Professional Associations in K-12 Computer Science

ITiCSE 2010
Speakers

- Chris Stephenson, Computer Science Teachers Asoc.
- Judith Gal-Ezer, The Open University of Israel
- Margot Phillipps: ACE Training Ltd.
- Jan Vahrenhold, Technische Universität Dortmund
Setting the Context for the Panel (Chris)

- Professional, subject-based associations provide an opportunity for achieving sustained and systemic change.
- They give teachers a voice to contribute to their own professional standing.
- They provide a context for shared purpose and shared action.
- They provide key services and mentoring to support professional growth (resources, curricula, professional development).
- They provide community to isolated teachers, especially those working in a field such as computer science which many do not understand or value.
Panel Purpose (Chris)

• To examine the challenges associated with establishing and maintaining computer science subject associations and ensuring their potential for improving all aspects of teaching and learning

  – Describe the context for such organization in our countries
  – Provide a brief history of the relevant organizations
  – Describe our missions and goals
  – Describe ways in which our goals have been met to date
  – Describe our biggest challenges
  – Describe how our organizations support the discipline of computer science
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Curriculum, Teachers, and Research

Panelist: Judith Gal-Ezer, Open University of Israel
(Panel statement presented by Chris Stephenson)
CS K-12 Education in Israel

Four Elements that make it!

• A well-defined curriculum (including written course text books and teaching guides)

• A requirement of a mandatory formal CS teaching license

• Teacher preparation programs (including CS undergraduate and CS teaching certificate programs)

• Research in CS education
History of the Organization (Israel)

• Since 2000 (exactly 10 years!), after the HS curriculum, was well established and applied
• Funded mainly by the Ministry of Education
• Dramatic reductions in funding (800k-900k on the first 3 years, 650k-700k on the next 4 years, 300k-450k on the last three years)
Mission and Goals (Israel)

• Fostering professional leadership of CS teachers
• Helping create a professional community of CS teachers
• Supporting, assisting and consulting academic CSE groups, local teacher centers, CS teacher educators and researchers
• Collecting and distributing CSE knowledge and experience
• Researching and evaluating the effectiveness of CS teachers needs and of the center’s activities
How We’ve Met Those Goals (Israel)

- Most important: building a leading teachers community (the basis for ALL other activities)
- Other activities: workshops / courses, meetings
- An active web site and a journal
- An annual conference and a summer seminar, which facilitate meetings and discussions between teachers and CS researchers from academia and industry, sharing pedagogical activities between colleagues, and assist in the social integration process of teachers from different backgrounds
Our Biggest Challenge (Israel)

• Stay alive (mainly from the budgeting aspect)

• Help teachers survive the difficulties they have to deal with:
  – Frequent changes in curriculum, and right now a massive update of the program
  – Maintaining the discipline as an elective, same as Physics, Biology, Chemistry
  – Getting familiar with new technologies
Supporting the Discipline (Israel)

- Act as an advisory junction for all parties involved:
  - Ministry of Education,
  - committees
  - teachers
  - academic institutions
  - researchers
- Promoting HS women students (with Google)
- Encouraging attending international conferences and visiting international websites
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Building Bridges, Relationships, and Credibility

Panelist: Chris Stephenson, Computer Science Teachers Association
CS K-12 Education in the United States (Chris)

- Computer science education is under severe pressure in the face of other educational issues and mandates
- Computer Science is broadly misunderstood and is often confused with educational technology/computer literacy
- Curriculum decisions made at the state or even school level therefore there is little consistency
- Teacher certification requirements are either non-existent or nonsensical
- Very difficult for teachers to get relevant, ongoing professional development to keep their technical and teaching skills current
History of the Organization (Chris)

- ACM formed CSTA in 2005 to serve as membership organization that speaks to the issue of K-12 computer science education from the perspective of the practitioners.
- CSTA today is a world-wide membership organization with 7000 members in 101 countries.
- We are also:
  - an advocacy organization
  - a provider of professional development for teachers
  - a research organization
  - a provider of resources
Mission and Goals (Chris)

• The Computer Science Teachers Association is a membership organization that supports and promotes the teaching of computer science and other computing disciplines. CSTA provides opportunities for K-12 teachers and students to better understand the computing disciplines and to more successfully prepare themselves to teach and learn.

• Goal and Objectives:
  – Promote a Better Understanding of Computer Science
  – Develop Research and Resources
  – Support National Standards
  – Support Teacher Excellence
  – Promote computer science as a field of study and as a career destination that provides a wealth of opportunities to students regardless of their gender, race, or socio-economic status
How We’ve Met Our Goals (Chris)

• **Research**
  – National studies (CD education, certification, curriculum)
  – Policy/issue papers

• **Resources**
  – Policy and Information Documents
  – Brochures for students and parents
  – Classroom posters for teachers and students
  – An online web repository of teaching and learning materials
  – Bi-monthly publications, website, blog, podcasts, videos

• **Curriculum**
  – ACM Model Curriculum and implementation support documents

• **Professional Development**
  – Annual conference
  – TECS workshops
  – Equity workshop
Biggest Challenges (Chris)

- The lack of a national curriculum or teacher certification standards (need to work on a state-by-state basis)
- Diminishing number of CS courses being offered at the secondary level
- Lack of policy-maker understanding of computer science as a discipline
- Lack of funding and opportunity for teacher professional development
- Lack of funding for computing hardware and software
- Poor student perceptions of computer science
Supporting the Discipline (Chris)

• We must help policy makers understand the importance of computer science education and its role in employability and our national economies

• We have to support computers science as a rigorous academic discipline and not a technical/vocational trade

• We have to begin to teach computer science in a way that is more engaging and relevant for all students

• We have to make sure that computer science teachers have the required grounding in the discipline/science
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A Work in Progress

Panelist: Margot Philipps, ACE Training Limited
CS K-12 Education in New Zealand

• Currently: no uniformity across schools (in contrast to other academic subjects)

• Assessment:
  – Unit Standards (US)
  – TIM Achievement standards (AS)
  – Generic Technology AS

• Nothing suitable to assess, for example, number and coding systems

• 2009: Body of Knowledge (BoK) formed

• 2010: Draft AS for level 1 (of 3) to be implemented in 2011
History of Organizations -NZ

• CETA: 50 years old.
  – Respected and valued by Business teachers

• NZIST: New Zealand Information Science Teachers' Association (Inc.)
  – Established 2000
  – Grew out of regional groups and NZ Computers in Education Society and spent many hours negotiating with MoE to get a Bursary subject (previous year 13 qual)

• NZACDITT: New Zealand Association of Computing and Digital Information Technology Teachers
  – Established 2009 : in response to the work of an experts panel convened by the MoE and the subsequent formation of the BoK
  – 175 schools (about 50%) and 360 members
Mission and Goals of NZACDITT

• Strengthen, encourage and improve the teaching of a broad range of Computing, Information and Digital Technologies in NZ Secondary schools

• Promote, advance, support and guide teachers of a broad range ...

• Facilitate, negotiate and foster links/consultation among teachers/educators and government institutions on any matters relating to the subject

• Assist in the development, maintenance and review of the guidelines

• Promote the education, professional development and members up-skilling

• Assist teachers of the subject to keep up to date with current practice and tertiary and industry developments

• Promote and advance the profile/image of the subject to students, government and educational institutions, IT professionals/organisations, industry and the public

• Affiliate with any organisation considered to be in the interest of the society
How NZACDITT Met Those Goals

• Some members of the committee have been involved in the writing of new Achievement Standards for the first level of the 5 strands of DT.

• Some members of the committee have been involved in the writing of new Teaching and Learning Guides for the first level of DT.

• Forming relationships with industry (NZICT) and the Computer Society (NZCS).

• One day Conference October 2009, held simultaneously in 2 sites.

• A 2 day symposium is planned for November 2010. This is being organised with the support of NZICT (Industry umbrella organisation) and funding from NZICT member companies.

• Google group for members to discuss new developments, share resources etc.
(NZACDITT’s) Biggest Challenges

• Ensure that the 5 strands are treated as subjects each in their own right. (Implications for scholarships, tertiary recognition etc.)
• Ensure that the BoK is a comprehensive, cohesive document leading to standards which are achievable.
• Professional development for teachers will become more serious as level 2 standards are introduced (2012) and level 3 in 2013
• Avoid volunteer burn-out
• Keep credibility with members as work with Ministry
Supporting the Discipline

• The BoK and Standards are a work-in-progress
• The symposium in November will consist of workshops, presented by a mix of industry and skilled teachers across the 5 strands, plus “The Digital Society”. Teachers will choose at most 3 strands and the workshops will focus on the knowledge and practice required to assess the standards.
• DTG, ministry funded project has helped form regional groups and Tim Bell has visited many with unplugged work
• Uncertain if there will be future PD funding from the Ministry
• Universities and other tertiaries and Industry connections encouraging, although such relationships are in their infancy
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Supporting K-12 Computer Science by a Successful Association and Academia Symbiosis

Panelist: Jan Vahrenhold, TU Dortmund, Germany
(proud member, but not speaking on behalf of ACM, GI, and CSTA)
CS K-12 Education in Germany

- German K-12 curricula in a nutshell:
  - 16 federal states, each responsible for its K-12 curricula.
  - Three major types of secondary schools, different focus in each.

- “To teach CS or not to teach CS, that is the question.”
  - Most federal states offer pre-college CS in 11th-12th grade.
  - 5th-10th grade: variations on a theme (see [Weeger, 2007]).
    - ICT (Baden-Württemberg); Media design/competencies (Bremen);
    - CS (Bavaria, Northrhine-Westphalia) [just to name a few].
    - Elective vs. mandatory; integrated vs. stand-alone.

Rhetoric question: How might a curriculum for a setting that diverse look like?
CS K-12 in Northrhine-Westphalia

- Northrhine-Westphalia (NRW):
  - Most populous, economically most powerful federal state.
  - 23% of all German K-12 teacher students. (48,000 / 212,000)

- CS K-12 in NRW:
  - **ICT** taught in 7th-9th grade, **CS** taught in 9th-10th grade (elective).
  - Most recent *curriculum* for 5th-10th grade dates back to 1993…
  - National *standards* (since 2008), alas, no implementation yet.

- Steadily increasing number of fully qualified CS teachers.

- Post-University training endorsed but not mandatory.
“Informatiktag NRW”(*)

• **Full-day convention** for CS teachers, held since 2002.
  – Regional chapter of the CS Education section of the “Gesellschaft für Informatik” (“German CS Association”, GI).

• Workshops, invited presentation(s), chapter meeting.
  – **Large number of participants** (2009: 400 [sold out]).

• Workshops designed and held by:
  – Senior teachers (presenting, e.g., best practice)
  – Apprentice teachers (presenting graduation projects)
  – Researchers (presenting, e.g., CS Ed. results)

(*): Similar conventions are organized in most federal states. For patriotic reasons, I am describing “our” convention.
Goals: Networking, Training, and More

• Programming-related workshops:
  – Greenfoot – Learning Java with Simulations and Games (Michael Kölling)
  – Introduction to Programming with Logo (Juraj Hromkovic, Andreas Sprock)
  – Visual Programming Languages in 5th-10th Grade (David Tepaße, Renate Thies)

• Methodology workshops:
  – Self-Organized Learning in CS Classes (Stefan Moll)
  – Cooperative Modeling (Heinz Ulrich Hoppe, Tamara Malzahn)

• Workshops on UML, Beaver, Cell Phones, Office...
How We Met These Goals: Symbiosis

• Professional association provides:
  – Public relations infrastructure, network among its members.
  – Access to workshop leaders outside academia.
  – Access to policy makers to maintain status as “training event”.
  – Legal status which allows for collecting fees from vendors.

• Academic partner provides:
  – Access to workshop leaders/invited speakers from academia.
  – Access to policy makers to obtain public support.
  – Personnel (e.g. student volunteers, organization committee).
  – Lecture halls and seminar rooms free of charge.
Evaluation and Challenges

• Supporting the discipline:
  – Regional chapters of the GI do K-12 CS a huge favor.
    • Key ingredient: Parties that mutually respect each other.
  – Conventions way more popular than formal conference.
  – Unique opportunity for researchers in CS Education.

• Challenges:
  – Influence policy makers to strengthen support for K-12 CS.
    • Pre-college CS not worth the same credit as, e.g., Physics.
  – Expand network among teachers and between schools.
    • Average number of CS teachers/school only little higher than two.
  – Help establishing K-12/University partnerships.
Summary

• Curriculum, Teachers, and Research
  [Judith Gal-Ezer, Israel]

• Building Bridges, Relationships, and Credibility
  [Chris Stephenson, USA]

• A Work in Progress
  [Margot Philipps, New Zealand]

• Supporting K-12 Computer Science by a Successful Association and Academia Symbiosis
  [Jan Vahrenhold, Germany]
• K-12 CS teachers’ conventions in most federal states:
  – Baden-Württemberg (since 2008)
  – Berlin & Brandenburg (since 2001)
  – Mecklenburg-Vorpommern (since 1993)
  – Niedersachsen & Bremen (since 2006)
  – Sachsen & Thüringen (since 1998)
  – Sachsen-Anhalt (since 2005)
  – Schleswig-Holstein & Hamburg (since 2004)
  – …

• Concept adopted by ETH Zürich in 2010.
Backup Slide: Informatiktag NRW 2009

• Invited talk
  – Coffee break and vendor’s exhibition

• Workshops I
  – Lunch break and vendor’s exhibition

• Workshops II
  – Coffee break and vendor’s exhibition

• Chapter Meeting
  • Includes Beaver prize giving ceremony.

Registration cost: 5-20 €.