Street
Jamestown NY 14701

Chemistry Dept. Chair
Mesa Community College
1830 W. Southern Ave.
Mesa AZ 85202

Dr. John Hallman
Nashville State Technical Institute
120 White Bridge Rd.
Nashville TN 37209

Dr. Kenneth J. Wright
North Idaho College
1000 W. Garden Ave.
Coeur D'Alene ID 8314

1 Prof. Tamar Susskind
Oakland Comm. Coll.-Auburn Hills Campus
2900 Featherstone Rd.
Auburn MI 48057

Mrs. Pat Flath
Paul Smith's College
Box 45
Paul Smith's NY 12970

Mr. Nicholas L Reuter
Raymond Walters College
9555 Plainsville Rd.
Cincinnati OH 45236

Dr. Curt McLendon
Saddleback Community College
28000 Marguerite
Mission Viejo CA 92692

Mr. Wes Fritz
St. Clair County Comm. Coll.
323 Erie St.
Port Huron MI 48060

Dr. John Mitchell
Tarrant County Jr. Coll.-N.E. Campus
Hurst TX 76053

Prof. Robert Kieburtz
Olympic College
16 th and Chester
Bremerton WA 98310

Dr. Vera Zdravkovich
Prince George's Community College
301 Largo Rd
Largo MD 20870

Dr. Anne Minter
Roane State Community College
Patton Ln.
Harriman TN 37748-5000

Chemistry Dept. Chair
Southern Arkansas U.-El Dorado Branch
300 South West Ave.
El Dorado AR 71730

Mr. Charles Yates
State Technical Institute at Memphis
5983 Macon Cove
Memphis TN 38134

Dr. John V. Clevenger
Truckee Meadows Community College
7000 Dandini Blvd
Reno NV 89512

INDUSTRIAL SPONSORS

At the close of the 1984-85 academic year, there were 39 paid-up industrial sponsors. Invoices for the present year were mailed out in June. To date, there have been 20 renewals, one new sponsor, and one cancellation for a total of 21 current paid-up sponsors. A second billing is being prepared and efforts will continue to affect renewal of the remaining sponsors.

FINAL FINANCIAL REPORT ON THE STORRS BOOTH

The $2YC_3$ jacket was raffled off at the Waukesha Conference, yielding \$44.50. This brings the net profit from the Storrs Booth to \$420.89.

Summary of Future Meetings

* SCHEDULED
 ** SUGGESTED SITES/APPOINTMENTS

ACADEMIC YEAR		
'85-'86	88th - FALL 10/11-12/85 Memphis State University (With joint SE/SW ACS Reg. Meeting) State Technical Institute 5983 Macon Cove Memphis, TN 38134	89th - FALL 12/6-7/85 Truckee Meadows Community College 7000 Dandini Blvd. Reno, Nevada 89512
Program Chair	Paula Ballard, Jefferson State Jr. College, Birmingham, AL James Graham, J.C. Calhoun Com. College, Decatur, AL	Carolyn Collins Clark County Community College Las Vegas, NV
Local Arr. Chair:	(205) 853-1200 X1463 George Williams (901) 377-4111	(702) 643-6060 John Clevenger, TMCC (701) 673-7221
Ind. Spon. Chair:		
Theme:	Frontiers in Chemistry	

90th- SPRING 4/11-12/86 Westchester Community College 75 Grasslands Road Valhalla, New York 10595 with 91st ACS Nat. 4/13-18/86	91st - SPRING 4/25-26/86 William Rainey Harper College Palatine, IL 60067
Patricia Flath Paul Smith College Paul Smith, N.Y. 12970 (518) 327-6266	William T. Mooney, Jr. El Camino College Via Torrance, CA 90506
John Tobias Westchester Community College (914) 285-6939	Joseph Bauer William Rainey Harper College (312) 397-3000
Stephen Dreier (718) 643-8242 New York City Technical College Brooklyn, N.Y. 11201	Duane Sell William Rainey Harper College

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'86-'87	92nd-SUMMER 7/27-8/1, 1986 9th Biennial Conference in Chemical Education Bozeman, Montana	93rd-FALL 10/3-4/86 Greenville Technical College Box 5616, Station B Greenville, SC 29606
Program Chair:	Ed Heath Southwest Texas Junior Coll. (512) 278-4401 X224	Leo Kling, III, Tri-Counties Technical College (803) 646-8361
Local Arr. Chair:		Alan Day, Greenville Tech
Ind. Spon. Chair:		
Theme:		

94th-FALL 11/21-22/86 Sinclair Community College Dayton, Ohio 45402	95th-SPRING 4/3-4/87 Community College of Denver (Specific Campus Undecided) (ACS Nat'l. 4/5-10/87 Denver	96th Montgomery Community College Rockville, MD 20850 5/23/ - 5/23
Richard Jones Sinclair Community College Dayton, Ohio 45402	Martin Van Dyke, CC of Denver N. Campus, 3645 W. 112 Ave. Westminster, CO 80030 (303) 466-8811	Margot K. Schumm (301) 279-5129 Montgomery Com. College Rockville, MD 20850
Roger Penn Sinclair Community College		
Jim Johnson Sinclair Community College		

* SCHEDULED
 ** SUGGESTED SITES/APPOINTMENTS

ACADEMIC YEAR

'87-88	97th Florida Junior College North Campus Jacksonville, FL 32218	S	98th
Program Chair			
Local Arr. Chair:	Wendell Massey		
Ind. Spon. Chair:			
Theme:			

REGIONS: E- EAST W- WEST
 S- SOUTH M.W- MID-WEST

99th June 5-11 Nat'l. at Toronto (Joint C ₃ -2YC ₃)	100th - SPRING Early May Ricks College (Dormitories) Rexburg, ID 83440 (near Idaho Falls, Yellowstone, Gr. Tetons & Craters of the Moon Nat'l. Parks)	W
	Arthur Hubscher Ricks College	

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	101st	102nd
'88-'89	ACS Nat'l. Late Sept., Early Oct. Los Angeles	Pittsburgh, PA.?
Program Chair	Doris Koll	Barbara Rainard (412) 237-2525 Community College of Allegheny Allegheny Campus Bob Ridge Ave Pittsburgh, PA
Local Arr. Chair:		
Ind. Spon. Chair:		
Theme:		

103rd	104th
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ACADEMIC YEAR

	105th-Fall	106th
'89-'90	with ACS Nat.- Miami 9/10-15	
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Local Arr. Chair:		
Ind. Spon. Chair:		
Theme:		

	107th-Spring	
	108th	
with ACS Nat.-Boston(week of 4/23)		

March 1985

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AMERICAN CHEMICAL SOCIETY
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(505-392-4510 ext 261)

Cunningham, Alan (1987) Monterey Peninsula College
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Sacramento, CA 95841 (916-484-8464)

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Sherman, Ruth (1986) Los Angeles City College
855 N. Vermont Ave, Los Angeles, CA 90029
(213-669-4223)

Scott, Peter (1986) Linn-Benton Community College
6500 SW Pacific Blvd, Albany, OR 97321
(503-928-2361)

Sterner, Wanda (1986) Cerritos College
11110 E. Alondra Blvd., Norwalk, CA 90650
(213-860-2451 ext 369)

Van Dyke, Martin (1987) Front Range Community College North Campus
3645 W. 112th Ave., Westminster, CO 80030
(303-466-8811)

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1701 Broadway, Seattle, WA 98122
(206-587-4080)

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PO Box 35009, Charlotte, NC 28235-5009
(704-373-6968)

Arnall, David (1986) Shelby State Community College
PO Box 40568, Memphis, TN 38104
(901-528-6748)

Anscho, F. Paul (1985) Hiwassee College,
Box 65, Madisonville, TN 37354
(305-442-2182)

King, Leo III (1986) Tri County Technical College
Pendleton, SC 29670
(803-646-3227 ext. 325)

Maier, Thomas L. (1986) Atlanta Junior College
1630 Stewart Ave. SW, Atlanta, GA 30310
(404-656-6365)

Winter, Anne P. (1986) Roane State Community College
Harriman, TN 37748 (615-354-3000)

Roach, Don (1985) Miami-Dade Community College South Campus
11011 SW 104 St. Miami FL 33176
(305-596-1157)

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3
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Co: Wisconsin-Waukesha, 1500 University Drive, Waukesha WI 53186 (414-544-8

Al: Ralph Burns (1986) St. Louis Community College at Meramec
11333 Big Bend, St. Louis, MO 63122
(314-966-7718)

Be: Crawford, Sam (1987) Johnson County Community College
College Boulevard at Quivira Road
Overland Park, KS 66210 (913-888-8500)

Cu: Eidsness, Warren (1986) Normandale Community College
9700 France Ave. S.
Bloomington, MN 55431 (612-830-9300)

Hu: Elkins, I. Dean (1986) Henderson Community College
University of Kentucky, Henderson, KY 424
(502-827-1867)

Ll: Johnson, Cullen (1987) Cuyahoga Community College, Western Campus
Parma, OH 44130 (216-845-4000)

Mc: Jones, Richard (1985) Sinclair Community College
Dayton, OH 45402 (513-226-7907)

St: Kenkel, John (1985) Southeast Community College
Lincoln Campus
Lincoln, NE 68520 (402-471-3333)

St: Klein, Dave (1986) Kansas City Kansas Community College
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Kansas City, KS 66112 (913-334-1000)

S: Koch, Frank (1985) Bismarck Junior College
Bismarck, ND 58501 (701-224-5423)

y: Kolb, Doris (1985) Illinois Central Community College
East Peoria, IL 61635 (309-694-5011)

Kreiger, Albert (1985) Jackson Community College
Jackson, MI 49201 (517-787-0800)

W: Redmore, Fred (1987) Highland Community College
Freeport, IL 61032 (815-235-6121 ext 331)

Sell, Duane (1987) Wm. Rainey Harper College
Palatine, IL 60067 (312-397-3000)

John Winklemann (1987) Illinois Valley Community College
Rural Route, Oglesby, IL 61348 (815-224-27

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Eastern Regional Vice-Chairman 1985:

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Cherim	(1985) Delaware County Community College Media, PA 19063 (215-353-5400)
Cucci, Myron w.	(1987) Monroe Community College Rochester, NY 14623 (716-424-5200)
Feldsine, John Jr.	(1985) Broome Community College Binghamton, NY 13902 (607-771-5000)
Flath, Patricia	(1986) Paul Smith's College Paul Smith's NY 12970 (518-327-6266)
Hajian, Harry G.	(1987) Community College of Rhode Island 400 East Ave. Warwick, RI 02886 (401-825-2258)
Kanter, Muriel	(1987) Roxbury Community College 625 Huntington Ave, Boston MA 62115 (617-734-1960)
Katz, David	(1897) Community College of Philadelphia 1700 Spring Garden Street Philadelphia, PA 19130 (215-751-8000)
Rainard, Barbara	(1985) Community College of Allegheny Allegheny Campus 808 Ridge Ave, Pittsburg, PA 15212 (412-237-2525)
Schumm, Margot K.	(1986) Montgomery College, Rockville, MD 20850 (301-279-5129)
Sollimo, Vincent	(1985) Burlington County College Pemberton, NJ 08068 (609-894-9311)
Vlassis, C. G.	(1985) Keystone Junior College LaPlume, PA 18440 (717-945-5141)
Zoranski, Edmund J.	(1986) Atlantic Community College Mays Landing NJ 08330 (609-625-1111)

ZYC₃ SUBCOMMITTEES

PROGRAM: Leonard Grotz (Chair), Carolyn Collins, Cullen Johnson

WORKSHOPS: Sam Crowford (Chair), Stanley Cherim, Peter Scott

PUBLICATIONS: Ethelreda Laughlin (Chair), Myron Cucci, F. Paul Inscho,
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John Feldsine

Memphis Meeting Attendees

Adams, J. O.
Northwest MS Jr. Coll
Highway 51 N.
Senatobia, MS 38668

Buescher, Karen
Vincennes University
2nd Street
Vincennes, IN 47591

Ballard, Paula
Jefferson State Jr. Coll
2601 Carson Road
Birmingham, AL 35215

Burns, Ralph A.
St. Louis CC - Maramec
11333 Big Bend Blvd.
St. Louis, MO 63122

Bard, James
Penn Valley Comm Coll
3201 S. W. Trafficway
Kansas City, MO 64111

Cantrell, Caroline
Treadwell High School
920 N. Highland
Memphis, TN 38122

Bardole, Jay
Vincennes University
Vincennes, ~~IL 475-91~~
IN 47591

Chang, Shu H.
Hinds Jr. College
Raymond, MS 39180

Barnes, James R.
Itawamba Jr. College
Fulton, MS 38843

Cheek, William
CPCC
1141 Elizabeth Avenue
Charlotte, NC 28201

Bradford, E. James
American Chemical Society
1155 Sixteenth Street, NW
Washington, DC 20036

Clevenger, John
Truckee Meadows Comm. Col
7000 Davdini Blvd.
Reno, NV 89512

Bryant, Bettie
Vincennes University
Vincennes, IN ~~42591~~
47591

Crook, Jody
Meridian Jr. College
5500 Hwy 19 N.
Meridan, MS 39305

Bryant, Preston
Kirby High School
4080 Kirby Parkway
Memphis, TN 38134

DHonaj, Curt
Vincennes Univ. Jr. Coll
Vincennes, IN 47591

Buck, R. Dale
Cape Fear Tech. Inst.
411 N. Front Street
Wilmington, NC 28401

Doyle, Rebecca S.
Miss. Delta Jr. College
c/o Science Dept.
Morehead, MS 39179

Elkins, I. Dean
Henderson Community Coll
Henderson, KY 42420

Freilich, Mark
Memphis State University
1315 Essex Drive
Memphis, TN 38119

Gaglione, Onofrio
NY City Technical College
300 Jay Street
Brooklyn, NY 11201

Giesemann, James
Chattanooga State Tech CC
4501 Amnicola Hwy
Chattanooga, TN 37406

Graham, James
J.C. Calhoun Comm. Coll
P.O. Box 2216
Decatur, AL 35601

Greenberg, Elliott
Prairie State College
202 S. Halsted Street
Chicago Heights IL 60411

Hammonds, Cecil N.
Penn Valley College
Kansas City, MO 64111

Herzer, Harry
NASA Headquarters
Washington, DC 20546

Jernigan, Diane
Trezavant Vo-Tech Center
3224 Rangeline Road
Memphis, TN 38119

Johnson, Betty
Paducah Community College
Alben Barkley Drive
Paducah, KY 42002-7380

King, Robert
Northwest MS Jr. Coll
Highway 51 N.
Senatobia, MS 38668

Kling, Leo
Tri-County College
113 Shaftsbury Road
Clemson, SC 29631

Kramer, Axtell F.
St. Louis C C - Meramec
11333 Big Bend
Kirkwood, MO 63122

Laughlin, Ethelreda
6486 State Rd., #12
Parma, OH 44134

Limbaugh, Charles
Mineral Area College
Flat River, MO 63601

MacNeill, Nancy
Wood Junior College
Mathiston, MS 39752

Marking, Bill
Raleigh Egypt High School
3970 Voltaire
Memphis, TN 38128

Massey, Wendell
Florida Jr. College
4501 Capper Road
Jacksonville, FL 32218

McKnight, Cleon
Hinds Jr. College
Box 45
Raymond, MS 39154

Miller, P. Thomas
Volunteer State Com Coll
Nashville Pike
Gallatin, TN 37066

Mitchell, John
Tarrant County Jr. Coll
828 Harwood Road
Hurst, TX 76054

Mitchell, Tony
Black Hawk College
6600 34th Avenue
Moline, IL 61265

O'Leary, Brian
Univ. of Alamba in Birmin

Parham, Herbert W.
Itawamba Jr. College
Fulton, MS 38843

Pierce, Tom
Univ. of North Alabama
Florence, AL 35632

Prather, Paul D.
White Station High School
514 S. Perkins Road
Memphis, TN 38117

Randle, Shirley
Hinds Jr. College
P.O. Box 795 HJC
Raymond, MS 39154

Sanders, Christopher
Memphis Prep School
1555 McAlister Drive
Memphis, TN 38116

Scott, Robert P.
State Tech at Knoxville
P.O. Box 19802
Knoxville, TN 37919

Sell, Duane
W.R. Harper College
Algonquin & Roselle Roads
Palatine, IL 60103

Siefert, Kathryn
Vincennes University
Vincennes, IN 47591

Singleton, William A.
State Tech
5983 Macon Cove
Memphis, TN 38134

Skipper, James A.
East MS Junior College
Scooba, MS 39358

Udovich, Gary
Univ. Of Wis Ctr-Waukesha
1500 University Drive
Waukesha, WI 53188

Watlinton, C. Joseph
Volunteer State Com Coll
Gallatin, TN 37066

Weissman, Katherine
C. S. Mott Comm. College
1401 E. Court Street
Flint, MI 48502-2391

Williams, George
State Tech
5983 Macon Cove
Memphis, TN 38134

Wilson, Ted
Clarke College
Box 440
Newton, MS 39345

Yates, Charles
State Tech
5983 Macon Cove
Memphis, TN 38134

40 Pct. of Adults Want Further Education, but Most Say They Would Need Student Aid

PRINCETON, N.J.

Four of every 10 American adults want to obtain further education, a survey scheduled to be released this week indicates.

In a poll of adults two years ago, only 24 per cent said they wanted more schooling.

Asked what type of institution they would like to attend, the largest proportion, 26 per cent, would choose a vocational or technical school. The other popular choices were public two-year and public four-year colleges, each chosen by 21 per cent of those surveyed.

Cost is one reason for those selections. A majority of those questioned said that tuition at vocational and community colleges was "about right."

In contrast, 70 per cent said that private four-year institutions were too expensive, and 54 per cent said private two-year colleges were also too costly.

The Council for Advancement and Support of Education and the New England Board of Higher Education sponsored the nationwide survey of 1,004 adults in conjunction with National Higher Education Week.

Despite sentiment that college is too expensive—77 per cent said tuition was rising so quickly that most people would not be able to afford college and 69 per cent said they could not attend college without grants or low-interest loans—public support for increases in federal student aid has fallen, the survey found.

In the 1983 poll, 63 per cent said they favored increasing student aid, and they ranked it third in a list of 14 major programs that the federal government supports.

This year, only 53 per cent advocated more student aid, and it dropped to seventh place on the list of federal priorities. The top three priorities are medical research, medical care for the elderly, and aid to higher education.

Asked on what basis financial aid should be given to college students, 43 per cent prefer to award it on aca-

demic ability, while 41 per cent would base it on financial need. Fourteen per cent want it based equally on merit and need.

The public is satisfied with the quality of a college education, the survey results indicate, with nearly three-quarters rating it excellent or good. Forty-four per cent said the quality of a college education was improving, 37 said it was the same, and 16 per cent said it was getting worse.

Among other survey results:

► Two-thirds said that the role of sports in college is overemphasized.

► Asked how intercollegiate athletics have affected the image of higher education, 44 per cent said it harmed the image, 30 per cent said it had no effect, 22 per cent said it

helped the image, and 4 per cent had no opinion.

► Thirty-seven per cent said they had made a donation to a college or university.

► On the issue of tax reform, 77 per cent favored retaining the federal tax deduction for charitable giving.

Opinion Research Corporation conducted the telephone survey between September 27 and October 7. The margin of sampling error is plus or minus 3 per cent, 95 per cent of the time.

The survey report, *American Attitudes Toward Higher Education—1985*, is available for \$95, prepaid, from Opinion Research Corporation, P.O. Box 183, Princeton, N. J. 08542.

—JEAN EVANGELAUF

Public's Views on Federal Support for Colleges

	Strongly favor	Somewhat favor	Somewhat oppose	Strongly oppose
Grants to low-income students	46.4%	38.0%	8.2%	5.7%
Low-interest loans to middle-income students	40.3%	41.4%	11.5%	5.8%
Support for colleges with a large percentage of low-income students	36.9%	45.1%	9.7%	6.3%
Support for university research in the arts	14.7%	41.1%	29.4%	11.9%
in the humanities	18.7%	47.5%	21.0%	8.3%
in medical fields	52.3%	37.1%	5.8%	3.6%
in the physical sciences	22.5%	51.5%	16.7%	4.8%
in the social sciences	13.2%	47.8%	25.5%	9.7%

Note: 'Don't know' responses omitted

SOURCE: OPINION RESEARCH CORPORATION

Panel Votes to Keep Tax Break

Continued from Page 11

Members of the Ways and Means Committee are involved in negotiations over legislation designed to balance the federal budget.

The committee's chairman, Rep. Dan Rostenkowski, Democrat of Illinois, is leading the House delegation to the House-Senate conference committee that is dealing with the budget.

The negotiations are expected to take up much of his time until at least the end of the month, making it difficult for him to lead the effort to write

a tax-reform measure before Congress adjourns for the year.

But Ms. Milliken said college leaders must continue campaigning against any action that would harm their institutions. Even if no measure is passed this year, she said, lawmakers will eventually pass a tax bill, "and they always start where they left off."

As a result, she said, when college leaders lose a fight on a tax issue they are worried about, "they start one step behind" the next time lawmakers begin drafting a bill.

College Groups Agree on Pell Grant Formula

Continued from Page 11

or 60 per cent of a student's expenses, whichever is less. Those figures now are \$2,100 or 60 per cent.

► The size of the maximum award

dependent Colleges and Universities, for example, would have cost about \$5.2-billion in fiscal 1988.

Lawmakers refused to consider those proposals. They said Congress

American Association of Community and Junior Colleges, the American Council on Education, the American Association of State Colleges and Universities, the Association of American Universities, the National

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The Ready-for-Prime-Time Players: Colleges Cater to the Adult Schedule

Scheduling classes to conform to adult life-styles helps colleges and universities attract and retain a significant student market.

HUGH L. THOMPSON



JOE WRINN/HARVARD NEWS OFFICE

As colleges and universities prepare for shrinking enrollments of traditional full-time students, they should examine the potential of using scheduling as a marketing tool. While traditional residential students generally register for late morning and early afternoon courses, nontraditional, part-time students have different needs that require different scheduling arrangements. The scheduling of classes is therefore crucial to attracting and retaining the reservoir of students needed to maintain academic and financial integrity. Institutions of higher education cannot afford to neglect the schedule as a marketing tool.

A properly assembled schedule can

Hugh L. Thompson is chancellor of the University of Indiana at Kokoma.

attract greater numbers of students than one randomly designed or based on the needs and interests of faculty. It is the department chair's responsibility to build a schedule that maximizes enrollment levels within each course and maintains academic integrity. Scheduling design should benefit the university's main service group—students.

What students want

The length of time courses meet and the frequency of meeting times can affect enrollment. For example:

- Moraine Valley Community College surveyed registering students on a variety of topics. Approximately 85 percent of the part- and full-time students said they were able to schedule the classes they needed. Students not specifying curriculum load generally

Adults returning to college are a sign of the times for higher education. Above, a son congratulates his mother, a fellow graduate from Harvard's Class of '84.

had more difficulty obtaining courses. Full-time students opted for evening classes. Both student groups preferred that three credit-hour courses be offered twice weekly; the second preference of full-time students was three times and for part-time students once weekly. Students frequently requested more classes in the evening and more sections for popular courses.¹

- South Oklahoma City Junior College conducted a needs assessment survey of the community surrounding its Open Access Satellite Education Services Center to determine levels of interest in educational activities. Art and music, business, leisure activities, and

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self-improvement were the most popular topics. Tuesday and Wednesday were the most popular days, while early afternoon and early evening seemed to be the most popular times.

• A study of non-returning students by Lakeland Community College identified instruction, scheduling, and weather as areas in which improvements might affect return-enrollment rates. Inconvenience of scheduling was a major factor in the decision not to return to college.²

• Santa Ana College conducted a survey to determine the needs and interests of residents in the service area. Over half of the respondents were interested in taking classes in fine arts, business, and English, and preferred classes that met once a week for three hours on weekdays and were scheduled in the mornings or evenings.³

• Moraine Valley Community College found that revising schedules to include more classes that meet only once or twice weekly is one way to reduce attrition and attract more students. The majority of the students preferred two ninety-minute class sessions per week and a many students preferred one three-hour session.⁴

• Tidewater Community College in Virginia administered student questionnaires that revealed that although most students were willing to compromise their personal/work schedules in order to take as many courses as possible, they preferred to make only one trip per day to school. In particular, female and black students were severely restricted by problems they encountered with transportation.⁵

• William Rainey Harper College questioned all registrants in fall 1977 to determine the extent of enrollment loss during registration periods due to scheduling problems and to identify measures that would prevent such losses. Twenty-nine percent of the students were not able to enroll in desired courses and elected not to matriculate. If these students had been able to matriculate, the institution's full-time enrollment would have been raised by approximately 10 percent. Offering alternative suggestions to students unable to enroll in desired courses increases satisfaction and encourages enrollment in alternative courses.⁶

Scheduling strategies

Institutions should schedule courses and programs according to the types and numbers of students the courses or

programs need to attract. For example, institutions usually offer courses and programs in the summer to serve students currently enrolled or about to enroll. The institution could design the same summer program to attract high school students who wish to take some courses prior to enrolling at another institution, or to permit students currently enrolled at other colleges and universities to carry courses while at home during their summer vacation. Institutions can significantly increase enrollment by focusing on target groups of potential students and launching adequate promotional efforts.

Planning schedules long in advance (allowing for some subsequent modifications) can greatly enhance the advising process and aid retention. By knowing what courses will be offered, students and advisors can design balanced schedules and avoid the "hit and miss" problems created by short-term scheduling. Institutions should accurately construct the annual schedule up to four years in advance—if possible—with only minor variations occurring from term to term.

Some specific strategies for using scheduling to attract greater enrollments include:

- expanding the length of the academic day, week, and year;
- altering the timing patterns, sequencing, and distribution of courses offered; and
- offering courses at a variety of locations to let more students attend.

Expanding the academic week

Colleges and universities must begin to look at increasing the length of the academic week and at utilizing their facilities on a year-round basis. The more usable hours there are in the academic week and calendar, the more effective is the system of scheduling.

James F. Blakesley writes:

The length of the academic week and variations in time patterns used in developing a schedule play vital roles in the effectiveness of the academic schedule. The academic week may be considered the boundary condition limiting the daily starting and ending times for normal instruction. It may include the noon hour or exclude Saturdays. For some campuses it includes the evening hours. For others those hours are considered separately

from the academic week—for adult education classes. In other words, the academic week is the framework of days and hours within which a set of classes may be offered.⁷

Departments should schedule noon hour classes, although they should not schedule two required single-section courses or both sections of a two-section course, at, say 11:30 a.m. and 12:30 p.m. on the same day.

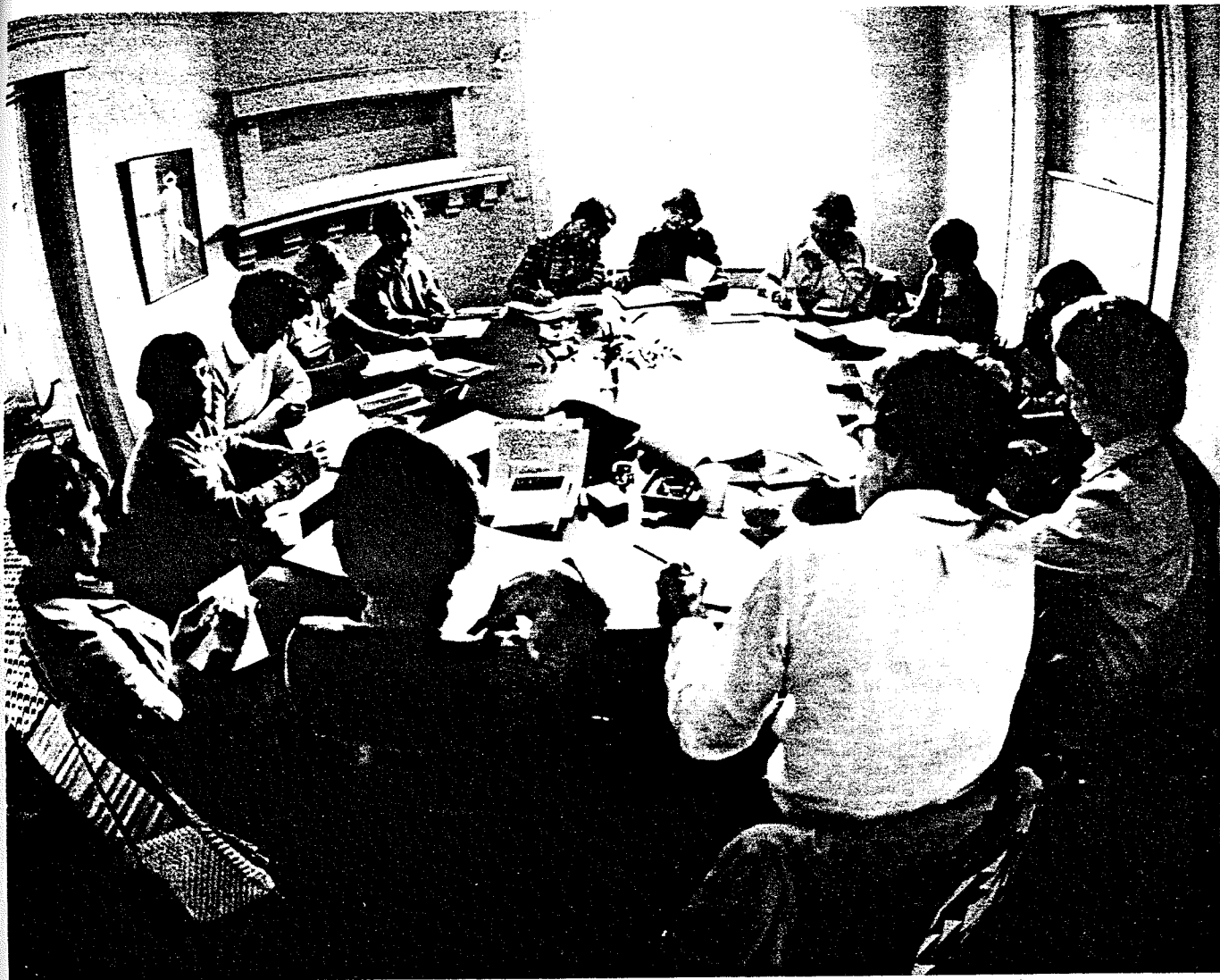
San Diego Mesa College developed Mesa's Afternoon Curriculum (MAC) to solve the problem of under-utilization of the plant during afternoon hours. MAC was divided into five six-week sessions beginning in September and ending in May. A three-week lecture course ran four afternoons a week, Monday through Thursday, for two hours each day. Classes were scheduled from 1 to 3 and 3 to 5 p.m. when instructional facilities were idle. Students enrolled in the afternoon program could earn six units in six weeks, and thirty units in the five sessions.

The MAC program enabled students to carry a full load of classes by enrolling in two courses at a time and attending classes in consecutive or alternate six-week modules. Mesa designed course offerings to meet the general education requirements as well as the elective course needs of students. The benefits of this system were many. It attracted new students, increased facility utilization, increased retention ratios, provided a full program of course offerings for students unable to attend college during morning or evening hours, and provided teaching opportunities for potentially underemployed full-time staff.

A marketing task force developed a successful promotional program that included radio, television, and newspaper public service spots and paid advertising. In addition, the task force distributed schedules, posters, buttons, and bookmarks to stores, banks, and fast-food restaurants and posted Burma Shave-type consecutive billboards at sites around campus.⁸

Weekends have gained popularity as a time for colleges to offer programs to attract students who could potentially increase their credit-hour production. Weekend colleges are becoming commonplace as an educational alternative for the working adult.

• East Texas State identified a marketing opportunity in the scheduling of



BOB LEWELLYN/HOLLINS COLLEGE PHOTO

To ease the transition into college, Hollins College offers special re-entry classes to returning women, where they study with other continuing education students in a supportive, stimulating environment.

its MBA program course offerings: It increased student enrollment by offering MBA program courses on Friday evenings and Saturdays. It continued its regularly scheduled classes on Monday through Thursday evenings, but adopted a modified summer trimester.

- Mundelein College in Chicago has designed weekend courses to meet the needs of older women and housewives.

- Augsburg College holds classes on alternative weekends, permitting a student to elect from one to four courses in a term. Each course meets for 3-1/2 hours on either Friday evening, Saturday morning, Saturday afternoon, or Sunday afternoon.

- Upsala College offers a program for adults with courses scheduled for 8 a.m. to noon, and 1 to 5 p.m. on ten Saturdays in a semester.

- To study the feasibility of Sunday scheduling, Franklin University performed an analysis that demonstrated that courses offered on Sunday are fi-

nancially beneficial and attract "repeat" customers. The university assumed that it could continue to offer Sunday courses on a profitable basis with sufficient attention to scheduling, promotion, and marketing; however, the success of the program would have to address the negative attitude on the part of many faculty toward teaching on Sunday.⁹

- Fonthomme College, a private institution in Missouri, focused its scheduling for nontraditional, part-time students on evening and weekend classes with increasingly longer class meetings on a concentrated eight-week basis. This has greatly increased the number and variety of courses offered during nontraditional time-frames. Full-time students and faculty, however, expressed preference for traditional time-frame scheduling and a traditional meeting frequency of two to three times per week for a typical three-credit course, suggesting that the schedul-

ing preferences of the full-time academic community should be considered as the college continues to provide innovative nontraditional scheduling for part-time students.¹⁰

Evening packages are another alternative to serve a more diverse student population.

- The Lawrence Institute of Technology in Southfield, Michigan, offers an evening bachelors program with classes scheduled on Monday, Wednesday, and Friday evenings, and an associate degree program that meets on Tuesday and Thursday nights.

- Illinois Benedictine College has an evening degree studies program designed to permit students to complete degree requirements in business, accounting, computer science, and nursing. The courses meet one, two, or three evenings per week, for a total of 3-1/2 hours. Students must complete work toward the degree within seven years after entering the program. The

college recommends that students complete a minimum of nine semester hours each academic year including day, evening, and summer sessions.

• Mercy College in New York has developed a unique approach to meeting student needs through parallel scheduling. The same courses are given by the same faculty member in the morning and evening. Parallel scheduling helps students who have work shift changes by permitting them to switch classes without going through any administrative red tape.¹¹

• Students at Bay State Junior College can earn degrees in applied science, accounting, airline travel/tourism administration, business administration, or secretarial sciences through an evening program. The sessions are of eight weeks duration and students can take one or two courses. Classes meet on both Tuesday and Thursday evenings at 5:45-8 and at 8:10-10:25 p.m. The students can complete the degree requirements in less than two years of full-time study.

• The DeVry Institute of Technology designs its schedule to permit students to complete their degree programs by attending classes only in the

With time, location is another consideration for busy adults. Indiana University-Purdue University at Indianapolis offers over 1,000 courses at five convenient shopping mall locations throughout the city in its "Learn & Shop" program.

morning, afternoon, or evening. The courses are arranged so that students come to campus regularly for concentrated periods of study and have the remainder of the day for work, study, or whatever.

Time patterns

Time patterns are the configurations of hours used in designing the master schedule of classes. Some options for configurations of hours follow.

• Schedule all multiple lecture and laboratory sections so that student course enrollments will be distributed approximately equally between mornings and afternoons and between the MWF and TThS sequences each term.

• Schedule four-hour multi-sections lecture courses with large enrollments that meet four days a week over the five following combinations: MTWTh, MTWF, MTThF, MWThF, TWThF.

• Departments that add sections and lecture courses above the total number offered the previous term should schedule the added sections in low-use time blocks. Rearrange existing and added courses or sections in any combination as long as the equivalent of the number added is scheduled in the low-use peri-

ods. No increase in peak-period use should be permitted. Likewise, if possible, reductions (cancellations) should come from the peak periods—not the low-volume periods.

Schedules could be coordinated with the pattern of total courses so that students could take all their courses on two or three days. Two sets would effectively utilize the space each week.¹²

Location of classes

In addition to timing, accessible locations can enhance scheduling service. Indiana University-Purdue University at Indianapolis (IUPUI) offers courses at five different shopping malls located throughout metropolitan Indianapolis. The program, "Learn & Shop," is offered during the day and evening, Monday through Friday. The majority of the offerings are lower division general education courses. IUPUI also has a weekend college and schedules courses from Friday evening at 6 p.m. through late Sunday afternoon, ending at 5 p.m. The university offers approximately 1,000 courses in forty different subject areas through the Learn & Shop program.

In Indiana, the private and public





JANET CHARLES/HUNTER COLLEGE PHOTO

Night time is the right time for Hunter College students (above) who can pursue almost all of the college's master's degrees entirely through evening courses.

colleges and universities offer courses to other campuses, medical centers, hospitals, businesses, industrial firms, military bases, and so on, through the Indiana Higher Education Television System. For example, Ball State University offers an MBA program beamed to locations throughout the state; Purdue University transmits engineering courses into various industrial plants; and Indiana University uses the system to deliver nursing courses into selected hospitals. Many of these courses and programs are designed for the nontraditional student who cannot get to the main campuses at the times the courses are offered. Some of the courses are broadcast to other colleges to enrich their curricula. This system has unlimited potential as faculty use it more as an instructional tool.¹³

Other scheduling options

The University College of the University of Maryland, enrolling students in the state and in seventeen foreign countries, specializes in flexible curricula and schedules for the B.A. and B.S. degrees, associate degrees, certificates, and a graduate degree in human resources administration. The college admits all undergraduate students as special students who may change status on completion of fifteen hours with a C average. The two delivery methods are through credit programs and a division of conferences and institutes.¹⁴

In a report on the small/rural com-

munity college, Chester H. Gausman found that courses offered through self-paced instruction and an open-entry-open-exit calendar may help to overcome limited resources of students, distance from campus, effects of working on student time, and sparsity of area population. Some advantages of this system are:

1. it increases enrollment of the temporarily unemployed;
2. it increases enrollment by providing more flexible scheduling to fit part-time employment as well as full-time employment;
3. it reduces costs by increasing the productivity of instructors;
4. it increases the portability of courses to distant centers by permitting the use of part-time instructors; and
5. it provides a more effective means of packaging programs for industry, that is, as short-time instructional units offered on the campuses.¹⁵

Scheduling within the context of planning can be a very effective instrument in attracting and retaining a greater number of students into a college or university program. Unfortunately, many institutions have not perceived scheduling as a marketing tool. It is time that faculty and administrators utilize more creative scheduling solutions in order to expand enrollments and to include more nontraditional and part-time students, especially in light of today's tight budgetary restrictions. Institutions must take bold but workable

steps in order to use their limited funds to serve greater numbers of students.

ER

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CONTROVERSIES

A is for ammonium carbonate

Why chemistry is not popular

Chemistry in Britain July, 1985

Peter Borrows writes:

In order to pass the time on a tedious car journey my family were playing a word game. I almost ran into the car in front when my seven year old son offered 'Ammonium carbonate' when it was his turn to suggest something beginning with 'A'. It is not difficult to interest people in chemistry, and make it a part of their everyday vocabulary.

Anybody reading this article must be mad—or, at least, somewhat unusual, because anybody reading this must be an enthusiast for chemistry. And yet most chemists, having once had a whiff of hydrogen sulphide at school, are enthusiasts for life, delighted that somebody is actually prepared to pay them for spending their time playing around with test tubes, and they find it incomprehensible that others do not share their fascination for the subject.

When children join their secondary school at about the age of 11, and start science, it is chemistry above all that for them marks the advent of 'real science'. At primary school, they may have studied the life-cycle of the frog, or found out which materials are magnetic, but now is the time for proper science—with bunsen burners! Who can forget that magic anticipation? They imagine foul but wonderful smells, or loud explosions, and are only slightly disappointed when they find themselves growing copper sulphate crystals.

Children enjoy that introduction to chemistry—getting pure white crystals of sodium chloride from dirty, sandy rock salt; obtaining a beautiful green solution from grass clippings, and then finding, by chromatography, that there is a yellow pigment there too; extracting a red juice from beetroot, only to find that soap and vinegar turn it different colours. The teacher finds that it goes down well in mixed ability classes, because it can be taken at a number of different levels. There is the sheer satisfaction of obtaining a result (eg a

colour change); the beautiful colours of copper sulphate or chlorophyll solutions are a source of wonder; and the more able children can start to appreciate the underlying patterns, eg what makes red cabbage juice turn blue. There are experiments to do, unlike biology, which, at this level, tends to be largely observation—and unlike physics, the experiments work!

Children's chemistry books?

But what then goes wrong? Why are children turned off chemistry? Go into a children's library, or your local bookshop.

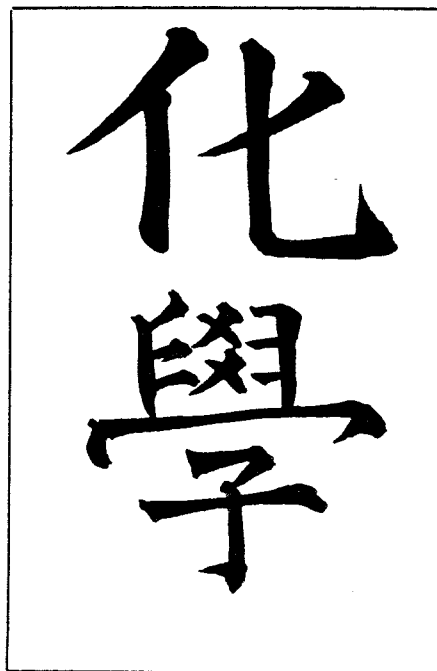


Fig. 1. The Chinese for chemistry means 'change-study'.

The shelves are filled with books on natural history, astronomy, electricity and electronics, that are beautifully illustrated and full of suggestions for observations and experiments to stimulate the young scientist. But will you find any chemistry books? And even if such books existed, would Aunt Flossie buy a chemistry book for her niece's birthday, in the way she might buy a book on natural history?

Some years ago the RSC invited its members to submit ideas for a book of simple, safe experiments that could be

done in the home with readily available chemicals. It was never published, apparently as a result of worries about the legal implications in the event of an accident. If the RSC shies away from publishing a book that might promote an enthusiasm for chemistry, then what hope is there for commercial publishers? (See Challenge 1).

It is not just in books that chemistry fails to get across. Visit the Science Museum in London. There are vast areas devoted to engineering, computers, flight, medicine, a whole museum devoted to geology, and another to natural history—but the chemistry gallery is small, and boring in the extreme. It is full of models that do not do anything very much. In the children's gallery there are many button-pushing activities, but the best the chemistry gallery can manage is a light-up Periodic Table. Of course, there are problems associated with practical chemistry exhibits in a museum. I was fascinated to learn from one of my sixthformers that the Chinese for chemistry literally means 'change-study' (see Fig. 1). It is difficult to study changes in a museum without encountering problems of cost and/or reversibility.

Museums and clubs

An *Exploratory* is to be set up in Bristol. Aimed at children between 8–80, it eschews the 'don't touch' approach of a museum, in favour of a hands-on appreciation of science, using cheap, easily repaired equipment. An article in *New Scientist* described some of the experiments likely to be included—out of some 98 column-cm, 'matter and chemistry' had less than three. The third and last sentence read 'How best to tackle chemistry needs more consideration'. Indeed it does! *New Scientist* was offering prizes for a 'Design an exhibit' competition. An exhibit should invite the visitor to 'interact' with it—it should attract attention, but not reveal all its secrets until the visitor had pressed the appropriate buttons, or pulled the necessary levers. Exhibits had to be safe, robust, and easy to work—and cost less than £500 to build. It will come as no surprise that none of the

Dr Peter Borrows is science education adviser to the London Borough of Waltham Forest. He lives at Pergola Lodge, Buttercross Lane, Epping, Essex, CM16 5AA.

prize-winning entries² involved any chemistry. An account of the Maryland Science Centre in *New Scientist*³ showed the absence of chemistry to be typical. The RSC might well do more to promote the future of chemistry in this country if it put up £1000 in prizes for ideas for chemistry exhibits at the Exploratory, than by some of its other activities. (See Challenge 2).

The London Zoo runs a young naturalists' club, and indeed there are plenty of bird-spotting projects, or butterfly surveys where youngsters can make a real contribution to scientific knowledge. There is a role for the amateur naturalist, and even today amateur astronomers make a real contribution, *eg* in comet spotting. Is there scope for the amateur chemist? Or, at least, a young chemists' club similar to the young engineers' clubs.⁴ Some pilot schemes have been set up under the auspices of the Standing Conference on Schools' Science and Technology, with the close involvement of practising engineers. Perhaps the RSC could learn something here. Every Saturday my children are busy music-making—but why not crystal-growing? A word of caution, however. There do exist a few Saturday morning activities, mainly for gifted children, and this sometimes includes science activities, but often all that happens is that the best experiments from the secondary school course are taken, and so they lose their impact when encountered in school at a later date.

Egg races

Many readers will have seen '*The great egg race*' and similar competitions on television. The British Association Young Scientists (BAYS) make extensive use of such competitions, and have recently published a book of ideas for such projects.⁵ Similar ideas appeared in an article in the *School Science Review*.⁶ All the ideas for these highly motivating problem-solving practical activities are basically engineering problems. Some would be helped by a knowledge of physics. Chemistry does not feature at all. Similarly, the problems set to sixthformers in the British Gas-BAYS film *Scientific solutions* were essentially physics problems. Is it impossible to devise a *Great egg race* type of problem in a chemical context, or which demands at least a limited degree of chemical understanding? (See Challenge 3).

Whilst on the subject of television programmes, one might ask who there is to promote the image of chemistry in that medium. The biologists have David Bellamy, the nutritionists Magnus Pyke, the astronomers Patrick Moore, and the engineers Heinz Wolf. All are delightfully eccentric, epitomising the mad scientist, and perhaps not the sort of image that chemists would wish to promote and yet at least their subjects have an image, which is more than can

inherent in the nature of chemistry that it cannot be popularised?

For some years we ran a CSE mode three physics syllabus at Pimlico School—a sort of 'physics of everyday life'. There were units on electronics, photography, car engines, and domestic plumbing (there is a lot of good physics in a lavatory cistern!) I have often pondered as to whether it might be possible to devise a similar chemistry syllabus. It is not difficult to think of some topics for inclusion—hard water, for example, or the corrosion of metals—but it is much harder to devise a complete syllabus *that can be explained satisfactorily at this level*. Much physics can be explained in terms of little more than pushes and pulls, but chemical explanations need recourse to the much less tangible atoms and molecules. Without such explanations, chemistry becomes cookery (slavishly following recipes),

academic laboratory. The *Cockcroft report* in mathematics rightly put the emphasis on development from the bottom up, and Terry Allsop expanded on this theme in a recent issue of *Educ. Chem.*⁷ A sound idea, in chemistry, as in maths, but it is not clear to me what the bottom is in chemistry, and whether it would provide secure enough foundations on which to erect any sort of edifice at all.

Ignorance of chemistry

Even for those who cope with the demands of chemistry sufficiently well to be able to pass chemistry exams I suspect that the explanations of chemistry, couched in terms of atoms and molecules, may be the great turn-off. Many apparently educated people seem to take a great pride in their ignorance of science in general, and chemistry in particular. On a bookshelf that contains

Challenges to the RSC

Challenge 1: Will the RSC consider (or re-consider) publishing a book of experiments, to stimulate the interest of the youngster working at home? And if not, will it at least consider setting up Young Chemists' Clubs, on the lines of the Young Engineers' Clubs? (To be led, ideally, by professional chemists other than schoolteachers.)

Challenge 2: Will the RSC put up prize money to promote the development of chemical exhibits at the Bristol Exploratory? Will it further approach chemical industry to sponsor exhibits, so that capital and running costs need not present a serious constraint?

Challenge 3: Will the RSC seek to collect together ideas for Great Egg Races in a chemical context?

Challenge 4: Will the RSC consider steps to popularise chemistry in the public eye, by the production of chemistry trails; or suitably frivolous songs; or, more seriously, by the encouragement of chemistry in adult education? And why do we leave it to the Institute of Physics to produce books like '*A random walk in science*' or '*The harvest of a quiet eye*'?

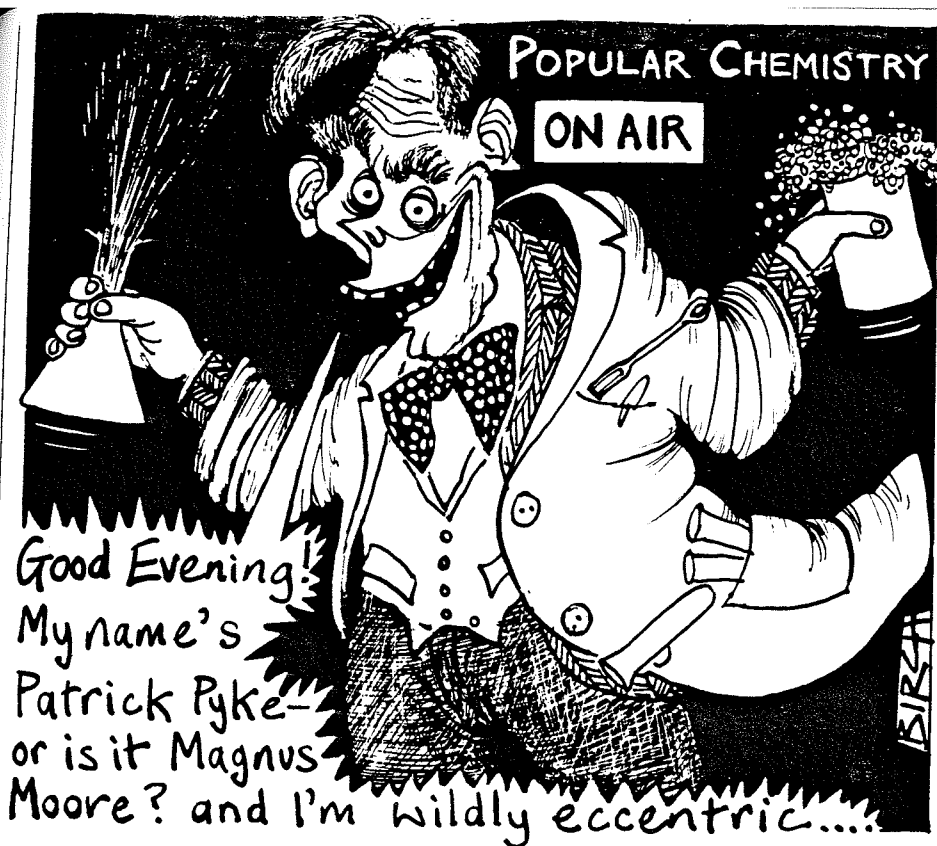
but the explanations are conceptually too demanding for many people.

Recently, Jan Harding at Chelsea has started to develop a '*Chemistry through issues*' course for 16+. In this, a newspaper article, for example, is taken as the starting point on which some aspect of chemistry is built. Thus, the headline 'Steelworks to close' might be the lead into a topic on the extraction of metals and their properties, although these brief comments do not do justice to the complex network of interlinking issues and chemical concepts that can be built up in this way. In a similar project at the University of York, Francesca Garforth and her team are trying to build a chemistry course for 16+ on everyday chemicals and materials, with topics like 'clothing', 'warmth', and 'agriculture'. It will be interesting to see whether these projects are able to develop a coherent course in chemistry, that provide an adequate level of explanation and an insight into the underlying patterns, and yet maintain

some or all of Attenborough's *Life on earth*, Sagan's *Cosmos*, Koestler's *The sleepwalkers*, Leakey's *The making of mankind*, and Bronowski's *The ascent of man* will you find a single book on chemistry? Has one been written?

We should not therefore be surprised at the image of chemistry presented by the press. In the tabloids, the only coverage of chemistry is in explosions, or horror stories about tankers of sulphuric acid crashing. Whilst the serious press is somewhat less sensational, the effect is usually antagonistic, concentrating on some aspect of environmental pollution. When a story does appear, you can usually count on a few chemical howlers, of the exploding sodium chloride variety—and there is no sense of shame when this happens. Even when the press is apparently favourable to science (*eg* in the *Guardian* 'Futures' pages on a Thursday), how much *chemistry* is there? For that matter, how much chemistry is there in

POPULAR CHEMISTRY ON AIR



Good Evening!
My name's
Patrick Pyke—
or is it Magnus
Moore? and I'm wildly eccentric....

Adult education

The field of adult education is equally barren. Whilst you can attend evening classes in Spanish, in French cooking, or in Greek dancing—what is there in chemistry? And who would dream of going? But Ben Selinger in Australia has shown what can be done. His book *Chemistry in the market place*^a was

based on a community education course *Chemical consciousness for concerned consumers*. Another approach is through the local environment. At Pimlico School I developed a *chemistry trail*^b which took readers around the local area, looking at aspects of its chemistry—stalactites in the concrete, acid rain on sandstone, corrosion of

metal window frames, chlorine for the swimming pool, and so on. Nature trails are a common and popular feature of the countryside; in Derbyshire, you can follow an archaeological trail; and the Geological Museum publishes geological walks around central London—so why not chemistry trails? (See Challenge 4).

Perhaps more could be done for our image as chemists if, following the example of *The biochemists songbook*,¹⁰ we were to publish a collection of *Songs for swinging chemists*! A start has already been made with Tom Lehrer's rendition of the list of chemical elements, and Flanders and Swann on the laws of thermodynamics.

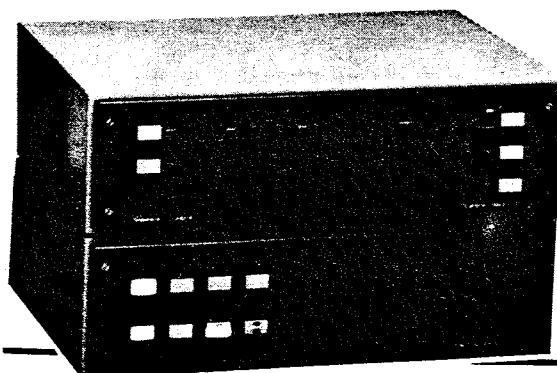
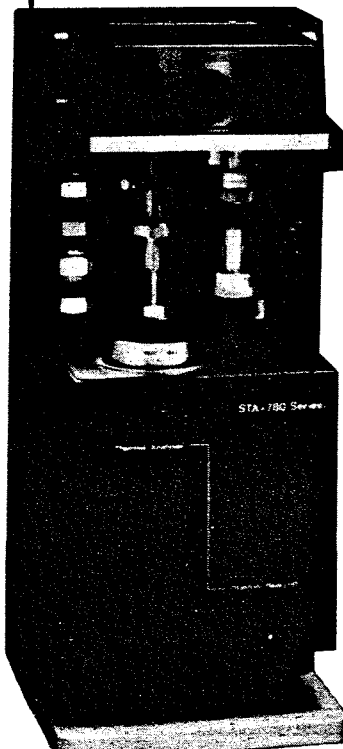
The Royal Society is currently investigating the public's understanding of science. My aim in this article has been to indicate the poor public image that chemistry, at least, has; to explore the reasons for this; and to present a few challenges, which if taken up, just might alter the situation a little.

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AACJC LETTER

AMERICAN ASSOCIATION OF COMMUNITY AND JUNIOR COLLEGES

An award-winning national newsletter for community, technical, and junior colleges.
Dale Parnell, Editor Sue Friedman, Associate Editor

October 15, 1985-No. 163

Dear Colleague:

Emphasize
Science
Education

Did you know that 97 percent of all federal science funds goes to 353 doctorate-granting institutions, mostly for research? Yet, a 1983 report by the National Science Board Commission on Precollege Education in Mathematics, Science, and Technology entitled "Educating Americans for the 21st Century" proposed a national plan of action for improving mathematics, science, and technology education for all American students so that their achievement is the best in the world by 1995. The report states that top priority "must be placed on retraining, obtaining and retaining teachers of high quality in mathematics, science and technology, and providing them with a work environment in which they can be effective." There is a certain lack of congruence between what the National Science Foundation preaches and what it practices.

SUPPLEMENTS
AACJC 1985-86 Meeting
Legal Brief
NCCCBO Conference Brief
NCRD Conference Brief
NSF Testimony Brief

As the National Science Foundation discussion about improvement in science, mathematics, and technology education becomes more intense; community, technical, and junior colleges tend to be overlooked. This distresses us. Your voice must be heard on this subject.

National
Science
Foundation

Bernard Luskin, executive vice president of AACJC, was one of five educational leaders who recently testified before the National Science Foundation Board on Undergraduate Science and Engineering Education. This testimony is included as a brief with this Letter. We urge you to take a serious look at the recommendations on teacher training and retraining, science equipment programs, technology transfer, encouraging public understanding of science, and general science education programs.

Let NSF hear from you regarding your support for these recommendations and other programs which improve science, mathematics, and technology education in community colleges and encourage cooperative programs with elementary and secondary students and teachers.

- Write: Dr. Bassam Shakashiri, Assistant Director for Education and send a copy to Dr. Eric Bloch, Director, National Science Foundation, 1800 G St., N.W., Washington, D.C. 20550. Please also send a carbon copy of your letter to Bernard Luskin here at AACJC.

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OPPORTUNITIES FOR FACULTY INVOLVEMENT IN SCIENCE EDUCATION

American Chemical Society 2YC3

* The American Chemical Society (ACS) Two-Year College Chemistry Program of the Education Division assists chemistry departments and faculty of two-year colleges in meeting their special needs and serves as a focus for ACS activities related to two-year colleges. Since 1961 the ACS has sponsored four annual two-year college chemistry conferences, one in each region. December 6-7 are the dates for the 89th conference at Truckee Meadows Community College (NV). The 90th conference will be at Westchester Community College (NY) April 11-12 and the 91st conference is scheduled for April 25-26 at William Rainey Harper College (IL).

- * For more information on 1985-86 conferences, contact: Jay Bardole, Vincennes University Junior College, Vincennes, IN 47591-9989, 812/885-4372. For information on the 1986-87 conferences, contact: Onofrio Gaglione, New York City Technical College, Brooklyn, NY 11201, 718/643-4900.

Newsletter

The 2YC Distillate is the newsletter for two-year college chemistry educators. For information on the 2YC Distillate, contact: Dr. E. James

- Bradford, Office of College Chemistry, American Chemical Society, 1155 Sixteenth St., N.W., Washington, D.C. 20036, 202/872-4587.

ACS Task Force

* In 1983 the ACS appointed a Task Force to Study the Involvement of the American Chemical Society in Chemistry in the Two-Year Colleges. Final revised Guidelines should be finished in early 1987. A preliminary draft has been submitted to leaders in the field for review.

Invitational Conference

The task force is also responsible for organizing an invitation-only roundtable on Critical Issues in Two-Year College Chemistry. Connie Odems of the AACJC staff is one of the invited presenters.

- * Questions or recommendations relevant to the roundtable topic can be addressed to the chair of the task force: William T. Mooney, Jr., El Camino College, Via Torrance, CA 90506, 213/321-9342. Other members of the Task Force are Harry Hajian, Community College of Rhode Island-Knight Campus; Donald Jones, Western Maryland University; Robert A. Schunn, E. I. DuPont de Nemours & Co.; Tamar Y. Susskind, Oakland Community College-Auburn Hills Campus; and Katherine E. Weissmann, Charles S. Mott Community College.

Outstanding Professor Awards 1986

The Chemical Manufacturers Association (CMA) has recognized five outstanding teachers of chemistry and chemical technology in two-year colleges since 1967 through the Catalyst Awards program. The first two-year college national award winner was William T. Mooney of El Camino College (CA). One \$1,500 national Catalyst award and four \$500 regional Catalyst awards are given each year.

- Nominations are made by the chief administrative officer of the college and must reach CMA by January 31, 1986. Information and nomination forms are available from: Catalyst Award Director, Chemical Manufacturers Association, 2501 M St., N.W., Washington, D.C. 20037.

NSF TESTIMONY BRIEF

AMERICAN ASSOCIATION OF COMMUNITY AND JUNIOR COLLEGES

TESTIMONY

ON

THE ROLE OF THE NATIONAL SCIENCE FOUNDATION IN UNDERGRADUATE SCIENCE AND ENGINEERING EDUCATION

By Bernard J. Luskin, Executive Vice President
American Association of Community and Junior Colleges

September 26, 1985

Mr. Chairman, members of the committee, my name is Bernard J. Luskin and I am the executive vice president of the American Association of Community and Junior Colleges.

My broad concern is undergraduate science education as it relates to all of America's postsecondary institutions. The institutions whose concern I reflect specifically are the 1,221 community, junior, and technical colleges that now form the largest branch of American higher education.

This year community, junior, and technical colleges enrolled almost five million credit students. They serve 52 percent of all Americans who go to college for the first time and 41 percent of all fulltime freshmen and sophomores.

Our colleges are now the largest door of postsecondary access for minority students. In 1985 community colleges enrolled approximately 42 percent of all Black college students, 54 percent of all Hispanic college students, and 43 percent of all Asian college students attending higher education institutions.

While we meet the needs of large numbers of 18-24 year olds, many typical community college students differ in fundamental ways from the "traditional" college student. They tend to be older. They tend to work and attend college parttime. They are commuters. They are often from a minority group or are new immigrants. They are often the first member of the family to attend college. They are more likely to pursue an occupational than a liberal arts program.

Undergraduate science education is vital to the future of this nation. The National Science Foundation (NSF) should assume a leadership role in undergraduate science education. And since community colleges are a major provider of undergraduate science education, the NSF needs to work closely with two-year colleges to support and enhance their work in this area.

The very fact that our colleges now enroll the majority of Americans who are starting colleges suggests that we serve a stream of talent that, in the national interest, the NSF can ill afford to ignore. The assumption that all the learners who are better suited to science and mathematics automatically take their undergraduate work at senior institutions is the kind of position that could very well undermine American leadership in global economic and technological competition.

The NSF must, in my view, be a guiding force in science education and in public understanding of science and technology transfer issues, in addition to supporting science research. We at America's community, technical, and junior colleges are eager to work with the NSF to further the cause, and are glad for this opportunity to contribute our perspective to this national policy discussion.

In my brief comments, I will address four imperatives which I believe are critical to the future of science education and the role of the NSF. They are: population, work, equipment and technology, and technology transfer.

POPULATION

Public Understanding of Science. During the coming years the United States will be confronted with major policy decisions involving science and technology. These policy decisions will have far-reaching consequences for all American citizens. If citizens are to react to issues in as rational a manner as befits the world's most scientifically and technologically advanced nation, they must be able to sort out, from all the conflicting information aimed at them by self-interested parties, the unvarnished facts from which policy should be made.

Supplement to AACJC Letter No. 163, October 15, 1985.

Opportunity With Excellence

NATIONAL CENTER FOR HIGHER EDUCATION

ONE DUPONT CIRCLE, N.W., SUITE 410, WASHINGTON, D.C. 20036

202/293-7050

EQUIPMENT AND TECHNOLOGY

The task of informing and educating the public with regard to issues involving science and technology is a formidable one, yet it is one that must be accomplished, for our democratic society rests upon the active involvement of an informed citizenry. As the issues we must grapple with become increasingly scientific and technological in nature, so must our people become more scientifically and technologically sophisticated. Community colleges, known as "democracy's colleges," are an ideal vehicle for achieving the upgrading of scientific knowledge on the part of our citizens.

Public support of science. A general public receptivity to science undergirds the public's general attitude toward the importance of science. A public that does not understand space, laser, biological, telecommunications, genetic and engineering technology cannot be expected to support programs that break new ground in these areas.

Minority understanding of science. Minority groups are a steadily increasing proportion of the population. It is estimated that by 1990 minorities will constitute approximately 25 percent of the labor pool as compared with 17 percent in 1980; women will make up about 47 percent of the workforce. In 25 major urban centers, minorities are now the majority of the community, and many of these individuals attend community colleges.

For minority groups, the growing need for understanding of science and technology has special implications. Already out of the economic and social mainstream, these population groups cannot afford to fall any farther behind. Yet, will the growing numbers of minorities shy away from science-based programs because such programs are ill-equipped, poorly taught, and outdated?

My point here is simply that two-year colleges provide the first opportunity for postsecondary education for half of all the minority students in this country. If, as a nation, we are serious about attracting minorities into science education, we must address their needs in two-year colleges.

WORK

Occupational Demands. Employees competent in the applied science fields are imperative to the well-being of this nation. The literature is replete with descriptions of the changing nature of work and the increasing demand for analysis and computation in technical fields.

If the nation's technical workforce is allowed to deteriorate, or to fall behind the skill levels of its global rivals, American prosperity can only decline, as will the revenue and resource base that sustains our leadership in science and technology.

Simply put, the welfare of our country and enlightened self-interest on the part of the science community demand leadership in science and science education. Only the NSF is in a position to respond in these areas.

As I have demonstrated, the need for more and better science education is great, and it is clear that the NSF must play a major role in improving science education in undergraduate programs. Unfortunately, many postsecondary institutions currently are poorly equipped to provide the increased sophistication in science education that is so greatly needed.

As I am most familiar with community colleges, let me present the circumstances in which many of our schools find themselves. Most of the nation's community colleges were built during the 1950s and 1960s, in part as a result of the GI Bill and the influx of veterans. They have grown from one-half million students in 1955 to the five million credit students currently enrolled. In too many instances, the community colleges have aging science faculties, working in outdated laboratories that lack "state-of-the-art" equipment. The colleges desperately need new equipment, and the faculties need training and retraining.

The NSF has concentrated its support on a mere handful of institutions. The 100 institutions that receive the largest share of NSF money are all doctorate-granting institutions representing only 3 percent of the nation's universities. Not only do these 100 institutions receive 61 percent of all federal aid to education, they also receive more than 80 percent of all science money. The 353 doctorate-granting institutions receive 76 percent of all federal education funding and 97 percent of all science money. Clearly, undergraduate institutions are underrepresented and underfunded.

There are specific, identifiable needs for science education at undergraduate institutions. These are: Science Instruction and Curriculum; Faculty Needs; Facilities and Equipment.

Examples of associate degree science programs in Community Colleges

A partial list of programs follows to show the range of programs now offered and for which attention is needed:

- Engineering Science (Transfer)
- Biology (Transfer)
- Geology (Transfer)
- Astronomy (Transfer)
- Chemistry (Transfer)
- Mathematics (Transfer)
- Physics (Transfer)
- Aeronautical Engineering Technology
- Airframe and Power Plant Technology
- Architectural Engineering Technology
- Biomedical Electronics Technology
- Civil Engineering Technology
- Communications Technology
- Computer and Digital Technology
- Cytotechnology
- Fluid Power Technology
- Genetic Engineering Technology
- Information Systems Technology

user Electro Optics Technology
Machine Tool Technology
Materials Engineering Technology
Mechanical Design Technology
Nuclear Technology
Petroleum Technology
Plastic Technology
Radiologic Technology
Robotics and Automated Manufacturing
Telecommunications
TV and Satellite Technology
Viticulture

These programs are expensive and they take sophisticated, highly-educated, up-to-date faculty and state-of-the-art equipment to teach them.

If the NSF does not give its weight of prestige, support and commitment to the obvious needs I have described, who will?

TECHNOLOGY TRANSFER

Computers, broadcast television, satellites, cable, instructional television fixed service (ITFS), point-to-point microwave, video disc and videocassettes, tele-computer networks and the various subgroups encompassed by each of these technologies are creating new means of instructional access and are changing the shape of teaching and learning through diversity. They also reflect the socialization of the exploding media technology and communications.

As their use permeates education, they provide many opportunities to do an even better job of what we already do well in education, by bringing new dimensions to the roles of teachers and students. The effectiveness of these approaches has been demonstrated in hundreds of experiments. Classroom and non-classroom-based learning systems will coexist side-by-side as new, accessible and flexible educational forms emerge. In fact, broadcast courses which enable formal learning to take place in the home give education the potential of becoming a family affair and offer examples of both dramatic technology transfer and vehicles to strengthen both science education and public understanding of science.

Industry is investing millions of dollars into configuring the home entertainment center for movies and records. Science recently sent a rocket through the tail of a comet and computer-controlled cameras into the ocean depths to scan the decks of the Titanic. Science research is going to outer space and inner space with accelerating intensity. These developments all have implications for science and science education. The question we face is, "what will be the nature of the home education center and how will these developments affect instruction on campus?"

The NSF has made a significant economic and leadership contribution to these efforts, and it must now be prepared to help colleges and universities stay abreast of these advances.

Some concluding observations

In conclusion, as obvious as some of the realities may be, several are worth reemphasizing:

1. Most science faculty have been around for awhile. An entire generation of science teachers is reaching the last third of its career. Fifty percent of these faculty, according to studies I've seen, indicate that they received their initial training because of both the encouragement and financial assistance of the NSF. Who will take their places? This issue should be a major concern of NSF. For many community college faculty, contact with the mainstream is nonexistent. Ignoring this reality deprives our educational system and country and a vast resource in talent, experience and dedication that exists in the science faculties of these institutions. For those with experience, some genuine improvements in instruction would occur with modest funding commitments from relevant agencies. Opportunities for community college teachers to reenter the mainstream via funded sabbaticals at research institutions or at research laboratories would create extremely effective paths to upgrading undergraduate education.

2. In the area of equipment, we face a constant struggle. Nationally each year funds are cut with the same consistency and dedication by which they were included in the budgets in the first place. In the long run this leads to an inferior level of some of the equipment. High quality chemistry scales, computer hardware for laboratories, numerical control machines for such programs, etcetera, create obstacles which faculty must "teach around." Stimulating commitment and providing a catalyst for support is a responsibility NSF should consider.

In short, there seems to be both good news and bad news.

Regardless of obstacles, including ill-prepared students, heavy teaching loads, feelings of isolation, etcetera, most of the science teachers in our community colleges will continue to do their jobs even if they never hear from NSF again. They love what they do and care deeply about the students in their classrooms. They are, however, eager to do better and to learn new science and new ways of communicating that science, if given the opportunity. So the good news is that people are doing the best they can in deteriorating circumstances. The bad news is that a large segment of the educational population has been long-ignored by those making funding decisions.

Perhaps that middle 50 percent of the student population who are part of the "neglected majority" will continue to be excluded from the more elite educational community either by birth or circumstances, but their dedication and talent can be as important to our national success as that of students attending large and prestigious institutions.

Recommendations

1. *Teacher Training and Retraining*
 - 1.1 Take a leadership role in identifying and supporting areas important for the improvement of science *teaching*, such as attracting qualified teachers, urging teacher preparation programs to become "state-of-the-art," and conducting programs for retraining and upgrading of staff.
 - 1.1a Establish and operate teacher training institutes for two-year college faculty.
 - 1.1b Support development and dissemination of materials for training, retraining, and in-service development in mathematics, science, computer science and technical occupation fields.
 - 1.2 Establish an industry/education matching grant program to support experience opportunities for faculty through cooperative arrangements.
 - 1.3 Foster a faculty exchange program between institutions of higher education.
 - 1.4 Include two-year college faculty in programs for graduate fellowships.
 - 1.5 Support summer institutes and workshops that provide for the improvement of science teaching and programs.
 - 1.6 Fund commissions, task forces and publications that specify and urge new developments and directions in college science teaching.
2. *Science Equipment Programs*
 - 2.1 Support programs that provide strategic science equipment for new and emerging science education programs.
 - 2.2 Fund commissions, task forces, and publications that outline the need for refurbishing science teaching equipment in colleges and that develop recommendations for improvements.
3. *Technology Transfer*
 - 3.1 Support broad-based projects designed to foster wide use of high technology applications in teaching.
 - 3.2 Support studies and publications that foster technology transfer.
4. *Public Understanding of Science*
 - 4.1 Provide support for special programs that help the general public understand the benefits and the problems related to technological development.
5. *Science Education Programs in General*
 - 5.1 Support programs that encourage and improve articulation of programs and facilitate student transfer from high schools to colleges. Improve the high school/college connection.
 - 5.2 Support roundtables across the nation that improve science teaching and learning in both high schools and colleges.
 - 5.3 Support applied science and technical programs in emerging science-related programs.
 - 5.4 Impanel a special broad-based commission to give guidance to high schools and colleges in science education and technology transfer.
 - 5.5 Modify the College Science instrumentation program to include two-year colleges. This program presently provides funds only for four-year institutions.

Funds expended to improve science faculty, equipment and programs must be seen as an investment both to move us forward and as a form of maintenance that will prevent our programs from deteriorating.

As previously noted these programs should include, but not be limited to, such fields as robotics, computer applications, microelectronics, laser technology, telecommunications and biotechnology.

A look back and a look ahead.

It is well known that science education has consistently been a problem area within the Foundation and should be a pacesetter for NSF.¹

Stresses between the priorities of research and the responsibility for leadership in science education have been visible. We at AACJC advocate the need for science research. But also we support the need for leadership and support for science teaching in undergraduate science programs.

We call your attention to the two-year college as a major provider of both transfer and occupational science education to vast numbers of Americans, including those who transfer to traditional colleges. We call your attention to the neglected majority who comprise the middle 50 percent of American citizens who fix the airplanes, keep our electricity charging, man our laboratories and run our computers.

We at AACJC believe that the needs I have expressed for support of teacher education, program planning and implementation, equipment improvement, and technology transfer should have significant priority in your deliberations.

Mr. Chairman and members of the committee, thank you for hearing my views and the views of the American Association of Community and Junior Colleges.

¹The Annual Report of the Advisory Committee for Science Education, 1976.

PRELIMINARY PROGRAM

**90th CONFERENCE
MC : F³
Modern Chemistry
From Formula to Function (and Beyond)
Westchester Community College
Valhalla, NY 10595
April 11 - 12, 1986**

Program Chair: Patricia C. Flath
Paul Smith's College
Paul Smiths, NY 12970
518 - 327 - 6264

Local Arrangements Chair: John Tobias
Westchester Community College
Valhalla, NY
914 - 285 - 6939

In conjunction with New York State Two-Year College Chemistry Teachers' Association

President: Cecelia Jorgensen
Hudson Valley Community College
Troy, NY
518 - 283 - 1100

SESSIONS: I: Formula Design or Where Does 'It' All Begin?
II: Function/Application or Of What Value Is 'It'?
III: Classroom Use or What Do I Teach My Students About 'It'?
IV: Computers/Simulation: If I Can't See 'It' or Get 'It', is There Another
Way to Teach 'Its' Chemistry?

Speakers: Tamar Susskind Paul Cauchon
H.A. Neidig James Bradford
Richard Cornelius

Trading Post: What tricks, cartoons, experiments work great for you? Please bring and share.

1985

DECEMBER 6 - 7

The 89th CONFERENCE, Truckee Meadows Community College, 7000 Dandini Blvd.,
Reno Nevada 89512

Program Chair: Carolyn Collins, Clark County Community College, Las Vegas, NV. (702)
643-6060

Local Arrangements Chair: John Clevenger, Truckee Meadows Community College, Reno
NV (702) 7221

1986

APRIL 11 - 12

The 90th CONFERENCE Westchester Community College, Valhalla, NY

Local Arrangements Chair:

Program Chair: Patricia Flath, Paul Smith's College, Paul Smith's, New York 12970

APRIL 25 - 26

The 91st CONFERENCE William Rainey Harper College, Palatine, IL 60067

Program Chair - William Mooney Jr. ElCamino College, Via Torrance, CA 90506

Local Arrangements Chair: Joseph Bauer, William Rainey Harper College, Palatine, IL

JULY 27 - AUGUST 1

The 92nd CONFERENCE Montana State University, Bozeman Montana, in conjunc-
tion with the 9th Biennial Conference on Chemical Education

Program Chair: Ed Heath, Southwest Texas Junior College, Uvalde, Texas 78801

OCTOBER 17 - 18

The 93rd CONFERENCE Greenville Technical College, Box 5616, Station B,
Greenville, SC 29606

Program Chair: Leo Klin, III, Tri-Counties Technical College

Local Arrangements Chair: Alan Day, Greenville Technical College, Greenville SC

NOVEMBER 14 - 15

The 94th CONFERENCE Sinclair Community College, Dayton, Ohio 45402

Program Chairs: Richard Jones, Sinclair Community College, Dayton, OH

Local Arrangements Chair: Richard Jones, Sinclair Community College, Dayton, OH

1987

APRIL 3 - 4

The 95th CONFERENCE, Community College of Denver, Denver, Colorado

Chair: Martin Van Dyke, CC of Denver North Campus,

3645 W. 112th Avenue, Westminster, CO 80030

MAY 22 - 23

The 96th CONFERENCE, Montgomery Community College, Rockville, MD 20850

Chair: Margot Schumm, Montgomery College, Rockville, MD 20850