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Language in Education: Theory and Practice

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Gina Doggett, Editor, Language in Education

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Content-Based ESL: An Introduction

The concept of integrating language instruction with subject matter instruction is not new to language educators. It has been attempted for many years in adult education, in university programs for foreign students, and in specialized language courses for scientists, businessmen, and other professionals. To some degree, it has also been a part of elementary and secondary school ESL programs, although actual content-based ESL courses are relatively new. This collection of essays—by classroom teachers, researchers, and teacher educators—describes some of the ways in which English language instruction is being integrated with science, mathematics, and social sciences in elementary, secondary, and college classes, and reviews some of the theoretical support for this approach.

Writing Across the Curriculum

The Bullock Report (1975) on English across the curriculum was the first overt expression of a growing movement away from the rhetorical, product-oriented writing class—divorced from other subject-matter classes—toward an approach that views writing as an integral part of any course within the curriculum. Although limited attention has long been given to business or technical writing at the secondary or adult/

tertiary level, attention to writing is appropriate in all content courses as a valuable means of learning (just as talking represents a way of learning). Although the language arts or writing teacher has been accorded a special role in helping students to find their own voice and to give form to their thoughts and feelings, teachers of mathematics, science, social studies, and other subjects also have a responsibility to see that writing skills are applied to authentic tasks such as lab reports, explanations of principles and theorems, discussions of historical causes and effects, or comparisons of religious or cultural institutions. Tchudi and Tchudi (1983) list the following benefits of teaching writing in the content areas:

1. Writing about a subject helps students learn.

2. Writing about content has a practical payoff. (Students write better when they spend more time writing.)

3. Content writing often motivates reluctant writers.

4. Content writing develops all language skills.

5. Teaching writing teaches thinking.

Reading in the Content Areas

A similar trend has developed in the field of reading: Language arts and reading specialists urge that reading be "taught" in all content areas, while they, in turn, introduce texts in their reading classes that are relevant to and representative of those that students will read in their content-area classes. This change has required reading teachers to teach more than literature; and mathematics, science, and other subject-matter teachers to teach more than their subject matter. Since reading is a way of acquiring information and learning, it is a skill to be addressed in all classes. The purposes for reading, the types of texts presented, and the kinds or reading skills required differ by discipline

and task; students need to acquire a variety of skills that they can apply to their reading assignments, whether reading for information, for pleasure, or for guidance in performing a task. Content-area teachers must recognize that they, too, are "reading" teachers; likewise, reading or language arts or English teachers must understand that their "content" may go beyond literature.

A great deal of research has been published on the types of texts and the kinds of skills and strategies involved in reading in the content areas, as well as descriptions of program models and curricula that integrate reading with content areas (Dupuis, 1984; Herber, 1978; Vacca, 1981). Dupuis (1984) found that "Over twenty textbooks are currently published to teach teachers how to deal with reading in content classrooms" (p. 2), although some subject-matter areas such as mathematics, science, and social studies have received more attention than other areas, such as music, health, or physical education.

Content in Language Instruction

While reading and writing theorists and practitioners have been concerned with using reading and writing to learn (not just helping students to learn to read and write), a similar trend has been evident in language instruction, where the focus is not just on learning the language, but in using it as a medium to learn something else. Although traditional language teaching has focused on grammar or literature, and more recently, on communicative competence or language use in a largely oral and interpersonal sense, a number of different segments of the language teaching profession have recognized the importance of focusing on content as well as language.

In English-for-specific-purposes (ESP) curricula, the goal of language instruction is to provide access to texts, seminars, lectures, and, broadly, the entire disciplines of such fields as engineering, science or technology, business or economics, medicine, law, or other professions. In teaching the particular vocabu-

lary, discourse styles, and syntax of science texts, written or oral, the ESP course uses materials and activities drawn from the field, focusing on the ways in which the language is used to convey or represent particular thoughts or ideas. Within adult ESL programs, the focus often shifts to skilled or semiskilled jobs, with special-purpose English courses designed to assist adults in becoming welders, electronic assemblers, technicians, clerical workers, and the like. In both adult ESL and ESP, the integration of language and content is accomplished through coordinated efforts of teachers in both fields and the language teacher's use of texts (sometimes simplified or adapted) and activities drawn from the field of study.

Foreign language (FL) instruction has also focused on academic content in delivering FL immersion programs in which children receive all or part of their education *through* the medium of another language, thus acquiring the language simultaneously with learning the academic content of mathematics, or science, or whatever portion of the curriculum is taught through the language. The desire to develop optimal ways to present this content so as to keep it understandable to the student who is only beginning to learn the language of instruction parallels the concerns of content-based ESL teachers.

Within the field of ESL, models abound for combining language and content instruction. One of these, ESP, was discussed previously. Another model teams ESL teachers in an "adjunct" relationship with academic subject-matter teachers in a particular field. Public schools offer "sheltered immersion" programs, in which the subject-matter teacher uses the insights of the FL immersion class and the content-based ESL or specific-purpose ESL class to provide understandable content in English-medium instruction to students with limited English. In both FL immersion and sheltered-immersion programs, according to Curtain (1986):

1. There is a focus on meaning rather than on form. There is no overt error correction.

2. Linguistic modifications such as simplified

speech and controlled vocabulary that are necessary for comprehensible input are used.

3. Instructional language has contextual clues to help convey meaning.

4. Conversational interaction—usually the subject content—is interesting and real to the students.

5. Languages of instruction are kept very carefully separated.

6. Students are allowed a silent period and do not have to speak until they are ready.

Why Content-Based Instruction?

The bases for the increasing interest in content-based language instruction are varied. Developments in second language acquisition theory and insights from practice within the various fields of language instruction have both fueled the interest.

Within second language acquisition theory, perhaps the most important influence has been an emerging emphasis on the role that meaningful, understandable input plays in the acquisition of another language. Krashen (1981, 1982) has drawn parallels between first and second language acquisition and has suggested that the kinds of input that children get from their caretakers ("caretaker speech") should serve as a model for teachers in the input they provide to second language learners, regardless of age. Input must be comprehensible to the learner (at or just above the learner's level) and be offered in such a way as to allow multiple opportunities to understand and use the language. Krashen's "Monitor Model" suggests that if comprehensible input is provided and the student or acquirer does not feel a great deal of anxiety, then acquisition will take place.

One way of reducing the anxiety and also increasing the potential relevance and meaningfulness of the experience is to provide interesting texts and activities.

Krashen has recently emphasized the importance of extensive reading for pleasure as a means of language acquisition, as well as the role of writing. He recommends using texts and activities that are not grammar- or drill-based, but instead are interesting and authentic, dealing with real-world ideas, problems, and activities.

Krashen posits a dichotomy between acquisition and learning, with one (acquisition) serving to initiate all language and the other (learning) serving only as a monitor or editor, activated when the learner has time and is focusing on the correctness of his or her language. Thus, he stresses natural acquisition opportunities that are structured only enough to make them comprehensible to the acquirer.

In another dichotomy, Cummins (1979, 1981) has hypothesized two different kinds of language proficiency: basic interpersonal communication skills (BICS), which are language skills used in interpersonal relations or in informal situations whose extra-linguistic and linguistic context provide relatively easy access to meaning; and cognitive academic language proficiency (CALP), which is the kind of language proficiency required to make sense of and use academic language in less contextually rich (or more context-reduced) situations. Cummins suggests that BICS are relatively easy to acquire, taking only 1 to 2 years, but that CALP is much more difficult, taking from 5 to 7 years and necessitating direct teaching of the language in the academic context.

Given Cummins' hypothesis, it is somewhat easier to understand why students who have left ESL classes to enter mainstream classes (where English is the medium of instruction) often have difficulty and fall further and further behind in their academic work. Their seeming communicative competence and fluency is deceptive; although they can talk with their peers, engage in informal conversation with their teachers, read simple narratives, or write informal notes or letters, they are not able to deal with the more abstract, formal, contextually reduced language of the texts, tests, lectures, or discussions of science, or mathematics, or social studies.

Many content-based ESL programs have developed to provide students with an opportunity to learn CALP, as well as to provide a less abrupt transition from the ESL classroom to an all-English-medium academic program. Content-based ESL courses—whether taught by the ESL teacher, the content-area teacher, or some combination—provide direct instruction in the special language of the subject matter, while focusing attention as much or more on the subject matter itself.

This Collection

This combined focus—on the subject matter and the English that is used to communicate it—is the basis for this collection of essays. The authors of the three essays represent a broad range of experience as practitioners and researchers. They share a commitment to exploring the ways in which content and language instruction can be best integrated, and they are all relative pioneers in this endeavor.

The authors of "ESL and Science" are a teacher educator (Kessler) and a secondary school science teacher (Quinn). Together, they have undertaken a number of experimental or pilot science programs, developing curricula and activities to enable the limited-English-proficient (LEP) student to understand and take part in the science program and documenting the kinds of progress made.

Dale and Cuevas, the authors of "Integrating Mathematics and Language Teaching," have worked together on a number of mathematics projects for LEP children, with Cuevas bringing the mathematics insights and experience (as well as sensitivity to language issues in mathematics), and Dale bringing the linguistic insights and experience. Both have taught at a number of levels: Cuevas is a teacher educator and Dale has worked with both elementary school children and college freshmen and sophomores. Much of their work has involved the investigation of linguistic barriers to math problem-solving and to the development of materials and curricula to deal with them.

The authors of "ESL and Social Studies Instruc-

tion" are all ESL specialists and teachers who work together in one school system. They have developed one of the first secondary school ESL programs to address both the cultural and linguistic requirements for ESL students to function effectively in American social studies classes. Besides the practical experience of having to develop curricula and materials, several members of the team have also been involved in teacher education, providing another source of insight into the kinds of problems inherent in integrating language and content instruction.

These three essays provide an excellent introduction to the rationale for integrating language and content instruction, and offer concrete examples of ways in which this integration can be accomplished. Although the focus is on ESL, the insights can be applied to other languages as well and may lead the language teacher to consider the materials and activities of other fields as a kind of content—to be used alongside the focus on language structure and the culture(s) of people who speak the language—adaptable for use in the language classroom.

The use of content from other fields offers the language teacher an opportunity to enrich the language classroom. By providing a more interesting class, teachers motivate students to master the more abstract and difficult language that characterizes the various content areas. Communicative competence is more than appropriate informal use of the language, it also includes the ability to read, discuss, and write about complex and abstract ideas drawn from history, science, mathematics, or any educational field.

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Integrating Language and Mathematics Learning

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Picture a seventh- or eighth-grade classroom in which about half the students are nonnative English speakers with varying degrees of English proficiency. The teacher is about to present a mathematics lesson dealing with the properties of equality. She begins by writing the following on the blackboard:

$$(6 + 5) + 4 \; \square \; 6 + (5 + 4)$$

She points to the number sentence on each side of the empty square and asks the class: "Are they equal?" An English-proficient student answers: "Yes, they are." The discussion continues:

> Teacher: *(pointing to a limited-English-proficient (LEP) student)* How do you know?

> LEP Student: They equal.

> Teacher: Yes, we know. But, tell me, why are they equal?

LEP Student: It is equal.

Teacher: O.K. They are equal because both number sentences have the same sum. Now, what symbol can we write in the empty square?

Native English-Speaking Student: Equal sign!

Teacher Right! Very good! *(now pointing to an LEP student)* Please write the equal sign inside the square.

LEP Student: *(Obviously not quite sure of what it is she is supposed to do, she goes to the board and writes the answer to each number sentence.)*

Teacher: Good! Tell me what symbol do we write in the *square* to say that this side *(pointing)* is *equal* to this side?

LEP Student: *(Appears embarrassed, lowers her head and does not answer.)*

After class, the teacher wonders how to reach LEP students like the one in this scene. She knows these students are intelligent and eager to learn, but she feels frustrated because she cannot get them to express the mathematical knowledge she thinks they know. Her concern is compounded when she tries to devise ways to teach LEP students whose knowledge of mathematics is also weak.

This is just one illustration of the fact that teaching involves frequent communication between teacher and students. When the dialogue is conducted in a language unfamiliar to the students, difficulties are likely to arise. Morris (1974) describes the nature of the problem:

> The problems of teaching in a second language are accentuated when mathematics is the context of the dialog. This is due essentially to the abstract nature of mathematics and the difficulties which arise in absorbing abstract concepts. Also, the

> language used has to be precise, consistent, and unambiguous, if mathematical ideas are to be explored and described effectively. And for dialog to become possible, the child must be equipped with a basic repertoire of linguistic concepts and structures. (p. 52)

Morris' statement underscores the importance of teaching the "special" language skills required for mathematics learning. Mastering "mathematics language" skills is essential for all students, but it is particularly crucial for students learning mathematics in English as a second language (ESL). This chapter discusses the integration of mathematics and language skills in two contexts: (a) incorporating mathematics content into ESL instruction, and (b) incorporating English teaching strategies into mathematics instruction. The following topics will be addressed:

• the nature of the language used in mathematics, including some of the features that may be problematic for LEP students;

• a brief overview of the role language plays in the context of teaching and learning mathematics, with special emphasis on learning mathematics through a second language; and

• suggestions for practical instructional strategies and activities for promoting mathematics and English language skills development with LEP students in both the ESL and the mathematics classroom.

The Language of Mathematics

What is meant by the language of mathematics? How is it different from the language used for everyday communication tasks? The English language represents a universe of language skills, and certain areas of language are used for specific purposes. Natural language, the language used in everyday