Keeping Faculty and Curriculum Current

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The need to keep faculty and curriculum current is now, more than ever before, critical and challenging. **Due to emerging technologies, the workplace is constantly evolving and the faculty and classroom environment have to change with it.** Heavy teaching loads and the era of ever tightening departmental budgets make it imperative to keep faculty abreast with easily accessible resources and affordable professional development events.
Keeping Faculty and Curriculum Current
How Can This Be Done?

- Ingredients
- Faculty
- Leadership/Champions
- Professional Development
  - Technology
  - Curriculum
  - Training
  - Implementation
- Program
- Sustainability
- Example - Physics
Faculty

- Find faculty who are interested
- Find faculty who can be made interested
- Compelling Arguments
- Supportive Administration and “Industry”
Leadership/Champion

- Someone(s) has to initiate and sustain the effort—both locally and “nationally”

- Someone has to “push” the need for keeping faculty and curriculum current

- This has to be done for a long period of time, probably ten years or more

- This means that leaders and champions will change
Professional Development

- Find ways to provide meaningful professional development activities on an on-going basis that emphasize

- Use of **technology** in the curriculum that students will see when they enter the workforce or need to use to be able to better train for the “next level”

- **Curriculum** that utilizes the technology and is, hopefully, student research-based

- Provides “hands-on/minds-on” **training** during the professional development activity

- Provide concrete and documented ways that the curriculum and technology has been **implemented** in a two-year college environment
Program

- Locally
  - Look at your program periodically (say every 3 to 5 years) to see if it fits the needs of the workplace or the “next level”
  - Be willing to change if change is necessary

- Nationally
  - Try to maintain a continuous professional development program that will allow faculty to remain current and to be trained in new curriculum, technology, and how to maintain this at their institutions
Sustainability

- Maintain the leadership/championship
- Maintain the professional development activities
- Remain abreast of current trends and decide what you need to do for your students and your program
Example - Physics

Why Physics?

- It has gone through this process and is continuing efforts to keep faculty and curriculum current
- It is, by nature, a problem-solving discipline and has faculty interested in solving this problem
- Many of its faculty are interested in technology (they like toys) and how to use it in a meaningful way in instruction
- Over the last 2 decades, physics has developed research-based curriculum that have been tested with students at many levels of formal education
- It is the only discipline area that I know much about!
Setting the Stage - A Little History
Two-Year College Physics circa 1989

- Very little information available in general about the role that two-year colleges (TYC) play in:
  - teaching physics - e.g., how many students take physics at TYC, what courses were offered, faculty information,…;
  - curriculum and curriculum development; and
  - what role the emerging technology (principally computers) would play in the physics program.

- Types of information available
  - Print publications - journals, textbooks;
  - Formal instruction in college;
  - Communications by mail or telephone;
  - On the job training/experience; and
  - Colleagues

- The defining event

- First ever national meeting of TYC physics faculty to discuss physics at two-year colleges
- Organized through the American Association of Physics Teachers
- Primary external funding through the Division of Undergraduate Education of the National Science Foundation
- Print version of the conference proceedings, conclusions and recommendations
- It helped established what needed to be done
What Needed to Be Done?
The Critical Issues Identified

- 1. There is a feeling of isolation experienced by many TYC physics faculty;
- 2. There is a need to network with other TYC faculty;
- 3. There is a need to remain current in pedagogical approaches to teaching physics;
- 4. There is a need to know how many students take physics at two-year colleges; and
- 5. There is a need to know what encompasses a physics program at TYCs (and how to keep it current).
Ingredients - Faculty I

- We had a small core of faculty interested - about a dozen with maybe 20 or more moderately interested (out of 1700+ nationally)
- We were convinced that they were more, we just had to find them and convince them
- We were supported mostly by the American Association of Physics Teachers with occasional, but timely and essential, funding from the National Science Foundation*
- The need for the project, TYC21
Ingredients - Faculty II
TYC21, 1994-2000

- Two-Year Colleges in the Twenty-First Century: Breaking Down Barriers
- Organized through and partly financed by the American Association of Physics Teachers
- Primary external funding through the Advanced Technological Education program of the National Science Foundation
- Print version of the “results” of their findings
- Online pdf version:
  - [http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/6b/d4.pdf](http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/1a/6b/d4.pdf)
What TYC21 Did

- Addressed critical issues 1 and 2
- “Galvanized” the TYC physics community
- Provided regional and national meetings
- Networking
  - How to establish a network of TYC faculty (15 regions)
  - How to sustain the network
- Isolation
  - Most TYC physics faculty are isolated
  - How to “combat” isolation
- Helped with the first ever national study on TYC physics
National Study of TYC Physics

- Conducted by the American Institute of Physics in 1996
- Primary external funding provided by the Advanced Technological Education program of the National Science Foundation
- Principal published results
- Partial follow-up study in 2001-2002 by AIP
AIP Survey
A Snapshot

- 120,000 students take physics per year at TYCs ~ 25% of all who take introductory physics
- 60% of TYCs who teach physics have 1 or less full-time physics faculty members
- 31% of students taking physics at TYCs are female
- 15% of students taking physics at TYCs are minorities
- 14% of TYC physics faculty are women
- 4% of TYC physics faculty are minorities
Ingredients - Leadership/Champions

- Post 1989, several individuals (the Champions) helped prompt the TYC physics community into action that would have a long term influence.
- Decisions were made by these individuals who recruited others (collectively the Leaders) and groups/organizations to help.
- The leaders have changed over the years, but the core is still there (even after 18 years).
- New leaders/champions are “blended in” with the existing group as the old leaders/champions “retire”.
Ingredients - Professional Development I

- Address the third critical issue of “a need to remain current in pedagogical approaches to teaching physics”, i.e., professional development - PD, through a series of PD opportunities

- Designed plan of action through two approaches
  - PD opportunities at regional and national meetings
  - Externally funded projects

- PD opportunities at regional and national meetings
  - National AAPT meetings
  - Sectional AAPT and regional meetings
  - Prior to, during, and post TYC21 initiative
What Was the Informal Plan of Action Professional Development II

- Externally funded projects - all funded by the National Science Foundation
- Two-Year College Workshop Project, 1991-2006
- Physics Enhancement Program for Two-Year College Physics Faculty, 1991-2005
- ATE Program for Physics Project, 2006-2009
- Others
Professional Development IIa
Two-Year College Workshop Project

- PI, Curtis Hieggelke, Joliet Junior College, IL
- Co-PI, Tom O’Kuma, Lee College, TX
- Three Day Intensive Workshops at TYC Sites around the Country emphasizing current curriculum and technology and their implementation into the physics classroom
- 61 workshops, 23 different TYC sites as host, 52 different workshop leaders, 1,304 participants from 46 different states, Puerto Rico, and Marshall Islands, 336 different TYCs, and 92 different HSs
- [http://tycphysics.org](http://tycphysics.org)
Professional Development IIb
PEPTYC Project

- PI, Robert Beck Clark, Texas A&M University
- Co-PI, Tom O’Kuma, Lee College, TX
- One or two year programs with 2 week intensive May Institutes (“Physics Boot Camps”) at TAMU and 2 academic year follow-ups at TS AAPT meetings
- Modern physics topics and pedagogical curriculum topics
- 7 programs, 148 TYC faculty representing 128 TYCs, 35 states and Puerto Rico
Professional Development IIc
ATE Program for Physics Faculty Project

- Co-PI, Tom O’Kuma, Lee College, TX
- Co-PI, Dwain Desbien, Estrella Mountain Community College, AZ
- Three Day Intensive Workshops and Conferences at TYC Sites around the country emphasizing current curriculum and technology and their implementation into the physics classroom and sustainability at their institutions
- 4 workshops, 4 different TYC sites, 88 participants from 25 states, Puerto Rico and American Somoa, 33 TYCs and 49 HSs
- [http://www.physicsworkshops.org](http://www.physicsworkshops.org)
Ingredients - Program

- What needed to be done?

- A Project
  - To Conduct Site Visits
  - To Conduct a Survey of Physics Programs
  - To Report the Project Findings
  - Also Addressed Critical Issue 5 directly

- Strategic Programs for Innovations in Undergraduate Physics at Two-Year Colleges Project
Ingredients - Program
SPIN-UP/TYC, 2002-2005

- Organized through and partly funded by a collaboration of Lee College, the American Association of Physics Teachers, and Southwest Texas Junior College
- Primary external funding provided by the Advanced Technological Education program of the National Science Foundation
- Print version of the “findings
  - Mary Beth Monroe, Thomas L. O’Kuma, and Warren Hein, Strategic Programs for Innovations in Undergraduate Physics at Two-Year Colleges: Best Practices of Physics Programs, AAPT, College Park, MD, 2005
- Online pdf version:
What SPIN-UP/TYC Did

- Conducted training for doing site visits, writing site visit reports, and case studies
- Conducting national survey to determine what constitutes an exemplary TYC physics program
- Conducted 13 site visits to exemplary TYC physics programs

- Conclusions
What are the Key Ingredients of an “Exemplary TYC Physics Program”

- Caveats
  - Many outstanding TYC physics programs – we chose 13
  - Adhered to the Selection Criteria – particularly geographic
  - Programs are individualistic making it hard to generalize

- Three Broad Areas of Physics Program
  - Faculty
  - Students
  - Faculty-Administration

- Others
  - Training of future teachers
  - Attracting underrepresented minorities
  - Technical Programs

- Transfer of students
Common Features of an “Outstanding Two Year College Physics Program”*

- Dedicated Physics Faculty
- A Real and Sincere Interest in Students
- Collegial Relationship with Other Faculty
- Good Working Relationship with Administration

*Based on SPIN-UP/TYC Site Visits
Ingredients - Sustainability

- Maintaining the Leaders/Champions
- Through networking and finding a common “issue”
- New Faculty Training Conference, March 6-8, 2008 at Delta College, University Center, MI

- Working with Students
- Workforce Involvement