

Professional Development

Excerpts from:

The Role, Education, Qualifications and Professional Development of Secondary School Physics Teachers

https://www.aapt.org/Resources/upload/Secondary-School-Physics-Teacher-Role_booklet.pdf

4. Professional Development

Both the teaching profession and the field of physics are in a constant state of change. Teaching strategies are emergent and not absolute therefore quality professional development is critical to the retention and improvement of any teacher in the classroom. Teachers should be encouraged to participate in peer collaboration experiences. These may occur within the department, within the school, within the district, within the community, at the state or national level. Some suggested venues for continued professional development follow:

Continuing Education

The physics teacher should be encouraged to pursue further studies in both physics and teaching pedagogy. Working towards advanced degrees can be both financially and professionally rewarding since many schools' salary structure encourages working towards a graduate degree.

Professional Organizations

There are a number of groups or associations with which the teacher can affiliate in order to keep in touch with developments in the field, effective teaching practices, and changes in resources. Membership and active involvement in professional organizations are recommended. These organizations include:

- Local sharing groups
 - In some localities, physics teachers from local schools meet several times a year. Meetings may have speakers, reports of research, classroom projects, or tours of facilities.
- State science associations
 - Sections of the American Association of Physics Teachers

The local section of the AAPT is a valuable organization. It provides a clearinghouse for much information, a means to keep up with latest developments and advances in physics teaching, and a chance to become known to other physics teachers.

- State Section of the National Science Teachers Association

The local section of the NSTA is a valuable organization. It provides a clearinghouse for much information, a means to keep up with latest developments and advances in physics teaching, and a chance to become known to other science teachers.

- National science associations

- American Association of Physics Teachers (AAPT, <http://www.aapt.org/>, referenced 30 April 2009)

The AAPT has two national meetings each year. The meetings are in different places in the country in order to make it possible for teachers everywhere to make meetings every few years. The meetings have participant papers, plenary speakers, workshops, discussion groups, teacher sharing, vendors, exhibits, committee meetings, lunches, dinners, awards ceremonies, and opportunities to network with colleagues and meet friends.

- National Science Teachers Association (NSTA, <http://www.nsta.org/>, referenced 30 April 2009)

The NSTA has one national meeting and several regional meetings each year. All sciences are represented. The activities are similar to AAPT, except that attendance is larger and the program has more variety.

- American Physical Society (APS, <http://www.aps.org/>, referenced 30 April 2009)

The APS runs high school teacher days at many of its divisional and both of its annual national meetings. These workshops, which are free for all physics and physical science teachers, provide a networking opportunity with research physicists, and a look at contemporary physics research during APS meetings.

Workshops and Institutes

Workshops allow for networking with other teachers as well as learning new content and pedagogy. Strategies come alive when the teacher is exposed to the methodology at first hand. When teachers learn and share with fellow colleagues it reduces teacher isolation and tends to renew enthusiasm. Some of these opportunities provide stipends, continuing education credits, or graduate credits. Workshops are available through such institutions as:

- Universities
- Colleges
- Museums
- Business and Industry
- Research institutes
- Professional Organizations such as AAPT, NSTA, and APS

Summer Research or Work Experience

These opportunities exist to give teachers experience with real world applications of their content area. It gives the teachers a better understanding of the nature of scientific research. Some of these opportunities provide salaries or stipends. Opportunities exist in:

- Universities
- Colleges
- Museums
- Business and industry
- Scientific and medical research facilities
- National laboratories
- Research Experiences for Teachers programs, funded by the NSF

Mentoring

Having a good, experienced mentor is essential to the growth of a physics teacher. As more physics teachers enter the profession without formal training in physics teaching, mentoring takes on an important role in the development and retention of qualified teachers. Teacher candidates and in-service teachers should be given the opportunity to work with effective,

experienced teachers. It is important that the administration provides time, training and support for mentoring experiences, this support needs to be extended to both the mentee teacher and the mentor teacher. Organizations such as the AAPT can be utilized to assist in locating mentors in the event that mentors cannot be found locally, e.g. small and or rural schools. When teachers receive this support from the administration and their mentors then the teachers will have the background to become mentors themselves. This snowball effect increases the number of qualified teachers and mentors, thus enhancing the school and student learning. Mentoring aids in both personal and professional development of both the mentee and the mentor:

- Reduces burnout
- Gives sounding board for new ideas
- Decreases isolation
- Provides a non threatening method of evaluation
- Provides a cheerleader for encouragement and sharing of success
- Allows for networking
- Provides opportunities to look at old things in new ways
- Encourages constant evaluation of what is done and why
- Opens dialogue on best practice and how to apply to a specific situation
- Fosters an environment of learning and sharing

Publications

Scientific knowledge is continually growing. This along with the changing nature of science education requires the teacher to keep abreast of modern developments. Professional readings will keep the physics teacher up to date, and maintain an awareness of current topics of interest and recent developments. Suggested publications include:

- Journals
 - The Physics Teacher (<http://scitation.aip.org/tpt/>, referenced 30 April 2009)
 - American Journal of Physics (<http://ojps.aip.org/ajp>, referenced 30 April 2009)
 - The Science Teacher (<http://www.nsta.org/highschool/?lid=pub>, referenced 30 April 2009)

- Physical Review Special Topics – Physics Education Research (<http://prst.per.aps.org>, referenced 30 April 2009)
- Books
 - *Teaching Introductory Physics* (Arons, 1997)
 - *Hands-on Physics Activities With Real-Life Applications* (Cunningham & Herr, 1994)
 - *Five Easy Lessons: Strategies for Successful Physics Teaching* (Knight, 2002)
 - *How to be an Effective Teacher: the First Days of School* (Wong, 1998)
 - *The Flying Circus of Physics* (Walker, 2007)
 - *Teaching Secondary School Science* (Trowbridge & Bybee, 1996)
 - *Teaching Introductory Physics: A Sourcebook* (Swartz & Miner, 1998)
 - *Teaching Physics for the First Time* (Mader & Winn, 2008)
 - Many more may be found through AAPT, NSTA, Association for Supervision and Curriculum Development and other organizations
- WebPages
 - ComPADRE (<http://www.compadre.org>, referenced 30 April 2009)
 - Physics Teacher Education Coalition (<http://www.PTEC.org>, referenced 30 April 2009)
 - Physics Education Technology Interactive Simulations (<http://phet.colorado.edu/simulations/>, referenced 1 May 2009)
 - BUBL physics education site (<http://bubl.ac.uk/link/p/physicseducation.htm>, referenced 30 April 2009)
 - websites associated with science and education publications
- Newsletters
 - AAPT eNNOUNCER (<http://www.aapt.org/about>, referenced 30 April 2009)
 - NSTA Reports (<http://www.nsta.org/publications/reports.aspx>, referenced 1 May 2009)
 - APS Forum on Education Newsletter (<http://www.aps.org/units/fed/newsletters/>, referenced 1 May 2009)
 - APS Forum on History of Physics Newsletter (<http://www.aip.org/history/newsletter/>, referenced 1 May 2009)

- Listservs
 - a variety of listservs focusing on secondary physics teaching are available including those sponsored by AAPT (http://www.aapt.org/Membership/listservs.cfm, referenced 1 May 2009))
 - Physshare (<http://lists.psu.edu/cgi-bin/wa?A0=PHYSHARE>, referenced 30 April 2009)
 - Physlrnr (<http://listserv.boisestate.edu/cgi-bin/wa?SUPED1=physlrnr&A=1>, referenced 30 April 2009)

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