NEWSLETTER

ONTARIO ASSOCIATION OF PHYSICS TEACHERS
(AN AFFILIATION OF THE AMERICAN ASSOCIATION OF PHYSICS TEACHERS)
VOLUME XV, NUMBER 1 OCTOBER 1992

EDITORIAL:

And They're Off...

The Lonely Life of a Physics Teacher

As you start the second month of a new school year, and the momentum of teaching your courses builds, and you begin to think you're the only one who is spending every evening (and most of the weekend) worrying about making your lessons exciting to your students, but you don't have time to build that neat apparatus you saw in the last OAPT newsletter because your department head wants you to help update the chemical store room to meet WHIMIS standards and you're on a curriculum committee to try and plan for the destreaming of grade nine next year, and your spouse is working the night shift and your youngest son came home with a scraped knee while your oldest needs to use the computer to do an English essay and...

This time of year can be very stressful, and finding time to revamp even a small part of your course can be difficult. Make sure you take some time to talk with your colleagues about what they're doing and what you're doing. As the only physics teacher in my high school I know you can start to feel out of touch with what's taking place in the other schools in the county, never mind the rest of the province. If you're in that position, maybe you can plan a get-together with other physics teachers in your county—discuss the interesting things you've done in your class, invite a physics professor from a near-by university to give a talk, or go to a lecture sponsored by the university. And one event you really shouldn't miss is the OAPT Conference. It's a great opportunity to get together with other high school, college and university teachers and find out what's going on in Ontario schools. This past June's conference at Ryerson was well worth the admission price (which is always reasonable compared to

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At Ryerson...

Report on the Ontario Association of Physics Teachers Annual Conference -- June 28-30, 1992

This year's annual conference was held in the heart of downtown Toronto, namely at Ryerson Polytechnic Institute. About sixty physics educators attended the conference that had carefully been planned by the Vice-president, Fred Hainsworth and by his colleagues at Ryerson. This was the first year that the conference was actually held outside of the academic calendar year. While the thought of attending a conference during their summer vacation may have inhibited some potential delegates those who did attend were able to relax and enjoy the presentations knowing that a critical educational deadline did not await them on their return to their home. Secondary schools, community colleges, and universities were all represented by the delegates in attendance.

As has been the case at past conferences the presentations consisted of a mixture of invited and contributed papers. The presentations varied in length from ten minutes to one hour. Presentations were made by secondary school teachers, Ryerson Faculty, McLaughlin Planetarium personnel, and invited guests.

Ian McGregor from the McLaughlin Planetarium gave us an historical overview of the development of planetariums as well as all of the personnel and hardware that is involved in the production of a show at the McLaughlin Planetarium. He revealed the interesting fact that the McLaughlin Planetarium is one of the

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largest planetariums in North America. Delegates who were present on Sunday night attended a planetarium show. A smaller group of delegates returned on Tuesday afternoon to have a "behind the scenes" tour of the facility.

Presentations designed to provide us with additional background and food for thought were provided by David Rowe and Helmut Burkhardt. Dr. Rowe's presentation was entitled "Symmetry, Art and Nuclear Physics" and Dr. Burkhardt's presentation dealt with the need to improve physics curriculum by establishing a clearer link between physics and other branches of knowledge. He suggested that by unifying fragmented knowledge structures, and translating general scientific principles into a common language a simpler, basic physics curriculum is possible.

Several presentations were designed to give teachers specific ideas for teaching certain topics or for developing effective and proven instructional strategies. John Wylie presented some of the basic principles involved in mountain climbing and actually demonstrated how these could be employed to climb a door jamb.[1] Bill Konrad shared ideas he picked up at the winter meeting of AAPT in Orlando. Several science olympics ideas as well as an inexpensive colour mixer were demonstrated. Watch for some of these in the demonstration column of this publication. Elizabeth Dunning described how a physics poster contest could be used with a grade 12 physics class to generate interest and to help create a physics atmosphere in the classroom. John Van Aalst described how he utilizes microcomputers as part of an inquiry-based instructional program for his grade 12 physics class.

The advantage in having the conference change its location each year is that delegates get a chance to get a glimpse of the research that is being conducted at the host institution. Paul Dunphy described his studies of the effects of weightlessness on the level of cerebral blood flow. This study is an effort to understand why some shuttle crew members experience nausea and vomiting during their flight and occasionally loss of consciousness during re-entry and post flight. His collaboration with Canadian astronaut Roberta Bondar made the presentation particularly interesting.

A number of sessions at the winter meeting in Orlando dealt with student misconceptions in physics. Ernie McFarland's presentation about general student misconceptions echoed the experiences related in Orlando. The response of delegates also indicated that this topic could be explored in greater depth at future conferences.[2]

The conference highlight was the presentation entitled "The Physics of Dance" by Dr. Kenneth Laws.[3] Dr. Laws was assisted in his presentation by a ballet dancer. The presentation was videotaped by the Ryerson Communication Arts department. It is hoped that this videotape can be made available to Ontario Association of Physics Teachers members in the near future. Watch this publication for further information.

The 1993 conference will be held in late June at Trent University. Watch this publication and special mailings for more information about program and costs.

Editor's Notes

1 *John Wylie's article on mountain climbing appeared in a recent issue of Quantum Magazine (see blurb below).*

2 *Two references of interest that were mentioned: "A Guide to Introductory Physics Teaching," Arnold Arons, Wiley 1990, ISBN 0-4741-51341-5 and "Physics by Inquiry" Lillian McDermott, University of Washington. As well, there is an interesting article in the May 1992 issue of the Physics Teacher on students concepts of force and mechanics (it includes two tests that were used in the study).*

3 *Kenneth Laws has a book on the Physics of Dance; see the blurb below.*

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Write to us!

Do you have something you'd like to say about physics teaching or education in general? Have you done something interesting in your class? Have a question you'd like answered? Read a good book you think other physics teachers (and/or students) should read? Send us a letter. We want to hear from you.

Address any Newsletter correspondence to:

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other conferences). The 1993 conference is being held at Trent University in Peterborough. There will be more information in an upcoming issue.

If there are any physics teachers in your area who don't know about us, make sure you show them the newsletter: the $8 membership fee is really very small compared to the benefits (especially with the Demonstration Corner), and it might help to make them feel a little less isolated. The more the merrier.

AAPT

Join the AAPT and receive a one year subscription to *Physics Today* plus *The Physics Teacher* and/or the *American Journal of Physics*. You also get discounts on teaching materials,computer software and books.

For more information write to:
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Upcoming Events:
AAPT Winter Meeting
New Orleans
January 2-7, 1993

APS/AAPT Meeting
Washington, D.C.
April 12-15, 1993

Membership Due?

The date on your address label is the expiry date for your membership. If it says **June 92**, your membership has already expired. You may use the coupon below to renew it.

Membership Application Renewal

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$8.00 per year, payable to the OAPT
Send to: Ernie McFarland, Department of Physics, University of Guelph,
Guelph, Ontario N1G 2W1

THE DEMONSTRATION CORNER:

I: A TIMELY SUGGESTION FOR MAKING WAVES

II: THE CAN THAT ALWAYS COMES BACK

by

Pauline Plooard

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I: A Timely Suggestion For Making Waves

Standing waves can be quickly and easily created on the front demonstration bench even if you don't have a genuine string vibrator. Simply tie a length of white butcher cord to the "clapper" of an old Stark[1] recording acceleration ticker-timer. Clamp the timer near one end of the front bench. Knot the other end of the string to a tap, rod, or other fixed object at the opposite end of the front bench so that the string is somewhat taut. Turn on the power supply to the timer and adjust the position of the timer and tension of the string to produce standing waves. Given that the timer frequency is 60 Hz, the speed of propagation of the waves can be easily calculated from the number of antinodes (loops) in the standing wave pattern. This is particularly useful in the class after "standing waves in a coiled slinky spring investigation" as reinforcement of the principles learned.

1 *The Stark recording acceleration ticker-timer is essentially an electric bell with the gong gone. Alternatively you could easily modify an electric bell to perform as above. Even a class set is possible.*

Column Editor: Ernie McFarland, Physics Department, University of Guelph, Guelph, Ontario, NIG 2W1

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

II: The Can That Always Comes Back

The difference between a property and a theory can often be vague for high school students. But describing the Roll-back Can and postulating why it always rolls back is fun and should help clear up the problem.

The Roll-back Can is constructed from an empty Ovaltine can, or one similar. Pop rivet a loop of wire on the inside of the lid and another on the inside of the bottom of the can. Between the loops, attach a slightly stretched heavy elastic band with a weight (large nut or washers) knotted onto its middle. Put the lid on the can, and draw happy or unhappy faces in black marker on the ends of the can to disguise the pop rivets.

Show the class the can and ask them to describe it. Eventually roll it away from you on the front bench repeatedly. You can even get a ramp and roll it downhill at increasing slopes to see just what it can do. (If you wear long sleeves or a lab coat, it's possible to imply a hidden magnet or strings.)

Sort the answers for a description into properties and theories. Eventually you will get properties such as metallic, shiny, cylindrical solid that when rolled away always comes back. Invariably there is a student who "knows" and is eager to offer a theory - I usually entitle any explanations "Johnny's Theory", "Joanna's Theory", etc. Students then have their name above that of Einstein or Darwin when I list names of any other theories they have heard about.

Finally, just like the atomic theory which explains the internal structure of a solid, emphasize they cannot look inside the Roll-back Can to see why it always rolls back anymore than they can cut open the metal to see the atoms.