

Evolution of a Computer Science Program toward Globalized Technological Education

Edward J. Wilkens
Mikhail S. Brikman

Computer Science Department
Salem State College
Salem, Massachusetts, USA

Why Bother with Globalization?

Undergraduates

| | |
|------------------|-------|
| Salem State | ~5000 |
| Computer Science | ~150 |

International Undergraduates

| | |
|------------------|-----|
| Salem State | 265 |
| Computer Science | 36 |

Computer Science Graduates

2004

| | |
|--------------------------------------|----|
| Total | 15 |
| International (+permanent residents) | 9 |
| Countries Represented | 9 |
| Total Highest Honors | 3 |
| International | 1 |
| Total High Honors | 5 |
| International | 5 |
| Total Honors | 3 |
| International | 3 |

Why Computer Science at Salem State?

- SSC's Center for International Education uses placement agencies
 - ◆ Japan Study Abroad Center
 - ◆ National Collegiate Institute (Japan)
 - ◆ KAJU Overseas Educational Center (Korea)
 - ◆ Aspect (Europe)
- Cost is a big factor, just as for American students

International vs. Local Students

International students often have

- stronger Math and Science skills
 - ◆ Necessity to spend class time on simple math / science examples for local students bothers some international students
- little or no prior access to computer technology
 - ◆ Open labs are intimidating for some
 - ◆ Increased use of Closed Labs helps solve
- experienced different educational systems
 - ◆ More rigid path through pre-chosen major
 - ◆ Fixed schedule for all with the same major
 - ◆ Very different grading systems
 - ◆ All these are a problem for advisors

Early Steps

- Large percentages chose "practical" majors like business and computer science on admission
 - ◆ Many initial CS majors quickly transfer to MIS
- Possible causes of major change
 - ◆ Difficulty with simultaneous ESL and CS1 courses
 - ◆ Late arrival, yielding poor choice of first courses
- Use of Preprogramming course
 - ◆ The original intent of this course was to provide problem solving skills in a simple programming environment to prepare for CS1.
 - ◆ Schedule around the time consuming ESL courses to make sure it is available to new International students

Multicultural Opportunities

- In previous experiences, international students were large groups from a few countries.
- Salem State has a broad range of countries, especially in those choosing computer science.

Origins of CS International and Permanent Resident Students at SSC

| | | | | | |
|-----------|-------------|--------------------|-------------|------------|----------|
| Albania | Cyprus | Columbia | Afghanistan | Cape Verde | Cambodia |
| Bosnia | Greece | Dominican Republic | Israel | Kenya | China |
| Lithuania | Italy | Ecuador | Morocco | Nigeria | India |
| Romania | Netherlands | Haiti | Pakistan | Senegal | Korea |
| Russia | Sweden | Venezuela | Syria | | Nepal |
| Serbia | | | | | Vietnam |
| Ukraine | | | | | |

Team Composition in Human Computer Interface Course

| Spring 2003 | | | | | Spring 2004 | | | |
|----------------|----|----------|--------|----------|-------------|-----------|---------|----|
| Albania | US | Cambodia | Cyprus | Kenya | Japan | Greece | Albania | |
| Dominican Rep. | US | Kenya | US | Pakistan | US | Morocco | China | US |
| Ecuador | US | US | US | US | US | Palestine | Kenya | US |
| Nigeria | | | | US | | Syria | Vietnam | |

Home Country Interaction

- Summer visits home:
 - ◆ Kenya – quick return visa approval
 - ★ Consulted about Kenyan oriented senior project
 - ◆ Morocco – one semester delay
 - ★ Summer job, no exit notification
 - ◆ Palestine – two semester delay
 - ◆ Pakistan – no renewal
 - ★ five year student visa expired
 - ★ Transferred two courses from a Karachi university

Capstone Project and Internship Definition

- Current – informal by student or supervisor
- Proposed - externally supportive: website based
 - ◆ invitation to propose projects
 - ◆ descriptions of departmental interest
 - ◆ student resumes for specific country and local internships
 - ◆ internship descriptions
- Proposed - departmental relationships with a few countries of origin
 - ◆ Japan and Kenya have more than 70 SSC undergraduates each, and Albania more than 20

Curriculum Issues

- Internationalization and Localization are required by Curriculum 2001, the definition of required Bodies of Knowledge for accreditation
- A large body of international students adds additional relevance and immediacy to these topics
 - ◆ Both local and international students will learn what is expected of exported software and interfaces
 - ◆ Cultural differences and other issues may be knowledgably discussed

Comments in Class

- So what *is* an American job?
- If a person who speaks many languages is multilingual, and one who speaks two languages is bilingual, what is a person who speaks one language?
- American!

Course Topics for Globalization

- Internationalization
 - ◆ Identification and isolation of culturally specific parts
- Localization
 - ◆ Creation of culturally specific instances of the isolated parts
- Courses
 - ◆ Software Engineering
 - ◆ Human Computer Interfaces
 - ◆ Database
 - ◆ Social and Professional Issues

Components

- Some culturally specific parts:
 - ◆ GUI
 - ◆ Text
 - ◆ Numbers
 - ◆ Currency
 - ◆ Dates
 - ◆ Images
 - ◆ Color usage
- Multiple languages create multiple localizations
- Common use of English for most technological applications may lead to a single localization
 - ◆ Care must be taken to isolate other cultural issues even under a single language

Tools

- Java Unicode base
- Design Patterns to implement localization
 - ◆ e.g. Abstract Factory and Strategy
- Localization of icons and sounds
- Dialog, menus, and message boxes
 - ◆ room for expansion with message size
 - ◆ Configuration or properties files to hold the localizations
- Dates should use names of months to avoid format confusion
 - ◆ This arises in our classes as well, with so many countries represented