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ABSTRACT

This paper examines content-based instruction, which is an integrated approach to language instruction drawing topics, texts, and tasks from content or subject matter classes but focusing on the cognitive, academic language skills needed to participate effectively in content instruction. The intent and design of content-based instructional programs are discussed, some of the strategies and techniques characterizing these programs are described, the means by which programs are implemented are outlined, and areas of needed research and development are identified. A need for additional work is seen in teacher education, student assessment, program evaluation, and the preparation of textbooks and other instructional materials. Additional research into the academic language and specific registers of mathematics, science, and other content areas is also recommended. (MSE)

CONTENT-BASED LANGUAGE INSTRUCTION IN SECOND AND FOREIGN LANGUAGES

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Content-based language instruction is an integrated approach to language instruction drawing topics, texts, and tasks from content or subject matter classes, but focusing on the cognitive, academic language skills required to participate effectively in content instruction. The integration of language and content instruction and the subsequent development of content-based language programs is of growing importance in both second and foreign language instruction in the United States, and we suspect will be of interest to language educators in other settings as well.

In this paper we will:

1) discuss the intent and design of content-based instructional programs;
2) describe some of the strategies and techniques which characterize these programs;
3) outline some means by which such programs are implemented; and
4) identify some areas of needed research and development.

WHY INTEGRATE LANGUAGE AND CONTENT INSTRUCTION?

Increasingly, second and foreign language educators in the United States are turning to academic subject or content areas as a means of improving language

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instruction and meeting the special language needs of their students. The (English as a) second language teacher is faced with a dramatic rise in the number of language minority students in American schools and the need to prepare them to compete successfully in English-medium classes, while the foreign language teacher is faced with the increased recognition among language majority individuals of the importance of foreign language proficiency and the need to help students develop more than minimal foreign language skills.

Integrated language and content instructional programs offer an opportunity to both broaden and deepen a student's proficiency in the foreign or second language. Such programs provide students the possibility of acquiring the more formal, decontextualized, cognitively complex academic language used in solving problems and communicating ideas and thoughts orally and in writing (Cummins, 1981; Snow, 1987). Content-based language instructional programs are designed to help students achieve language proficiency beyond development of social language skills which are more commonly addressed in language classrooms or the knowledge of the forms of language (Cantoni-Harvey, 1987; Curtain & Pesola, 1988; Mohan, 1986).

The integration of language and content instruction, then, is of major interest to both second (English) and foreign (Spanish, French, Chinese, etc.) language educators. For second language educators, the need is acute. During the past 15 years, the number of language minority individuals in the United States has increased dramatically and today, it represents the fastest-growing population. As a result, in many metropolitan school districts, the majority of the school-age population comes from homes in which a language other than English is spoken. Because of demographic trends, these numbers

are rapidly increasing; by the year 2000, the majority of children in major metropolitan-area schools will most likely be language minority.

Although some of these students enter school with some proficiency in English, their proficiency is not usually adequate for them to undertake the complex cognitive tasks in English that school demands, and for those who enter with little or no English, the challenge is even greater. Bilingual education programs are provided in some areas, enabling students to continue cognitive and academic growth in their mother tongue while they are studying English, but these programs are relatively scarce. More common are transitional programs in which students are provided with English as a second language instruction for an hour or so a day, usually for one to three years, during which time they are expected to acquire sufficient grounding in English to be able to receive all their instruction in regular, English medium classes with their English-speaking peers. Unfortunately, as a number of studies have demonstrated, while these students often are able to interact socially in English--to talk informally with other children and with their teachers--they are not able to perform the more cognitively complex academic language tasks which are required of them in their math, science, or social studies classes. They lack what has been called Cognitive Academic Languge Proficiency (Cummins, 1981; Dawe, 1984) or the ability to deal with increasingly decontextualized language (Snow, 1987), the kind of language proficiency needed to understand math language and solve math problems; to read science textbooks, conduct experiments, and write lab reports; and to intepret maps, graphs, and charts and write essays in social studies. Almost immediately after being "mainstreamed," that is, after being exited from their ESL programs, these students

begin to experience difficulty in their academic work, falling progressively behind their English-speaking peers (Collier, 1987).

The problem is especially great for Hispanic students who constitute the largest minority language group. Approximately 50% of these students will leave school before graduation. One statistic alone illustrates the severity of the situation: if a student in the United States is Hispanic, was born outside of the United States, entered school speaking no English, lives in a family which is at or below the poverty line, and is male, his chances of graduating from high school, statistically speaking, are almost 0%! (Cardenas, Robledo & Waggoner, 1988). While socioeconomic status, educational role models, cross-cultural communication problems, and other factors play a role, a significant factor in the educational failure of these students is the burden which English language medium instruction places on them, especially in mathematics and science (Crandall, Dale, Rhodes & Spanos, in press; Cuevas, 1984; Duran, 1979).

For language majority students the need is also great. Relatively few American students study a foreign language for more than two years, and those who do rarely achieve sufficient proficiency to gain access to more than basic or simplified texts written in that language or to be able to carry on discussions of a complex nature or otherwise interact or negotiate effectively in that language. If students are not presented with complex cognitive texts and tasks, with opportunities to develop advanced oral and written language skills in their foreign language classes, then it is not surprising that they exit from their foreign language programs with only minimal proficiency. Foreign language educators, then, are looking toward content-enriched or content-based language instruction to help expand the proficiency of language majority

students by presenting at least a portion of the academic curriculum through a foreign language (Curtain & Pesola, 1988; Schinke-Llano, 1985).

CONTENT-BASED LANGUAGE INSTRUCTION: SOME PROGRAM MODELS

Content-based language instruction is not really new to English language teaching. It has been used in tertiary programs in English for Specific Purposes or in secondary or tertiary programs which teach English for Academic Purposes; in adult programs which teach Vocational English while teaching related job skills; and even in programs to train foreign teaching assistants at the university. Traces of its origins can also be found in efforts to teach writing across the curriculum or reading skills in the content areas. (See Crandall, 1987 for a fuller discussion.) However, the scope has increased dramatically in the current integrated language and content instructional programs, with instruction provided by language teachers, content teachers, or teams of both.

Foreign language teachers have implemented content-based language instruction in a number of programs. These include partial or total immersion programs, where a part of the child's academic instruction is received through the medium of a foreign language; the delivery of an academic course (often history or related social studies) through the foreign language; and innovative two-way interlocking or bilingual immersion programs in which students of two or more ethnolinguistic backgrounds are brought together to receive part of their instruction in each of the two languages (Tucker & Crandall, 1985, 1989; Campbell, Gray, Rhodes & Snow, 1985).

Integrated language and content programs can be found in the elementary, secondary, and tertiary levels in the United States. These programs may be the purview of the language teacher, the content teacher, or both. In a content-based language program, the language teacher (usually with assistance from a colleague who teaches another content area; for example: a math teacher, science teacher, or social studies teacher) develops a special language class which uses concepts, texts, and tasks from the content area to teach the language. The class might be a Math/ESL course which teaches the English language skills required for mathematical problem solving or a history course taught through the medium of French or Spanish. Both of these seek to enable students to acquire academic language skills in that language, but the degree to which the language teacher is responsible for the actual subject matter instruction varies from only providing skills to enable the students to participate in another content course to actually providing the content instruction (Short, Crandall & Christian, 1989; Crandall, Spanos, Christian, Simich-Dudgeon & Willetts, 1987).

Conversely, subject matter teachers (often with the assistance of the language teacher) may adapt their instruction to accommodate different levels of langauge proficiency in their classes. These classes, known variously as sheltered English or language sensitive content classes, are increasingly provided in schools in which language minority students constitute a large population. Here the language teacher acts as a resource to other teachers, helping them to increase the means by which linguistically different students can learn the academic concepts and skills. These techniques might include the use of demonstrations, visuals and or other objects to establish meaning; the use of interaction and communication activities in the classroom to enable students to

communicate effectively in the register or language of the subject area; and often the use of adapted or simplified texts and materials (Short, Crandall & Christian, 1989; Crandall, Spanos, Christian, Simich-Dudgeon & Willetts, 1987).

Some programs have parallel instructional designs, sometimes referred to as paired or adjunct courses (Snow & Brinton, 1988). In these, students receive instruction from two teachers, a language teacher who may focus on the reading or writing skills required for a history or psychology course, while the history or psychology instructor focuses on concept development. These paired programs are often found at the tertiary level.

An example of a program which uses all three approaches, with integrated instruction offered by the language teacher, the content teacher, and in parallel courses, is the program provided by CAL to Honduran students in Tegucigalpa preparing for university study in the United States. In that program, math and science classes are taught by bilingual instructors, who integrate progressively more English language in their instruction during the three trimesters, beginning with Spanish medium textbooks and instruction and then switch to sheltered English instruction, ending with English as the medium for texts and instruction. At the same time, English teachers are introducing progressively more content into their instruction, using both content-based and parallel instruction. The program is particularly fortunate to have one science instructor who is also a qualified English language instructor, but the majority of the program design has emerged from cooperation across the disciplines.

At the elementary level, a two-way bilingual or interlocking immersion model may be employed, whereby students from two different language and ethnic groups are

brought together in one class to receive some of their academic instruction in one language and the remainder in the other. In these programs, all instruction must be sheltered or integrated with language development, since at any time at least some of the students in the class will not be proficient in the language of instruction. (For more information on these and other foreign language models, see Tucker & Crandall, 1989.)

ATTRIBUTES OF A CONTENT-BASED INSTRUCTIONAL PROGRAM

Regardless of program design, the following eight attributes are characteristic of a content-based instructional program. (For a fuller discussion, see Snow, Met, & Genesee, 1989; Short, Crandall & Christian, 1988; Cuevas, 1984).

1. Instructional objectives are drawn from language, academic content, and thinking or study skills, usually at the intersection of these. A language teacher might focus on the ways in which addition is signalled in mathematics or algebraic word problems--for example, through the sum of, plus, and, increased by, or in addition to,--and help students to use this language in paired, small group, or cooperative learning activities which promote interaction in that language. The math teacher, on the other hand, might focus on strategies for setting up and solving these problems, while noting the special language in which these problems are embedded. Both would directly or indirectly involve thinking skills of analysis and classification. (See Crandall, Dale, Rhodes & Spanos, in press and Spanos, Rhodes, Dale & Crandall, 1987 for a fuller discussion of lexical and semantic, syntactic, and discourse features of mathematics and algebra which pose difficulty to both linguistically different and English-speaking

students in mathematics problem solving.)

2. Schema or background knowledge must be developed in the language. This is usually accomplished through oral language activities, which precede extensive reading and writing activities, although it is possible to use writing--especially interactive writing such as dialogue journals or computer networking--as a means of developing and activating schema at the same time as academic language is being developed. Using top-down processing, general knowledge is developed before details are addressed.

3. Both content-obligatory and content-compatible language can be included (Snow, Met & Genesee, 1989). That is, while the teaching of magnetism necessarily includes teaching such terms as to attract, to repel, magnetic properties, magnetic fields and classification language and skills, it also provides an opportunity, among others, for developing vocabulary of a variety of items (which can be evaluated as to their magnetic properties), as well as descriptive language and rhetorical skills concerning the patterns iron filings make on paper when magnets are used.

4. Paired and small group interaction are used to develop and to demonstrate proficiency in the academic language. Cooperative or collaborative learning and peer-tutoring may be employed. Activities are specifically developed to encourage student interaction with the content material and negotiation of meaning. When possible, class size and conditions permitting, the teacher's role may shift to facilitator of learning, rather than direct presenter or lecturer of information. Although direct presentation is still necessary, teachers may spend more time interacting with small groups of students when they need redirection or clarification or other explanations.

5. A wide range of materials is used in the classroom. Traditionally, language classes focused on two kinds of texts: extended discourse, such as that found in textbooks or novels, and dialogues, such as those found in plays or sadly, only in other language textbooks. However, broader and deeper uses of the language require that students be able to interact with and produce a variety of texts: maps, charts, graphs. tables, lists, lab reports, diagrams, timelines, and other forms and documents. Authentic materials, drawn directly from the content area, can be used, although it is often necessary to adapt the information to make it more accessible to students with less developed language proficiency. This does not mean that the material is "watered down" or somehow less rich in concepts; it does require, however, that the information be restructured so that relationships between ideas become clearer and new vocabulary is adequately contextualized in the early presentations while schema are being developed in that language. Ironically, the restructuring of large amounts of connected discourse often results in the presentation of that information in other kinds of texts such as flow charts or tables, exactly the kinds of texts which students need to master anyway. For example, in a lesson dealing with the various branches of government, it may be more effective to draw a chart which reflects the specific roles and responsibilities of each branch, clarifying the concepts while developing the language needed to discuss this topic. If appropriate, students may be asked to read a long passage in which these ideas are presented as a later activity.

6. Multiple media and a variety of presentation techniques are used in the classes to reduce the reliance on language as the sole means of conveying information or demonstrating meaning. Thus, content-based language programs or language-sensitive

content programs use demonstrations, a wide variety of audio visuals, authentic materials, objects, and even guest speakers. For example, an elementary science class on animal classification might benefit from a visit by a veterinarian or zookeeper who brings animals to the class and points to differences and similarities, allowing students close observation and perhaps even touch as a means of really understanding the classification system. Although oral and written language are employed, they are supported by many other sources of information for the students.

7. Experiential, discovery, and hands-on learning are also used to encourage students to develop concepts and interact with each other, placing the language learning into relevant, meaningful frames. Experiments and research projects are particularly appropriate, as are the use of games, role plays, and simulations. When students can work together, cooperatively, in doing experiments and presenting results, the important academic language is learned as are the concepts.

8. Writing is included both as a means of thinking and learning and as a means of helping students to demonstrate what they are learning. Language experience stories, students as authors, dialogue journals, learning logs, and other writing activities are used. Even asking students to draw pictures or diagrams and labelling these can be helpful as can developing story sequences which reflect activities in which students have been engaged. Both provide opportunities for students to develop sequencing skills at the same time as language skills. Of particular interest is the practice of having students write their own mathematics word/story problems, since in doing so they are demonstrating mastery of the special language in which word problems are embedded as well as their understanding of mathematical/scientific formulas such as that of

distance = rate times time. Writing activities can also serve as models for those which are required in the content area: for example, lab reports, essays, and research papers may all be introduced in the language class.

Some sample strategy sheets or lesson plans, describing lessons for students at various levels of language proficiency, are provided in Short, Crandall & Christian, 1989; Cantoni-Harvey, 1987; Mohan, 1986, as well as in several other texts and papers listed in the references.

A MODEL INTEGRATED CLASS

Perhaps what would be most useful here is to describe a particularly successful high school algebra/ESL class which one of us recently observed. The 25 students in the class were all relative newcomers to the United States, having been there no more than four years. The students were from a number of ethnolinguistic backgrounds (about half were Hispanic, from a number of Central and South American countries) and their English proficiency varied widely. Although the classroom was very small and cramped, students sat at round tables, with six or seven students per table. As students began to settle down, the teacher passed out sheets with questions relating to the previous night's homework. Students worked in pairs, asking and answering questions about what the problem is asking, what is already known, or how the problem might be solved as the teacher moved about the room, providing help when necessary. Students then volunteered to go to the board, often in pairs, to explain their answers. Following this was a short review on solving inequalities, followed by a vocabulary game in which

the teacher gave a definition ("I'm thinking of a term for . . . ") while students working at tables sought to spell the word with letters on the table. The teacher awarded students a point for the first right answer and another point for spelling it correctly. (These points can later be added to quizzes or tests to improve the scores.) A lot of discussion and negotiation was heard as the students tried to figure out the word. After about 15 minutes, the teacher collected the letters and shifted to a classification activity. She put on the board a variety of different algebraic expressions, equalities, and inequalities, without giving any information about any of these, and then asked students to point out what kinds of similarities they could find within the many items. Students pointed out that some are binomials or have several variables, before they arrived at a way of classifying these into the three categories. Whenever students offered explanations or points of similarity, the teacher would ask the class whether others agreed or not. Students worked until they arrived at agreement and correct answers, though the teacher did not openly label any answer as "correct" or "incorrect." Subsequent activities included reading aloud the various items, and copying them onto the proper place (expressions, equalities, inequalities) in a chart on the board. While competition is a part of the class in the vocabulary game, the majority of learning is cooperative, with students who have more advanced mathematics or more proficient English skills helping those with less. Although the teacher does some direct presentation, so also do the students, providing ample opportunity for the teacher to determine how well the students are able to use mathematics language productively in thinking and solving problems. There is a textbook, but the teacher has supplemented that with materials which focus attention on language and break down problems into

several steps; other "texts" such as charts are developed by the students in their classwork. Students write out explanations and talk them out, as well as perform the more usual algebraic tasks of setting up and solving problems. What is particularly important about this class is the enthusiasm and the degree to which students are actively engaged in their education. Not surprisingly, these students also experience a great deal of success. Classes taught through an integrated language and content approach can be found throughout this school and overall school success is also high. Some 85% of the students who enter remain in school and graduate.

Admittedly, this is an exemplary class in an exemplary school, but classes with various degrees of integrated instruction can be found at all levels, taught by a wide variety of teachers, using a number of different activities and materials. As student enthusiasm and learning from these classes increase, so does the likelihood that more integrated instruction will occur within these classes, spreading to other teachers and classes who learn of their colleagues' success.

IMPLENTING A CONTENT-BASED INSTRUCTIONAL PROGRAM

Content-based second and foreign language programs often result from collaboration between a single language and single content teacher, then spread to collaboration between disciplines/departments, to collaboration among teachers in a number of departments in the institution, and even throughout a school district. A language teacher may initiate the collaboration, seeking to make the language instruction more relevant or more challenging to students. However, the language

teacher may also become a resource to a content teacher who is seeking to find alternative ways of making the content accessible to a wider variety of students. In some cases, schools may decide to integrate the teaching of language--especially reading and writing--across the curriculum and thus teams of language teachers and other subject matter teachers work together to develop a more integrated program. In still others, a school district may decide to develop integrated curricula, to enable teachers to more effectively integrate their instruction. One school district has developed an elementary curriculum which takes objectives from all the content areas and integrates these with English as a second language objectives into one curriculum.

Programs usually develop because of interested teachers, who seek to learn from each other through classroom observations, interviews, and analyses of texts, tests, and other materials. To accomplish the shared discussion and collaboration, some planning time must be provided by the adminstration, both before the academic year and during it. Time is needed to plan the curriculum and develop lesson plans, as well as to revise these as they are implemented.

A key factor in program success is the support of an administrator who provides time for joint planning, preservice and inservice training, and curriculum development. It is also important for administrators to ensure that teachers attempting parallel instruction have the same students in their classes. Although this may sound obvious, more than one paired program has experienced difficulty because this kind of planning had not taken place.

FUTURE INITIATIVES

Since this approach to integrating instruction is relatively recent, there are a number of areas in which additional work is needed. Among these are teacher education, student assessment program evaluation, and the preparation of textbooks and other instructional materials. Additional research into the academic language and specific registers of mathematics, science, or other content areas is also needed.

Except for the occasional course in content-based language instruction, such as one that one of us (Crandall) recently taught at The American University or that was offered at the 1988 TESOL Summer Institute at Northern Arizona University, current language teacher preservice education does not specifically address ways of integrating language and content instruction or even provide adequate instruction to enable teachers to perform their own needs assessments or analyze subject matter texts and classroom tasks for their language and cognitive requirements. As a result, language teachers may feel inadequately prepared to structure and teach a content-based course.

To help provide needed education and training, a number of seminars, institutes, and other inservice educational programs have been developed for elementary, secondary, and tertiary level instructors at local, state, and national levels. For example, there are summer institutes for elementary foreign language immersion teachers, as well as institutes for college and university instructors seeking to integrate English and math, science, or other instruction. But these exist in short supply and are often isolated educational activities. Only rarely is it possible to build in peer observation and feedback or sustained coaching to assist the teacher in implementing the innovation.

What is needed is a comprehensive educational program, inserting appropriate coursework into preservice education and then providing an ongoing program of inservice education, involving observation, discussion, demonstration, and coaching for teachers attempting to implement this challenging approach. Ideally, master teachers should be identified and trained to function as trainers in their institutions, providing observation and feedback and collaborative learning.

Student assessment represents another challenge. What should be assessed, and how? If a program is truly integrated, then both academic concepts and language should be tested, but currently, few if any appropriate instruments are available. Instead, teachers use a battery of language proficiency tests, achievement tests which are intended to measure academic achievement in the first language, and other informal measures. Some informal measures of mathematics language are being developed by linguists and mathematics educators in a current project at CAL, but these are merely a beginning. What is needed is a series of measures which evaluate how well a student has mastered academic language and content in the target language, as well as tests which separate these sufficiently to identify whether what is needed is additional attention to the language or the conceptual development. Some initial attempts in both second and foreign languages have been made, testing language within a content framework. In addition, a series of sample assessment items in mathematics have been developed which teachers can use to measure student progress in understanding math language and concepts. Papers describing these tests; discussing the problems in developing appropriate measures; identifying relevant trends in assessment of reading, mathematics, and language proficiency; and other issues related to assessment were

delivered at a recent seminar on student assessment in integrated instruction which was held as part of the activities of the Center for Language Education and Research at CAL (Crandall, ed. forthcoming).

Program evaluation is also needed. Not surprisingly, no longitudinal evaluations of content-based instructional programs have been undertaken, since evaluating the relative efficacy of using various language methods is notoriously complex and slippery and even more so when academic content is included. Moreover, since these programs are relatively new, they are difficult to characterize and thus to evaluate--quantitatively or qualitatively. However, if we are to convince others of the efficacy of this approach--something many of those involved in both second and foreign language instruction in the United States firmly believe--then evaluations will need to be carefully structured to provide both formative and summative information.

Perhaps the most pressing need of all is adequate materials upon which to base these programs. Currently, teachers or schools develop their own materials, something which requires inordinate amounts of time and is inefficient. But the development of integrated curricula and materials is very complex and demanding, as those of us involved in the development of a new ESL series for elemetary students are discovering. Identifying grade appropriate objectives from the various subject areas taught to elementary students and then combining these with second language and language arts objectives, as well as the development of thinking skills, is enormously challenging. Still, such materials are needed if we are really to encourage more teachers to increase the academic and cognitive load in their language teaching. Foreign language teachers have a right to expect texts on geography, history, government, business, and culture to be

available in the languages they teach, and even to be able to set aside one part of the current curriculum to be taught in another language, as is done in some innovative language programs which enroll elementary immersion program graduates.

Additionally, a great deal more research is needed to describe the ways in which language is used in math, science, and other content learning and to identify the specific lexical and semantic, syntactic, and discourse features which are characteristic of the registers of these fields. Especially important is the analysis of protocols of students engaged in negotiating meaning in learning these various content areas, although classroom observations, interviews with students and teachers, analyses of classroom discourse, texts, and tests are important as well. Using these various methods, several colleagues at CAL have been investigating the ways in which students develop and use math language in their mathematics and algebra learning, with special attention to places in which the language serves as a barrier to effective problem solving (Spanos, Rhodes, Dale & Crandall, 1988). Some initial research in secondary biology and physical science classes has also been undertaken. These, and comparable work by Dawe (1984), Mohan (1986), and others are providing a much better research base upon which to develop classroom activities and curricula, but additional research of this type is sorely needed.

In the meantime, the number of innovative programs of integrated language and content instruction is increasing in both second and foreign languages, at elementary, secondary, and tertiary levels. Additional research, teacher education, materials and test development, and program evaluation can only serve to strengthen what has emerged as an exciting instructional approach.

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