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

2/21/2002

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Agenda

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

• What should we be doing?
• 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
  – 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

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### Local Corporations

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### Local Science Workshops and Science Museums

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### University and Gov. Agencies

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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

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.