

# Lessons from Professors

What the IEEE Learned from Global University Outreach

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IEEE Standards Education Committee



# Outline

**IEEE University Outreach Program**

**Observations**

**Opportunities**

**Highlighted Conclusions**

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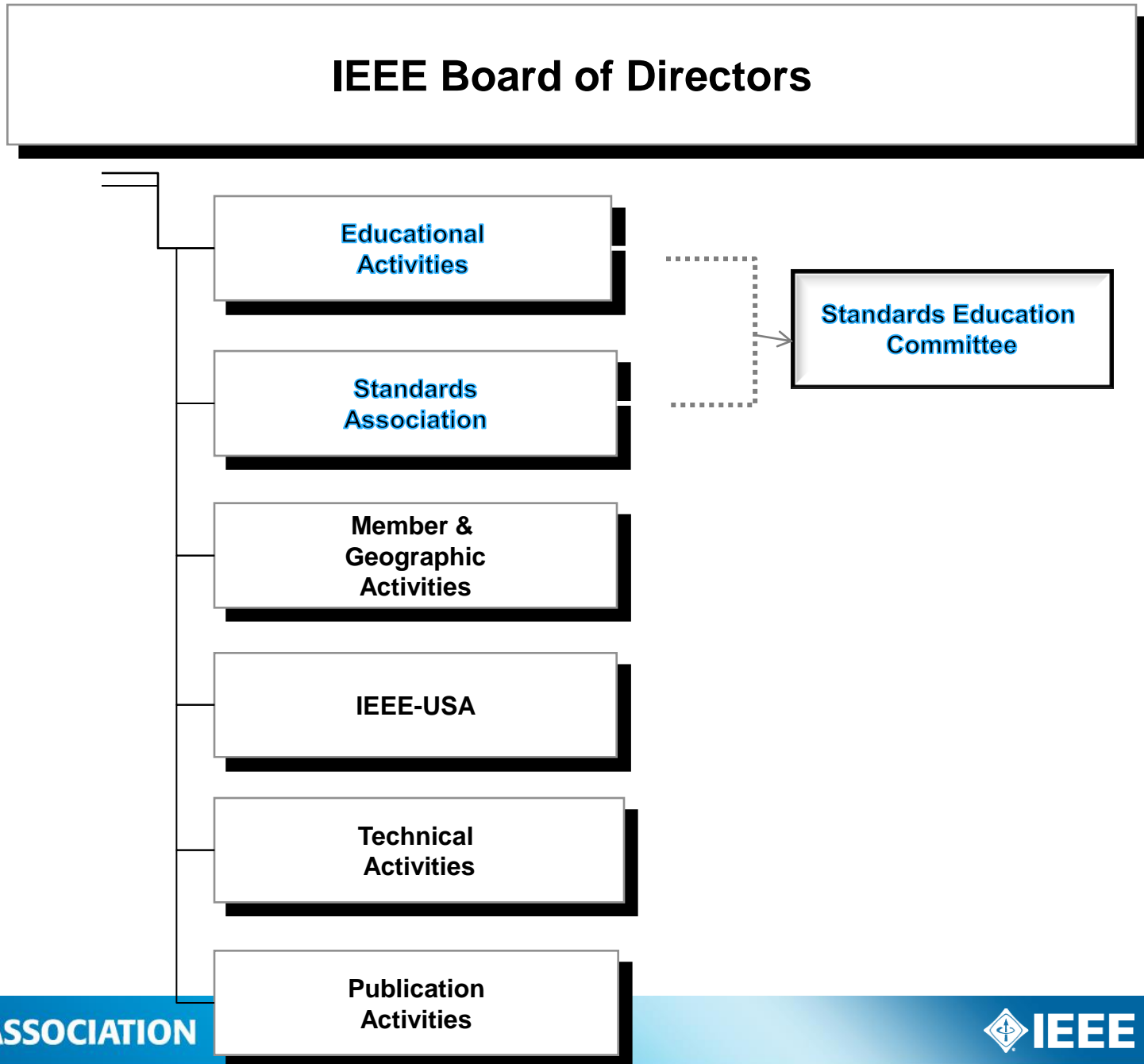
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# IEEE Board of Directors

## Standards Education within IEEE Board Structure



# IEEE University Outreach Program

## WHAT

To determine what would be useful to universities for introducing "the importance of standards" into the engineering course curriculum.

## HOW

F2F visits with faculty and administrators for an exchange of views and data gathering about best approaches and materials.

Short presentation, followed by "Discussion Topics."

# 17 Universities Visited in 7 months

**Tsinghua University (Beijing)**  
**Beijing University of Posts and Telecommunication (Beijing)**  
**Princess Sumaya University for Technology (Amman, Jordan)**  
**Jamia Millia Islamia University (New Delhi)**  
**Delhi Technological University (New Delhi)**  
**India Institute of Science (Bangalore)**  
**Indian Institutes of Information Technology (Bangalore)**  
**University of Strathclyde (Glasgow)**  
**Durham University (Durham, UK)**  
**Kingston University (London)**  
**Imperial College London**  
**Queen Mary University (London)**  
**University of Illinois--Urbana-Champaign (U.S.)**  
**Purdue University (Indiana, U.S.)**  
**DeVry University—North Brunswick (New Jersey, U.S.)**  
**University of California--Irvine (U.S.)**  
**Stanford University (California, U.S.)**

# Examples of Discussion Topics

Are standards and their importance a part of your current engineering course curriculum? If so, at what level, and how are they taught?

What about the focus of such education? Should it be more technical, or should it include the standards development process, including IPR issues?

Do you think it is important for students to have an understanding of the industry standards applicable in their fields of interest?

Which of these would be helpful to you in teaching about industry/technical standards?

- Access to standards online
- Coursework assignments and lectures
- Books
- Case studies online
- Tutorials online
- Lectures online
- Face-to-face workshops or seminars
- Independent study
- Internships with companies or standards development organizations

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# Observations

There are practical obstacles to adding standards to the curriculum ...

- Schools are overwhelmed by the quantity of currently required material.
- Professors don't feel they know enough about standards to teach the subject well—or assess students' work.
- Necessary materials don't exist.

And there are philosophical obstacles ...

- University education should teach EE concepts, focus on fundamentals, and standards are not part of that.

# Observations *(cont'd)*

The state of standards education at the university level is diverse.

Where a school stands on the practical-analytical continuum is key to the current inclusion/exclusion of standards in the engineering curriculum.

There are different needs at the undergraduate and graduate levels.

- Undergrads require basic level of understanding that standards and standards organizations exist
- ...but can also use standards right away at project level.
- Graduate students will use standards related to specific fields of interest
- ...but can also explore the standards development process and the intersection with business interests.

There are differences among countries ...

- Short summer courses on standards suggested in China; certificates in India.

And among universities ...

- Many kinds of internship programs exist.

# Observations *(cont'd)*

## **And there are common themes ...**

Educators prefer a distributed model for standards education rather than dedicated courses or programs.

Employability is always an important issue for students.

Industry involvement—bringing the “real world” to the campus--is welcome.

Add value without adding to the burden on professors and your material will be used.

Those who would change standards education must decide the most important things they want to impart about standards.

# What Should Students Know?

Give students an understanding of the interplay of the three fundamental dynamics of Standards:

- **Technology, Economics, and Politics**

Show them how standards play a part in their lives.

Teach them to think critically about standards development and technology solutions.

- Are standards keeping pace with technical change?
- Does the standards development process produce good technical solutions?
- How—and why—are standards fluid?

Explain how standards help drive innovation.

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# Opportunities

## Case studies.

- Students love real-world examples, and there is always a shortage of them.
- The more famous, the more contemporary, the better.
- *Show* the intersection of technology, economics, politics.

## Coursework.

- Using the distributed model, find “bite-sized” ways to include standards education in meaningful ways.
- Ancillary materials should include assignments and assessment guides.

## Professionalism.

- There is a place for standards education in courses on the engineering profession, alongside ethics, law, social responsibility, etc.

# Opportunities *(cont'd)*

## Guest speakers on standards topics during regular semesters.

- Lectures, live or on video.
- Especially at undergrad level, this is one way to give students just the basics.

## Video interviews with technology experts who work in standards.

- Interviews are an enjoyable way to learn about the work of creating standards.
- Can stop/start videos to include dialogue with professors to encourage critical thinking.

## Industry seminar programs.

- Guest speakers at student events focused on learning about the profession.
- Many of these are focused on graduate level.

# Opportunities *(cont'd)*

## Technology workshops.

- “Demystifying IEEE 802 Standards,” e.g.
- Can focus on one school or open up to a whole region.

## Teacher training.

- “Teach me how to teach about standards.”
- Help teachers mentor students’ use of standards in their capstone projects.
- Can include ancillary materials, internships, workshops.

## Internships.

- Many professors thought standards internships would be popular with students—and possibly with faculty, too.
- Internship should be a partnership between standards developing organization and corporation.
- Summer or full semester possible.



# Opportunities *(cont'd)*

## IEEE Student Application Papers + Grant.

- Papers must illustrate how specific standards were applied to a task in the classroom and impacted the design process.
- Expand existing IEEE program and make it fit better into real world of universities.

## Competitions.

- For fun and profit, make standards more interesting for students.

## Certificates attesting to standards training.

- Following a series of seminars, e.g.

## Teach readability of standards.

- Help students learn how to get the most out of the standards they use.

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# Highlighted Conclusions

## Distributed model preferred over dedicated model.

- Overwhelmingly, professors say they would like to see standards education included when appropriate and relevant in coursework, assignments, lectures rather than offered as separate, stand-alone courses or programs.

## There is great openness to the idea of including standards education and equally great need for materials and support to do so.

- Those who support standards education need to choose the most critical elements, provide documentation, and train the trainers.
- **It can happen with us.**
- **It won't happen without us.**

# IEEE Standards Education Contacts

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**Thank you!**