Pronunciation Improvement for Science and Engineering Students: Promoting Autonomy in External Learning

Ralph L. Rose
Center for English Language Education in Science and Engineering
Faculty of Science and Engineering, Waseda University

IEEE-PCSJ Annual Conference - 13 December 2009
Shibaura Institute of Technology - Tokyo, Japan
Overview

- Background
  - Autonomy and External Learning
  - Science and Engineering Students
    - Pronunciation needs
    - Learning styles
- Course Description
- Sample Work
- Discussion
Learner Autonomy

● "Autonomy is ... the ability to take charge of one's own learning." (Holec, 1981, p. 3)

● Crucially involves ...
  - Determining goals
  - Deciding how to reach the goals
  - Measuring progress

● Cf., Learner Strategies (Wenden & Ruben, 1987; Wenden, 1991)
Autonomy and External Learning

• Emphasis on collaboration and negotiation in autonomy research in 1990s (Benson, 2001)
  - Focus on autonomy in the educational context

• In 2000s, call for more attention on autonomy outside the educational context.
  - "Continuing learning" (Harmer, 2001)
  - "External learning" (Field, 2007)
S&E Students: Pronunciation Needs

• Large proportion become engineers and managers.
• Will use English as lingua franca.
• Need speech comprehensibility (for int'l audience)
  - Consistent, recognizable speech accent
  - Mastery of pronunciation of technical jargon
S&E Students: Learning Styles

- High math and physics aptitude
- S&E learning style research (Felder and Brent, 2005; Felder and Silverman, 1988)
- S&E students prefer active, visual, and sensory learning (Kolmos and Holgaard, 2008).
Course Description

- Determining (pronunciation) goals
- Deciding how to reach the goals
- Measuring progress

STFE: The Sound System of English

Learning Style

Pronunciation Needs

Autonomy in Pronunciation Development
Course Objectives

● Understand and be able to talk about the fundamental concepts of (acoustic) phonetics and phonology in English.

● Understand and be able to describe some of the key phonological and phonetic features of the English language in English.

● Use specialized software to measure and analyze acoustic recordings of English speech.

● Design and carry out a small-scale experiment looking at some phenomenon of the English sound system.

● Present findings from the above experiment in English in both oral and written forms.
Course Content

- International Phonetic Alphabet
- Fundamentals of acoustic phonetics (e.g., waves, formants, tube model of speech)
- Sound system of English
  - Vowels and Consonants
  - Syllables & Words
  - Stress & Rhythm
  - Intonation
Course Tools

- **Praat (www.praat.org)**
  - Tool for waveform and spectrographic analysis
  - Freeware
  - Cross-platform
  - Portable

- Provides *electronic visual feedback* (Anderson-Hsieh, 1992)
Course Tools

- Speech Accent Archive at George Mason University (accent.gmu.edu)
Classroom Activities

• Lectures on content
  - Interspersed with ...

• Tasks
  - Practical confirmation of content
  - Pronunciation diagnostic
Sample Activities

● **Stress-timing of English**
  - Record poems and look for constancy of stress.
  - Record sentences with additional unstressed syllables and check for constancy of time.
    - CATS EAT MICE.
    - The CAT will EAT the MICE.
    - The CAT will have EATen the MICE.

● **Measure and plot vowels in vowel space**
Sample Activities
Final Project

- Small-scale research project
  - Interesting feature of English pronunciation
  - Comparative study of English-Japanese pronunciation

- Creation of an individualized program of pronunciation development

- Projects reinforce diagnostic techniques
  - Foundation for future pronunciation development
Sample Final Project 1

- Comparison of vowels in British and American English.

“plastic”

“frog”
Sample Final Project 2

- "Method to improve my pronunciation"

Before

After

IEEE - PCSJ 2009
Discussion

- **Student as (applied) linguist**
  - "We can train them to be their own language researchers..." (Harmer, 2001, p. 343)

- **Limitation: Difficult to adapt to other contexts**
  - Computer laboratory
  - Specialist knowledge

- **Effectiveness**
  - Unknown, as yet
  - Difficult to measure
Summary

- **STFE: The Sound System of English** addresses S&E students' pronunciation needs by
  - Taking their active, visual, and sensory learning style into consideration
  - Preparing them for external learning
    - Diagnose pronunciation problems
    - Measure progress
- **Future work involves measuring effectiveness and facilitating adaptability.**
References


