Optics Ed: The Silicon Valley Ad-Hoc Committee on Education in the Optical Sciences

An examination of grass-roots needs and entities to leverage for maximum return on effort and longevity.

Santa Clara Valley Chapter of IEEE/LEOS and
the Optical Society of Northern California

bob.dahlgren@ieee.org

2/21/2002

Agenda

- Introduction
- Assign secretary
- History
- Goals & Philosophy
- Projects
  - Consumable Item Account
  - Laser Kit Circulation
- Organizational Issues

Questions

- What should we be doing?
- What what should we NOT be doing?
- Who are we and how should we work together?
- How do we fit into the larger picture?
- What niche should we serve?
- How do we reconcile our goals with our resources?
- How do we monitor and continuously improve?
- How do we get the word out?

Draft Goals

- Encourage K-12 studies Science Technology Engineering and Mathematics (STEM).
- Create an optics outreach program (OP) that creates excitement in Middle and High School teachers and students which leads to an increase in STEM studies.
- Attract historically under-represented groups to STEM.
- Prime the education pipeline for post-secondary schools.
- Build connections & linkages between local OP entities, creating a framework for interaction.
  - Users, Resources, Volunteers, and Facilitators.
- Create a long-lasting, low-maintenance, sustainable OP, with low (or no) cash burn-rate.
- Organize competitions, HS optics clubs, science fair prizes.

Draft Mission

- To create a model for K-12 outreach for OPTICS & RELATED SCIENCE that is:
  - Scalable
  - Durable
  - Flexible
  - Affordable
  - Low maintenance
- PLEASE PROVIDE YOUR INPUT

History

- Topic came out of a 1998 joint meeting of the officers
  - Santa Clara Valley Chapter IEEE/Lasers & Electro-Optics Society
  - Optical Society of Northern California
- Incorporated into memorandum of understanding in 1999.
- Input requested via newsletter and chapter meetings.
- The subject of significant brainstorming among the officers and interested people in 1999 and 2000.
- Decision to purchase one laser kit for HS in 1999
- Action item given in CPO meeting at Photonics West ’00.

History

- Announced and held two ad-hoc meetings:
  - Wyndham Hotel 4/19/2000
  - Pelham Foundation 5/4/2000
  - Further meetings in 9/2001
- Attended Ad-Hoc Meetings
  - SCV LEOS Officers
  - OSNC Officers, Stanford OSA Chapter Officers
  - San Jose High School District Science Coordinators (representing 250 science teachers)
- Brief presentation to CPO in 1/20/2002
- Today's (2/21/2002) meeting at RAFT.

What we want to do:

- Many well-intentioned OPs have failed in the past. We want to make a sustainable program.
- Most OPs waste money. We want to be frugal.
- Use available resources (usually match local needs).
- Build success by establishing local linkages.
- We want to create a strong "need to know" about optics and (insert favorite topic here) in middle, high school and undergraduate students.
- We want to encourage and facilitate students with interest.
- We want to establish metrics to evaluate our success.
- Market optics, photonics,and STEM positively to teachers, students, parents, and the general public.

What we DON'T want to do

- We do not want to burn-out our volunteers.
- Not create another bureaucracy. Not enrich administrators.
- We do not want to re-invent the wheel.
- We do not want to put off teachers.
- We do not want to develop lots of content.
- We do not want to clash with curricular standards.
- We do not want to have more than one or two face-to-face meetings annually.

Philosophy to Date

- Philosophy is independent of location and discipline.
- Fiscally conservative & technically imaginative.
- Maximum return for minimum effort.
- Build a tradition of success, while increasing our equity and momentum.
- Avoid rigorous approach, allow teachers options.
- Assumptions
  - Volunteers have very limited time.
  - There will be no paid staff.
  - Entities exist for content, vetting, distribution, monitoring, etc.
  - Money is readily available locally (OP needs to pass legal muster).

Philosophy, continued

- Adopt best practices, and not re-invent the wheel.
- Identify and leverage existing OPs wherever possible.
- Local and national entities maintains resource lists.
- "Exploratorium" model
  - Low budget, low glitz, high robustness, high longevity.
  - Carefully crafted, objectively tested, and qualified content.
  - Continuous improvement of content (the hard part).
- The Ad-Hoc should play a "matchmaker" type of role, to establish linkages between various local entities:
  - Connect teachers, content, distributors, volunteers, societies…
  - Scalable without major ad-hoc intervention.
  - Eventually get involved only when a phone call is needed.
- Content should be as free as possible to end-user.

Of course this is an evolving philosophy and will change

Who We Are

- Technical societies and associations
- K-12 science teachers
- 3rd-party facilitators
- Manufacturers of kits and materials
- Grass-roots science workshops
- University and government programs
- Local Corporations
- Science museums

Technical Societies

	EMAIL	AD-HOC
• SCV-LEOS	X	X
• OSNC	X	X
• SCV-IEEE K-12	X	X
• SPIE	X	
• OSA	X	
• LEOS	X	

Educators

	EMAIL	AD-HOC
• ESUHSD	X	X
• CUHSD	X	
• Los Gatos HS	X	
• Gunn HS	X	
• Santa Theresa HS		
• SCCOE		
• BASA		
• PION		

Local Corporations

	EMAIL	AD-HOC
• Avanex	X	
• Cisco	X	
• Coherent	X	
• IBM Almaden	X	
• JDS	X	
• Crossbow	X	
• K2	X	
• KLA-Tencor	X	

Facilitators

	EMAIL	AD-HOC
• RAFT	X	
• WSV	X	
• DiscoverE	X	
• FOPAL		
• FOSJL		
• WestEd		
• CSTA		

Local Science Workshops and Science Museums

	EMAIL	AD-HOC
• Palham Foundation	X	X
• Schmahl Workshop	X	X
• CESE	X	
• Exploratorium	X	X
• Tech Museum	X	
• Discovery Museum		
• Science Clubs		

University and Gov. Agencies

	EMAIL	AD-HOC
• SJSU	X	X
• LLNL	X	
• LBL	X	
• UC Berkeley	X	
• Stanford OSA	X	
• SJ City College	X	
• UC Santa Cruz		

Project Proposals

Example Project Roadmap

- Steering Committee approves project.
- Identify local needs.
- Identify available resources.
- Obtain/develop content.
- Identify distribution.
- Donate content to distributor.
- Monitoring/continuous improvement.
- Steering committee annual review.

Example Project Players

- Identify Needs
  - Silicon Valley school district science coordinators.
- Identify Funding
  - National societies, NSF, local corporate and non-profit foundations.
  - IEEE K-12 to market our OP to them, send out proposals.
- Baseline Content, Fieldtrips, Video, CD-Rom, Presentation
  - Assume national entity will provide for custom CD-Rom and video production, and significant other content and curricula to distribute.
  - Local industries, academic, and government facilities, speakers…
- Identify Distributor(s)
  - RAFT for video and print media, teacher training.
  - WSV for equipment loan and circulation.
  - SVEC "Discover E" for presentations.
- Commence Continuous Improvement
  - TBD for non-profit or consulting firm.

Example Needs

- Needs will vary geographically and with time.
- Example from East Side S.J. High School District:
  - Consumables: Batteries, bulbs, paper towels, books, magazines.
  - Tools: meters, reference materials, useful web sites, laser kits.
  - Learning: Speakers, tours, shadowing days, tradeshows, internships.
  - Volunteer: Ask-an-expert, mentoring, judging, science fair projects.
  - Training: Develop lesson plans using optics, optics videos.
  - Grants: Fieldtrip, awards, sponsoring, Radio Shack, VWR Scientific.
- Getting teachers comfortable with teaching optics.
- Some teachers will not use resources.
- VHS Video and CD-Rom are preferred over the WWW.

Example Project Resources

- Funding
  - Government, society, individual, and corporate.
  - Equipment, journal, kit, and book donations.
- Volunteers
  - Judges for Sciencepalooza, mentors, speakers.
  - Webmaster, list maintenance, please ask.
  - Instructor training.
  - People to review and vet the material
- Executives that encourage volunteerism.

Example Project No. 001

- Problem
  - It has been identified that science teachers often spend their own cash on consumables such as batteries.
- Solution
  - Set up account at Radio Shack, e.g. $10 max. purchase.
  - Endow with donation from SCV-LEOS funds.
  - *Teachers may procure items until account is exhausted.*
  - Statements go to SCV-LEOS chairman.
  - How to have accountability?
  - How to get the word out?
- Is there a better long-term solution for batteries?

Example Project No. 002

- Problem
  - Schools lack science equipment for optics.
- Solution
  - Study how optics is integrated into curricula and review and approve the optics kits.
  - Procure optics kits and donate to 3rd-party, who *circulates the kits to middle and high schools*.
  - Provide training (required) for teachers to use kits.
  - Get national society to provide lesson plans.
- How does this integrate into the standards?
- How do we get the word out and get participation?
- Are there alternatives to circulation?

Optics Kit Project

- Need Funding (TBD)
- Kit Manufacturers: LaserLightLab, FOSS, Optics Suitcase (get free training deal)
- Content (kit manufacturers, societies)
- Evaluation (ESUHSD, Exploratorium)
- Focus Group (Schmahl Science)
- Distribution (propose RAFT and/or WSV)
- Training (volunteers, at RAFT, et. al.)
- Marketing (propose SVEC and/or CSTA)

Example Project No. 003

- Master Resource List for Teachers
  - Optics kits and equipment available.
  - Class lesson plans incorporating optics.
  - WWW sites, VHS, CD-Roms for content.
  - Career info for kids and councilors.
  - Volunteers, tours, speakers, etc.
  - Awards, funds, grants.
  - Essential books.
  - Training for teachers.

Living Lists to Maintain

- At local level
  - List of local teachers, schools, and projects, and what are their needs to encourage STEM.
  - List of local distributors, non-profits, OPs and what type of content and equipment is available.
  - List of local volunteer opportunities and companies that encourage volunteerism, tours, lectures, etc.
- Eventually, at national level
  - Aggregated best practices for OPs.
  - Content for instructors, students, parents.
  - Pointers to navigate to the above local web sites.

Proposals and Progress

Proposals for Optics Ed

- Adopt Optics Ed philosophy and model.
- Establish linkages at the local level between societies, teachers, foundations, distributors.
  - Seed money in SCV LEOS coffers.
  - Can raise money if properly documented.
  - Can generate and continuously improve content if a suitable firm can be identified.
  - Can manage and distribute material if a suitable firms can be identified.
  - Can get volunteers if leverage corporate executives.
- Initiate Radio Shack and Laser Kit projects.

Proposals for National Entities

- Create a master list(s) for nationwide resources in optical/physics education.
- Generate high-quality content for teachers.
- Qualify and improve the content.
- Share best practices from other OPs.
- Coordinate our OP with other OPs.
- Provide some part-time staff support to supplement our volunteers.
- Career push to parents and councilors.

Progress

- Held several meetings at the Pelham Foundation, and a core group of volunteers is "self-assembling."
- Donated 2 caches of optics journals to ESUHSD.
- Have surveyed local needs and available resources.
- Philosophy is solidifying, need input.
- David Fong established K-12 Fund within the IEEE foundation, which is a 503(c)
  - Permits tax-deductible donations
- Radio Shack Account established.

Progress

- Established e-mail reflector
  - ❖ optics-ed@ieee.org
  - – Minimize the need to physically meet
  - – Over 100 members
- Established web page
  - ❖ www.ewh.ieee.org/r6/scv/k-12/optics.html
  - – For use of the group
  - – Need a webmaster
- Established promotion partner
  - ❖ http://www.svec.org/news/societyevents.html

New Business

- We need a better name!
- A more formal steering committee?
  - – Propose more active ad-hoc members.
  - – Representing non-profit or educational entity.
  - – Rotating leadership.
  - – Call for participation.
- A permanent home that is larger for our infrequent face-to-face meetings.