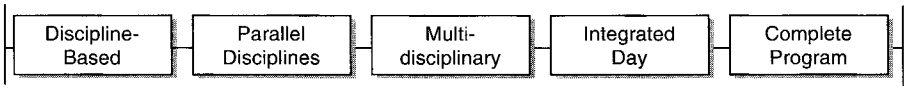

Figure 3
Continuum of Options for Content Design
Source: Heidi Hayes Jacobs, ed. 1989. *Interdisciplinary Curriculum Design and Implementation.* Alexandria, VA: Association for Supervision and Curriculum Development.

or her own instructional program. Thus, while collaboration among one or more teachers may be a desirable way to ensure strong connections among disciplines, individual teachers can effectively provide interdisciplinary instruction as well. Foreign language teachers who work in schools where collaboration is not feasible can still make connections; teachers who work in schools where thematic units are common will find additional rich opportunities for connections as well.

Planning for Connections

Different disciplines provide differing opportunities to exploit for language growth. Ultimately, the connections made should help students become more-proficient language learners. Connections should not be made for their own sake, but rather teachers will need to seek out legitimate avenues that result in student acquisition of language course objectives. Not all content at each grade level will provide the same rich resource for language development. Students who discuss the parts of simple machines may not have the same opportunities for acquiring high-frequency vocabulary or for engaging in extended discourse as those who describe the kinds of goods and services available in their local community. Describing the life cycle of butterflies may be less useful for language development than describing the migratory patterns of Monarch butterflies.

Connections may also be different at different levels of schooling. FLES teachers will find many obvious connections between the language and school curricula, in part because the school curriculum and language curriculum coincide in the early grades (e.g., learning the numbers; naming colors; identifying days, weeks, months, etc.). Other connections will depend on the language proficiency of the learner, the opportunities for context-embedded experiences, and the students themselves. Older students, particu-larly those at the secondary to postsecondary level where teachers often do not share students, may pursue connections to other subjects independently. That is,

individual students may decide when they are ready to make connections to other subjects through independent projects. Similarly, students with special interests and greater autonomy as learners may make connections through independent study. In this way, connections to other disciplines will be made by individual students—not planned as a whole-class activity by the teacher—and may be made at the times most appropriate to the needs and interests of the students themselves (Sandrock, personal communication).

It is also important to note that with time, students in middle and high schools will be able to handle more sophisticated and complex language tasks than those that may initially be included in language instruction. As standards increasingly guide language program development, students will start language learning earlier and function at higher levels of proficiency at middle school and high school than is currently the case. The range of possible connections to other disciplines and the range of learning experiences students engage in are likely to expand significantly.

While connecting to other disciplines from a topical or thematic perspective has been a primary focus of language/content integration, it may be helpful to also consider connections that involve learning processes and strategies. If learning how to learn is an important aspect of education, then it may also be useful to connect the strategies students gain in one area of the curriculum with their application in another (Met 1995; 1994; Met et al. 1983). Research into language learning strategies has identified numerous ways in which students can be empowered to be autonomous, self-directed learners (Chamot and Kupper 1989; O'Malley and Chamot 1990; Oxford 1990). Many of these strategies cross disciplinary boundaries. For example, reading strategies such as calling on prior knowledge, using context clues to deduce the meanings of unknown words, and monitoring oneself to ensure comprehension of text are important in both the English and foreign language classroom. Similarly, prewriting activities such as brainstorming and using graphic organizers are common to both subjects. Other strategies and skills that are common to many disciplines include hypothesizing, observing, and collecting and analyzing information/data—all useful for students encountering new cultural situations, whether directly or indirectly through the media.

Connections to other disciplines can be both thematic and skills-based. Teaching content in a foreign language should be cognitively demanding, and it can promote higher-order thinking skills such as hypothesizing or analysis. As Snow (1998) points out, the publication *New Ways in Content-Based Instruction* (Brinton and Master 1997) is organized around types of activities that involve "information management; critical thinking, hands-on

activities; data gathering; and text analysis and construction" rather than around the traditional four skills, or even separate disciplines. This view is reflected in foreign language standards at the state level as well. For example, both the Wisconsin and Nebraska state standards suggest that both information and skills will be connected across disciplines.

Integrating Language Learning and Subject Content

As noted earlier, most foreign language teachers will view content from a language-driven perspective. That is, most language teachers will have language learning as a primary objective, and content from other disciplines will be at the service of language course objectives. When looking across the curriculum, language teachers may find it helpful to use the language curriculum as a criterion for making connections: How can the information and skills from this or that subject matter enable my students to become more proficient in the target language and/or gain greater insight into the target culture? There are probably as many right answers to that question as there are classes of teachers and their students. In the section that follows, some examples of connections with other disciplines are provided as a point of departure for thinking about curriculum integration. These are intended as examples of the realm of the possible, rather than an exhaustive list of the probable.

Connecting with Mathematics and Science. Mathematics provides many opportunities for connections. At the earliest levels of language proficiency students can practice numbers in cognitively demanding tasks. Many of the major conceptual tools of mathematics can be applied to almost any topic, and as such can fit well with the topics of the language classroom. For example, estimation and measurement can be used to predict and then calculate the size (height or weight) of classroom objects or the equivalent weights of fruits (How many grapes weigh the same as this orange?), or to calculate the ratio of the circumference of one's head to one's height. Number use and number patterns work well with both younger and older learners. While young students can engage in simple arithmetic operations, older students can use numbers to complete challenging number patterns (e.g., 3-7-15-31-?). Both young and older students can use numbers to predict and then measure the size of objects in inches or centimeters. The concept of percentages and the tool of graphing can be applied to the group work and class surveys that are common in communicative classrooms. Students can report the results of their surveys in percentages (e.g., 38% of our group and 67% of

our class thinks the world will be a safer place in the year 2010). Survey results can also be graphed in various forms, both common and less common, such as bar and line graphs, pie graphs, or even box-and-whiskers or stem-and-leaf graphs.

Teachers can focus on specific language elements through connections with mathematics. Pair and group tasks can lead to reports that use the first-person plural forms of verbs and adjectives (e.g., we found . . . , our banana weighed . . . , 75% of us like to . . .) or to the third-person plural of the past tense (e.g., 18% of students went to the movies last weekend). In recent years, heavy emphasis on pair work has meant that many students get more practice in using the singular verb forms than in the plural forms. Reporting survey results or interpreting graphs and survey data can provide increased practice for needed forms.

Connections with science will depend on the grade level and topic. Some science topics work well for language learners, such as the migration of butterflies and weather/meteorology. Many students have a deep interest in the environment. Not only can students acquire language to describe the natural environment, they can also identify ways in which the environment can be protected, even in first-year classes at the secondary level. Natural phenomena (earthquakes, monsoons, tornadoes) can be linked to the language for identifying and describing geographic and topographic features. Grammatical skills and expression of language functions can be expanded through discussion of scientific phenomena. Students can describe (orally or in writing) the steps in an experiment (past tense) and the reasons for the results (describing cause-and-effect relationships) or hypothesize using if/then constructions.

Connecting with Social Studies. In the primary grades, social studies provides language practice and context for learning high-frequency vocabulary. In social studies, students learn about families, aspects of their community (where to buy things, modes of transportation, community services), and basic map skills. As students progress through the grades, study of national and world regions can provide a good link to foreign language. Study of the African continent allows students to achieve language objectives related to weather, numbers, or naming languages as they explore climatic characteristics of various regions; they can compare relative distances between cities in Africa, observe the percent of the population that lives in rural vs. urban areas, or identify the official languages of many African countries in the early part of the twentieth century as compared with its close. Study of U.S. or world history can allow students to further their language skills as they

make comparisons between ways of life then and now (transportation in colonial times and today, changes in what is men's work/women's work or men's clothing/women's clothing).

Social studies is a particularly useful connection to the cultural objectives of the language curriculum. Many of the understandings students acquire in social studies can be applied to the study of the target culture. Many elementary and middle school teachers find it natural to relate aspects of life in a country studied in social studies with that of the target culture. Students of all ages can enhance their higher-order thinking by completing Venn diagrams (see Figure 4) that show similarities and differences between the target culture and one that is the focus of a social studies class. (Venn diagrams are used in many subjects of the school curriculum and provide a concrete springboard for compare/contrast tasks.) And because foreign language instruction and social studies share a common emphasis on developing multicultural perspectives, the culture standards delineated in Goal 2 can be addressed through links with social studies.

Specific language skills can be enhanced through connections with social studies. History texts allow students to observe the authentic use of the past tense(s) and can illuminate how choice of a specific past tense can affect

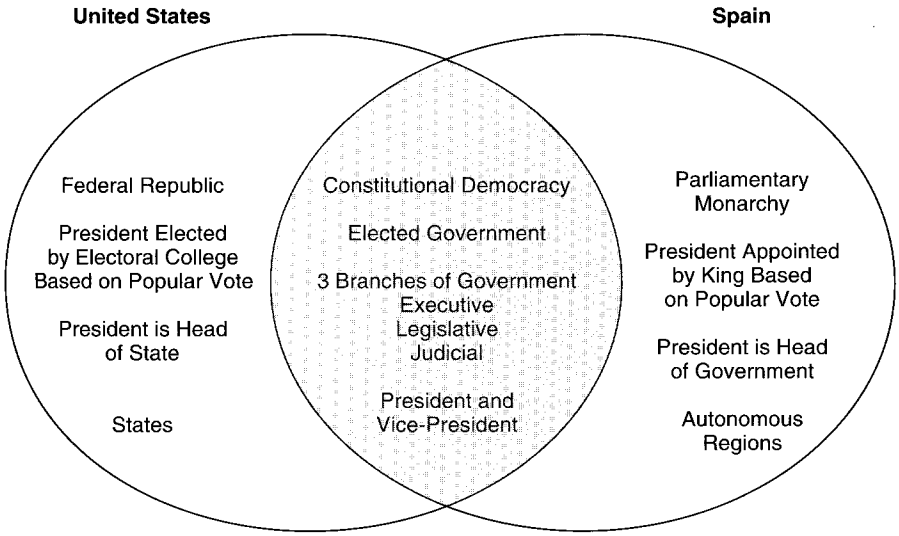

Figure 4
Political Systems

intended meanings. Students can be asked to describe historical events, as they are given cards with events indicated and verbs omitted or provided in infinitive form (Jamestown/to found/1607: *Jamestown was founded in 1607*). Students can make history time lines that show when specific events occurred, and also indicate the historical backdrop for those events (As World War II continued, more women joined the labor force). Both higher-order thinking and language skills can be promoted as students ponder the what if's of history: What if France had not sold the Louisiana Territory in 1803? What if Europe becomes a united single political entity? What if the Boxer Rebellion had succeeded?

Because many aspects of history and contemporary issues are multifaceted, social studies topics discussed in the language classroom provide opportunities to stretch and refine student skills in important language functions such as stating and defending a position. Carefully structured tasks in which students work toward the ability to express and counter viewpoints can result in modified debates in the language classroom even at the lower range of intermediate proficiency.

More-proficient students obviously can work with more-abstract content. For example, Stoller and Grabe (1997) describe a demography unit for university-level students. The unit includes discussion of population trends in both developing and developed countries, and the relationship between population trends and the environment. Students also explore the impact of population on air, water, and natural resources. Other examples may be found in the professional literature on content-based instruction for postsecondary students: Leaver and Stryker (1989) report on area studies taught in the foreign language at the Foreign Service Institute; numerous examples of models of language/content integration at the postsecondary level are found in Krueger and Ryan (1993) and Snow and Brinton (1997).

Connecting with the Arts. Many foreign language teachers are already making strong and useful connections with art and music. These connections can not only address the culture standards, but promote attainment of Goal 1 (Communication) as well. Possible connections between the arts and language learning will be familiar to teachers.

Some works of art can be viewed as "stories artists tell." In particular, portraits can be viewed as visual biographies. Teachers may ask students to describe what they see in purely objective terms (I see a little boy. He is wearing . . .). From there, students may be invited to interpret the portrait and to develop a story about the person. Teachers may provide additional information about the painting, its origins in time and place, and the subject,

to weave together culture, history, and geography. Students may choose to revise their biographies based on this new information.

Works of art that depict events or groups of people can be used as a springboard for oral and written group tasks. Students can write skits to portray their response to a question such as: Imagine you were one of the people in this picture. What were you doing 10 minutes before the moment in this picture occurred? One hour afterward? Individual students may be asked to write in response to the question: Imagine you were one of the people in this picture. What were you thinking at the very moment the event in this painting occurred? If you could be any of the people you see pictured here, which one would you want to be and why?

Students can use landscapes or portrayals of events as a springboard for creating descriptions of settings for fictional narratives. Examination of texture and color can be used by students to generate oral or written descriptions of feelings evoked or to create analogies with senses (red tastes like . . . rough sounds like . . .).

Both music and art provide many avenues for developing language proficiency. Students may learn or write rhymes, chants, and poems, then tap out the beat; they can create movement, actions, or dance to accompany songs, rhymes, chants, and poems; or they can use different art media to illustrate songs, rhymes, chants, and poems. Teachers may use song lyrics to highlight vocabulary and grammar in context or ask students to write additional verses, new lyrics, or a summary of the lyrics in their own words. Elementary-grade teachers can research jump rope rhymes from U.S. culture and children's rhymes from other cultures. Students can act them out or set them to music. More-proficient students can give oral or written explanations of the game that goes with the rhyme. Students can play games from other countries, and then develop Venn diagrams that show how these games are similar to or different from games played here. Students can then explain orally and/or in writing the similarities and differences.

Not All Connections Are Equal

There are ways in which the disciplines can be exploited for language growth and ways in which each discipline has unique terminology or discourse features that may limit the ways connections are made (Met 1998; Met, forthcoming). Connections with English reading/language arts help improve both first- and foreign-language literacy through acquisition and application of learning strategies and processes. Reading skills can be enhanced in social studies, but may be limited in the area of mathematics and sciences because