Ontario Association of Physics Teachers

NEWSLETTER

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AAPT Winter Meeting Report

by Alan Hirsch, Section Representative

The annual winter meeting of the AAPT was held from January 19 to January 24 in San Antonio, Texas. The first two days, Saturday and Sunday, were filled with workshops, many of which related to the use of videos and computers. The main part of the conference, from Monday to Thursday, consisted of invited and contributed papers, round-table discussions, commercial workshops, awards and ceremonial sessions, poster sessions, and committee meetings.

In a short report, I cannot provide many details of the conference, but I would like to share with you the general themes and trends that I observed.

- Computers continue to find more and more uses at all levels of education. Some educators predict that within the next decade the teacher will be a facilitator rather than an instructor. Many new software packages and video disc packages are available for the MacIntosh and IBM computers.

- Innovative ideas have been developed for using video cameras and VCR's in the physics laboratory and classroom. One impressive idea was to take videos of students acting out demonstrations of physics principles, such as standing wave patterns, simple harmonic motion, and the law of conservation of momentum. (The latter was done in a swimming pool with students walking, etc., on a large floating exercise mat). The ideas I saw at this conference were not, in my opinion, as varied and useful as the "Freeze-Frame Physics" ideas presented at the November, 1990, STAO Conference.

- More attention is being paid to the interaction between different levels of physics instruction. Some groups are focusing on the relationship between elementary school science and secondary school science. Other groups are concerned with the liaison between high school physics and college or university physics. I was asked by a committee member if Ontario teachers would be interested in a workshop on this topic to be funded by an American institution. As your representative, I replied "Yes." I will follow up on this kind offer.

- Some of the most popular audio-visual materials produced many years ago (such as Frames of Reference) are being edited for reproduction onto the video (VHS) format. Teachers who currently have the old silent version of The Tacoma Narrows Bridge Collapse may want to order the new video version which is accompanied by narration as well as a detailed teacher's guidebook. This video is available from the AAPT Publications Sales Department for U.S. $42.00 less 20% for AAPT members.

- One of the very popular sessions at the conference had as its theme the link between physics and the arts. The physics of music, the physics of ballet dancing, and the hints of quantum mechanics found in the poetry of Robert Frost were among the more memorable presentations. At some time in the future, I'm sure that Ontario teachers would welcome workshops or invited talks by Thomas Rossing (on the physics of music or musical instruments) and Kenneth Law (on the physics of dance). Both are excellent speakers.

-Among the talks given by Canadians was that of T. Dean Gaily of the University of Western Ontario who reported on research comparing the achievements of students who had studied an area of kinematics using computer software with the achievements of students who had studied the same topics by attending traditional lec Conference as well as the annual executive meeting in October.

- For the foreseeable future, the AAPT will hold three meetings annually: the main Winter Meeting (which will continue to include meetings of the executive committees), the Spring Meeting held in April in Washington, D.C., as a small part of the APS Conference, and the popular Summer Meeting, traditionally held on a university campus in late June. (This meeting will be moved to about the third week in August starting in 1992.) Dates of the AAPT meetings and other conferences are listed below.

- APS/AAPT Spring Meeting Washington, D.C.
  April 22 - 25, 1991
  (plus a workshop on "Global Warming", April 20 and 21)
- ASP Annual Meeting University of Wyoming
  June 21 - 27, 1991
- AAPT Summer Meeting Vancouver, B.C.
  June 24 - 29, 1991
- Inter-American Conference on Physics Education
  Caracus, Venezuela
  July 14 - 19, 1991
- AAPT/APS Winter Meeting Orlando, FL
  January 6 - 9, 1992
- APS/AAPT Spring Meeting Washington, D.C.
  April 20 - 23, 1992
- AAPT Summer Meeting University of Maine
  August 10 - 15, 1992
- AAPT/APS Winter Meeting New Orleans
  January 4 - 7, 1993

Note: The 1990 Summer Meeting at U.B.C in Vancouver is shaping up to be a major event. Abstracts for contributed papers must be received by March 7, 1991. Further information may be found on page 113 of the December, 1990, Announcer.

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Two OAPT Executive Officers Required

As Section Representative of the Ontario Section of the AAPT, I have enjoyed working with the other AAPT executive members as well as fulfilling my responsibilities within the AAPT. My term as Section Representative expires prior to our June Conference in Kingston, so the OAPT is looking for a replacement who will commence duties at that conference. A second executive position, that of Member-at-Large, has remained open for at least three years. Following are details of these positions.

Responsibilities of the Section Representative

The OAPT Section Rep must be a member of the AAPT and acts as the liaison between the Ontario Section and the AAPT. The Section Rep sends reports to the AAPT providing details of the activities of our section. He or she is expected to attend the annual Winter Meeting of the AAPT in January and to contribute to various aspects of that meeting. At the very least, the Rep must attend three executive meetings held in the evenings at the Winter Meeting. Section Reps are also invited to share other responsibilities at the meeting. The Ontario Rep reports general trends of the Winter Meeting to the Ontario membership as well as specific items for consideration to the OAPT executive. Of course the Rep is expected to attend the annual June Conference held at some Ontario university and to contribute to the planning and organization of that conference as well as report to the general membership on the main events of the conference. Traditionally, two executive meetings are held each year: one at the June Conference and the other in October. Other responsibilities, including ones listed in the OAPT constitution, will be passed on to the next Section Rep in June.

Responsibilities of the Member-at-Large

The most important responsibility of the Member-at-Large is to act as a liaison between the OAPT and physics teachers at community colleges in Ontario. The OAPT is hoping to increase interest and membership among these important physics teachers. Like other executive members, the Member-at-Large is expected to attend the annual June Conference as well as the annual executive meeting in October.

If you are interested in serving on the OAPT executive as either the Section Rep or the Member-at-Large, please write a note to Malcolm Coutts, as soon as possible. If more than one person is interested in a single position, an election will be held.

A. Hirsch

Al Hirsch has served more than four years as Section Representative. During that time, he has kept us well informed about the activities of the AAPT and has given us strong leadership in our own section. Thanks, Al.

Some Dates To Remember

OAPT contest, 1991 - Tuesday, May 7

OAPT Conference, 1991 - Queen's University, Kingston, June 23-25

OAPT Conference, 1992 - Ryerson Polytechnical Institute, Toronto, June 28-30

Ontario Association of Physics Teachers Annual Conference

June 23-25, 1991
Queen's University, Kingston, Ontario

Program Highlights: A Sunday workshop on computerized test and exam construction; a cruise and banquet through the famous 1,000 islands; an array of guest speakers with talks ranging from international standards in physics education to current research in polymer physics; presented papers from OAPT members.

Cost: All expenses including conference and workshop registration, accomidation, board and cruise/banquet will be well under $200. For more information and registration forms, contact; John Wylie, Ontario Association of Physics Teachers, c/o The Toronto French School, 306 Lawrence Ave. E., Toronto, Ontario, M4N 1T7, Telephone (416) 484-6533, Fax (416) 488-3090.

Plan to be there !

Membership Due?

If your membership has expired, you may use the coupon below to renew it.

Membership Application and/or Renewal

Name_____

Address_____

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$8.00 per year, payable to the OAPT

Send to: Ernie McFarland,
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A COMMON STUDENT MISCONCEPTION IN INTRODUCTORY PHYSICS

by Ernie McFarland
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This article is based on part of a presentation at the 1990 OAPT Conference, held at the University of Windsor.

Many students studying physics at the secondary school and introductory university level suffer from a number of misconceptions. One of the strongest of these is that "**motion implies force**," that is, if an object is moving, even at constant velocity, then this motion must be the result of a (net) force on the object in the direction of motion.

This misconception is neither new nor Canadian — it has been demonstrated by careful studies in a number of countries — and it is not unreasonable for students to have this belief. After all, in everyday life, a moving object will gradually slow down and come to rest unless some force is provided in the direction of motion.

Here is a question from the 1988 OAPT Physics Contest (Gr. 11 & 12):

"A ball is thrown vertically upward. As it travels up after being released by the thrower, which describes the force(s) that act(s) on the ball, other than air resistance?

(A) the force of gravity, vertically downward
(B) the force that maintains the motion, vertically upward
(C) the downward force of gravity and a constant upward force
(D) the downward force of gravity and a decreasing upward force
(E) no net forces"

Only 22% of the students correctly chose "A," whereas 66% chose "D," an answer that includes an upward force on the ball in flight. Students would undoubtedly have done much better if asked a numerical question about the position or velocity of the ball during its motion. In other words, students' ability to solve numerical problems does not necessarily indicate a clear understanding of the physics in a given situation.

I have used a number of similar questions in first-year university courses, both as pre-test questions and as short examination questions, and have always been disappointed with the student performance. In one exam question, students were asked to show the correct free-body diagram for a woman standing on a moving walkway in an airport. The walkway is moving at constant velocity, and air resistance is negligible. In spite of the constant velocity stipulation, many students included a horizontal force on the free-body diagram. Again, to them, motion implies force.

So **what can we do to help** our students leap over this misconception hurdle?

- ask more non-numerical questions about forces on objects, and engage students in discussion about these questions
- give students the opportunity to experience and measure forces and accelerations in real-life situations (have them make accelerometers[1] to use in cars, elevators, amusement park rides, etc.)
- make students aware of the misconception
- remind students that "forces have sources" (What could be the source of a decreasing upward force on a ball in flight?)
- discuss the misconception again later in the course (perhaps for charges moving in a uniform electric field)
- listen to students when they describe how they are thinking, and adapt teaching strategies to help them
- finally, buy a copy of Arnold Arons' book, *A Guide to Introductory Physics Teaching* (Wiley, 1990, ISBN 0-471-51341-5) and reflect on what he has written.

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[1]available from Merlan Scientific in Georgetown. (See also Carole Escobar's article on amusement park physics in *The Physics Teacher*, Oct. 1990.)

THE DEMONSTRATION CORNER

THE WORLD'S SIMPLEST SPEAKER

by
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Demonstration

The world's simplest speaker can be constructed in a matter of seconds.

Equipment

A soup can (10 cm in diameter, 12 cm high), a circular ceramic magnet (7 cm in diameter), a coil of wire (about 50 turns of motor-winding-gauge wire made into a coil with a mean diameter of about 6 cm), a "ghetto blaster" with an external speaker jack, and connector wires to attach the coil to the speaker jack.

Construction

Simply connect the coil to the speaker jack, place the ceramic magnet on the closed end of the soup can and tuck the coil in underneath it. Disconnect the speakers of the "ghetto blaster" and plug in the coil's speaker jack to it. Sit back and enjoy the ultimate in sound; well, not quite.

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Submissions describing demonstrations will be gladly received by the column editor.