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ABSTRACT

This report contains a collection of articles that document the evolution of English for Science and Technology (EST) instruction and research--one of the earliest and most active branches of English for Specific Purposes (ESP). Articles included are: (1) "WWW-Based Instruction for EST" (Roy Bowers); (2) "English for Medical Purposes in Mexico: A Bulletin for EMP Practitioners" (Robert M. Chandler-Burns); (3) "Affective Barriers, Schema Theory, and Teaching in a Foreign Language" (Kiel Christianson); (4) "Using Journal Articles to Teach Research Writing" (Garry Dyck); (5) "English Language Development in a University Foundational Programme for Science Students" (Margaret Inglis); (6) "English and Technology as Customers" (Mary Ann Julian); (7) "English Enhancement for Engineering Students: Professional and Technical Communication (Protech)" (Elizabeth Ann Mueller); (8) "Can Multimedia Be Effective in EST?" (Brian Shilhavy); (9) "HUT Email Writing Project: An Ongoing Experiment" (Ruth Vilmi); and (10) "The English for Science Programme at the University of Hong Kong" (Andrew Wright). An international directory of EST programs (preliminary list of 22 programs in 13 nations) and services is appended. (NAV)

English for Science and Technology: Profiles and Perspectives

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International Directory of EST Programs

Acknowledgements

Many people deserve to be acknowledged for making this book possible. First of all, my heartfelt thanks and respect go to Dr. Tosiyasu Kunii, President of the University of Aizu, for the vision, courage, and perseverance to establish a revolutionary new type of research university in Japan. Second, my respect and thanks go to Dr. Hisako Murakawa, Head of the Center for Language Research, for her wisdom and limitless energy that have gone into laying the foundation for serious language research and education at the University of Aizu. Third, I thank Dr. Shunji Mori, Director of Academic Affairs; the members of the Academic Affairs Committee; and the Fukushima prefectural government for providing funding for this publication. And finally, I extend my greatest thanks and appreciation to the authors of articles in this collection who agreed to share their expertise with those of us who desire to learn from their work and experience.

Introduction

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One of the earliest and most active branches of English for Specific Purposes (ESP) is English for Science and Technology (EST), a cover term for all research and instructional activity designed to understand and support the effective use of English in scientific and technological fields. The term EST was apparently first coined by Larry Selinker in the mid-sixties during his tenure at the University of Washington and meant "the written discourse of scientific and technical English" (Trimble, 1985, p. 2). There in Seattle, Selinker and Trimble jointly developed a reading/writing course for nonnative English speakers pursuing undergraduate and graduate degrees in "engineering, the physical and natural sciences, pre-medicine and dentistry, nursing, nutrition, and home economics" (Trimble, 1985, p. 137). As other programs developed, however, and as more educators and researchers joined the work of EST, research efforts expanded beyond Selinker and Trimble's analysis of scientific English in college textbooks and popular science magazines (e.g., *Scientific American*) to include inquiry into scientific citations (e.g., Bavelas, 1978), reports (e.g., Bazerman, 1984), slide usage (e.g., Dubois, 1980), student writing assignments (e.g. Horowitz, 1986), scientific verb tense (e.g., Malcolm, 1987), course descriptions (e.g., Lenze, 1988), and other diversified uses of English in a wider range of scientific and technology-related contexts. Research efforts also broadened to encompass more language-learning theory (e.g., Wittrock, 1985) and language-learning applications (e.g. Holes, 1984; McKenna, 1987) and began to draw upon a widening circle of information from other fields. Consequently, the acronym EST has now evolved to identify far broader concerns. It can be understood to include all research and pedagogical activities related to English language learning and usage in scientific and technical fields. The most frequent appearance of the term, however, continues to surface in English as a Second Language (ESL) or English as a Foreign Language (EFL) communities where the educational concern is primarily that of nonnative speakers.

This collection of articles, followed by an international directory of EST programs and services, documents the continuing evolution of English language instruction and research in the sciences and technologies, particularly as the field increasingly incorporates computer-network and multimedia technologies into the profession. It is a diverse collection of reports and discussions from EST professionals around the world who wish to share their expertise and to stimulate greater commitment to excellence in teaching and research. The editor offers this collection both to those inside the profession as well as to those without for the information it can provide and the new ideas it can engender.

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WWW-Based Instruction for EST

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PROGRAM PROFILE

The Center for Biological Research in La Paz, Mexico is a government funded institute supporting 125 researchers and graduate students in aquaculture, ecology, marine biology, biotechnology, and marine pathology. There are no English classes at the CIB because by charter, the CIB cannot duplicate the instructional services of the local university. Unfortunately, the university EFL program is not a viable option for CIB researchers who are to busy to attend classes 20 km away.

The salary of the Mexican researcher virtually doubles with international publication, creating extreme pressure for scientists in these hard economic times. In lieu of an EFL program, an English editor was hired to help CIB biologists publish their work internationally. This full time editing service has been available for all researchers and doctoral students since January, 1991. International publication has increased substantially from this editing, but learning has been languid.

In late 1993, the Center implemented a program of autonomous learning which 1) capitalized on linguistic input from biological dialogue on the Internet, and 2) provided students with a computer assisted retention strategy for learning from error correction during the learning process (Bowers, 1995). Positive results from this program are now beginning to show, prompting the investigation of even more instructional measures we can take without providing conventional English classes.

PROFESSIONAL PERSPECTIVE

Web-Based Instruction for EST

Students of English for science or technology generally fall into two profiles, those who are finishing their studies and those who are already working in their field. Both of these profiles share a common problem: EST students feel they don't have enough TIME to devote to improving their English because their academic or vocational endeavors have priority.

How can the field of EST address the linguistic requirements of this target group without interfering too much in the rest of their academic and professional lives? One way is to provide INSTRUCTION ON DEMAND by using the interactive power of the World Wide Web. By enrolling in EST courses which use the web as a delivery vehicle, students can set their own pace and learn EST on their own time schedules.

Web-based instruction is not just another example of technology replacing the teacher. Instead, it is a way to help the student get the most out of the teacher within a personal time frame. With web-based instruction, the role of the teacher is not in the classroom, but in curriculum development, material writing, and editing.

Is web-based instruction effective and worthwhile? I would like to make a case for this

vehicle in the hopes that EST programs with resources and abilities in this technology will see a potential market for this remarkable instructional media.

HTML: The Power of Interaction

Hyper-Text Markup Language (HTML) is the page making protocol of the World Wide Web (WWW). It provides the browsing software with the codes required to display a presentable and workable page to the end user. HTML can universally mark paragraphs, headlines, italics, etc. in a manner that is independent of the particular computer being used, provided that computer offers a graphical environment.

One of HTML's most important qualities is the ability to generate "forms." WWW forms are the computer equivalent of paper forms, only on a WWW form you will find a button (or link) often labeled "Submit." When this button is clicked, the data that has been entered in the form is sent to the host server, then on to the teacher in the form of e-mail (or alternately, stored on the server). Common uses of forms on the World Wide Web are surveys, on-line order forms, feedback, or any input which is elicited from the user to accomplish a given task.

HTML versus Hypertext Software

Hypertext software creates links between *prepared* text and other documents. In contrast, the use of HTML on "the Web" allows the teacher to reference *STUDENT WRITING* to other documents. In this way, a teacher can link student errors to pre-prepared documents which have been designed to remedy writing problems. Thus, when a student clicks on her error, another document is called to the screen which provides the linguistic explanation necessary for its correction.

In addition to linking student errors to prepared help files, HTML also allows the teacher to *comment* on student writing when it is more appropriate. Using an HTML editor, the teacher can link student input to teacher comments which the student can load by merely clicking on the highlighted text. The teacher's comments, in turn, can provide links to other prepared documents containing grammar explanation or practice.

Hypertext is not new to computer assisted language learning; CALL software has made extensive use of hypertext. However, HTML allows the teacher to provide individualized instruction for student writing, something software doesn't do. The possibilities for curricular design in this medium are simply endless and do not require any special "authoring" skills on the part of the teacher.

Distance Education: Web-Based Instruction versus E-mail Instruction

Web-based instruction is more focused for the student than e-mail instruction. With e-mail, a student receives a "lesson" from the instructor where it sits in the student's mailbox until she is inclined to retrieve it along with the rest of her e-mail. This compares poorly to web-based instruction where the student actively pursues the instruction with total attention on the task.

Differences between web and e-mail instruction are also found in the presentation. Web pages in graphical browsers are not basic e-mail text. They can display attractive fonts and graphics with fill-in forms and hypertexted coaching. A web page has the ability to elicit a series of responses in boolean fashion, or prompt for input and feedback, right on the spot. This feedback is immediately sent to the instructor where it can be evaluated.

Using HTML Editing at the CIB

Here in the Doctoral Program of the Center for Biological research we are experimenting with the use of HTML for error correction. We have explained twenty of the most common writing errors in HTML documents which can be linked to student errors. When a student submits a paper, the teacher converts it to HTML, blocks the errors, then links them to their corresponding documents. During the rewriting process, a student will "multitask" between two programs: the WWW browser and the word processor.

Starting in the browser, the student clicks on an error which pulls up one or more remedial documents. The student can continue clicking through the pages until arriving at a satisfactory solution to the error. The student then switches to the word processor where the error can be corrected. A multitasking environment allows the student to continually switch from the learning process (the browser) to the writing task (the word processor).

To date, we have noticed that students spend more time on the learning process in their browser than on the writing process in their word processor. We interpret this as a good sign since beforehand, students would simply enter the corrections suggested by the editor without analysis of the problem. Hypertexted correction appears to be more emotionally satisfying to the writer than grammar clues such as "VT" (meaning Verb Tense). Research also seems to indicate that coded feedback is no more effective than direct correction (Robb, Ross & Shortreed, 1986).

Revision using HTML is currently in the development stage at the CIB. A public WWW server is not yet online, so we have had to use a temporary local server which is incapable of processing forms. Despite this limitation, we have noticed that HTML editing in this manner forces students to learn about the grammar rule that controls their error, then apply that rule to their revision. This contrasts markedly to simple error correction which does not foster learning for most EFL students.

The Future of Web-Based EST Instruction

At our research center, we are unable to provide scientific writing courses in any form. However, we would be willing to pay for them (if reasonably priced). Now that secure payment, password access, and other controls are in place on the World Wide Web, any institution with the ability to provide web-based EST courses would find a willing market in countries where 1) it is difficult to find competent instructors, 2) the target group is unable to attend conventional classes, and 3) the need for scientific and technical English is great. Most scientific and technical centers outside the industrialized world fit this description.

Potential Problems

Some countries with limited bandwidth may need to use text based browsers (such as Lynx) for distance education. However the lack of graphics should not impair the instructional objectives of EST writers. In those countries with phone companies that charge for local calls, modem access would be expensive since time on task is on-line time whether the web server is being contacted or not. In such cases, instruction would probably not be cost effective from home, but only via an institution's local network. Finally, there is a learning curve for teaching teachers how to correct with HTML. Fortunately, there are outstanding HTML editors that make this an agreeable task; some even work with popular word processors.

Summary

Now that English is the officially recognized lingua franca of international science and technology, the demand for EST instruction has never been greater. There are two productive directions that HTML can take. It can be used to help writers learn about their errors during the editing process, and it can be used as a distance education medium for actual courses in scientific writing. The World Wide Web offers a promising vehicle for institutions with the faculty, resources and inclination to target this market.

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English Corpora for Science and Technology

Publishing Scientific Research in Journals Edited in English: The Role of the Translator-Pre-Editor (TPE)

English for Medical Purposes in Mexico: A Bulletin for EMP Practitioners

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PROGRAM PROFILE

Our EST program was born on September 1, 1980 at the updating of the 4-year medical technology major to a 5-year clinical chemistry major, including a 4-semester English for medical purposes (EMP) program. Then, in 1981 a one-semester EMP program was designed for last-year medical students to prepare them for the two-day National Examination for Medical Residencies (NEMR), 13% coming from medical literature written in English.

All master's and doctorate programs require LSP courses (the language depends on the area the candidate chooses). However, the most populated courses are the 8-semester 4-skilled ones as the top 5% of our medical school graduates have travel grants available which permit them to rotate at Heidelberg and the Mayo Clinic in Jacksonville, Florida. Researchers have translator-pre-editor (TPE) services available, and specialists and subspecialists since 1994 have to publish clinical research in medical literature in order to graduate putting a heavy burden on the EST practitioner as all national publications require an abstract written in English to be available via the world's on-line medical data banks.

Our EST/EMP approach can be summarized as follows:

- a) minimum vocabulary (BSTE, FSTE, SSTE see below) is taught with its grammatical context before reading comprehension is attempted,
- b) usage of authentic and current medical literature,
- c) in the last courses the medical metaphor and neologisms are explored; the writing of the abstract in English is carried out.

There are only 5 tenured professors (3 are EMP practitioners) in our department of modern languages, all others being part-time staff or instructors.

1st PROFESSIONAL PERSPECTIVE

English Corpora for Science and Technology

Introduction

Our ongoing lines of research in language for special purposes (LSP) encompass computational linguistic analyses and corpora construction in four areas: the medical lexis based on recently written articles in English (1), contemporary Spanish for medical purposes (2), biolinguistics (3) and the construction of specialized scientific- technological English corpora (4). The latter will be of interest to EST practitioners. The methodology shown here is a relatively easy task to carry out and should prove to very effective at being included in EST syllabi.

English Corpora for EST

EST reading comprehension should be based on three corpora: a basic core of language that is universal to all reading, regardless of field or specialization; a fundamental layer that can be called the language of the researcher; and lastly, the specialized layer that is particular to each field and/or specialized area of EST.

The basic scientific-technological English core (BSTE) was isolated by Kucera and Francis in 1967 (5) and still proves to be the most effective tool to use in the construction of vocabulary for EST syllabi. The 665 high frequency homogeneous terms that are found in K & F appear in all 15 fields that were used as input for the study.

The fundamental scientific-technological English layer was isolated by Salager-Meyer (6) and Chandler-Burns (4) in the 1980s and constitutes the 335 most frequent words used by the researcher. A shortened version of this list is annexed here. Without domination of the core and the first layer there can be no comprehension and should be taught with their grammatical settings before reading comprehension of authentic material is given.

Instructions

The specialized scientific-technological English (SSTE) layer will be isolated by carrying out the following routines.

Step One: Choose 50 2,000-word articles: one-third in the theoretical area of the specialization, one-third dedicated to practical applications and one-third dealing with the artifacts used in the specialized area.

Step Two: Do not choose the articles yourself; rather, have researchers in the specialized area do the choosing; only they will know which articles are best for your EST students.

Step Three: A synchronic cut of the last ten years will insure the language isolated will reflect contemporary usage.

Step Four: Create an error-free vector from the articles by inputting the articles two times and matching up for errors in WP5 or some equivalent word processing software:

Subroutine to Create a Vector

```
CD DOS
CD SSTE
```

```
WP (4.2/5.0)
    F5
    ENTER
    LOCATE FILE (01...50)
    1
    ALT-F2
    NO
    ONE BLANK SPACE WITH SPACEBAR
    ESC
    ENTER
    ESC
    CTRL-F5
    SELECT OPTION 1
    END
    ADD ".TXT"
    F7
    NO
    NO
    (RETURN TO PROCEDURE)
END OF JOB
```

Step Five: Calculate frequencies for the vector using the following CLIPPER program or some equivalent program (UNIX works well, too):

```
CLOSE ALL
CLEAR
SET TALK OFF
SET BELL OFF
@ 10,10 SAY 'WORKING WITH FILE 01[...50]'
 SELE 1
  USE 010[...50]
  COPY STRU TO 01[...50]
 SELE 2
  USE 01
SELE 1
N=SPACE(25)
F=0
S=0
M=0
N=WOR
F=FRE
M=1
SKIP
DO WHILE .NOT. EOF()
IF W=WOR
E = F + FRE
M = M + 1
ELSE
 SELE 2
 APPE BLANK
```

```
REPL WOR WITH W
REPL FRE WITH F
@ 12, 10 SAY 'WORD, FREQUENCY'
@ 15, 15 SAY W
@ 16, 16 SAY F
 SELE 1
 F = FRE
 W = WOR
END IF
SKIP
ENDDO
 SELE 2
 APPEND BLANK
 REPLACE WOR WITH W
 REPLACE FRE WITH F
 @ 12, 10 SAY 'WORD, FREQUENCY'
 @ 15, 15 SAY W
 @ 16, 16 SAY F
CLOSE ALL
RETURN
```

Step Six: Select the frequencies above f greater than .05% to be included in the SSTE layer and the syllabus.

Result: The 100,000-word corpus should produce approximately 1,000 words above the f greater than .05% cutoff. These words are the "meat and spuds" of your syllabus vocabulary.

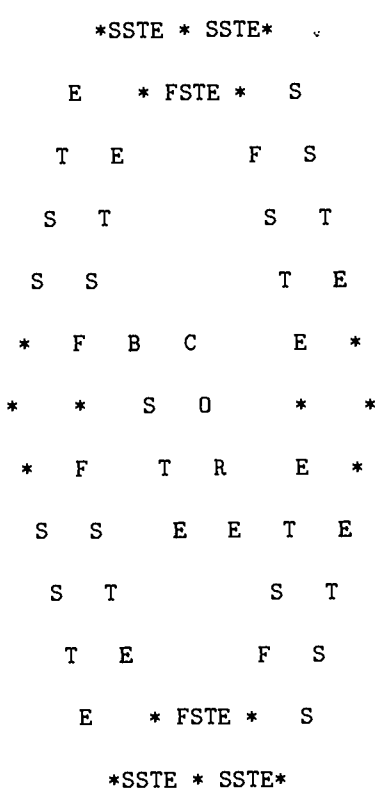
Fundamental Scientific and Technological English Vocabulary

Table 1

absence	deduce	grade	observe	sequence
according	defect	graph	obtain	series
accurate	define	grasp	order (in\~to)	severe
adequate	degree	group	pair	sharp
adhere	derive	heavy	pattern	show
administer	describe	however	peak	show
affect	design	hypothesis	*percent	significant
agent	despite	increase	performance	similar
allow	detect	indicate	permit	simultaneous
alter	determine	immerse	periphery	since
alternate	develop	imply	persist	slight
analyze	differ	improve	poor	spite (in\~of)
appear	dilute	include	portion	spontaneous
approach	diminish	index	positive	stable
approximate	*discard	indicate	precede	standard
assess	*dismantle	induce	predict	statistics
associate	distribute	inhibit	present	study (n)
assume	document	initial	pressure	subject (n)
attach	dominate	investigate	prevent	subsequent
attempt	drain	involve	primary	sufficient
available	due (to)	isotope	probe	suggest
below	employ	laboratory	prove	sum
*buffer	enable	*latter	procedure	support
calculate	*enhance	length	produce	suspect
case	estimate	level	proportion	system
category	evaluate	limit	quality	technique
cause	evident	loss	range	*tend
chemical	examine	low	rapid	test
circumstance	exceed	magnify	rate	therefore
clamp	except	main	recent	thus
compare	exclude	major	recur	total
complicate	exhibit	measure	regard	transient
concept	expand	manifest	relate	transmit
conclude	expect	marked	remain	utilize
conduct	express	maximum	report	value
confirm	extend	mean (adj)	require	vary
consecutive	fact	mechanism	respectively	versus
consider	factor	mediate	result	view
consist	fail	method	reveal	wash
contain	*failure	mild	risk	weight
continue	find	minimize	salt	whereas
contrast	flush	mix	sample	whether
correct	follow	moderate	search	while
correspond	former	modify	secondary	within
count (n)	frequent	monitor	seem	yield
criterion	function	multiple	segment	
curve	furthermore	*narrow	select	
data	gain	negative	separate	

Note: Words marked with * appear in Chandler-Burns et al. (1987) but are not included in Salager-Meyer (1983). This list is based on f greater than 0.15% instead of f greater than 0.05% to eliminate terms that do not appear in Kucera & Francis' first 2,000 words.

Figure 1



SSTE = Specialized Scientific and Technological English corpus/layer.

FSTE = Fundamental Scientific and Technological English corpus layer isolated by Salager-Meyer (1983) and confirmed by Chandler-Burns et al. (1987).

BSTE = Basic Scientific and Technological English (the core) was isolated by Kucera & Francis (1967).

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(3) Chandler-Burns, R et al. (1994) Un nuevo paradigma para pronosticar funcion a partir de estructuras primarias de genes y proteinas: hacia una gramatica biolinguistica (primera communicacion). Monterrey: *Memorias del XII Encuentro de Investigacion Biomedica*, Publicaciones de Subdireccion de Postgrado, p. 121.

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2nd PROFESSIONAL PERSPECTIVE

Publishing Scientific Research in Journals Edited in English: The Role of the Translator-Pre-Editor (TPE).

Introduction

Outside of the English-speaking countries there are many research groups that contribute to science and technology only in an ancillary way due to not being able to publish their research and results in refereed journals because of stylistic and grammar problems. The post of translator-pre-editor was conceived and written up in the international medical literature in 1987 (1) to overcome this deficiency in such research groups in medicine. The application of the TPE, however, can be extended to all EST fields. The following is designed to help your department create the post if it does not already exist.

TPE: The Need

The senior or associate researcher working outside of the English-speaking scientific/technological world generally will have little time to take a formal 4-skill 8-semester English course; yet, the lingua franca of her/his field is English. She/He dominates the English language in reading comprehension almost perfectly, attends world congresses and does not worry about the lack of fluency in spoken language; but suffers terribly in the rejection of the MS. This suffering is due to her/his colleagues in the English- speaking world not having time to edit the MS. The colleagues may read it via e-mailed or faxed copies but do not wish to spend the necessary time it would require to take it apart and put it back together again. The non-native speaker has

tried to give his work to an "expert translator" but with the same result. This "expert" has no idea of the field and the critical idea is lost in a translation that is not perfect. Some give their MSS to graduate students and, again, with the same result -rejection.

The problem, of course, is that others cannot do perfectly what she/he must do -control the MS from its inception to final editing and writing the cover letter. Most of the time the translator is rushed and being a fatalist after many rejections now believes the act of publishing is not unlike winning the lotto.

A survey would probably show that most MSS take approximately six months to write up after the final results are in. A six-month, once-a-week, one-hour session with a TPE is, perhaps, the best option.

TPE: The Qualifications

What are the qualifications to be a TPE? Unfortunately, it requires familiarity with each and every researcher's field! But that is not too much of a package if the TPE has no more than 10 to 12 "clients." The references that are included in the MS' bibliographic section makes for good background reading with which the TPE can familiarize her/himself. Mario Bunge's texts on the methodology of the scientific enterprise are good instruments to learn how to separate pseudoscience from serious work and should be part of the TPE's training. The question arises: can the TPE reject a badly done research? I believe it is her/his obligation to do so.

TPE: The Task

Our experience at AUNL might be of help for other TPEs:

The first 6 weeks are dedicated to getting the MS into an acceptable first draft in English. The researcher "takes dictation" from the TPE and both work out problems together. The MS, now on diskette and printed out, is ready for the scientific reading by the TPE.

The second draft has the purpose of making the language "sound" and flow as if it were written by a native English speaker. The problem is to respect the jargon that has to be used. The TPE has to learn this jargon and how it is employed in the context of the researcher's field. This phase should take about 10 weeks (or 10 TPE sessions).

The third draft now (at about the 16th week) is what we could call the aesthetic draft -not one error in either scientific methodology or typography. Professor Waclaw Szybalski at the University of Wisconsin, editor of *Gene* calls this "the most beautiful moment of science (2)."

The remaining 1 to 2 weeks of the semester are dedicated to writing the letter to the editor. And as John Bayley (3) said once, "without common language and regal sway" the letter and MS fall dead on the editor's floor.

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English for Medical Purposes in Mexico: A Bulletin for EMP Practitioners

Introduction

EMPM 13(1), now being edited, has two specific purposes: to keep EST/ESP/EMP professionals working at or with medical colleges up to date and to influence in the decision-making process as it affects EMP practitioners and her/his medical students at Mexico's 57 medical colleges. The bulletin is sent to EST practitioners as well as to the offices of the National Commission on Medical Education.

English for Medical Purposes

The EST environment for medicine (hereafter called English for medical purposes, EMP) may be highly uncommon in the non-English-speaking world.

While the medical education curriculum for the typical medical college is almost world-wide in design and implementation, the demands on the student to dominate reading comprehension of medical English is manifested in the examination to enter a residency or specialization training after graduating from medical school in Mexico. Thirteen percent of the National Examination for Medical Residencies (NEMR) includes clinical-surgical material taken from English and American journals.

Most clinical clerkships involve translating recent journal articles written in English for discussion in the "journal club" hour of the clerkship once a week. Yet, there is no course included in the curriculum to teach one how to translate.

The typical medical college in Mexico obliges the student to learn her/his English outside (e.g. at the school of letters where ESP/EST/EMP courses are taught). Some demand a minimum score on a local TOEFL-like exam and others include extra or bonus points for reactives in English on midterm and final exams in the clerkships in order to accustom the student to the reactive written in English; the latter a relatively recent development due to pressure from the students on the administrators.

Most English that is taught at those few with an EMP course is managed by the medical education department and not by a department of modern languages. This means that the typical EMP practitioner cannot become a tenured professor of the medical college.

The NEMR brochure each year has included two official texts: one taken from the doctoral dissertations of two graduates of the University of Edinburgh in Scotland (1); the other, a Longman text used in Spain and now in Mexico since 1993 (2). EMP practitioners mostly use these texts; however, others are confected and used locally (3,4).

Official statistics from the NEMR brochures indicate that each last Saturday and Sunday in September, approximately 11,000 students take the NEMR with a pass rate of 40% plus or minus 1%. Those waiting several years after graduation to take the NEMR have fewer possibilities, having a pass rate of around 32%. We have been unable to raise that rate at AUNL.

The EMP Practitioner as a Researcher

While *EMPM* is mainly devoted to EMP pedagogy there is always a section on research keeping the practitioner up to date on what is happening at biomedical forums, symposia and congresses and news in applied linguistics.

All EMP practitioners in Mexico are now aware of the great variety of didactic help there is via gopher, WWW and CELIA. However, due to budget cuts in 1994-5, it will be a long time, perhaps, before all students have access to the technology that is needed.

EMPM as a Political Force

The unending song of the editorial is the need to create a department of modern languages in every college of medicine, create curricular courses and give professors tenure who can publish in the international literature.

With the implementation of the North American Free Trade Agreement (NAFTA) the medical schools of Mexico are aware that English and French are now essential. However, to convince the academic senate is another ball game. In Mexico the colleges' academic senates (in public universities only) are made up of one-half tenured professors and one-half students (medical students, master's/Ph.D. students and specialist/sub- specialist residents) who are elected to represent the student body in the academic senate, the dean having the tie-breaking vote. *EMPM* detects only very slow movements in the direction of complying with the obligation to overcome this prejudice of old-guard academic physicians.

Tenured EMP practitioners are now a reality in only 2% of the possible cases in Mexico. *EMPM* has not had a very good track record in influencing this area. The first were made only ten years ago in 1985.

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Affective Barriers, Schema Theory, and Teaching in a Foreign Language

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PROGRAM PROFILE

The University of Aizu opened in 1993 as Japan's first prefectural university devoted entirely to computer science. Tl is, along with the fact that approximately 60 percent of the permanent faculty are non-Japanes·, makes the University of Aizu "completely different from anything that's ever been done" ir Japan, according to a June 26, 1994, article in the *New York Times*.

The Center for Language Research, headed by Dr. Hisako Murakawa, has been working since the opening of the university to develop an effective EST program which will prepare students both for their computer science courses taught by the university's non-Japanese faculty and for the English they must employ as professionals. To do this, the CLR is developing courseware in the areas of pronunciation, composition, technical writing, reading, and conversation & listening. This courseware will combine text, video, audio, and software in order to maximize the high-tech resources of the university, which include two Language Multimedia Laboratories (LMLs) that are fully equipped with computer workstations, and video, laser disk, and audio cassette equipment for each student. Authentic computer science material–vocabulary, texts, lectures, and discipline-specific discourse and rhetoric–is being included in these courseware packages in order to orient the students to the field of computer science and to their new academic environment.

PROFESSIONAL PERSPECTIVE

Introduction: EST is not Unique

In his "reality check for SLA theories," S. N. Sridhar (1994, p. 800) raises four salient points for EST teachers:

- "Typically, the L2 is used along with, not in place of the first language....
- "More SLA takes place in nonnative contexts, where the L2 is not spoken as the primary native language, than in native contexts....
- "More learners learn an L2 for instrumental reasons than for integrative reasons.
- "Increasingly, 'much of the world's verbal communication takes place by means of languages which are not the users' "mother tongue," but their second, third, or nth language"' (quoted from Ferguson, 1992, p. 13).

This is an accurate description of the students at the University of Aizu and, in my estimation, nearly all EST students. In other words, EST students are more prototypical EFL learners than are "traditional" EFL learners (whatever they may be). This raises numerous questions, such as: *Why then is EST often seen as a somewhat marginalized branch of EFL? How can EST*

professionals pick up where "traditional" materials writers and publishers often leave us, with out-dated or inappropriate materials? How can we assist experts in the fields of science and technology, who are often nonnative English speakers themselves, to teach content material to EST students? Because this last question is most pertinent to our situation at the University of Aizu, I will devote the rest of this section to attempting to answer it.

Although it may at first sound counter-intuitive, I believe that language is the least of the problems to be overcome in a situation where a nonnative English speaker is teaching new content material in English to other nonnative English speakers. Language barriers can be overcome; they have been throughout human history. However, to do so requires a great deal of work on the part of both teacher and student. Moreover, careful consideration must be given to dealing with problems which I feel are far more harmful than language barriers to the learning process. These are

- affective barriers;
- incomplete or inconsistent instructional schemata (background knowledge); and
- gaps in the students' and professor's conceptions of completeness, coherence, and comprehensibility in classroom presentations and materials.

Fortunately, there is a large body of SLA research on these topics. Based on current theories, I will attempt to outline several teaching strategies which might be employed to overcome the above barriers to learning encountered in the teaching context under consideration.

Affective Barriers in an EST Context

Brown (1987) makes it very clear that "language is inextricably bound up in virtually every aspect of human behavior." As such, language both L1 and L2 is closely tied to students' personalities, emotions, fears, weaknesses, and strengths, perhaps more so than any other subject of study. Consequently, foreign language teachers must take into account individual personalities and issues of anxiety, self-esteem, inhibition, risk-taking, and empathy, as well as the classroom dynamics involved in maintaining appropriate discipline and conduct, student equality, cultural perspectives, and dealing with face-threatening situations (p. 101). In EST and content-area courses, student anxiety due to the nature of foreign language learning is compounded by introducing content material with which students might be totally unfamiliar.

How best to assist students in overcoming their anxiety so that they are more comfortable in both the EST and content-area classroom? Before giving some suggestions, it would be helpful to distinguish between the three kinds of anxiety so that their causes are better understood. According to Ellis (1994), these three types of anxiety are trait, state, and situation anxiety.

Trait anxiety refers to a psychological predisposition or tendency to be anxious. State anxiety is experienced for a limited period of time in response to a definite situation (eg. foreign language class). Situation anxiety is experienced, often habitually, in response to a specific situation and can be triggered by events such as speaking in public, flying, or hearing/speaking a foreign language (p. 479-80).

Considerable SLA research has been devoted to situation anxiety in particular. Being asked questions, reciting memorized text, reading aloud, taking tests, taking notes on material in a foreign language, among others, can all be sources of situation anxiety. And again if anxiety is triggered by either English or unfamiliar, confusing content material, or an uncomfortable classroom environment, it will affect the comprehension of the entire classroom presentation.

While it is the EST teacher's job to find ways to alleviate anxiety caused by English, the content area teacher can reduce a great deal of situation and state anxiety by taking steps to assure that students will be able to follow what is happening, even if they do not understand all of the English being spoken. If students feel comfortable with and certain of what is expected of them in every class session, affective barriers will be lowered, and they will be more capable of receiving, comprehending, and producing information in English. To do this, content area teachers, particularly nonnative English speakers teaching in English to other nonnative English speakers, need to establish explicitly defined "classroom schemata."

Schema Theory and the Classroom Environment

In 1932, F. C. Bartlett proposed that our knowledge of the world is organized into interrelated patterns which are based on prior experience. These patterns, called *schemata*, can then be used to predict what will take place in future situations. Schema Theory has been used to promote a top-down approach to comprehension, both in written and oral communication. A top-down approach is one in which readers or listeners move from their overall schema of a given text or situation to more detailed information about a specific situation or text.

Brown and Yule (1983) use the term *stereotypical knowledge* instead of schemata when talking about listening comprehension. They stress, as does Bartlett when speaking of schemata, how this knowledge allows native speakers dealing in their own language to "construct expectations" of given contexts, for example a university classroom. Stereotypical knowledge can be analyzed in terms of speaker, listener, place, time, genre, topic, and co-text, which are summarized from Brown & Yule (pp. 61-3) as follows:

Speaker: A listener listening in his native language searches all previous experience of speakers, and based on this experience, will generalize the characteristics of the present speaker. Assumptions are then made as to the role of the speaker, of the intended effect on the listener, and of the language itself.

Listener: Based on past experience as a listener to this particular speaker or to similar speakers, the listener makes predictions as to what response is appropriate, given the situation. This response is dependent on the speaker's and listener's mannerisms and the speaker's choice of language, tone, and register.

Place: The listener will expect to hear different language in different situations. One aspect of situation is place. Stereotypical knowledge of court rooms or locker rooms, living rooms or classrooms are drawn upon to predict appropriate behavior and language for the speaker and listener.

Time: The listener makes assumptions based on stereotypical temporal knowledge. He has expectations of what constitute the beginning, middle, and end of stories, jokes, or lectures. He interprets directions in terms of previous experience with words such as "now," "soon," "late," and "early." Meaning is also derived from the verb tenses used.

Genre: The listener exploits previous experience with various situation- or discipline-specific genre or discourse. For example, "Please be seated" for the native English speaker suggests a church service, while "Sit down!" suggests a classroom of unruly children. Based on this stereotypical knowledge of genre, the listener predicts what is expected of him when it is his turn to produce language in the given context.

Topic: Loosely, topic is "whatever is being talked about." It is the topic which determines to a large extent the vocabulary, method of presentation (as in a lecture situation), and the genre employed. Stereotypical knowledge of the topic allows the listener to construct expectations

about these things to to prepare himself accordingly.

Co-text: The listener's expectations are affected globally by the context (inclusive of all the features above). Locally, the listener's expectations are affected by what has already been said in a given situation, the co-text. If the listener is unable to adapt expectations to newly-presented information, topic shifts, etc., he will become lost.

Whether we use the term schemata or stereotypical knowledge, EST students learning in English from other nonnative English speakers are clearly lacking in this area. They may have limited English ability, true, but of greater hindrance to the learning process is the fact that such students have no foundation on which to construct expectations of and make predictions about

- teacher-student interaction, including appropriate classroom language (eg. titles, levels of politeness, explicit vs. implied instructions) and question-asking and answering protocols;
- classroom behavior, including non-verbal signals of respect or disrespect (eg. sleeping or talking during class), tardiness and absenteeism;
- academic responsibility and integrity, including the timely completion of assignments, cheating and plagiarism, and student vs. teacher roles in the learning process;
- classroom protocol, including daily routines and consistency in presentations, activities, and expectations; and
- instructional and student performance norms in the content area field (eg. presentation methods, "classic" examples and problems, assumed common knowledge, types of assignments, standard testing procedures).

While EST teachers can introduce English and (to an extent) discipline-specific presentation organization methods and discourse to students, we cannot possibly tell the students what exactly they should expect from content-area instructors when those instructors will naturally conduct their classes according to the norms of their specific disciplines as taught in their specific cultures. Therefore it is of paramount importance to orient students to their new academic surroundings. Specifically, nonnative English-speaking content-area instructors should present students on the first day of class with a written description or course expectations, from the more general description of material to be covered and evaluation methods, to the details of what is expected from tardy students (i.e. apologize? explain? ask after class for handouts that were missed? etc.), or of how students should address the instructor (i.e. Sir/Ma'am? Mr./Mrs.? Professor? first name?) I strongly believe that by explicitly providing students with this fundamental information, they will be able to develop their stereotypical knowledge of the instructional situation and construct appropriate expectations. Consequently, situation and state anxiety will be alleviated, affective barriers will lower, and students will be able to devote their complete mental energies and world knowledge to the demanding process of learning new material in English.

Considerations when Giving Content-Area Lectures in English

On a macro-instructional level, providing students with the above information will relieve their anxiety and allow them to better adapt to individual classrooms and professors by assisting them to build up stereotypical knowledge, or schemata, for each course. On a micro-instructional level, each day's activities be it lecture, lab, discussion, or a combination of these will also require extra materials which support the main presentation. This is especially true of oral presentations. Even for a native English-speaking audience, the rule of thumb for a public speaker is: "First

tell them what you're going to say, then say it, then tell them what you said." In the case of a nonnative English speaker lecturing in English to other nonnative English speakers, a fourth step, "Ask them what you said" is also necessary to immediately check comprehension.

Although some may argue that such an approach will reduce the amount of material that can be covered, this is in fact not the case. The first and third steps can be performed in writing or on video, thus taking up no class time. Furthermore, the better students comprehend the presentation the first time around, the less time needed for repairing misunderstandings. Some of these methods are outlined below and are drawn in part from Brinton, et al. (1989, pp. 89 ff.).

"Tell them what you're going to say."

In foreign language instruction, this is often accomplished with pre-listening activities or *advance organizers*, which have been shown to be of significant help to students in constructing expectations for given activities. Even the simplest advance organizers, consisting of only a few sentences, when given to students prior to a lecture, will allow them to prepare themselves mentally for the material and language to be presented (Herron, 1994). Examples of advance organizers are as follows:

- lists of key words
- lecture outlines
- full lecture notes
- summary sentences restating main points
- reading texts related to the topic of the lecture
- computer-based activities demonstrating the principles to be covered in the lecture

Exactly when these advance organizers should be distributed depends on the difficulty of the material, course schedule, the amount of time the instructor devotes to preparation, and the nature of the advance organizers themselves. However, all advance organizers can be used as homework which can be assigned the week prior to the lecture, and which will allow students to fully prepare themselves for the upcoming lecture by looking up unfamiliar vocabulary, preparing questions, and, of course, acquiring background knowledge of the material, thus making it more accessible to them.

"Tell them."

Whenever possible, lectures should be accompanied by visual aids, some of which, preferably, should be independent of linguistic support, i.e. schematic drawings, diagrams, formulas, etc. These aids can come from the advance organizers, which are subsequently followed along with through the lecture. Alternatives are overhead projections, multimedia packages, and of course writing on the board. Allowing the students more than one way to access the information is crucial.

Insist that students take notes. Or, if all the information they need has been provided for them in the advance organizers, insist that they follow along as you work through the information together. Emphasize main points again and again, to the point of explicitly telling students, "Write this down! It will be on the test." Assist them in every way possible to cull the important information from interesting but nonessential asides and trivialities.

Regarding the actual oral presentation of information, researchers working with international teaching assistants in the U.S. (Tyler, 1994; Williams, 1994; Madden & Myers, 1994) have found that in presentations by nonnative English speakers to native speakers, the greatest barrier to comprehension is not pronunciation or grammar. Rather, native-speaker audiences have trouble following presentations if they lack

- marked discourse moves, such as signals of topic shift (eg. "next," "now," "On the other hand," etc.);
- lexical specificity, i.e. references established within the context of the presentation and used consistently (eg. "the first *method of service* we'll talk about is series processing.... *This* is....Another *method* is...."); and/or
- overt marking of key statements via example, definition, restatement, etc.

Again, EST instructors can introduce these various features of English discourse to students, but we cannot assure the students that the oral presentations of nonnative English-speaking content-area instructors will exhibit them. Therefore, in order to support the students in their micro-level schemata-building process, it is crucial for content-area instructors to do one or both of the following when making oral presentations:

- Preferably, follow the discourse conventions of English as closely as possible to allow students to use what they have learned in the EST classroom about English discourse. OR
- At least be consistent in presentation, so that students can grow accustomed to individual presentation styles and organization methods (which may be purely idiosyncratic or determined by the instructor's native culture and language).

"Tell them what you said."

Professional public speakers know that audiences are most likely to remember, in this order, the last thing you say, the first thing you say, and, considerably less accurately, whatever comes in the middle. Therefore, take time to run through the main points again at the end of the lecture. Summarizing, restating, and repeating main points the things the instructor really wants the students to grasp-will help ensure that students are able to separate core from parenthetical information. As tedious as it sounds, it might be of great help to walk through the lecture again point by point, checking to make sure students' notes are complete.

If time limitations make such thorough review impossible, audio- or video-tape each lecture. Make copies and make them available for students to borrow and listen to/watch again. This will allow them yet another chance to hear something they might have missed. Such tapes also allow students who were absent to access firsthand what they missed, rather than relying on the possibly incomplete notes of classmates.

"Ask them what you said."

Methods of checking comprehension vary tremendously, but in the type of situation being considered here, it is crucial that the method(s) used provides 1) as immediate a response from students as possible; and 2) an accurate representation of their knowledge of the content area. This first point is critical, as it is usually easier for the lecturer to backtrack and repeat information in the context of the same lecture, rather than trying to do it later. Regarding the second point, it should be kept in mind that it is difficult to verbally express complex concepts

in a foreign language. Consequently, imperfect expression can lead to the impression that the material has not been understood. Rather than verbally demanding comprehension checks such as end-of-the-semester essay exams, oral presentations, or tricky multiple-choice exams, it is suggested that frequent, less verbally demanding, briefer, and more varied comprehension checks be made. Examples are

- daily/weekly quizzes;
- assigning students to prepare questions to ask after the lecture;
- writing short paraphrases/summaries of main ideas; and
- open-note activities which allow students to check their notes for missing information.

Conclusion: The Virtues of Consistency

Even students with outstanding aptitude, skills, and knowledge will find it difficult to function well if they are overwhelmed by feelings of disorientation and anomie. While neither instructors nor students like to feel as if they are in a rut, consistency (and even routine) lends a greater sense of security to the classroom. Once again, if students are freed from entering the classroom every day full of trepidation and uncertainty about what will transpire, affective barriers to learning-most notably state and situation anxiety will lower, and students can concentrate more on the information at hand. Moreover, they will be able to acquire stereotypical knowledge of their classes and instructors, and will therefore be able to construct accurate expectations of the classroom atmosphere, the instructor, the presentation style and methods, the material to be covered, and evaluation techniques.

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Using Journal Articles to Teach Research Writing

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PROGRAM PROFILE

The English Language Centre provides English for Academic Purposes (EAP) for those studying or interested in studying at the University of Manitoba. In consultation with specific faculties, English for Science and Technology (EST) programs have been developed for Medicine and Engineering. Programs have taken the following two formats.

Intensive Academic English Program: This is a twelve week intensive (27 hours per week) program. Programs designed in consultation with faculties give the program its specific focus. Programs occur in summer, fall and winter.

39-hour Courses: These courses are designed for students already enrolled in Medicine or Engineering. Oral English for Graduate Students in Medicine gives students practice in orally presenting their medical research. Research Writing for Graduate Students in Medicine prepares students for writing up their medical research in a journal or thesis format. Similar courses are available for graduate students in Engineering.

If you would like more information on the English Language Centre, point your gopher to gopher.cc.umanitoba.ca and open Ancillary Services.../Student Resource Services/English Language Centre. World Wide Web browsers may use the following address:

http://www.umanitoba.ca/SRS/ELC/elcinfo.html

PROFESSIONAL PERSPECTIVE

Using Journal Articles to Teach Research Writing

A primary concern for graduate students is to be able to publish research. Students will often look to existing journal articles for models of what is expected. This can prove to be unsatisfactory as the student's own style may be lost resulting in a paper that sounds mechanical. Furthermore, although published articles used as models are grammatically correct, not all published articles are written clearly (see Gopen and Swan, 1990). It is therefore useful for the instructor of research writing to present research that describes the patterns common in scientific research writing, to provide samples of that writing from journals, and then to evaluate those patterns in terms of effective writing.

This article discusses the use of journal articles for the teaching of research writing. It is based in part on my own experience of teaching such courses to graduate medical students and graduate engineering students.

Journal Articles as Models of Research Writing Patterns

In examining one or two journal articles, a person may be able to recognize the forms being used and be able to write using those forms. However, in order for students of scientific writing to develop their own writing style, they must be able to understand forms as they appear in several journal articles. In other words, they must be able to recognize and understand scientific writing patterns. A good understanding of these patterns will allow students to produce articles that communicate their ideas to a scientific community in the most effective manner while allowing students their own individual styles.

However, prior to examining journals articles, students need to know which patterns are unique to science writing so that they can recognize those patterns. I have done this by using texts in research writing, most recently, the text by Swales and Feak (1994), which provides a critical look at research writing patterns. It is also possible to examine patterns by reading the literature on research writing. English for Specific Purposes has consistently provided good, clear research in this area over the past several years. A list of sample articles is included in the list of references.

Example One: Definitions in Medical Journals

In teaching definition writing, I first taught the section on definitions in Swales and Feak (1994, chap. 2). We noted the pattern established by the authors for both sentence definitions and extended definitions. Students completed exercises on definitions and identified some terms that would need to be defined in their present research.

In a class limited to graduate medical researchers, I brought to class photocopies of first pages of articles from medical research journals. I had discovered that most first pages of scientific journals contain a definition. As a class, we noted that the pattern in the journals compared favourably to the pattern outlined in the text. Students also noted that one of the journal authors had used "where" in his definition, a practice which Swales and Feak suggest as "less appropriate for a formal definition" (1994, p. 44). We discussed why this author may have chosen to use "where" and how it could be changed.

In a class which included students from a variety of science-based faculties, students brought to class three journal articles. Students then found definitions in the articles and established a pattern which was compared with the pattern established in the text. Again, students had a strong background from the text to study these critically. In some cases, individual students suggested alternatives and the class compared the alternatives with the originals.

In both classes, students then wrote their definitions which were peer evaluated and then discussed in the larger class. A variety of modifications were suggested.

When I discover that a pattern is employed broadly in a number of scientific journals, I ask students to look at examples in journals quite distinct from their field of study. For example, I had the medical students look at definitions in engineering journals even though they did not have the engineering vocabulary. This was effective in reinforcing the definitions pattern.

Example Two: Verbs in Medical Abstracts

In the medical research writing class, students were confused on the nature of verbs in abstracts. Specifically, they had received conflicting advice concerning the use and acceptable frequency of the passive. Information from writing manuals proved unsatisfactory. I was, however, able to provide information through a journal article. Salager-Meyer (1992) outlines the frequency of verb tenses and modals in medical abstracts. As in Example One above, students then compared this information with actual journals and occasionally suggested alternatives to

published abstracts before writing their own abstracts.

Advantages

First, students are using what ESL instructors refer to as authentic material rather than relying on generalizations about effective communication from a single textbook. Second, students are encouraged to critically examine the language of journal articles. Third, students are more inclined to accept patterns found in a text when they are reinforced by examples in several journals. After using journal examples in two consecutive classes and not in a third, students commented individually that they would have preferred to have devoted some time in class to examining journal examples. They were in essence saying, "Let's make sure this is the way 'our' journals present information." Fourth, this type of teaching encourages independence as students become better at recognizing established patterns. Students become more aware of the language aspects of journal articles. When I asked a student in the Department of Human Genetics if a particular pattern was also common in the journals that she read most frequently, she responded after some thought, "You're asking a hard question. I will have to go back to the journals to find out." Fifth, with a clearer understanding of generalizations as opposed to rules, students will be more inclined to develop their own scientific writing styles.

Conclusion

As in other areas of ESL, ESP students need authentic material which is research based (Kuo, 1993). Graduate researchers primarily focus on the content of journal articles to complete their research. ESP classes should lead students to observe and evaluate the language in those journals. In order for instructors in ESP classes to do this effectively, there is a need to continue to develop further research on the nature of English as it communicates research in scientific journals specific to a particular field of study.

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English Language Development in a University Foundational Programme for Science Students

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PROGRAM PROFILE

Many black African students come from educationally disadvantaged backgrounds and do not have the entry requirements for admission to the undergraduate science degree programme at the University of Natal in Pietermaritzburg. The Science Foundation Programme (SFP) is a year-long integrated course for such students, who have been identified as having the potential to succeed in degree studies in science. In its fifth year of operation, the SFP in 1995 and 1996 is expanding its numbers from 35 to 50 students and by 1996 to 100 students. To date, all students on the SFP have been students who are second language speakers of English. The medium of instruction throughout the university is English. SFP students take the same package of courses, namely, Biology, Chemistry, Mathematics, Physics and the English Language Development course, Learning, Language and Logic, itself a first year credit course for ESL students at the university. Within each of the courses, there is a component which focuses on language issues of that discipline.

In the language course, students meet with a tutor for three 90 minute sessions per week. The course focuses on developing communicative competence, by requiring students to work in small groups, and understand the demands and benefits of small group communication. Students learn the conventions of academic communication, mainly through the reading of academic texts, and writing of essays, and conducting a small-scale research project for which they submit a written report and do an oral seminar presentation.

PROFESSIONAL PERSPECTIVE

Authentic Tasks in Communicative Language Teaching

For the past five years I have been involved in teaching an English language development course to black African students who are second language speakers of English. They are studying towards an undergraduate degree in science at the University of Natal in Pietermaritzburg where the teaching is conducted through the medium of English.

All the students speak reasonably fluent English on their arrival at the university. They have had to study English as one of the six examination subjects that they write at the end of 12 years schooling, and the medium of instruction at the senior years of the schooling system has been English. But many of the students have seldom, if ever learnt English/or heard English from mother tongue speakers. When they get to the university, their lecturers could be English L1 or L2 speakers, and their textbooks and reference material will be in English. For many of them, this will be the first time that they are living and working within an English medium context.

The students perceive English as being an international language, and believe that it is advantageous to be able to speak English very competently. They believe that if you want to go and study anywhere else in the world, if you want a good job in South Africa, or other parts of Africa or the world, the more proficient you are in English the better. However, this does not of itself necessarily provide enough incentive to see the direct benefit of doing a course in English language development in addition to the four science courses that they are required to do as students enrolled in the Science Foundation Programme. The other courses, biology, chemistry, mathematics, and physics are considered by the Science Faculty to be good subjects within which to give foundational courses. Foundational courses in these general subjects allow for transference of skills into other allied, or more specialised fields, rather than offering foundational courses in all the disciplines offered in the Science Faculty.

The language course locates itself very firmly within a communicative language teaching paradigm. We frame the purpose of developing English in terms of being a effective communicator in an academic environment. An immediate need is for the students to function successfully in the other science courses that they are doing. In keeping with a communicative language teaching methodology, our aim is to find or create authentic communicative situations within which our students will learn to express themselves effectively in English.

The language course has its own theoretical content, with which we teach academic reading, academic writing, and spoken communication in formal academic situations, viz listening to instructions, or lectures, and in giving oral presentations in class and in a seminar situation. We also teach for effective communication in spoken conversational situations of, for example, interacting with the teaching staff, with their peers in the classroom situation and other members of the university community, such as librarians, laboratory technicians, and people involved in financial and administrative positions.

In a course that is trying to teach effective communication it is important that students learn how to be academically literate in terms of the course itself - ie learn how to meet the academic demands of the course. But, to be really effective they need to judge how effective they are being in the daily encounters with other members of the university environment, as well as in the other subjects that they do. This is achieved in two ways: firstly, some of the tasks that students are required to do involve formal interviewing of members of the academic community in the process of trying to conduct a small-scale investigation of some aspect of life in the university. In addition students have to do a lot of collaborative work in the classroom with their peers.

The second way of trying to ensure transfer of skills of effective communication is to foreground the language demands of the tasks that students are required to do in their other science subjects. These tasks are required to be handed in by the students in their other classes, so they are highly motivated to be able to do them adequately. These tasks are absolutely authentic, in that the students understand perfectly what the stakes are in successful achievement of the tasks. Thus students become attuned to the fact that each assignment has both a formal (ie structural) aspect as well as a content aspect, and that if either is neglected in the submission of an assignment that will count against them in the final assessment.

The advantage for the language course is that language, and the students' effective use of that language is show-cased much more often than if there were no formal links with the tasks of the other subjects. The students, from a language development point of view get more than one opportunity to practice a particular kind of task. So, for example, in the language course, students have to prepare and present an oral presentation in a seminar setting, and in the chemistry course they are also required to make a oral presentation. In the language course, they write up a report of their investigation, and in biology they write up an scientific report

on a small research project they have been doing.

All the students are studying the same package of subjects, which they do for two semesters over a one-year period. The language course focuses on basic skills of note-making, essay writing and academic reading, and working in small groups in the first semester. In the second semester all those skills are deepened: students work with more demanding essay topics, in academic reading they look at the underlying assumptions of the writers, and do a section on critical language awareness, they have to collaborate with each other in a small group to do their investigation. Similarly in the science subjects the tasks will be correspondingly more difficult in the second semester.

Teachers in the Science Foundation Programme meet once a week, to talk about the progress of their courses, as well as to discuss ways in which teachers from the various disciplines can enhance the learning that students are making in other subjects, by drawing attention to aspects of their subject which have relevance in another subject. In this way the students are focusing explicitly on metacognitive aspects of learning. They are learning to look for, and find, links within and between subjects. They are expected to use ideas understood in one subject and exploit them in another context.

Within the language classroom students are expected to work collaboratively, either with a partner next to whom they may be sitting, or more formally in peer learning groups. Once a week for an hour the teacher leaves students in groups of about 6 or 7 members to discuss a series of questions based on the textbook for the language course. Students are expected to have read the material before coming to the session, and then to use the resources of the group to answer a series of difficult questions. The teacher leaves the group to work together for an hour, before returning to conduct a plenary session during which student fears about being "on the wrong track" can be allayed.

While students in the language class are expected to interact with each other and the teacher in English, interaction in any language is encouraged in the science subjects. Having students articulate their understandings is felt to be a sound way of developing their understanding of scientific concepts. Thus students have to learn to share their ideas with their peers, even if those ideas are not yet fully understood. In the process they learn to conceptualise strongly, they learn to ask each other questions, and they see a concrete demonstration of the fact that knowledge is socially constructed. This discussion is informal, but will have a more formal outcome, as the science teachers will require students often to come to the front of the classroom or laboratory to explain aspects to the whole class. This they will have to do in English.

Most of the students come from a very traditional language learning background, and feel that if they are not learning grammar and we are not marking their grammar errors all the time then they are not learning English properly. However, a sociolinguistic emphasis in the first semester pays huge dividends, as students are homesick and nervous about the new environment into which they have come, and focusing on strategies for working in small groups, and talking to people of different status at the university is a very important survival skill

I keep a record of students' language performance on all the written tasks that they submit for assessment. From that record, I find that the majority of students in the group improve their ability to write coherently over the year course. I think this is due to the rich learning environment that the course provides, but in addition, I think that as the learner understands the context better, as the learner becomes confident in the new environment of the university, and as it begins to make sense, so learners understand better what is expected of them. As students write in an academic environment they learn the conventions and the expectations of their teachers, and thus they master the task better and better. Therefore, the ongoing

development of the language course continues to focus on identifying real tasks and problems within the students' concerns that can be incorporated into the course and used to develop effective academic communication in the learners.

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English and Technology as Customers

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PROGRAM PROFILE

The University Service Programs of the University of Pennsylvania English Language Programs have a very clear charge: "to support University departments in their teaching, training, and research efforts by offering English language training and testing to non-native speakers of English." In practice, this translates into three main spheres of activity: (1) academic purposes courses, (2) international teaching assistant training, and (3) content + language programs.

In the first sphere, we have been designing support courses for graduate students for many years. Not all courses are given each year, but our 1995 "active" panel includes courses in the medical, nursing, and dental schools, and in the Energy Management and Policy Graduate Group. These courses are designed by coordinators, and staffed by specialist teachers on our full-time or part-time staff.

Second, we undertake University-mandated testing and training of teaching assistants whose first language is not English. This special area of teacher training arises because Pennsylvania law requires each person teaching undergraduates to be fluent in English. An overwhelming majority of international TAs teach science, math, and engineering, so we have become expert in helping them convey complex and abstract information to their students.

The last area, collaborative content + language courses for international professionals, is still underdeveloped with respect to Science and Technology, although the ELP has a long history of collaboration with Business and Management. We hope in future to help Penn technical faculty share their expertise not just with students, but with a wider internacional audience of practitioners.

PROFESSIONAL PERSPECTIVE

English and Technology as Customers

The English Language Programs of the University of Pennsylvania are already moderately active in EST teaching, and intends to promote this aspect of our expertise energetically in the future. We feel this is one of the most valuable contributions TEFL/TESL professionals can make to the schools, departments, and students that make up this university. Several philosophical biases (if that is not too grand an expression) inform our planning in this area. Specifically, in the Great Debate about English for Special Purposes (ESP), we assert that (a) its existence can be demonstrated beyond reasonable doubt, (b) the number of clients needing to master some version of ESP will grow throughout the next decade or two, and (c) ESP can be taught, well, by TEFL/TESL professionals.

First, as regards the existence of something "different" which we can call ESP, we feel that a trained linguist listening to (or reading) a sample of authentic professional discourse in English

should be able to identify at least a few features that would strike me as abnormal in general social communication. Scientific and technical discourse offers particularly clear evidence. Probably the most prominent feature in most samples is the unusual dominance of information management strategies (which in social communication are fairly evenly balanced with interpersonal skills.) Such strategies not only predicate a shared technical or semi-technical vocabulary and foreground the use of the lexis of number and measurement, but also lead to a high incidence of certain grammatical forms - most famously, passive voice. Finally, successful ST discourse exhibits (or seems to - systematic studies are needed) a disproportionate number of the kind of discourse markers which road-map the organization of, and relationship of entities in, a communication: expressions that emphasize sequence, cause and effect, conditionality, subordination, and so forth.

Let me be clear. We would not claim that such features cannot be found in general discourse, but rather that they predominate certain kinds of ST discourse. English courses designed for ST professionals must target these features, if we are adequately to help our clients become more comprehensible to their colleagues and effective in their work. Neither would we claim that "social" English should be ignored. Technicians whose general English level is barely intermediate level frequently aspire to become fully at ease in English-use social situations, but in the meantime the dictates of their academic or professional life may already require an "advanced level" repertoire of information management strategies. In fact we predict a sharp increase in the demand for this "unbalanced" kind of English proficiency, commensurate with the growing internationalization of all fields of science and technology. Town planning, oil, architecture, waste management, medicine, civil engineering, manufacturing, heavy industry, electronics, CIS today virtually every scientific and technical specialism has both an international dimension and a growing number of globally-mobile practitioners. Even those who work exclusively in their home country read technical or scientific journals, over 90% of which are published in English. In increasing numbers scientific and technical specialists join fellow-professionals in refresher courses to upgrade their skills courses that may well be administered, in English, by departments of universities like Penn.

I said above that we at Penn believe EST can be taught, well, by TEFL/TESL professionals. Indeed, if applied linguists are not fit to respond to this challenge, who is? Scientists are not trained to analyze language and identify the features which get particularly heavy use in technical communication, or those strategies that will ensure a successful exchange of crucial information. Those TEFL/TESL teachers who specialize in professional discourse are. Perhaps we should be a bit more energetic about letting the scientific and technical community know how much we have to offer them (provided we recognize standards and adhere to them.)

First of all, we can undertake practical applied research into professional communication, to determine more accurately what should be included in the syllabus of EST courses. Here at Penn course design is usually preceded by collecting substantial audio or video data. For example, in the case of our courses for the Nursing School, we recorded days of interaction in various hospital departments and health care facilities.

Second, TEFL/TESL professionals can design special courses which will make ST students, or ST professionals, more effective in English in their occupational settings. Systematic discourse analysis of the research data gives insights into which the learning targets are most essential for a particular discipline. Third, we can draw on our expertise in managing learning to make class or study hours truly productive. Unfortunately those commissioning language training sometimes have unrealistic expectations, so our success depends on our skill at magnifying the opportunities for learning. Our benchmark should be a well designed course in which each activity practices something new, while at the same time preparing for future activities and

recycling previously-taught material.

The fourth thing we have to offer is sometimes overlooked, but it is crucial to the credibility and ultimate acceptance of our entire "product". It is our ability to provide in-service training and support for TEFL/TESL teachers who wish to specialize in EST instruction. Frustrating experiences of inappropriate course designs, in the hands of insufficiently experienced and prepared teachers, is probably the source of at least some of the heat in the Great ESP Debate. Related to this training contribution is our opportunity to cooperate with publishers to produce apposite, attractive and focused materials to replace some fairly lackluster offerings on the shelves at the moment. In this respect, by the way, we will have to encourage EFL/ESL publishers to make a clear distinction between the needs of students of ESP subjects, and those of professionals working in their special fields.

This last brings me to the final potential contribution that I am going to outline: TEFL/TESL experts can collaborate with institutions, employers, and educators in making science and technical knowledge available to a wider professional (as opposed to full-time student) audience. One suitable medium for this outreach is a short intensive certificate course. These are already common in business and management but are not yet so plentiful in technical fields. Specialist EST teachers can make it possible for ST institutions and departments to succeed with new international endeavors, by acting as partners: our linguistic expertise can help content instructors structure their output so that it is more easily understood by an audience with low levels of English proficiency, and our teaching expertise can help course participants take in new information by providing support documents related to the course content, or language analysis/practice activities that will equip them to understand more easily or to negotiate for meaning.

To summarize, at the University of Pennsylvania English Language Programs we believe EST teaching to be a clearly identifiable mission, and one which will continue to make interesting demands on TEFL/TESL professionals well into the next century, as more and more clients are encountered, and the standard of the instruction offered is raised. At Penn we hope to grow even more active in the field, giving some of our teachers a chance to develop the special qualities needed to be a good ESP teacher. Check with us from time to time to see what we are up to!

The Author: Dr. Mary Ann Julian moved to Penn in August 1994, after being ESP Coordinator at UC Berkeley's ELP. Her doctoral research (University of Edinburgh, Scotland) focused on professional discourse.

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English Enhancement for Engineering Students: Professional and Technical Communication (Protech)

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PROGRAM PROFILE

The University of Hong Kong (HKU) was first incorporated in 1911. The Engineering Faculty was founded in 1912 and is one of nine faculties at HKU. The Faculty offers a Bachelor of Engineering Degree and a Bachelor of Science in three- year programs. A number of professional engineering bodies recognize these degrees and this ensures a high level of rigor in the curricula. There are also robust postgraduate programs in all departments. The Faculty serves approximately 620 first year students.

HKU is an English medium institution. The L1 of virtually all students at HKU is Cantonese. 90% of Hong Kong's schools are "English medium," although there is a wide variation in what that actually entails. A Use of English Grade D (equivalent to TOEFL 540) is required for entry into the Faculty. This standard is now in question as newly established universities in Hong Kong are attracting students and a wider pool of applicants must be considered.

HKU has endorsed a university-wide English enhancement program for all first year students. Each faculty has been invited to negotiate with the English Centre to set up and run courses to compliment the curriculum for their students. A needs analysis revealed that engineering students coped with the academic needs of their programs adequately, though not ideally, with the level of English skills they had. There was some concern, however for their communicative skills upon graduation and in the workplace. The Protech course was thus developed to enhance English communication skills for needs beyond the university classroom (See Allison, 1993).

PROFESSIONAL PERSPECTIVE

English Enhancement for Engineering Students: Professional and Technical Communication (Protech)

The Professional and Technical Communications (Protech) course evolved from a 20-hour report writing course prepared for first year engineering students. The course served only about 1/4 of the whole intake, selected by a pre-term writing test and assessed by a pass/fail system. As a result, the course was seen as a burden for less able students who were not even given credit for their efforts. The course was also deficient in two other important areas. One, many students who could have benefited from help with writing in English were not served and two, needs for oral English enhancement could not be met.

The Protech course has sought to overcome these negative attributes. All first year students are required to take Protech. The course is a one half paper (credit) for the Bachelor of Engineering degree and a full paper (credit) for the Bachelor of Science degree. This has important motivational implications for students giving the course equal footing with other courses in their

curriculum. The faculty has also given the course 48 hours in the syllabus. Engineering students at HKU have on average 35 hours of class each week in lectures, tutorials and labs. In spite of this, we are now able to meet with all students for two hours each week over two semesters, enabling the course to cover more skills.

Based on the needs analysis, it was decided to concentrate, not on skills which students need for 'academic purposes' but rather for the communicative skills in the professional workplace. Most graduates find employment in commerce and industry and the civil service. While many will continue in fields related to their disciplines, many will use a degree in engineering simply as a generic degree and seek careers in business and finance. We therefore, needed to design (and continue to develop) courses which begin to prepare students for the expectations of the professional world of work, while taking into account the rest of their syllabus which is theoretical, highly academic and demanding.

Four principles which govern the Protech course are presented below along with examples which are representative of those principles.

The first is to enhance the existing language skills of first-year students. A significant increase in proficiency levels in 48 hours is not an expectation. Project work is the structural theme of the course and professional and technical contexts are chosen for projects which require students to apply their English language skills to the communicative tasks embedded in the projects. Language teaching per se - grammar, vocabulary development, pronunciation - is less overt and is dealt with only as needed in relation to the development of a piece of writing or oral presentation. This has been referred to as teaching by stealth, yet it is an effective approach as the purpose and application of "the rules" are readily evident.

As an example, the Protech course for Industrial and Manufacturing Systems and Mechanical Engineering includes a simulation in which students act as research and development teams. They design tests for "prototypes" such as clothes pegs, plastic toys and chopsticks, complete the tests and write recommendation reports to management on the basis of the test results. In the course of the project teams also hold meetings for which minutes must be recorded, write memos to a supervisor and write a report with executive summary for management. A process approach is employed so that students write drafts from which teachers extract problematic points for teaching.

The second principle is in relation to the rest of the students' coursework. Whereas lecturers would prefer clear, concise, and correctly written work, there is nevertheless a high tolerance for inaccuracy as long as key words are evident. Faculty members feel moreover, that so much work is mathematical, that skilled writing is of secondary importance. In contrast, the Protech course maintains that accuracy is significant. It is a criteria for real-world assessment of work and so holds equal importance with content.

Each major project outcome has (or will have) a specific marking rubric so that students can see what is valued. They can also then see what they do well in relation to other marking criteria. Students may do well in formatting and content, but if accuracy is not sufficient, marks are reduced. Also, by simulating real-world outcomes, it is possible to give feedback in real-world terms: how a client would react to a letter full of errors, the value of conciseness in 'the time is money' equation, the importance of clarity in a proposal bid.

The third principle guiding the course is the need to serve as a bridge from "school" English to the language expectations of the professional world. Students have had virtually no experience communicating outside the home or school context. As much as time permits, the Protech course requires students to seek information outside the classroom and off-campus. In doing this, they may or may not communicate in English, but the outcomes of their work must be presented in

English simulating the real-world context of Hong Kong.

In the Protech course for Civil Engineering, students seek information from government offices on rules and regulations governing noise control, transport, geotechnical concerns and town planning. Even at age 18 or 19, students are unfamiliar with office environments as they are accustomed to having data presented to them in handouts or in textbooks. Having gathered the necessary data themselves, students can assume a more confident role of expert in using the information in classroom tasks. In the Protech course for Computer Science and Information Systems, students must identify and contact a real office, clinic, school or establishment for a mock systems analysis. They must conduct interviews, plan a system, present it to the "client," present the case to the class and write a report. Playing the role of professional rather than student, is an important confidence building experience.

A fourth principle concerns relevance. Unlike arts and science students (at HKU) those in engineering are already focused on future careers. Course design and content must be perceived by students as contributing toward those professional goals. The Protech course has been separated into 4 streams to accommodate this.

Protech for Civil and Structural Engineering concentrates on dealing with issues which affect the public such as noise pollution and traffic control, writing proposals which is required before projects are undertaken and oral presentations, generally agreed to be an important professional skill.

Protech for Computer Science and Information Systems, focuses on those skills required for information systems analyses: interview skills, oral presentations, team work and business communications.

Protech for Computer and Electrical and Electronic Engineering also teaches oral presentation skills and business communication, but there has been a concerted effort to contextualize projects in these disciplines. One project has teams inventing a (Rube Goldberg or Heath Robinson type) burglar alarm with limited materials such as a battery, copper wire, lightbulb, tin cans and string which can be connected to a computer. In another project students compete in simulated consortiums to propose a telecommunications system for a fictitious third world island country.

Protech for Industrial and Manufacturing Systems and Mechanical Engineering involves students in problem solving in the prototype testing project and in another project in which teams design or invent mechanical devices which they test and redesign. In such projects, teams consider engineering principles in discussion and in written reports which enables them to draw on the rest of their coursework.

In general terms, the Protech course tries to function as a staging ground where students can apply the abstract and theoretical concepts of their disciplines to situations where they must deal with non-experts as well as specialists in their disciplines.

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Can Multimedia be Effective in EST?

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PROGRAM PROFILE

King Fahd University of Petroleum & Minerals (KFUPM) is one of the most recognized universities in the Middle East in the areas of science and technology. The medium of instruction is 100% English. Therefore, students coming out of high school are required to take a one year orientation program which includes 20 hours a week of English instruction before starting Freshman level courses. The English Language Center (ELC) is considered to be the best in Saudi Arabia at the university level. The students admitted to the university are traditionally among the top of their high school classes, but they come from all over the Kingdom of Saudi Arabia with a variety of learning styles and language abilities.

The curriculum of the ELC is divided into four main skill areas: Reading, Listening, Writing, and Grammar. A fifth skill area, Vocabulary, is emphasized in both the Reading and Listening components. Students spend one class hour a day in each of the four skill areas. The entire curriculum has been developed over the years by ELC faculty members. It concentrates in the content areas of science, technology, and business.

PROFESSIONAL PERSPECTIVE

Introduction

Multimedia technology is very costly, and the typical questions most often raised in EST and other types of ESL discussions these days are: "Is multimedia worth the investment? Once you get beyond all the 'glitz' and 'gloss' of multimedia, is it effective in language learning?"

Unfortunately, there are very few multimedia products on the market today that could be used in an EST environment, and fewer (if any) that have been designed from a curricular perspective especially for an EST program. Any that do exist were probably developed in house, and not available on the market. The problem is one of economics: who is going to invest in developing such a product and throw it on the market when most institutions of learning are still using old technology, like Apple IIs and XTs? However, as the technology becomes cheaper, this will become less of a problem.

So in answering the question as to the effectiveness of multimedia in EST instruction, we don't have many models or case studies yet that we can look at to try and answer this question. Instead, I think we need to look at what the technology can do, identify the problems we have in teaching EST students, and then look at ways in which multimedia can address those needs. The next step would be to develop prototype multimedia lessons and pilot them.

Here at KFUPM we have gone through this process, and are now at the piloting stage. In this article I would like to identify some of the problems we have in teaching EST, how we thought multimedia could address those problems, and give a description of the prototype lesson we have developed.

Problem 1: Curriculum Development in EST

Here in the ELC at KFUPM the teaching staff develops all of our curriculum. Because we teach English for Science and Technology in Saudi Arabia, it is difficult to find existing curriculum that, 1) is based upon the content and has the vocabulary our students will need in their university studies, and 2) is appropriate for the Saudi Muslim culture. We are constantly revising our curriculum to try and improve our students' deficiencies in English.

A constant point of contention among our staff which is revising the curriculum is what our objectives are in curriculum development. Do we base our teaching objectives solely on the technical kind of skills they will need in their university studies (reading and writing research skills often to the exclusion of oral skills) or also have some "general English" type of objectives since we are, after all, teaching English?

For example, recently a needs analysis was carried out on the writing skills students need in their university studies here. We found that students were using very little of the writing skills we were teaching them, e.g. topic sentences, paragraphs, introductions, conclusions, etc. Instead, a bulk of the kind of writing they were doing was lab reports, summaries, explanations of formulas, etc. As we met to discuss the needs analysis and how we were going to revise the writing curriculum, the faculty was divided as to what approach we should take: emphasizing the technical skills the students needed (why spend so much time teaching what a topic sentence is if they seldom write that way in their university studies?). or emphasizing a more general English writing approach (staying with technical content areas) and including other types of writing styles as supplementary.

Problem 2: Learner Styles and Abilities

The problem of students' different learning styles and abilities is one that is not unique to EST instruction, but is common to any classroom educational setting. No matter what level of English you are teaching; beginning, intermediate, or advanced, you are fully aware that all of the students in your classroom are not at the same level of ability in terms of what they know and how fast they can learn. A teacher usually has to aim at the middle of the class to effectively educate as many students as possible. There are always problems with the advanced students who become bored with the level of instruction, as well as the slow students who have a difficult time keeping up with the rest of the class.

In our particular program, this seems to be the most pronounced in the listening component. Students currently meet in "listening labs" which are classrooms with 24 booths and headphones linked into a Sony console. The teacher sits at the console directing the listening activities. There are traditionally pre-listening activities, a lecture, and exercises based on the content of the lecture. Students are expected to take notes during the lecture portion of the lesson, and then use those notes to complete exercises.

As I have taught the listening component, I have felt that the pace of the lectures was appropriate for only about 25-30% of the students. Many of the rest of the students were either completely bored, or completely lost and had given up on even trying to take notes.

How Multimedia can Address the Problems

As to the first problem, curriculum objectives, multimedia does not really have any magical solutions. Whatever objectives you adopt for your non-computerized curriculum would also characterize the curriculum you put on computers. If, however, you had a multimedia self-access lab, you could supplement your core curriculum with lessons or activities that may be

lacking in your regular program. This could also be accomplished with an ESL library or reading room, but multimedia would add the extra dimensions of interaction, immediate feedback on exercises/tests, and listening activities. However, who has the luxury to develop such "supplementary" materials? Until such materials can be found on the market, this is not a real cost effective means of investing in multimedia technology.

It is to the second problem that multimedia seems to have it's greatest value. Given the technology available, it was decided that multimedia could best be applied to our listening program. Therefore, two of us developed a prototype lesson centered around the theme of "petroleum exploration."

A Prototype Lesson

Our goal was to develop a lesson that would address the different needs and abilities of our students. We wanted the slower students to have more time to listen to the lecture repeatedly, with different language aids available to him. We wanted the advanced students to have more challenging activities to explore the English language and develop their skills. Therefore, it was decided that the prototype lesson would be an integrated lesson covering all the skill areas, with the primary focus being on listening.

A menu page was developed where the student could access any one of the five skill areas (Listening, Reading, Writing, Grammar, and Vocabulary). An additional menu item, "Advanced," would take the student to some advanced activities which could only be accomplished if the student had successfully learned the content from the listening and reading lessons.

Listening

In the Listening section, the student would access a menu of the Listening activities (Pre-listening, Lecture One, Lecture One Exercises, Lecture Two, and Lecture Two Exercises.) The Pre- Listening section takes the student to some pre-listening activities designed to introduce the topic of the lectures and preview some of the skills the student is expected to acquire in the lesson (e.g. note-taking skills, transition markers, etc.) After completing the pre-listening activities, the student would proceed to the first lecture. The first lecture is a short documentary type of lecture which introduces the topic, in this case "petroleum." As a documentary style lecture, there is no interaction. The student must listen to the lecture straight through without being able to stop it and take notes as best he can. An animation illustrates what the lecturer is talking about. The lecture is a little over three minutes long. At the end of the lecture, the student has two choices. For those students who were able to comprehend most of the lecture and take good notes, they can proceed directly to the exercises for Lecture One by clicking on the "Listening" menu and choosing the exercises. For those students who need to hear the lecture again, they would go to the next screen. On this screen the student would have more control over the lecture by being able to pause it at any point they wish, and restarting and listening to the lecture as many times as he wishes. He would also have the opportunity to click on a "vocabulary" button, which would display a list of the key vocabulary words. Simply pointing the mouse at the word results in a pop-up definition of the word, along with other examples of how the word is used. The student can access these vocabulary items while listening to the lecture, or as the lecture is paused. When the student is satisfied that he has mastered the content of the first lecture, he would proceed to the comprehension exercises where he could test his knowledge.

Lecture Two covers the subject more in depth, reviewing the content of Lecture One and then moving on to describing the process of actually finding petroleum. Lecture Two also draws upon the content of the Core Reading passage which would have been covered in their Reading

classes at the beginning of the week about the same time they were studying Lecture One. The Core Reading passage discusses the various tests geophysicists use to locate possible sites to drill for oil. Lecture Two is more of a classroom lecture style, in contrast to the documentary style of Lecture One. The lecturer, John Mather, who is the principle architect of this portion of the lesson, presents the material in a natural way, lecturing from a set of notes rather than a written script. Various pictures and diagrams appear on the screen as he is talking. The students have the opportunity from the start to stop the lecture at any time, as well as access vocabulary items. In addition, at various points in the lecture John asks the students a question to check if they are comprehending what he is saying or reviewing. At that point the lecture stops, and the students must answer the question correctly in order to continue the lecture. The question is not given on the screen, only the answers. If they did not hear the question, they have the option of hearing it again by clicking a "repeat" button.

Again, as in Lecture One, the students can move on to the exercises when they feel they have mastered the content of Lecture Two. The exercises can test their comprehension in a number of different ways. One way we do it is by supplying a "question" button that they click on to hear a question. They must respond by clicking on the right answer, or in some cases write the correct answer. They get immediate feedback as to how well they are answering the questions. They can also repeat the questions as many times as they like. If they are not doing well, they can go back and review the lectures.

Besides traditional true/false, multiple choice, and fill in the blank exercises, we also have exercises that are more task based. For example, in one exercise they must study a diagram of sub- surface features and click on the correct layer of non-porous rock. Similar examples of diagrams were presented in Lecture Two. The Advanced Activity for this lesson is an exercise in which the student has to apply everything he has learned from the lectures and the readings. In the Advanced Activity, the student must actually find a suitable place to drill for oil on a grid map. They do this by taking aerial and seismic surveys which will reveal one of the sixteen sectors as the best one to drill for oil. As they conduct the surveys, they get various maps and diagrams of each sector they click on. They must correctly interpret this data to find the oil.

Reading

As was mentioned above, this multimedia project was designed to replace the Listening curriculum. However, we wanted to integrate the other skill areas also. In the Reading component, we supply the core and related reading passages that the students would be studying that week in their Reading classes. The primary advantage for having the passages on the computer is for vocabulary study and reference for some of the exercises. The vocabulary items are underlined, and by clicking on the word a pop-up definition appears as in the lectures. The students also have the option of hearing the text read to them by clicking on the audio text button. This has the advantage of giving them the pronunciation of the vocabulary words in the context of real text, and not in isolation as a single word.

Writing

In the Writing component, students have access to the word processing and typing programs that are used in the orientation program. The writing assignment that was given in their writing classes that week would be repeated here for reference. Writing assignments could be given that require the student to look up information in databases or CD-ROM encyclopedias.

Vocabulary

In the vocabulary section, a list of all the vocabulary words for that unit is supplied. Students simply click on the word to get a pop-up definition of the word. However, students would be encouraged not to study vocabulary from the list, but rather within the context of the lectures and reading passages. There is an exercise where the students must fill in the missing blanks of a text with the correct vocabulary word, or form of the word.

Grammar

The grammar section gives a review of the grammar constructions covered in the students grammar classes that week. The student has the option of studying these constructions within the context of the reading passages or the listening lectures. By clicking on one of the reading buttons, the reading passage pops up with all the occurrences of the grammar constructions (passive, for example) in red letters. By clicking on the one of the lecture buttons, another series of "example buttons" appears. Clicking on one of the "example buttons" plays a short segment of the lecture which contains a passive construction. The passive verbs are given to the left, and the student is prompted to listen for that verb form. The advantage of presenting the grammar this way is that the student would have already studied the content of the lectures and reading passages, and would be familiar with the vocabulary, hence he can go back and concentrate on the occurrence of specific grammar points.

Initial piloting of this program has been positive. We are confident that the new multimedia lessons will be a great improvement over the existing Sony labs.

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HUT Email Writing Project: An Ongoing Experiment

(Autumn 1993-Spring 1995)

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PROGRAM PROFILE

This article describes an ongoing international writing project which was started in the Language Centre at Helsinki Univc .sity of Technology in autumn 1993.

In autumn 93, students from around the world shared their insights and assisted one another in writing in English on academic and technical topics. Short email messages resulted in research papers. More details about the autumn 93 and spring 94 projects can be had from my paper, "Global Communication by Email" on the www:

URL http://www.hut.fi/ rvilmi

In autumn 1994, new technology was used and the project developed into three email writing courses: the Individual Writing Exchange, the Robot Activity and the Environment Activity. In this article I shall describe briefly the autumn 94 and spring 95 courses.

In autumn 94, the courses involved international competitions, an essay competition for the Individual Writing Exchange, and team competitions for the Robot and Environment activities. These competitions were sponsored by Nokia Telecommunications in Finland. Several samples of the essays and the reports produced by the student in addition to their evaluations, can be found on HUT Gopher and the www.

In the Spring 95 courses, we are concentrating on the Individual Writing Exchange and exploring new possibilities on the World Wide Web.

PROFESSIONAL PERSPECTIVE

Introduction

This short article details three email courses co-ordinated by Ruth Vilmi in the Language Centre, Helsinki University of Technology, and her net-colleagues around the world, mentioned by name in Table 1 at the end of this article.

The Individual Writing Exchange

The Individual Writing Exchange is a system which encourages writers from differing "rhetorical backgrounds" to consider ways to make their writing more effective on the international stage. It is based on a three-week cycle in which students submit articles on significant topics to the international group, then comment on articles written by students from other countries, and finally share their perceptions of the strategies from the collection of articles that made for

effective communication. On the basis of these "Criteria for Effective Writing," they can then revise their own articles and create more effective articles during the subsequent cycle.

The Individual Writing Exchange has the longest history in the project and has been developed co-operatively by foreign language teachers on the teachers' list started at HUT in 1993. The teachers and students are from many different countries including England, Finland, France, Norway, Russia, Egypt, Hong Kong, Korea, and the United States. The topics are chosen each term by the teachers. Evaluations from the previous term are taken into account; some very popular topics are continued the following term, and some new topics agreed on. It must be borne in mind that the students are very different each term. They come from different cultures and from various disciplines. There must be some topics to suit everyone, but not so much choice that some students get no comments on their work.

In autumn 1994, the topics for individual writing included:

1. Gender discrimination
2. Racial discrimination
3. The cinema
4. Violence on TV
5. Literature
6. Abortion
7. Traffic problems.
8. Legalisation of drugs.
9. Computer problems.
10. Current events
11. Youth culture
12. Censorship
13. Alternative energy sources
14. Nuclear waste
15. Ethnic traditions and beliefs
16. Our university.

Over 1000 articles were posted to the newsgroup Each student wrote at least three articles and commented on six. The most popular topics for the Finnish students were gender discrimination, violence on TV, abortion, alternative energy sources and legalisation of drugs. Youth Culture was very popular among the Eastern students but not with the Finns.

This spring, the topics are divided basically into technical and non-technical topics, as we have some technical classes and some business and general classes. Special subject lines are required as the messages are sorted by topic and by country and put onto the WWW. However, the students find it surprisingly difficult, or fail to understand the importance of sticking to these subject lines! The topics include the following:

Round 1: a) Technical

1. role-of-technology-at-work
2. dream-car
3. scientists-and-responsibility
4. genetic-engineering
5. electronic-cottage

Round 1: b) General / Business

1. beliefs-and-stories
2. cross-cultural-experiences
3. is-English-enough
4. my-ideal-boss
5. future-of-the-EU
6. animal-rights

Round 2: a) Technical

1. pulp-and-paper-industry
2. electronic-media
3. alternative-building-materials
4. sports-and-technology
5. environmental-problems
6. abuse-of-technology

Round 2: b) General / Business

1. gender-discrimination
2. duty-to-my-country
3. utopia-an-ideal-world
4. shopping-on-line
5. problems-faced-by-students
6. cinema
7. legalisation-of-drugs

Round 3: a) Technical

1. alternative-energy
2. nuclear-waste-disposal
3. technology-of-the-future
4. controlling-city-pollution
5. intermediate-technology
6. computer-art
7. robots-of-the-future

Round 3: General / Business

1. professional-sports
2. starting-a-business
3. multinational-companies
4. racial-and-ethnic-diversity
5. censorship-of-television
6. current-events
7. euthanasia

The students are required to write in a fairly formal "reflective paper style" when doing the articles, but there are also separate subject lines, such as, chatting-culture and www-sources, for informal chatting. In these informal exchanges, students are encouraged to get to know people from different cultures, and learn about their traditions and life-styles.

In addition to doing this regular individual writing, students work meet in the classroom once a week for oral discussion and presentations. Groups are formed, consisting of a chairperson, a secretary, an archivist and a technical advisor. Each student has his own task within the group, such as doing research on the discussion topics, leading discussion on the topics , creating a class glossary and glossary tests. They also help each other to create WWW Culture Pages. Groups suggest various main headings for the Culture Page menu and then make subdivisions. Each university with access to the Internet will make its own Culture Pages. At the moment, the main headings suggested for the HUT Culture Pages include:

- The Soul of the Finn
- Finnish art
- Finnish beer and spirits
- Finnish folklore
- Finnish food

- Finnish language, compared with others.
- Finnish laws
- Finnish pastimes
- Finnish research
- Finnish sports
- Finnish technology

In order to develop oral skills, each student at HUT and at some of the other universities, has to give a presentation on one of the topics in every round, and a demonstration of his or her culture pages.

Task-based Team Writing Courses

The Task-based Team Writing Projects are a more recent development and represent the type of writing required of students or in business and technological fields. Each of the projects is geared toward a specific goal or product and demands long-term (i.e. one term)co-operation among international teams of students.

The Robot Activity

In the Robot Activity, students work to find a robotics solution to a real world problem, to design such a robot and to present the results in a written report and an oral presentation. In autumn 1994, the international teams included robotics students from INSTN, Paris, France, and technical students from The Chinese University of Hong Kong and a technical English class at HUT. Students were put into small international groups, so each team consisted of at least two students from each university. The teams competed to devise (and "sell") the best solution.

The three teachers concerned, Linda Thalman, George Jor and Ruth Vilmi, had many discussions on the teachers' list planning the details for the course. We all had the same aims, the same requirements from our students and the same deadlines.

We all agreed on a minimum portfolio:

1. Introductory letter or CV.

2. Team report:
   A. Definition of the problem and why it needs to be solved.
   B. Promotional brochure, including:
      - narrative description of the robot,
      - specifications,
      - instructions,
      - technical drawing,
      - price.

3. Letter to a company (sponsors) to invite them to the class International Robot Fair.

4. Abstract (250 words) for ''The 5th International Conference on

Robots and Applications.''

5. Record of how work was delegated.

6. Essay evaluating the project.

7. Oral activities : the Finnish, French and Hong Kong teams all gave oral presentations and the local students chose the best teams.

The schedule was made very carefully, but there were not enough real deadlines. Students from every university complained about the other teams being slow to respond to mail. Another complaint was that, when the students did get a message from abroad, it seldom answered the home team's questions. The Finnish team did have their final reports ready on time, and did very good oral presentations, but their foreign partners were late sending the work, in the worst case the work arrived two weeks after the deadline and after the presentations. The students' evaluations of the project, and the Finnish teams' reports, including technical drawings, are linked to the writer's home page. In spite of the challenges, excellent written reports were produced by students at all three universities and the students all agreed it had been a worthwhile experience. They learned that it is very easy to have misunderstandings, both cultural and technical ones.

The teacher from Finland, Ruth Vilmi, was lucky enough to visit the French students and their teacher, Linda Thalman, at ENST in Paris, and the French students were able to taste some Finnish delicacies, such as reindeer pate, Karelian pies and Finnish chocolate.

The schedule at all three universities was identical:

12th Sept. (week 37) Class divided into teams.
Email addresses sent to HUT.
Teams discuss and choose problem.
Prepare CV or intro. letter. (individ.work)
Prepare report on problem selected. (team work)
Take photos of teams.

19th Sept. (week 38) Send off CVs and report to list.
Classroom discussion on technical methods for decision making/voting, scanning photos, scanning/ftp drawings etc.
Read and discuss reports from other teams.
Write to list about decisions on the above.
Make team decisions on problem to work on, in the agreed way.

26th Sept. (week 39) Teams have brainstorm in class for ideas on solutions to the selected problem. Send the best idea(s) to the list.
Make team decisions on solution to work on.

3rd Oct. (week 40) Teams divide up the tasks for the project and get to work.

10th Oct. (week 41) Bring drafts to class and discuss with peers.

Write to list for comments, if necessary.
Send photos by method agreed on.

17th Oct. (week 42) Send draft documents to list for comments/revision.

24th Oct. (week 43) Discuss revisions. Give personal mail to Ruth and Linda (they will meet in Paris!) Ruth leaves on 26th Oct. and returns to work on 3rd Nov.

31st Oct. (week 44) Prepare final documents.
Prepare presentation and material for fair.

7th Nov. (week 45) Oral presentations (Ruth's class)
Discussion of documents (input from teacher?)
Send documents to list (still chance for comments and final revision)

14th Nov. (week 46) Final drafts due. Deadline for sending to newsgroup Fri. 18th Nov.

21st Nov. (week 47) Robot fair. Invite outsiders. Outsiders vote on best robot and best salesperson. Take photos. (Ruth's class)
Students vote on best robot.
Teacher sends results of vote to teachers' list.

28th Nov. (week 48) Final announcement is sent to newsgroup.
Winning report sent to www.
Write essay (about 500 words) evaluating the project.
Send essay to newsgroup.

5th Dec. (week 49) Final test. (Ruth's students)

The Environment Activity

The aim of the environment activity was to provide an interesting forum for students from different cultures and disciplines to exchange ideas, enhance their writing skills, and enjoy cross-cultural communication.

They were required to: i) select a problem area and try to find a practicable solution through international team work, using email, ii) present the solution orally, both to peers and outside visitors, and iii) publish the final documents on www.

The international teams consisted of American management students from Mesa Community College, USA, and technical students from the Chinese University of Hong Kong and a business English class at HUT. Each university formed five "home" teams. Each home team worked with an international team.

Teams selected a problem area from the list below:

- nuclear power & toxic waste disposal
- automotive industry & exhaust pollution

- manufacturing & ground water contamination
- forest products industry & wildlife preservation
- airport development & noise pollution
- energy industry & oil spills

The names and email addresses of each home team were sent to HUT by email, and each team was given its own team mailing list address. When these addresses were used, all messages went to the members of the team.

The minimum portfolio for each university consisted of: i) Individual work. Items one and eight, ii) Team work. Items two to seven. (Deadline 11th November). Records kept on how the work was shared, and sent to the teachers.

1. Introductory letter or CV. (Individual work. Deadline: 19th September)
2. Report stating the importance of the problem to the long-term objectives of the company or the health of the industry involved.
3. A three year plan showing what will need to be addressed during these years.
4. A budget outlining what monies will be spent when and where.
5. A technical report, recommending certain technical solutions to the problem.
6. A 250 word abstract for the Call for Papers for "The Fifth International Conference on Improving the Environment" to be held in York, England from April 10th to 13th, 1995. Deadline 11th November.
7. Record of division of labour (How? When? Where? Who? Deadline 11th November.)
8. Essay (250 words) evaluating the course. (Deadline 25th Nov. for Ruth's group.)

The Schedule

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Sept. 12  Divide class into teams.
          Set up Email addresses.
          Teams discuss and choose problems.
          Teams prepare initial introductory communication.

Sept. 19  Teams begin to work together.
          Inclass brainstorming sessions coupled with exchange of ideas
            to members abroad.
          Receive feedback and settle on the approach to defining,
            researching, and reporting on the problem.

Sept. 26  Teams finish agreeing on approach, methodology and basic
            outline of project.  Individual team assignments are made.

  Oct. 3  Team members begin the research task and stay in contact
            with foreign members to relate facts and documents go
            through peer review for comments and revision.
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Oct. 10 Research and draft stage continues.

Oct. 17 Research and draft stage concludes.

Oct. 31 Preparation of the final document begins. Students will have two weeks to agree upon exact content and form of final report.

Nov. 11 Final report/recommendations are due.

Nov. 18 Oral presentations.for Ruth's class.

During the presentations the audience and the teacher voted on the best team. As with the Robot Activity, many teams were disappointed as messages were too few and far between, particularly near the beginning of the course, so it was difficult to keep to the deadlines. Also, the aims of the teachers seem to conflict - the American teacher was more interested in the thinking process, and the Finns were interested in finding a real solution to a problem and writing about it in a report. The Hong Kong university were late coming on line and but still wanted to decide which had already been agreed on by the other teams. When the other teams were firm, the Hong Kong students felt their ideas had been ignored. The Hong Kong students wrote excellent evaluations of the project and discussed what they felt to be cross-cultural problems. Unfortunately, the American teacher would not require his students to write an evaluation. These evaluations are essential in order to develop similar course.

These Team Writing Projects were still in the initial trial stage of development during the autumn of 1994. Teachers have reported students enthusiasm for the concept of such authentic tasks clearly related to their academic fields. However, students also expressed a need for a stronger cross-cultural element in the project to be able to get to know their international partners better.

A future Robot Activity or Environmental activity will need closer monitoring by teachers to assure continual exchanges among the team members. More deadlines and more specific details about each task need to be agreed on beforehand. Many students particularly those abroad, did not stick to the deadlines, and this was disappointing.

An Innovative Distribution System

At first the project relied on individual penfriends, then, in spring 94, computer mailing lists were introduced for international communication. The mailing lists resulted, however, in dozens of copies of the same message being sent over the Internet to multiple recipients at the same site, and in overloaded student mailboxes. Mailing lists are still used for small groups of students in the team writing tasks, and by the teacher at HUT as class mailing lists. They were automated in Spring 1995 by Mika Silander at HUT Language Centre. Mika has also written many small programs to help with the organisation of the project.

In 1994, Jukka Virtanen from the Computer Centre at HUT, developed a new system by which only one message is sent by email to each site; the site handles the distribution by various means, such as a local newsgroup or Gopher. This allows students and teachers to browse at will without overloading their mailboxes. In autumn 1994, a sorting program was made, by Rainer and Mikael Puittinen, in HUT Language Centre, whereby the articles written for the hut.writing-project newsgroup are saved according to country. This is interesting for research

purposes.

There was great progress this spring, as Laurent Gaillard, from ENST, Paris, made a program which not only sorts the messages from the newsgroup but puts them onto the WWW and updates them every two hours. It is very simple to read the topics on a certain topic or from a certain university, and to reply to the writers personally by clicking on their email address. In addition, the teachers can see at a glance which students have been writing!

These projects have been successful and motivating for students and teachers. The overall goals of the projects, to give the students a meaningful and motivating forum for their writing and to increase their cultural sensitivity, have been achieved. Future projects will build on this success. There will be improvements in technology, general "net competence" will increase and the teaching and learning of English will move towards global approaches such as those we have taken at HUT.

Table 1

Universities and Teachers Involved in the HUT Email Writing Project

Autumn 94

1. Helsinki University of Technology
   Chief Co-ordinator: Ruth Vilmi (Ruth.Vilmi@hut.fi)

2. New York University
   Co-ordinator: Andrew Hess (hessa@acfcluster.nyu.edu)

3. The Chinese University of Hong Kong
   Co-ordinator: Jor Chi Keung (george-jor@cuhk.hk)

4. George Washington University
   Co-ordinator: Christine Meloni (meloni@gwis.circ.gwu.edu)

5. Sogang University
   Co-ordinator: William Burns (burns@ccs.sogang.ak.fr)

6. Institut National des Sciences et Techniques Nucleaires (INSTN)
   Co-ordinator: Linda Thalman (thalman@nea.fr)

7. Ecole Nationale Superieure de Telecommunications (Telecom)
   Co-ordinator: James Benenson (benenson@inf.enst.fr)

8. College of Education, Trondheim
   Co-ordinator: Sandra Foldvik (sandra.foldvik@trdlh.no)

9. Mesa Community College, USA
   Co-ordinator: Charles Lewis (lewis@mc.maricopa.edu)

Spring 95

1. Helsinki University of Technology

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home phone: (33 1) 45 46 13 83

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news reader: rn, tin, a mac newsreader
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CC email address: Dax@inf.enst.fr

5. Supelec--Ecole Superieure d'Electricite, France
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newsreader: tin, eudora, xrn
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The English for Science Programme at the University of Hong Kong

Andrew Wright

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PROGRAM PROFILE

The Science Faculty at Hong Kong University is one of the university's nine faculties and consists of four core departments: biological sciences, mathematics, chemistry and physics. At the end of the 1980s the Hong Kong Government decided on a massive increase in tertiary places: a doubling by about 1995. This involved the upgrading of two large Polytechnics to university status and the opening of the new, lavishly funded, University of Science and Technology. These developments have made it increasingly difficult for us at Hong Kong University to maintain the quality of student intake. Incoming students are expected to achieve a minimum of grade D on the Exams' Authority's Use of English (equating to about 530-550 on TOEFL); in the past few years the university has been obliged to waive this requirement and this year, 1994-95 we have been tracking the progress of a number of such students.

Starting this year, our English enhancement course has been compulsory for all first year students and their grades will be recorded on their graduation transcripts. These developments have had positive results: since students are not now tested out of the programme there is no longer the perception that the course is a penance for the unlucky; and secondly, recording of grades on the transcripts seems to be resulting in increased commitment and motivation to the programme. The English programme is taught as unified course to students irrespective of the department they belong to.

PROFESSIONAL PERSPECTIVE

Constraints

One: Depending on the department in which they are enrolled students receive widely differing levels of English language immersion: The biological sciences demand extensive writing and a certain amount of discussion while at the opposite extreme physicists and mathematicians receive much less, and probably the least in the university.

Two: At the time of writing students receive a maximum of 48 hours instruction, and only in the first year. It would be unrealistic to expect this to boost their proficiency significantly. Because of the relative lack of language maintenance during their everyday life, students' English attrition during their second and third years is worrying, worrying for students too as they face the job market, related correspondence and possibly interviews, in English. We are now thinking of establishing a voluntary course to be taught during the third year to meet these fairly specific needs.

Three: Hong Kong university has developed along the lines of a British university and while there has been a marked increase in the proportion of Chinese faculty, particularly in the Engineering and Science Faculties, the passage from school to university for our incoming students

still amounts to a transition to a learning culture markedly different from anything they have previously experienced: the shift from an intensive, teacher-directed regimen of English training to an environment which expects them to be maturer, autonomous learners.

Four: The concentrated programmes of English teaching at high school are effective enough at preparing students for matriculation but we need to meet students halfway by picking up on their lack of language awareness.

Course Objectives

The rationale for the course is based on
1) training students in English academic skills, and
2) raising awareness of scientific method and learners' own culture.

Academic Skills

Data collection students are trained in using the full resources of the library systems in the early weeks of the course, necessary skills for their everyday college life. The second and third cycles require students to conduct collaborative projects where they carry out a questionnaire-based survey to gauge people's opinions and attitudes to some aspect of Hong Kong Society and in cycle three, they study some aspect of a "Chinese scientific system." Data analysis and interpretation of results are both problematic areas. Students have often been content to merely describe data, or to apply some formulaic system for interpreting it. In the first cycle students are presented with textual and graphic arrays of data for interpretation, discussion and eventual cohesion into a written report. Report writing is one of the major course objectives. It is explicitly taught within a tightly controlled regimen in the first cycle, then in the second and third cycles students select, analyse and interpret their data and present it in a report. Oral presentation skills and seminar-style discussions always rated as popular in end of course evaluations, these are both process and product in the second and third cycles.

Raising Awareness

Raising awareness of Scientific method is really a summation of the academic skills already described: accessing information sources, "digesting" information through analysis and interpretation and then presenting the information in a rational, understandable way.

Sources of information, a major objective of cycles two and three, is to encourage students to go beyond the confines of the university and its libraries and by investigating and asking about things around them, to realise that research can draw on a wide variety of information sources, eg. visits to Chinese drug stores, markets and museums. Learners' own culture and language a further objective is to demonstrate to students that English is not the only language of scientific discourse, and that information can just as easily be gathered (in fact is most likely to be) in Chinese. Students here seem to concentrate on "Western" science and this project invites them to increase their awareness of their own history and traditions.

Course Structure

The course structure is composed of three (roughly) seven-week investigative cycles, the key components being

- informational/topic vehicle

- accessing background information - enriched context
- description, interpretation and analysis of data
- presentation of written and/or spoken outcome

Autonomy stages are recycled with increasing autonomy with each investigative cycle.

CYCLE 1: Learning Events

- getting to know-you "fun" activities
- orientation to self-access centres
- orientation to word processing
- hands-on orientation to Main Library information access systems with work sheets/report back
- analysis and interpretation of graphic data writing background and discussion sections of a report: orientation to writing background and discussion sections of report.

Negotiations: 1) Discussion of overall objectives, and 2) Protocols, 30 Interpretation of visuals.

Rationale: The first two weeks are concerned with orientating students towards facilities they will need, and how to use them: the Computer Centre, Self Access Centres and the Main Library systems. The focus of activity switches to report writing: writing about graphically displayed information; students discuss and interpret individual graphics orally, inform other groups about their graphics. They are then given a display of all graphics and then write up individual reports stressing the Discussion and Conclusion sections. Learning events are managed quite prescriptively in this Cycle. Highest levels of negotiation are achieved in the Library Access work and during group oral discussion of their individual graphics; these learning events also require the need the highest level of social cooperation among learners.

CYCLE 2: Learning Events

- investigating some aspect of "Hong Kong Society" by writing a questionnaire
- using the questionnaire to gather data
- preparing to discuss and interpret results

This "social action" drives two subsequent, closely related series of learning events:

- section by section development of a full scale write up of the whole project, and
- preparation of an seminar-style oral presentation of procedure, findings and interpretations.

Negotiations: 1) Identifying/refining topic, 2) drafting questions/shaping up questionnaire, 3) carrying out library search to provide contexts for current investigation, 4) deciding on data gathering procedures with classmates, then with teacher, 5) collaborative preparation of seminar-style presentation/make presentations, and 6) collaboration with classmates and teacher in writing up the group reports.

Rationale: This Cycle draws heavily on the learning experiences of Cycle 1: collaboration among learners (leading to social action), familiarity with information access systems, familiarity with word processing and report writing skills. The seminar-style presentation is designed to

encourage learners to make explicit the rationale and procedures for gathering their data as well as revealing interpretations of their results. In writing the report they are encouraged to make clear the context for their investigations, which grow out of a library search, and to demonstrate ability to draw on information from a variety of sources.

Note that the "Negotiations" list is longer than for Cycle 2.

CYCLE 3: Learning Events

- investigation of a 'Chinese Scientific System'
- identification of area of enquiry
- identification/location of information sources
- drafting organisational workplan
- access background information
- data collection
- development of oral presentation skills
- preparation of group oral presentation/make presentations

Negotiations: 1) identifying/refining area of enquiry, 2) locating sources of information, 3) determining procedures for collecting data, 4) collaborative preparation of oral presentation. and 5) making oral presentations.

Rationale: Recycling of all learning processes and outcomes. The project 'Chinese Scientific Systems' is intended to encourage learners to range beyond the confines of the university and exploit the resources of Hong Kong and begin to familiarise themselves with one topic area of 'Chinese Science'. Effective completion of the project requires a high degree of interaction not just between learners and learners and their teacher, but also between learners and people outside the university.

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International Directory of EST Programs

The following is a list of English language support programs and services around the world for nonnative speakers of English in fields of science and technology. Given the rapid evolution of such programs recently, this list does not pretend to be exhaustive. However, the editor offers this preliminary directory of EST sites for the service it may offer the profession and to serve as groundwork of a more definitive edition in the near future.

Canada

The English Language Centre
The University of Manitoba
520 University Centre, Winnipeg, Manitoba R3T 2N2, Canada

Contact Person: **Hannah Friesen**, Coordinator
Phone: (204) 474-9251, Fax: (204) 275-8098
E-mail: Hannah_Friesen@UManitoba.ca
URL: http:/www.umanitoba.ca/SRS/ELC/elcinfo.html

The Czech Republic

Czech Technical University
Prague, The Czech Republic

EST Program Sponsor:
Communication, Arts and Humanities
Delaware County Community College
901 S. Media Line Road
Media, PA 19062 USA

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Phone: (610) 359-5370, E-mail: aprosper@dccc.edu

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Japan

Shizuoka Institute of Science and Technology
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Fukuroi, Shizuoka Prefecture 437 Japan

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Center for Language Research
University of Aizu
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Hong Kong

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Course: Professional and Technical Communications (Protech)
Contact Person: **Annie Mueller**, Coordinator
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Course: English for Science Students
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Hungary

Pecs Medical School Modern Languages Department
POTE Idegennyelvi Intezet
H7624 Pecs
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Contact Person: **Kati Varadi**, Deputy Director, English for Medical Purposes
Phone: 36/72-324-122, ext. 1540, Fax: 36/72-326-244

Israel

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Technion-Israel Institute of Technology
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The Philippines

Hilario A. Quimbo
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South Africa

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Contact Person: **Gregory Barnes**, Director
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3401 Applewood Road
Midland, MI 48640 USA

Contact Person: **Alan G. Headbloom**
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Minnesota English Center
101 Klaeber Court
320 16th Av. SE
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Contact Person: **Mark Landa**, Director
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