

# Communities of On-Line Physics Educators

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It's a physics educator's dream—a readily available group of like-minded people with a variety of backgrounds and expertise who want to discuss physics and physics pedagogy with their peers. For the teacher who is feeling overscheduled, isolated, or lonely this “coffee klatch” opportunity is a boost that lasts all day and on into the night. We're talking about the virtual world of electronic mailing lists that are dedicated to the teaching and learning of physics. This electronic community is bound together through shared information and experience, an on-line culture<sup>1</sup> that comprises high-school, college, and university instructors, researchers, hobbyists, students, retired teachers, and amateurs.

Electronic communications have a long and rich tradition in physics research. Hypertext Markup Language (HTML) was invented by particle physics researchers at CERN in Switzerland, and the modern Internet owes much of its early development to academic research networks run by physical and computational science researchers. Physicist and Nobel Laureate Kenneth Wilson described electronic communications as an important avenue of contribution between professional physics researchers and educators where “seasoned physicists...become mentors to others, who in turn produce interventions of steadily improving quality capable of serving exponentially growing numbers of schools.”<sup>2</sup>

## The Language

Electronic mailing lists use computer software to maintain a directory of people known as **subscribers**. An (e-mail) message sent to the list address by any subscriber is re-mailed or broadcast to all subscribers by the software. Such messages are known as **postings** or **posts** to the list. Many lists **archive** all posts in a web-searchable database for retrieval by content. Subscribers receiving a post can reply by e-mailing a return posting to the

entire subscriber list or by direct private mail to the originator of the posting.

Subscribers follow list conversations by topics called **threads** (identified by the e-mail subject line) for their own benefit and information. Subscribers may silently read these postings for their own information, often called lurking, or join in the conversation or respond to a question.

Although there are many physics-related e-mail lists, the four major ones are PHYS-L, PHYSHARE, TAP-L, and PhysLrnR. None of these are **moderated** (messages are not directly edited before posting), but all are monitored by their respective **list owners** (people who administratively control the list software).

The most widely used software for managing electronic mailing lists is LISTSERV by L-Soft Inc.<sup>3</sup> L-Soft claims that more than 125,000 mailing lists run on its software, with more than 25,000 of these lists being publicly accessible, and at least 150 lists with over 10,000 subscribers. Typically, an educational institution or instructional technology center will administer list software for several hundred administrative, academic, and scholarly lists. When LISTSERV became a commercial product, some smaller universities shifted to the lower-cost LISTPROC software for UNIX, a slightly less capable product with slightly different commands. There are others, for instance, Majordomo, Mailstorm, ListSTAR, LetterRip, and AutoShare, with similar functionality.<sup>4</sup>

## The Big Four

Table I displays pertinent information regarding the chief public physics-related lists. Members of the American Association of Physics Teachers (AAPT) are active in all of them.

**PHYS-L** is the granddaddy of these lists, with the longest history, largest membership (about 650 subscribers), and most eclectic subject postings. Richard (Dick) Smith of the

Table I. Summary of information on four public physics-related electronic mailing lists.

Name (# subs)	PHYS-L (650)	PHYSHARE (550)	PhysLrnR (475)	TAP-L (300)
Description	Forum for Physics Teachers	Sharing Resources for HS Physics Teachers	Physics Learning Research List	Technical Aspects of Physics Labs & Lectures
List Address	<phys-l@lists.nau.edu>	<physhare@lists1.cac.psu.edu>	<physlrnr@listserv.boisestate.edu>	<tap-l@listserv.appstate.edu>
List Admin. Address	<listserv@lists.nau.edu>	<listserv@lists1.cac.psu.edu>	<listserve@listserv.boisestate.edu>	<listproc@listproc.appstate.edu>
List Owner	<danmac@nau.edu>	<jdp@westy.jtwn.k12.pa.us> and <kctipton@NOSPAM.tenet.edu>	<dykstrad@bsumail.idbsu.edu>	<grahamaj@appstate.edu>
Related Web-pages	< <a href="http://purcell.phy.nau.edu/phys-l/">http://purcell.phy.nau.edu/phys-l/</a> > and < <a href="http://mailgate.nau.edu/">http://mailgate.nau.edu/</a> >	< <a href="http://members.odyssey1.net/kctipton/faqs/psharefaq.html">http://members.odyssey1.net/kctipton/faqs/psharefaq.html</a> > and < <a href="http://lists.psu.edu/archives/physhare.html">http://lists.psu.edu/archives/physhare.html</a> >	< <a href="http://listserv.boisestate.edu/archives/physlrnr.html">http://listserv.boisestate.edu/archives/physlrnr.html</a> > and < <a href="ftp://physlrnr.idbsu.edu/plrserve/pub/physlrnr/">ftp://physlrnr.idbsu.edu/plrserve/pub/physlrnr/</a> >	< <a href="http://members.odyssey1.net/kctipton/faqs/tapfaq.html">http://members.odyssey1.net/kctipton/faqs/tapfaq.html</a> > and < <a href="http://listproc.appstate.edu:8000">http://listproc.appstate.edu:8000</a> >

University of West Florida saw the need to have a method of discussing physics education issues for the benefit of faculty and teachers who were situated in small physics departments. The original PHYS-L list on BITNET (an e-mail network preceding the Internet) had seven members in 1987, all recruited at the AAPT summer meeting at Montana State University in Bozeman. That first year, Dick generated frequent postings, trying to amass enough traffic and members to make the discussions self-sustaining. For some years he hosted a PHYS-L cracker-barrel session at AAPT meetings. His success with PHYS-L inspired others, and Dick directly assisted in the creation of dozens of education-related lists, in particular PhysLrnR and TAP-L. The leading chemistry education list, CHEMED-L was established with Dick's assistance. Dick retired in 1998 and turned PHYS-L over to the present owner at Northern Arizona University in November 1998. The homepage for PHYS-L has archives of all postings since February 1996, and links to list members' personal webpages. Together these form an outstanding set of resources.<sup>5</sup>

**PHYSHARE** is a large list (about 550) focusing almost exclusively on high-school physics teaching issues and is administered by high-school teachers David Popp and Keith Tipton through LISTSERV software at the University of Pennsylvania. PHYSHARE postings since October 1991 are archived, and list members' personal homepages are collected together with those of PHYS-L.

**PhysLrnR** is a highly specialized list of about 475 members focusing on professional research into physics learning. It runs on LISTSERV software at Boise State University and is owned by Dewey Dykstra, an experi-

enced and active physics-education researcher and curriculum developer. This list has a private archive for postings, accessible to subscribers only. PhysLrnR maintains a large collection of specialist literature on physics education research.

**TAP-L** is a smaller, focused list of 300 subscribers specializing in the design and construction of physics laboratory and demonstration apparatus. It runs on LISTPROC software at Appalachian State University and is owned by Andy Graham. Members are mainly college and university physics demonstration and lab coordinators and Physics Instructional Resource Association (PIRA) members. PIRA is an AAPT-affiliated organization. Uniquely, this list runs a web ring of websites run by demonstration and laboratory coordinators at several dozen universities and colleges.

Although there are affiliations between these lists and AAPT, the Association does not directly sponsor these lists because it does not peer review or edit the list postings and cannot guarantee the accuracy of the physics content. AAPT members and executives are frequent users, and they post official Association notices to these lists. Content of the official AAPT websites is very carefully controlled.<sup>6</sup>

To join ("subscribe to") a list and to subsequently control the delivery parameters, a user must direct command messages at the list software through the list administrative address (given in Table I). Since three of the four physics-related lists discussed here run on LISTSERV software, readers will want to read the description of LISTSERV software function at <<http://www.lsoft.com>>.

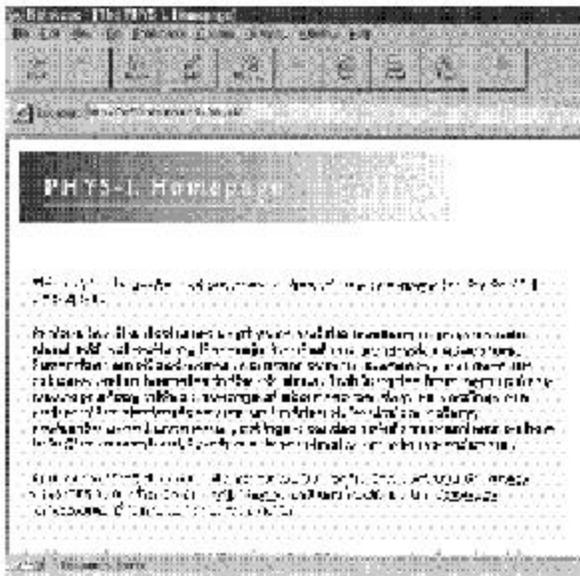


Fig. 1. Introduction to PHYS-L homepage.

## The Forum for Physics Teachers (PHYS-L)

The homepage for this, the largest and oldest of the physics-centered electronic mailing lists, can be accessed at <http://purcell.phy.nau.edu/PHYS-L> (see Fig. 1). The PHYS-L on-line community has representatives in at least 35 countries, and well over 100 educational institutions in the United States. Typically, daily traffic is between five and 15 postings, most of which generate between two and five public responses. In a month, 80 people might post to PHYS-L, but only a few will post more than five messages. For example, last spring a PHYS-L member sent a posting requesting recommendations and comments regarding textbooks for teaching advanced placement physics. This was e-mailed to some 650 list members. Five replies were posted to the list that day from members with experience on this topic, including directions to a set of on-line reviews of standard physics texts. All these postings were filed to the list program for future recall and reference via the web at <http://mailgate.nau.edu>.

### PHYS-L postings typically fall into three general categories:

—**Announcements** of interest to physics educators, such as book commentaries and errors, opportunities for grants or workshops, on-line and off-line resources—for instance: *Where can I learn about undergraduate research opportunities? What organizations exist to support and encourage enrollment of women in math, science and technology courses?*

—**Queries** requesting straightforward factual information regarding specific physics-teaching strategies and physi-

cal phenomena—for instance: *What resources are available for grade-nine physical science demos? What is the physics of the boomerang? How does a dissectable capacitor work?*

—**Discussions**, statements, and questions related to the interpretation of physics teaching practices—for instance: *What are the issues related to block scheduling for high-school physics students? How can I best use telescopes and binoculars to teach observational astronomy? What physiological dangers and legal liabilities are associated with teaching with Van de Graaff generators?*

To browse all PHYS-L postings since February 1996, or scan through any month's postings by thread, or search postings by any contained text, go to <http://mailgate.nau.edu/archives/phys-l.html>. Extensive help on formulating searches is available at that location.



*You never know the age of the writers on Phys-L.*

(by Kent Ellis, physics teacher, Flagstaff (Arizona) High School)

## Comments

Electronic mailing lists themselves have become objects of study by psychologists interested in electronically mediated interactions. Researchers such as Turkle,<sup>7</sup> Roschelle and Pea,<sup>8</sup> and Etzioni and Etzioni<sup>1</sup> have discussed how “virtual” on-line communities complement “real” off-line communities, ascribing notable advantages to lists:

- easy communication over national borders and time zones.

- inclusion of homebound people.
- accommodation of more individuals than in off-line meeting rooms.
- strong memories.
- high safety.
- allowance for exploration of new relationships and identities.
- indifference to physical appearance and off-line identity.

But of course the growing virtual community of physics educators, as any real community, must monitor itself by asking members to adhere to reasonable guidelines in conversation (“in this case teaching and learning physics, and not jokes about accountants”), in tone (“conversational, not formal but respectful of others”), reminders (“you are *not* talking aloud to yourself in private”), and cautions (“viruses have been spread through the physics lists”). Inflammatory language or personal attacks are monitored on the electronic postings described here. Administrators work hard to keep the resource welcoming and supportive for all list members.

From all around the globe, physics teachers and researchers in settings large and small can join others with common interests and concerns to mutual benefit and encouragement. I encourage readers to investigate and consider joining a list for physics educators.

#### Acknowledgments

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1. A. Etzioni and O. Etzioni, “Communities: Virtual vs. Real,” *Science* **277**, 295 (1997); also, <<http://www.gwu.edu/~ccps/E30.html>>
2. K. Wilson, “Improving physics education wholesale: A design challenge,” *AAPT Announcer* **29** (2), 119 (1999).
3. LISTSERV software function is described at <<http://www.lsoft.com>>; a catalog of known LISTSERV-based lists is found at <<http://www.lsoft.com/lists/listref.html>>
4. For a technical discussion of popular UNIX-based electronic list software, see A. Schwartz, *Managing Mailing Lists* (O’Reilly, Sebastapol, CA, 1998).
5. Bill Beatty’s page <<http://www.eskimo.com/~billb/scilists.html>> is another extraordinary reference for physics-education discussion groups, listservs, and newsgroups.
6. AAPT’s webpage <<http://www.aapt.org/>> is concerned mainly with administration. References to physics content primarily appears on the Association’s on-line Physical Science Resource Center at <<http://www.psrc-online.org/>>, which is scrutinized and edited for content.
7. Sherry Turkle, *Life on the Screen: Identity in the Age of the Internet* (Simon and Schuster, 1995).
8. J. Roschelle and R. Pea, “Trajectories from today’s WWW to a powerful educational infrastructure,” *Educational Researcher* (June-July 1999), pp. 22-25, 43; see especially “Vector 3: Towards tools that foster self-improving communities.”