NOTES/CONSIDÉRATIONS PÉDAGOGIQUES

Writing Errors of Engineering Students: A Diagnostic Analysis

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A WRITING SKILLS TEST WAS GIVEN to 104 second-year engineering students as the first assignment in their third-year technical writing course. The purpose of the test was to assess the writing abilities of the upcoming third-year class and to act as a test-case for the post-admission writing test that will be given to the first-year engineers in September 1995 at Queen's. The writing samples were ranked from zero to ten and the lowest 16 papers were analyzed in detail. Problems with word choice and sentence structure made up approximately 40 % of the 465 errors that were noted in the detailed analysis. Results are generalized to ESL engineers, since that group represented 15 of the 16 lowest papers.

Test and Results

A comprehension/writing test was given to 104 second-year Electrical Engineering students at Queen's University in April 1995. In the test, the students listened to the details of a safety inspection, delivered clearly but in a deliberately verbose, disorganized, and colloquial manner. The speech was given in person, rather than by a tape recorder, in order to ensure that the report could be heard by everyone in the room. The students took notes and then wrote a memo including all relevant details in an organized structure. The test took 50 minutes. At the end, students handed in their memo and notes, and were given an answer guide as they left the room.

The tests were marked in three stages. A mechanical engineer with an M.Ed. marked the tests, assigning a grade out of ten to each one. (See Appendix A for the scale.) He also made comments on the test papers to show the students where their writing needed improvement. An electrical engineer with a Ph.D. in Linguistics then read the papers and attached a

diagnostic sheet to all papers that received a six or lower. The diagnostic sheet (Appendix B) included a list of potential problems that can be found in writing. An X beside one of the problems indicated that the student had one error of that description. If more than three errors of one type were found, a line (———) was written after three X's.

For the third stage, I read photocopies of the papers, and entered the sixteen lowest-scored papers into a computer for further analysis. I tagged each of the errors with a comment. For example, "unsafty" was followed by the tag <nonword>. (Tagging is discussed in more detail below.) The errors that I found did not necessarily correspond to the list of errors used in the second stage of marking. Since I had more time to analyze the documents, I found more errors, and was able to classify them more precisely. After tagging all of the samples, I used a programme called TACT[1] to facilitate the analysis and quantification of the errors. TACT is a programme used by linguists who are studying a text in detail. It enables a researcher to collect data about a text, such as the number of occurences of any word in a text or the context surrounding any word. I used this program to count the number of errors (or tags) in the sixteen papers and to allow me to see the context in which the error occured. It is important to note that TACT did not diagnose the papers; rather it facilitated the analysis.

The most salient feature of the results is the double Gaussian curve shown in Figure 1.

Two clear groups of students are shown. One group, centring around 7 and 8 out of 10, are likely to do well in the required communications course and become competent technical writers. The second group, centring around 4, 5, and 6 out of 10, appear to be mainly ESL students who need extensive help and practice in written English. (It was determined that these students were ESL by noting that they had TOEFL scores on their records.) Those who received 5 and below will probably be unable to complete a course in technical written English without prior remedial work. In the sixteen samples of writing tagged to identify the errors, sixteen categories of errors were noted.

Each error is identified and quantified in Table 1. This table shows that, of the 465 errors found in the samples, 40 % came from either word choice (24%) or sentence structure (16%). The stereotypical errors that are

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1. TACT (Textual Analysis Computing Tools) was developed by John Bradley, Lidio Presutti, Michael Stairs, and the Centre for Computing in the Humanities, University of Toronto.

usually associated with all students of English as a second language are still apparent, but they are not as prominent. For example, tense (6%), prepositions (5%), and articles (2%) only make up a total of 13 % of the errors found. These results indicate that the areas of word choice and sentence structure require at least as much attention in ESL teaching materials as is given to tense, prepositions, and articles.

Word Choice and Structure Problems

Word choice errors can be further classified into five subcategories (see Table 1). "Strange wording" would not be considered acceptable by a native speaker in the context, whereas "awkward wording" might be used by a native speaker but would be considered inappropriate in the context. If the writer had "words confused," another word was clearly meant by the word that was used; and a "nonword" is one that does not exist in the English language. A "formality" error was noted when the wording was either too formal or not formal enough. A sample of tagged writing is as follows:

> The unsafety <nonword> use of electric shock-related equipment <awkward> tangling <words confused> over benches creates a pretty awful <formality> inspection <strange>.

All these errors were found in the samples.

Trying to teach students how to identify and correct this type of error
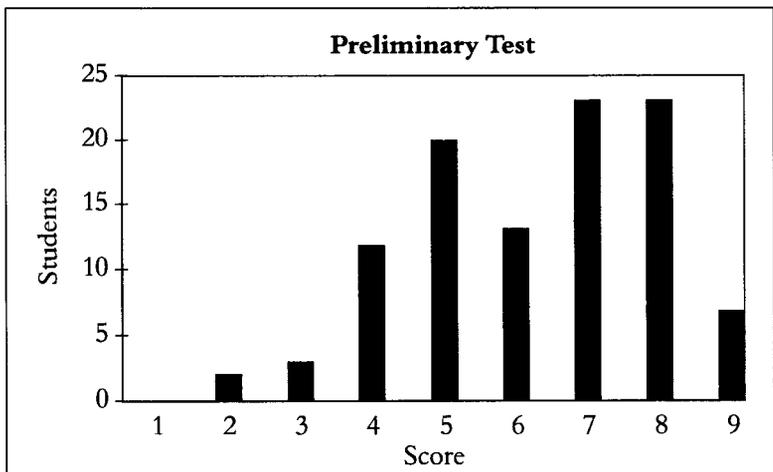
Figure 1: Double Gaussian Curve

Table 1: Categories of Writing Errors

Error	Description of Error	Number of Errors Found

Word Choice
  Strange Wording - 50
  Awkward Wording - 27
  Words Confused - 21
  Nonwords - 9
  Inappropriate Formality - 4
	Unconventional or inappropriate word choice	111

Structure	Non-standard English structure making interpretation difficult	73
Comprehension	Text indicates that writer has misunderstood some aspect of the information provided	33
Plurality	Plural used where singular is needed and vice versa	29
Tense	Incorrect choice of tense	29
Conciseness	Text is too verbose	28
Spelling	Non-standard spelling	28
Preposition	Wrong or missing preposition	22
Agreement	No agreement between subject and verb or between article and noun	21
Punctuation	Incorrect use of commas, semi-colons, colons, apostrophes, etc.	21
Clarity	Text difficult to understand	20
Tone	Inappropriate tone making text sound condescending or dictatorial	20
Missing Items	Missing words which make text ambiguous or misleading	10
Articles	Wrong or missing article	8
Precision	Not enough information given	5
Dangling Modifiers	Intended subject of modifier not given	2
TOTAL		465

is quite complicated. It is not very difficult for a native speaker of English to recognize some of the words confused in the sample. For example, a number of students used the word "tingling" or "tangling" instead of the correct word "dangling" when describing the unsafe power cords in one room. Also, a number of students wrote that books were lying on a "cardboard" instead of on a "cupboard." These mistakes would be immediately obvious to most native speakers but not to all ESL students.

Some word choice errors, in particular the confused words, are caused by phonetic misinterpretation. The students might have heard "cardboard" instead of "cupboard." Unfortunately, giving advice on how to avoid this type of error cannot extend beyond telling the student to listen more carefully. The inappropriate use of colloquial terms is another problem. Students may have been unaware of the required level of formality or they may have been incapable of writing at that level.

Some word choice mistakes elude explanation. One student used the word "scrambling" to describe what the cables were doing. Another called a room very "scruffy" and said that "chunks" of newspaper were on the floor. These words fall into the "strange wording" category, the largest category of the word choice errors. It is quite difficult to decide how to help students to avoid these errors when it is not clear what causes them.

Structure problems, the second largest category of errors, vary from awkwardly worded phrases involving a few words to the larger problem of incorrect syntax within a whole sentence. Examples of phrasal errors are "student grad area" (referring to the "grad student area") and "bare looped thread holes" (commenting on a carpet). In the following examples, however, the whole sentence needs revision:

> For example undestinated bicycles can be stored down the basement, compaters can be moved in such a way that they are against the wall so that wires are not dangling in the middle of the classroom, lights can be changed.

> Despite of the fact that one can determine whether the fire extinguisher is checked or not by its weight but this is certainly an accurate approach.

These types of errors, along with the word choice errors, are rarely discussed in most writing textbooks suitable for advanced ESL students. Most of these books (see Appendix C) focus on the problems identified as

lower in priority in this diagnosis: dangling modifiers, articles, and punctuation. When textbooks do attempt to discuss word choice, for example, it is usually in the form of a list of words that are easily confused, such as accept/except or formally/formerly. The choices discussed above (tingling/dangling etc.) would not be covered.

Conclusion

To meet the special needs of ESL engineering students, remedial English instruction should be designed with these results in mind. The less prominent errors such as problems with tense, prepositions, and agreement still have to be recognized and corrected, as they mark a text as sloppy and unprofessional. However, these errors are quite nicely handled in standard ESL grammar/writing texts. A testimony to that fact is seen in the present study, where high level ESL students do not seem to be making as many errors in those categories. On the other hand, it is extremely difficult to find textbooks that appropriately address the issues of word choice and sentence structure. As noted earlier, textbooks quite often include a section on "word choice," but the contents are usually not geared towards the kinds of mistakes that high-level ESL students actually make. ESL teachers need textbooks and other teaching materials that recognize the kinds of errors that their students are actually making. This is a linguistic and pedagogical challenge that demands some attention.

Appendix A

First Level of Assessment - Mark out of 10

10 — Fantastic!	Perfect or nearly so
9 — Excellent!	Just a few relatively minor blemishes
8 — Very good	Sound communication, but with several problems
7 — Quite good	Reasonable communication spoiled by several errors or deficiencies
6 — Weak	Perhaps acceptable overall, but with several major problems
5 — Poor	Only marginally acceptable as effective communication
4 — Very poor	An unacceptable document with many serious errors

3 — Exceptionally poor	Totally unacceptable with many errors of mis-communication
2 — Incredibly poor	Largely incomprehensible
1 — Words fail me!	Incomprehensible or nearly so
0 — Nothing submitted	

Appendix B

Second Level of Assessment — Diagnostic Sheet

The following assessment identifies problems apparent in this particular assignment only. The number of X's represents the number of errors. A line (——) after three X's indicates many errors.

General Structure	• format for memos
	• introductory sentence
	• closing sentence
General	• comprehension
	• following instructions
Technical Content	• completeness
	• relevance
	• accuracy
	• known information
Organization	• grouping of topics
	• overall order
	• paragraphing
	• structure within paragraphs
Expression	• clarity
	• conciseness
	• formality
	• tone
Sentences	• incomplete (note form)
	• sentence fragments
	• poor structure/order
	• too complex
	• immature
	• comma splice
Other	• agreement/plurality
	• punctuation
	• prepositions/particles
	• articles
	• tense/voice/mood
	• word choice/wrong words
	• spelling

Appendix C

Textbooks

The following is a list of textbooks that deal with word choice, but do not mention the types of errors that the students made in this test. Please note that some of these textbooks are perfectly good in other respects — they just do not address the issue addressed in this essay.

Barnett, M. T. (1974). *Elements of technical writing.* New York: Delmar.

Crowell, Thomas L. (1964). *Index to modern english.* New York: McGraw-Hill.

Emery, D. W., Kierzek, J. M., & Lindblom, P. (1977). *English fundamentals* (6th Ed.) New York: Macmillan.

Master, P. A. (1986). *Science, medicine and technology: English grammar and technical writing.* New Jersey: Prentice-Hall.

Moyles, R. G. & Logan, F. (1982). *Words, sentences, paragraphs, essays.* New York: Holt, Rinehart and Winston.

Roberts, J., Scarry, J., & Scarry, S. (1994). *The Canadian writer's workplace.* (2nd Ed.). Toronto: Harcourt Brace.

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British Columbia Ministry of Skills, Training and Labour. (1993). *An approach to ESL literacy assessment.* Victoria, BC: MSTL.

Cooper, C. R., & Odell, L. (1997). *Evaluating writing: describing, measuring, judging.* Buffalo: National Council of Teachers of English.

Dietrich, T. (1997). *A linguistic guide to English proficiency testing in schools.* Arlington, VA: Center for Applied Linguistics.

Douglas, D. (1993). *A new decade of language testing and research.* Alexandria, VA: Teachers of English to Speakers of Other Languages.

Dunphy, J. (1992). *On your marks: Guide to evaluation and improvement of writing in the transition years.* Nepean, Ontario: Carleton Board of Education.

Greenbaum, S. (1988). *Good English and the grammarian.* London and New York: Longman.

Harris, D. P. (1969). *Testing English as a second language*. New York: McGraw-Hill.

Hill, C., & Parry, K. (Eds.). (1994). *From testing to assessment: English as an international language*. London and New York: Longman.

Mednick, J. *Feedback processes in second language writing*. Unpublished MEd thesis, Queen's University, Kingston, Ontario.

Ruth, L., & Murphy, S. (1988). *Designing writing tasks for the assessment of writing*. New Jersey: Ablex.

Yang, P. (1994). *Examining the content validity of the English Proficiency Test from communications perspectives*. Unpublished M.Ed thesis, Queen's University, Kingston, Ontario.