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Children's Learning Strategies in Language Immersion Classrooms

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This article reports on an investigation of learning strategy applications in elementary French, Japanese, and Spanish immersion classrooms. The focus of this article is on identifying strategies that more and less effective learners use for classroom reading and writing tasks in the target language. Think-aloud data from 3rd-grade and 4th-grade students were quantified and compared through matched-pairs *t*-tests. Although there were no differences in total strategies used by high-rated and low-rated students, there were some differences in the types of strategies students relied on when reading. Low students used a greater proportion of phonetic decoding than did high students. High students used a greater proportion of background-knowledge strategies (including inferences, predictions, and elaborations) than did low students. Potential differences in the quality and flexibility of students' strategy use are explored.

LEARNING STRATEGIES ARE METHODS OR techniques that individuals use to improve their comprehension, learning, and retention of information (Weinstein & Mayer, 1986). Strategies are typically described as mental procedures that assist learning and that occasionally can be accompanied by overt activities. A major contribution of research on language learning strategies has been to identify the strategies used by good language learners and to determine how these strategies can be conveyed to others (Cohen, 1998; Hosenfeld, Arnold, Kirchofer, Laciura, & Wilson, 1981; Naiman, Fröhlich, Stern, & Todesco, 1978/1995; O'Malley, Chamot, Stewner-Manzanares, Küpper, & Russo, 1985a, 1985b; Oxford & Leaver, 1996; Rubin, 1975, 1996; Rubin & Thompson, 1994). Extensive research has described and classified language learning strategies among students of English as a second language and students of various language backgrounds learning English, French, Japanese, Spanish, Russian and other languages at the secondary and college levels (e.g., Bedell & Oxford, 1996; Chamot, Barnhardt, El-Dinary, & Robbins, 1996; O'Malley & Chamot, 1990; Oxford, 1990;

Rubin, Quinn, & Enos, 1988; Thompson & Rubin, 1996).

The present study extends this work on learning strategies to third- and fourth-grade foreign language learners in immersion settings. The study uses think-aloud techniques to reveal strategic differences between more and less successful learners for the kinds of language tasks they experience in their immersion classrooms.

Language immersion programs are characterized by a focus on learning school subjects through the medium of a second language (L2), rather than an exclusive focus on the language being learned. Children in immersion programs typically begin in kindergarten or first grade and continue through the elementary years. In partial immersion programs, some subjects are taught in the target language and others in English, whereas total immersion programs teach initial literacy and mathematical skills as well as other subjects in the L2. In total immersion programs, literacy in children's native language is typically introduced in second grade or later, and the curriculum may gradually shift to a balance of foreign and native language instruction (Curtain & Pesola, 1988; Met & Galloway, 1992).

Immersion programs in French were initiated in Canada in the 1960s and in Spanish in the U.S. in the early 1970s (Campbell, 1984; Lambert &

Tucker, 1972). More than two decades of research indicate that this approach is highly effective in developing an impressive level of foreign language proficiency in English-speaking children and grade-level or above achievement in English skills and content subjects (Curtain & Pesola, 1988; Genesee, 1987; Swain, 1984, 1995). The focus of this research has been on the linguistic and academic products of immersion education rather than on the teaching and learning processes involved (Bernhardt, 1992). Thus, whereas we know the levels of achievement attained by children in language immersion programs, we have little knowledge about how they reach those achievement levels. In particular, the learning strategies used by children in foreign language immersion settings and the effects of learning strategy instruction in such settings remains largely unexamined.

In contrast, the role of learning strategies has been extensively studied with children learning in native language contexts and, to a lesser degree, with older language learners. Considerable success has been achieved in teaching elementary school children to use learning strategies in first language (L1) contexts (see Pressley & El-Dinary, 1993; Pressley, El-Dinary, Gaskins, Schuder, Bergman, Almasi, & Brown, 1992), but research in L2 elementary school contexts has focused on the description of learning strategies used in English by bilingual students (Padrón & Waxman, 1988). Research with older students, however, has shown that effective language learners use strategies more appropriately than do less effective language learners, and that learning strategies can be taught to both secondary and college-level L2 students (Chamot, 1993; Chamot & Küpper, 1989; Cohen, 1990, 1998; Cohen & Apek, 1981; Hosenfeld, 1984; O'Malley & Chamot, 1990; Rubin et al., 1988; Thompson & Rubin, 1996). Applying this research to younger students in language immersion programs holds promise for developing an understanding of their learning processes and strategies.

The study reported here is part of a 6-year longitudinal study of learning strategies in elementary immersion programs (Chamot, 1996, 1999; Chamot, Keatley, Barnhardt, El-Dinary, Nagan, & Newman, 1996). Research questions addressed over the first 3 years of this investigation include the following: (a) Which learning strategies are used by more effective and less effective learners in elementary foreign language immersion programs? (b) Do these strategies change over time, and if so, how? (c) Do students who use learning strategies more frequently perceive

themselves as more effective language learners than do students who use strategies less frequently? (d) Do students who use learning strategies more frequently also rate higher in language proficiency than students who use strategies less frequently? (e) What are the differences in strategy use across the languages studied? This article focuses on the first research question: identifying the learning strategies used by elementary school foreign language immersion students and comparing the strategies used by more and less effective language learners.

STUDY PARTICIPANTS AND CONTEXT

Three immersion programs in the Washington, DC, suburbs participated in the study and included five French immersion classrooms, three Spanish immersion classrooms, and six Japanese immersion classrooms. The grade levels ranged from kindergarten through grade six, but not every grade level is represented for each of the three languages because teachers participated on a voluntary basis. The French and Spanish programs were total immersion, in which all content areas were taught in the target language for most of the school day. The Japanese program was a partial immersion program in which students received instruction in Japanese in mathematics, science, and health for half of each day, and then spent the remainder of the day in English instruction for subjects such as language arts and social studies.

The students in these immersion programs were mainly from native English-speaking families. Only very few children in the Japanese program had a Japanese-speaking parent. A somewhat larger number in the Spanish program had a Spanish-speaking parent or parents. In the French program, the majority of students also had native English-speaking backgrounds, but a number of Francophone African and Haitian students were enrolled in this program as well.

Fourteen immersion teachers participated in this research project. Twelve of these were native speakers of the target language, and the two remaining were near-native speakers. All held elementary teaching certificates, and many also had teaching credentials and experience from their native countries. All of these immersion teachers had received ongoing professional development in immersion philosophy and methodology through inservice workshops, university course work, or both. The teachers were enthusiastic about immersion education and provided in-

struction virtually exclusively in the target language.

PROCEDURES

Identifying Participants

Teachers were asked to rate the target language proficiency of students in their class as high (exceeds expectations), average (meets expectations), or low (fails to meet expectations). Teachers were advised to make their rating for each student independently of the ratings of other students in the class. Thus, in a high-achieving class, half or more students might be rated high, and the reverse could occur for a low-achieving class. These rating scales were used to identify a stratified random sample of highly effective and less effective learners in each classroom. That is, once students were rated, they were randomly selected from within the high and low groups by drawing ID numbers.

In the spring of each year of the project, think-aloud interviews were conducted with the sample of students thus identified and with students being followed over time. A minimum of 3 highly effective and 3 less effective students in each classroom participated in the think-aloud interviews.¹ When possible, oversampling took place as a precaution against possible attrition of students who would be followed in the longitudinal aspect of the study. Table 1 identifies the number of participants in each grade level, the languages, and the ratings during each year of the study.

Data Collection

Data collected for the main study included classroom observations, annual think-aloud protocols, questionnaires, and interviews with teachers (see Chamot et al., 1996). The substudy re-

ported here utilized data gathered from the think-aloud protocols for a sample of participating students. The main study will be completed in late 1999 and will provide cross-sectional information on a larger sample of 72 students, as well as longitudinal case studies of a smaller sample.

Given that learning strategies are internal mental processes and therefore not directly observable behaviors, their identification has always been problematical and has relied heavily on learner self-reports (Cohen, 1987; Cohen & Hosenfeld, 1981). There is general agreement among L2 researchers that observation yields extremely limited and unreliable information on students' mental processes (Chamot, 1987; Cohen, 1987; 1998; Naiman et al., 1978/1995; O'Malley & Chamot, 1990; Rubin, 1975; Wenden, 1991). The most common methods of data collection in language-learning strategies research are questionnaires and interviews, which provide retrospective information on students' recollections of the strategies they have used for particular tasks and, often, of the frequency (sometimes, often, usually, etc.) with which they use the strategy. Two obvious limitations of such retrospective data collection are students' ability to remember accurately the strategies they have used and their willingness to respond truthfully. Nonetheless, questionnaires and inventories have been favored by many language-learning strategies researchers because information can be collected from a large number of participants and analysis is straightforward (e.g., Cohen, 1998; Nyikos & Oxford, 1993; O'Malley & Chamot, 1990; Oxford, 1990; 1996; Oxford & Burry-Stock, 1995).

Relatively few research studies have used think-aloud procedures in which individual students are asked to recount their thoughts while working on a language task, perhaps because this method of data collection is extremely labor-intensive (individual interviews with verbatim tran-

TABLE 1
Full Data Set for Qualitative Analyses

Grade	Japanese			French			Spanish		
	1994	1995	1996	1994	1995	1996	1994	1995	1996
K	—	—	—	4	1	—	—	—	—
1	7	6	—	—	8	6	4	—	6
2	6	6	3	10	—	10	11	5	3
3	6	7	7	—	8	2	5	11	4
4	6	6	9	—	6	6	—	6	6
5	6	6	2	4	1	—	—	—	2
6	3	5	2	9	5	—	—	—	—

Note. Dash (—) indicates that the program did not cover those grades in those years.

scription) and complex to analyze. Think-aloud procedures also have potential limitations, such as participants reporting only some of their actual thoughts and strategies and not being able to verbalize their mental processes. In addition, the presence of the interviewer may affect their thinking processes and strategies. In spite of these potential limitations, however, think-aloud procedures in this and in other studies (e.g., Chamot, Barnhardt, El-Dinary, Carbonaro, & Robbins, 1993; Chamot, Dale, O'Malley, & Spanos, 1993; Chamot, Küpper, & Impink-Hernandez, 1988; Cohen, 1998; Cohen & Hosenfeld, 1981; Hosenfeld, 1976; O'Malley, Chamot, & Küpper, 1989) have provided rich descriptions of students' mental processing and learning strategies that are not accessible in any other way.

Think-Aloud Interviews

The think-aloud protocols were developed to capture children's reported mental processing as they worked on familiar types of school tasks. Teachers helped to identify appropriate reading and writing tasks for the think-aloud interviews of their students. These reading and writing tasks were planned to resemble familiar learning activities that would be somewhat challenging. Teachers explained the purpose of the research to their students and also described the process of thinking aloud.

A team of researchers participated in developing a scripted interview guide for the think-aloud interviews. Interviewers studied the interview guide, participated in training sessions in which they watched models of think-aloud interviewing, and then received coaching as they used the scripted guide to conduct mock interviews.

When conducting individual student interviews, the researcher first explained the purpose of the interview in both the target language and English, telling students that they would be asked to describe their thoughts as they worked on the tasks. The remainder of the interview was conducted in the target language (except with kindergarten students), but researchers assured children that they could describe their thinking in either of the languages or in a mixture of the languages.

The interviewer first explained how to think aloud, then modeled thinking aloud while solving a picture puzzle. The interviewer next asked the student to restate what he or she had just said, praising students for identifying the thoughts that the interviewer had verbalized. At the end of this task (and after each subsequent task), the

interviewer gave the student a small prize. The researcher then asked the student to try thinking aloud. For this practice, students worked through a logic problem and the interviewer asked questions like, "What are you thinking now?" or "How did you figure that out?" Similar prompts were used for the data collection tasks, which consisted of about 10 minutes of reading and 10 minutes of writing. For the reading task, children read excerpts of level-appropriate authentic children's literature in the target language. For the writing task, students selected a picture and were asked to write a story about it in the L2. During the entire think-aloud interview, researchers gave open-ended prompts to encourage thinking aloud and also requested clarification and elaboration of children's remarks.²

Analyses of Think-Alouds

Think-aloud interviews were audiotaped, transcribed verbatim, and then translated into English. A team of researchers from a variety of backgrounds, including those who had conducted the interviews in the target languages and others who were experienced with a variety of models of learning strategies, analyzed data using a grounded theory approach (e.g., Strauss & Corbin, 1990). Researchers independently studied subsets of the data across languages, grades, and ability levels to develop a coding scheme of strategies. Through discussion, the researchers' analyses were integrated into a single coding scheme, which has been revised as necessary with further analysis.³ The coding scheme identifies both metacognitive and cognitive strategies and includes an abbreviated code with a strategy term, description, and illustrative transcript excerpts. Appendix A includes an outline of the coding scheme categories and their organization. Appendix B gives an excerpt from the coding guide table.

Researchers worked in pairs, composed of one of the interviewers for the language in question and an experienced learning strategies researcher, to apply the coding scheme back to the think-aloud protocol data, and thereby to describe the strategy use patterns of each student. For several classroom sets of the data, both researchers first completely coded a transcript independently by writing the appropriate abbreviated analysis codes in the margins of transcripts. The research pair then met to compare codes, calculate percentage of agreement for reliability, and resolve differences in coding. For the data presented here, coders agreed on the specific strat-

egy code 79% of the time; an additional 6% of strategies were coded within the same level-2 category (see the hierarchy in the coding scheme, Appendix A). Thus, for the level-2 categories reported here, interrater agreement was 85%. Any differences in coding were resolved through discussion, referring back to the coding scheme and further clarifying definitions and distinctions of categories when necessary. As the coders became more comfortable and reliable working with the coding scheme, they switched to a more time-efficient process in which one coder completely coded the data, then the other reviewed the coded transcript and suggested revisions. Pairs then met to review only the differences in their coding. Thus, all coded data were agreed upon by two researchers, either in initial coding or after discussion.

The pairs of researchers recorded tallies of their codes (see sample tally sheet in Appendix C), resulting in a quantified description of the student's patterns of strategy use. Qualitative profiles of each student were also developed, again by a pair of researchers, in order to capture the most prominent and consistent features of each student's think-aloud interview (see Appendix D).

High-Low Comparisons

Quantitative data on the strategy use of high-rated and low-rated students were compared using a two-tailed, matched-pairs dependent *t*-test. The analyses reported here are based on eight pairs of students from the 1995 third and fourth grades. Pairs were matched for language and grade level. Students who spoke the target language at home, had studied in a target language-

speaking country, or were identified as having learning disabilities were removed from the matched-pairs analysis. Table 2 shows the breakdown of students by rating, including information about students excluded from the analyses. Table 3 shows the resulting number of matched pairs available for each grade and language.

Separate analyses were performed for the reading and writing tasks. Analyses presented here focus mostly on on-line strategies reported in the think-aloud protocols; that is, strategies the student applied to the actual task. In addition, children often responded by saying things like, "This is what I usually do." These reported strategies were identified as retrospective. Overall measures of strategy use were calculated by taking raw totals of all strategies, of metacognitive and cognitive strategies, and of comments indicating metacognitive awareness rather than by use of a particular strategy (e.g., comments about why or when the strategy is useful, about the students' learning preferences, and evaluative comments about oneself as a learner). Strategies also were analyzed according to categories from the coding scheme (level-2 categories, see Appendix A). The sum of on-line strategies in a level-2 category was divided by the total number of on-line strategies used for the task; this yielded a proportion indicating how often a certain type of strategy was used in reference to the other strategies. Comparisons of proportions allowed us to examine relative use of strategies, rather than simply to compare raw numbers of strategies used. This procedure also helped to control for differences in student verbosity. For simplicity of interpretation, proportions are reported here as percentage of total strategy use comprised by each strategy.

TABLE 2
Grade 3-4 Think-Aloud Subjects in 1995 by Rating

Grade	Rating	Japanese	French	Spanish
3	High	3 (2 excluded ^a)	4 (1 excluded)	5 (1 excluded)
	Average	1	1	6 (1 excluded)
	Low	3	3 (2 excluded)	0
4	High	3 (2 excluded)	3	3
	Average	0	1	0
	Low	3	2	3

^a Students were excluded from the matched pairs analysis as special cases when the target language was spoken in the home, when students had studied in a target language country, or when the researcher or teacher suspected a learning disability.

TABLE 3
Resulting Number of Matched High/Low Pairs
in 1995

Grade	Japanese	French	Spanish
3	1	1	—
4	1	2	3

Note. Dash (—) indicates that the program did not cover that grade in that year.

Reading/Writing Comparisons

We were also interested in differences between strategies that students used for reading and those they used for writing. Dependent *t*-tests compared proportions of each strategy type for reading and writing for each of the 16 students.

RESULTS AND DISCUSSION

Throughout the results section, supporting think-aloud excerpts are included. As explained previously, these excerpts were translated into English for interviews conducted in each target language. Students are identified by language and grade level, and often by rating (e.g., J1H = Japanese first-grade student, rated high). The interviewer is identified by the letter *I*.

Coding Scheme

An important accomplishment of the study was the development of a coding scheme that identified the types of strategies used by immersion students. Our coding scheme included a hierarchical organization of strategies (Appendix A), as well as definitions and examples of each strategy (Appendix B). To our knowledge, this is the first coding scheme for think-aloud data that has been developed for analyzing children's L2 learning strategies. Analysis of the transcripts revealed that students as young as first grade were often able to describe their thoughts and approaches to tasks in rich detail, frequently in the target language but sometimes in English. For example:

I: Okay. You remember the pictures? Okay, is there anything else you were thinking [while listening to the story]?

J1L: Uh, just a couple of math problems.

I: Math problems? You were thinking of math while you listened?

J1L: Uh-huh. . . . I have one half of my brain that does thinking of stories and the other half does math problems.

Students also often had thoughtful responses and detailed descriptions about when and why they think in their L2 or in English:

F6H: I think in both [languages] . . . because I have like a picture in my head, but I think in French, but . . . my vocabulary was born in English, so . . . that's why I translate into English.

As the coding scheme in Appendix A shows, analyses of the transcripts revealed a rich and extensive variety of strategies and processes that are used in different ways by immersion students. Each type of strategy—such as planning, monitoring, and using language knowledge—had a variety of manifestations, as indicated in the subcategories of these strategies. Some strategies are used mainly at lower or upper grades or for a specific language, whereas others are used across grades and languages. The following excerpts illustrate the variety of strategies and their use across languages and grades:

S4: I try to look at the title to see what it is like. . . . I think that it is recycling. . . . "From Iron to Silverware" because it is from one thing to another, that it says that it converts to something else. . . .

J4: Sometimes, I picture what they said, a picture like the character's actually saying it, or like a narrator telling . . . what's going on and everything.

J2: [When I don't know a word] I read the first data. I think about what the first data says. In this case, *age* is the same as the first part of *agemasu*.

F6: I think that this will be the easiest [picture] to make a story about . . . there was another picture I liked a lot . . . but I could not think of a story I could use.

S2: [I'm thinking about] what I can use to organize my ideas.

J2: When I have to spell them but I don't know . . . sometimes I just . . . like . . . pretend those letters are in front of my face . . . in the words. . . . It helps me.

F6: I think about the stories I have heard and then those that happen in my life and then those that happen in the papers and then I use my imagination to think of different or creative things . . . because I don't always like stories that are true to life.

High-Low Comparisons: Overall Strategy Use

Strategies from the coding scheme were quantified as described in the procedures section. Tables 4–7 provide means, standard devia-

TABLE 4
Reading Strategies Used On-Line

Strategy Type	High-Rated Ss Mean ^a (SD)	Low-Rated Ss Mean (SD)	t_7 (p)	Effect Size: Standardized Mean Difference	Power
Raw Total: Number of Strategies Used	12.25 (3.45)	10.38 (4.41)	1.11 (.31)	0.47	0.16
Metacognitive Strategies	21% (16%)	7% (7%)	2.18 (.07)	1.15	0.47
Plan	4% (6%)	0% (0%)	1.91 (.10)	0.96	0.38
Selective Attention	2% (4%)	2% (4%)	0.54 (.61)	0.03	0.08
Monitor	15% (12%)	5% (7%)	1.91 (.10)	1.01	0.38
Cognitive Strategies	79% (16%)	93% (7%)	-2.18 (.07)	-1.15	0.47
Background Knowledge	52% (18%)	35% (21%)	3.37 (.01)	0.82	0.82
Inference	25% (14%)	16% (12%)	1.34 (.22)	0.65	0.21
Predict	12% (10%)	13% (14%)	-0.09 (.93)	-0.05	0.05
Elaborate	15% (14%)	6% (10%)	1.17 (.28)	0.68	0.17
Language Knowledge	22% (20%)	47% (28%)	-3.52 (.01)	-1.04	0.85
Knowledge of L2	5% (8%)	3% (6%)	0.60 (.57)	0.32	0.08
Decoding	17% (17%)	44% (25%)	-4.69 (.002)	-1.25	0.98
L1-L2 Comparisons	0% (0%)	1% (3%)	-1.00 (.35)	-0.50	0.14
Manipulate Information	5% (4%)	10% (13%)	-1.00 (.35)	-0.55	0.14
Resource	—	—	—	—	—
Recall Strategies	—	—	—	—	—

^a Percentage of strategies represented by strategy category.

tions, effect size, and statistical power for each analysis.

Figures 1–4 further illustrate relative strategy use in each group. There were no statistically significant differences between high- and low-rated students in overall measures of strategy use or metacognitive awareness statements for either reading or writing (see Figure 1). However, differences in the proportions of metacognitive and cognitive strategies approached significance in reading, suggesting that high-rated students may have used a greater proportion of metacognitive strategies than low-rated students (21% versus 7%, respectively, $t_7 = 2.18$, $p = .07$), whereas low students may have used a greater proportion of cognitive strategies than high students (93% versus 79%, respectively, $t_7 = -2.18$, $p = .07$).

High-Low Comparisons: Relative Use of Strategy Types

Figures 2 and 3 compare high and low students according to proportions of strategy types used on each task. On the reading task (Figure 2), matched-pairs dependent t -tests revealed two main differences between high and low students. The greatest difference was in the use of phonetic decoding ($t_7 = -4.69$, $p = .002$). Low students relied extensively on decoding, which comprised 44% of their strategy use. In contrast, decoding represented only 17% of high students' use of strategies. The other significant difference was found for strategies using general background knowledge (the combination of inferences, predictions, and elaborations). Background-knowledge strategies represented 52% of high-rated

TABLE 5
Writing Strategies Used On-Line

Strategy Type	High-Rated Ss Mean ^a (SD)	Low-Rated Ss Mean (SD)	t_7 (p)	Effect Size: Standardized Mean Difference	Power
Raw Total Strategies Used	6.38 (4.98)	5.75 (5.63)	0.27 (.80)	0.12	0.06
Metacognitive Strategies	62% (21%)	56% (26%)	0.43 (.68)	0.28	0.07
Plan	40% (23%)	42% (29%)	-.12 (.91)	-0.07	0.05
Selective Attention	1% (2%)	0% (0%)	1.00 (.35)	0.50	0.14
Monitor	21% (20%)	14% (22%)	0.59 (.57)	0.36	0.08
Cognitive Strategies	38% (21%)	44% (26%)	0.43 (.68)	-0.28	0.07
Background Knowledge	13% (13%)	16% (18%)	-0.42 (.68)	-0.18	0.07
Language Knowledge	10% (18%)	20% (21%)	-0.96 (.37)	-0.52	0.13
Knowledge of L2	9% (18%)	8% (11%)	0.12 (.91)	0.06	0.05
Decoding (to spell)	0% (0%)	2% (5%)	-1.35 (.22)	-0.67	0.22
L1-L2 Comparisons	2% (4%)	10% (18%)	-1.21 (.27)	-0.64	0.18
Manipulate Information	0% (0%)	1% (2%)	-1.00 (.35)	-0.50	0.14
Resource	9% (19%)	6% (11%)	0.44 (.67)	0.25	0.07
Recall Strategies	5% (12%)	2% (5%)	0.66 (.53)	0.35	0.09

^a Percentage of strategies represented by strategy category.

students' reading strategies, but only 35% of low-rated students' strategies ($t_7 = 3.37, p = .01$). The individual strategies—inferences, predictions, and elaborations—were not significant.

As Figure 3 indicates, there were no significant differences between high and low students for strategies used for writing.

Reading-Writing Comparisons: Relative Use of Strategy Types

When reading and writing are compared, both high and low students used about double the number of strategies for reading as they did for writing (see Figure 1). Table 8 provides means, standard deviations, effect size, and statistical power for analysis of each strategy type.

As Figure 1 illustrates, cognitive strategies were used in greater proportion for reading, whereas metacognitive strategies were used in greater proportion for writing. Significant differences fa-

vored reading for the following cognitive strategies: background knowledge, language knowledge, and manipulating information (translating and summarizing; see Figure 4 and Table 8). Significant differences favored writing for the metacognitive strategy of planning. Overall, students used nearly twice as many strategies for reading as for writing.

For the students in this substudy, background knowledge strategies such as making inferences, predictions, and elaborations were used to help comprehension but played a much smaller role in language production (in this case, writing). Strategies for manipulating information, such as retelling, summarizing, and translating, were also more important in comprehension than in production for this sample of students. Both high and low students also seemed to rely on language strategies, such as decoding and deductions, to unlock the meanings of words more than to assist in recalling or spelling words. The only strategy type that stu-

TABLE 6
Reading Strategies Mentioned Retrospectively [Raw Totals]

Strategy Type	High-Rated Ss Mean (SD)	Low-Rated Ss Mean (SD)	t_7 (p)	Effect Size: Standardized Mean Difference	Power
Total	4.75 (3.96)	2.50 (1.77)	1.50 (.18)	0.73	0.26
Metacognitive Strategies	1.13 (2.80)	0.38 (0.52)	0.72 (.50)	0.37	0.10
Plan	0.00 (0.00)	0.00 (0.00)	—	—	—
Selective Attention	0.75 (1.75)	0.38 (0.52)	0.55 (.60)	0.29	0.08
Monitor	0.38 (1.06)	0.00 (0.00)	1.00 (.35)	0.50	0.14
Cognitive Strategies	3.63 (1.60)	2.13 (1.55)	1.93 (.10)	0.95	0.38
Background Knowledge	1.13 (0.83)	0.50 (0.76)	1.93 (.10)	0.79	0.39
Language Knowledge	0.38 (0.52)	0.38 (0.52)	0.00 (1.00)	0.00	0.05
Manipulate Information	0.38 (0.74)	0.00 (0.00)	1.43 (.20)	0.71	0.24
Resource	1.75 (1.16)	1.25 (1.16)	0.80 (.45)	0.43	0.11
Recall Strategies	0.00 (0.00)	0.00 (0.00)	—	—	—
Metacognitive Awareness	2.00 (2.62)	0.88 (1.46)	1.76 (.12)	0.53	0.33

dents used more for writing than for reading was planning strategies. Although several planning strategies, such as previewing text, can be appropriate for reading, students seemed not to rely on these strategies as much as writing planning strategies, like choosing a topic because it is familiar.

Strategies Mentioned Retrospectively While Working on Language Tasks

The strategies comparisons made in the preceding paragraphs represent on-line strategy use—strategies that the students reported using on the think-aloud task itself. As they worked on the tasks, students also spontaneously offered some retrospective reports of strategies they typically use for certain problems. Although sometimes students offered retrospective reports on their own, more often these reports were in response to specific interviewer probes, such as “What do you usually do when you come to a word you do not know?” There were no significant differences between high and low students in retrospective reporting, either overall or when

divided by strategy type. Mean frequencies of retrospective reports ranged from 0 to 2 for each strategy type (see Tables 6 and 7).

Qualitative Findings Regarding Reported Use of Strategies

Although there were few differences in the relative frequency of strategies reported, that is not to suggest that more effective and less effective learners use strategies the same way. Rather, extensive reviews of the transcripts suggest that there are differences between these groups, and that the important differences are often difficult to quantify. That is, the appropriateness of the strategies used for a particular task or problem may be more important in effective L2 processing than the frequency or even the types of strategies used. Several emerging qualitative conclusions about strategy use are described in the following paragraphs. These qualitative findings are based on analyses of all data shown in Table 1, representing a wide range of grades from all three languages and across the first 3 years of the main study.

TABLE 7
Reading Strategies Mentioned Retrospectively [Raw Totals]

Strategy Type	High-Rated Ss Mean (SD)	Low-Rated Ss Mean (SD)	t_7 (p)	Effect Size: Standardized Mean Difference	Power
Total	3.25 (3.54)	2.38 (1.60)	0.73 (.49)	0.32	0.097
Metacognitive Strategies	1.25 (1.98)	0.25 (0.46)	1.67 (.14)	0.69	0.31
Plan	1.25 (1.98)	0.25 (0.46)	1.67 (.14)	0.69	0.31
Selective Attention	0.00 (0.00)	0.00 (0.00)	—	—	—
Monitor	0.00 (0.00)	0.00 (0.00)	—	—	—
Cognitive Strategies	2.00 (1.69)	2.13 (1.64)	-0.19 (.86)	-0.08	0.05
Background Knowledge	0.13 (0.35)	0.13 (0.35)	0.00 (1.00)	0.00	0.05
Language Knowledge	0.63 (0.74)	0.50 (0.76)	0.55 (.60)	0.17	0.08
Manipulate Information	0.13 (0.35)	0.13 (0.35)	0.00 (1.00)	0.00	0.05
Resource	1.13 (1.13)	1.38 (1.06)	-0.45 (.67)	-0.23	0.07
Recall Strategies	0.00 (0.00)	0.00 (0.00)	—	—	—
Metacognitive Awareness	1.63 (1.51)	0.75 (1.04)	1.82 (.11)	0.68	0.35

For example, qualitative analyses of think-aloud transcripts suggest that effective learners are more flexible with their repertoire of strategies and more effective at monitoring and adapting their strategies than their less effective counterparts. In contrast, less effective learners are more likely to cling to ineffective strategies either through unawareness of their ineffectiveness or inability to adapt strategies to the task demands. For example, after not recognizing a word, a high-rated student explains what she does when she doesn't know a word in French.

F5H: That depends; if I think that this word is important enough, I look it up in the dictionary, but if I can maybe understand the sentence and it's clear enough, I don't look it up in the dictionary, and I deliberately forget about it.

A low-rated student (J5L) responded to the same prompt by listing people who could help her, including her mother, father, grandmother, and finally a pet guinea pig. This student's approach focused on one strategy—seeking help from other people (or even from a pet!).

Another example regarding flexibility is that low students often seemed to rely on single strategies, particularly visual cues, rather than use multiple cues, as did the more effective students.

Low-rated students often continued to use the same strategy repeatedly even when it was not effective, as in unsuccessfully attempting to decode a word over and over. In contrast, high students were often clearly flexible in their strategies, such as a girl who chose a picture prompt she could write a lot about rather than the one that first got her attention (F6H). When reading, the same student frequently verified or modified earlier predictions about the story as she got more information from the text.

Another difference between effective and less effective performance on L2 reading and writing tasks was that less effective learners got bogged down by details, whereas more effective learners focused more on the task as a whole. A specific example is when low students got stuck on decoding or trying to spell an individual word. Some students spent a great deal of time trying

FIGURE 1
Comparing Reading and Writing Strategies of High and Low Students by Overall Strategy Category (Level 1)

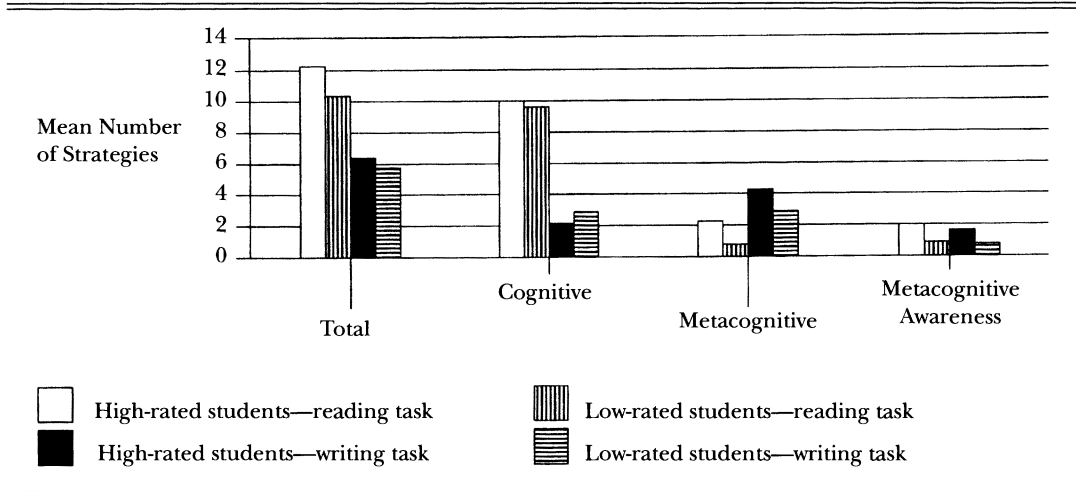


FIGURE 2
Reading Strategy Use

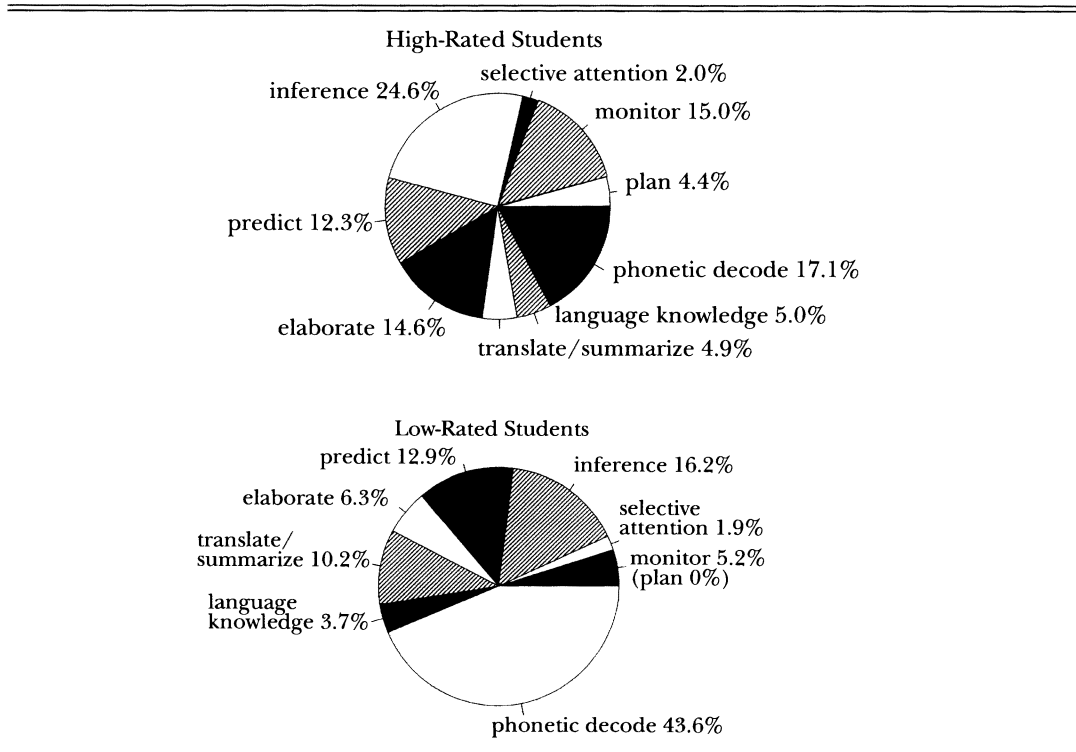
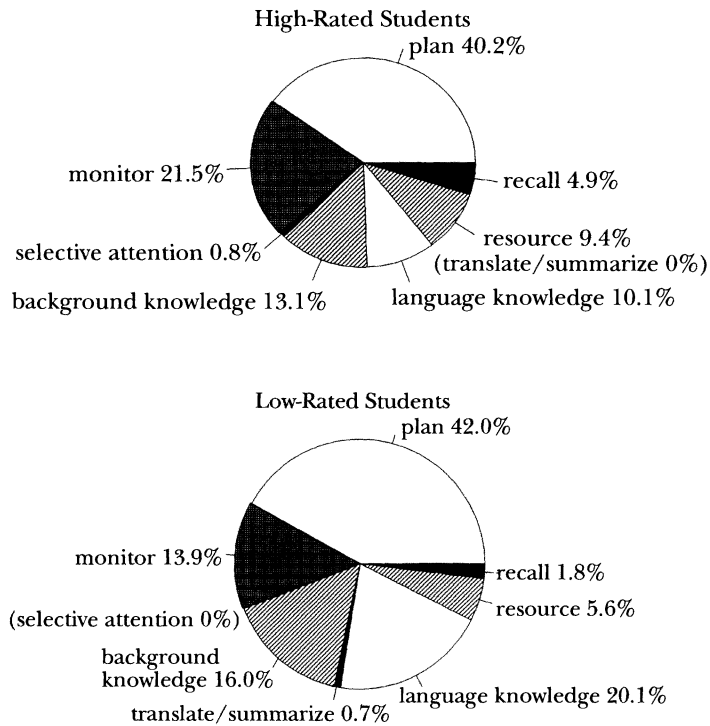


FIGURE 3
Writing Strategy Use



to decode words or listing words they did not know, rather than focusing on the meaning of the text based on parts they did understand. For example, after sounding out several words, a student (S2L) reported, "I am thinking how the words are said." The same student said he thinks in English "when there are words that I know, but I don't know how you can say (them)." Although decoding can be an excellent strategy to unlock the meaning of a word, less effective students often persisted in laborious decoding of a word, not trying anything else or even skipping over a word that had them visibly frustrated. This qualitative comparison was supported by the quantitative finding that low-rated students relied on decoding more than on any other strategy (44% of their strategy use; see Figure 2).

In contrast, more effective students seemed more comfortable guessing or skipping some individual words than their less effective counterparts. Although they sometimes decoded words, they relied much more on other strategies, especially using their background knowledge and

making inferences. High-rated students also seemed most concerned with the overall meaning:

J5H: I don't understand *no fushigi* or *fushigi*, and if I read this [referring to main text] I'll understand.

A final potential difference is that effective students may make more relevant and more extensive elaborations about a text than less effective students. For example, one low-rated student had received a pog⁴ as a prize for completing a previous task. The pog was put away, and the interviewer put a story in front of the student. Pointing to the text, the interviewer asked, "What are you thinking?"

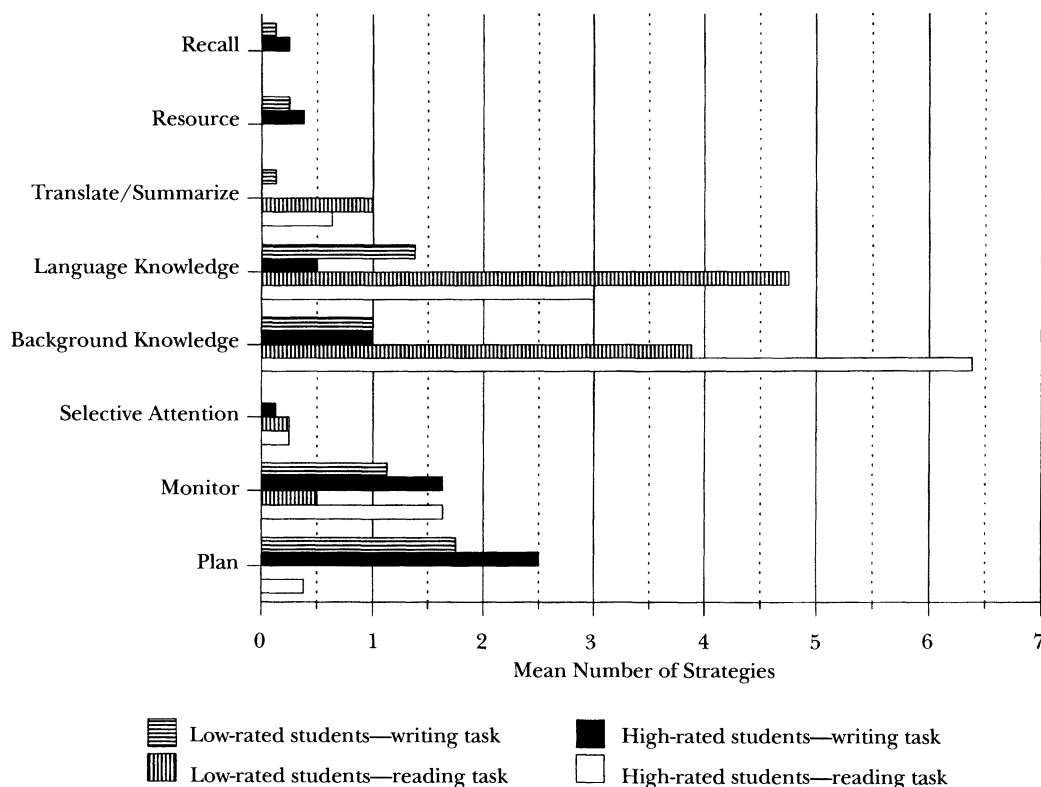
FIL: I think . . . I think . . . I like pogs.

I: But what are you thinking when you look at this text?

FIL: I think that there are no flowers.

Later, the interviewer says: You began to say beh and all that. What are you doing in your head?

FIGURE 4
Comparing Reading and Writing Strategies of High and Low Students by Level 2 Strategy Type



F1L: Um . . . I . . . I dance. . . . I fly.
Later, the interviewer asks when the student thinks in English and when in French.

F1L: I like. . . . I like. . . . How do you say peanut butter in French? Peanut butter and jelly. I eat, I eat when I speak in French.

In contrast, high-rated students made many relevant elaborations, often in rich detail.

I: What are you thinking about at this moment, before starting to read?
S2H: [Examines picture] That this story could be a fantasy. . . . Because I think that the story is going to be very funny and things are going to happen that can't happen.
J5H: [The man is] a little strange . . . because he always carries the umbrella. . . . He must really like the umbrella. . . . When it rains, he runs without using the umbrella even though he gets wet. . . . The umbrella must be really precious.

CONCLUSIONS

This substudy of the main 6-year longitudinal study of learning strategies of language immersion students provides insights into the language learning processes of elementary school students using a L2 as the medium for acquiring new information and skills.

The degree to which many of these young learners could describe their own thinking and learning processes seems to indicate that metacognitive awareness begins at quite an early age, given that students as young as grade 1 were often able to describe their thinking in rich detail. Previous research with young language immersion learners has tended to focus on linguistic analyses and academic achievement (see Bernhardt, 1992; Curtain & Pesola, 1988; Genesee, 1987; Lambert & Tucker, 1972; Swain, 1984). The findings of this study add to the immersion education literature by providing information about cognitive processing and learning strategies reported by immersion children.

TABLE 8
Relative Use of Strategies for Reading Versus Writing

Strategy Type	Reading Mean ^a (SD)	Writing Mean (SD)	t_{15} (p)	Effect Size: Standardized Mean Difference	Power
Total	11.31 (3.95)	6.06 (5.14)	3.61 (.003)	1.15	0.92
Metacognitive Strategies	14.26% (14.1%)	59.18% (23.0%)	-6.69 (.000)	-2.35	1.00
Plan	2.18% (4.9%)	41.09% (25.4%)	-6.07 (.000)	-2.12	1.00
Selective Attention	1.98% (3.6%)	0.39% (1.6%)	1.55 (.14)	0.58	0.31
Monitor	10.11% (10.7%)	17.70% (20.6%)	-1.33 (.203)	-0.46	0.24
Cognitive Strategies	85.74% (14.1%)	40.82% (23.0%)	6.69 (.000)	2.35	1.00
Background Knowledge	43.48% (20.7%)	14.54% (15.2%)	5.08 (.000)	1.59	1.00
Language Knowledge	34.67% (26.9%)	15.08% (19.4%)	2.95 (.01)	0.84	0.79
Manipulate Information	7.59% (9.7%)	0.33% (1.3%)	3.24 (.005)	1.05	0.86
Resource	0.00% (0.00%)	7.50% (14.7%)	-2.04 (.06)	-0.72	0.48
Recall Strategies	0.00% (0.00%)	3.37% (8.8%)	-1.52 (.15)	-0.54	0.30

^aPercentage of strategies represented by strategy category.

This study also provides some initial information about differences in learning strategy use between more effective and less effective young language learners. Many of these differences are similar to those reported with older language learners (see Abraham & Vann, 1987; Chamot et al., 1993; Cohen & Cavalcanti, 1990; O'Malley & Chamot, 1990; Padrón & Waxman, 1988; Vandergrift, 1997; Vann & Abraham, 1990). Across age levels, good language learners seem to be adept at monitoring and adapting strategies, whereas poor learners cling to ineffective strategies. As has been found in other research with older language learners, effective young language learners in this study reported a variety of strategies that they tried for a particular task, suggesting that they recognized the need for flexibility in their use of strategies to accomplish language learning tasks.

It may be that less effective learners focus too much on the details, whereas more effective learners focus on the task as a whole. For example, in the study reported here, low-rated students relied more on phonetic decoding during reading than on any other strategy, but high-rated students focused more on using background knowledge and inferencing to under-

stand a text. This finding may also be related to developmental differences between more and less able readers, irrespective of the L2 variable.

Further analyses of data to be collected annually through 1999 will provide additional information about how children's reported strategies change over time, the relationship between children's use of strategies and their perceptions of their self-efficacy as language learners, and any differences in strategy use across the languages studied. Descriptions of the strategic processing of children in foreign language immersion classrooms can provide teachers with insights into the learning strategies used by younger and older students, as well as by more and less successful language learners. Moreover, the identification of learning strategies reported by children in three different language contexts can provide a basis for developing and integrating strategies instruction into elementary language immersion programs.

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NOTES

¹ The 1995 Spanish third-grade class included very few students rated low by the teacher or by the project's Spanish specialist. The class was an unusual population with over 70% of the students classified as gifted. Because of this special situation, third-grade students are being added in the final year to fill these slots (i.e., students who have not already participated in the study as second graders). In other cases, a student was given one rating by a teacher in 1994 but a different rating by another teacher in 1995 or 1996; researcher ratings served to help provide a final rating in such cases. Both average and discrepant cases were eliminated from all high-low comparisons but were included in the development of the coding scheme and in other qualitative analyses.

² For example: Before reading, what are you thinking about? What are you looking at now? Why do you think that. . . ? How did you figure that out?

³ Revisions included reorganizing subordinate strategies within the coding scheme, refining definitions of strategies, and clarifying distinctions among strategies. Strategies with clear theoretical distinctions were not always so easy to distinguish in students' practice.

⁴ Pogs were popular toys at the time that children collected and traded. They consisted of round plastic tokens with different designs.

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 APPENDIX A
 Coding Reference/Index

(Numbers at left indicate “level” of each category in the hierarchy. Letters in bold indicate the abbreviation that was written in the margins when coding transcripts.)

1 METACOGNITIVE STRATEGIES

2 *PLAN*

3 Preview

4 **Prev genre/organizing principle**4 **Prev main** idea/topic

3 Organizational planning

4 Sections

4 **Aid** organizational aid (web, list; unprompted only)

3 Self-management

4 **know** (- chooses topic knows little about)5 **know L2** selects topic because knows L25 **know topic/interest**4 **DA** [Directed Attention]4 **RA** read aloud/whisper for a purpose4 **Self-cue**4 **Repeat pattern**4 **Avoid** what I don't know how to say; change topic4 **Rh** Rehearsal (“lip”/think words before saying)

[Metacognitive & cognitive—count as metacognitive.]

2 *SA SELECTIVE ATTENTION*3 **SAknwd** (to known words)3 **SAkey** (important words)3 **SAtitle**3 **SApicture**3 **SA#** (numeral)3 **SAling** linguistic features/word endings/specific part of speech/grammatical correctness3 **SApronunciation**3 **Skip**4 **Skip LB**4 **Skip NI**3 **Reread** [not counted as a disagreement with Look back]4 **Look back**2 *MONITOR*3 **Strat** +/- [Monitor current strategy use]3 **Msense** [note whether what is being read/said/written makes sense]4 **Msense+** [Makes sense; I understand.]4 **Msense-** [Doesn't make sense.]3 **Aud mon** auditory monitoring [sounds right/wrong]3 **Verify** Confirm/change an inference, prediction, cognate meaning [revising an inference by making a new one codes as both Ver and I]3 **SC** Self-correct errors/perceived errors3 **SQ/QVer** [self-questioning/hypothesizing answer & asking interviewer if correct]

1 COGNITIVE STRATEGIES

2 *CONNECT W/ BACKGROUND KNOWLEDGE TO MAKE MEANING*

3 Inference

[I- if incorrect; count I- separately]

4 **Ititle**4 **Ipic**4 **I#**4 **Iknwds**4 **Itext**3 **Predict** (based on:)4 **Pred** based on **title**4 **Pred picture**4 **Pred #** (numeral)4 **Pred knwds** (known words)4 **Pred text** (context)4 **Pred lit/med** (literature/media)3 **Elaborate** [elab- if irrelevant; count separately]4 **Elab pers** [personal experience, judgment, emotional response to text]4 **Elab txt** [connection between parts of text]

4 Ilit/med
4 Iwrld

4 Pred wrld (general world
 knowledge)

4 Elab pic [talk about pictures]
4 Elab class [talk about
 specific class activity]
4 Elab wrld [observations ab.
 world situations]
4 Elab lit/med [connect to
 literary/media kn.]
4 Vispic [image: object/scene]
4 Role [imagining self in story]

2 USE SPECIFIC LANGUAGE KNOWLEDGE TO SOLVE PROBLEMS

3 L2 knowledge

4 Deduction

4 Decoding [each word S tries to decode]

5 Dec-mn [mental decoding]

5 DecCharacter [recognition/pronunciation]

4 Semantic awareness [alternative meanings;
 connotations]

4 Substitute

3 L1-L2 knowledge

4 Cognates

4 Borrow modify/accent L1 word to fit L2;
 make up word

4 Mix go back and forth from L2 to L1 words
 [imm writing; HS speaking]

2 MANIPULATE INFORMATION

3 Retell

3 Summarize

3 Translate (– if clearly incorrect)

4 Metatranslation

2 RESOURCE [computer, text, own notes, video/audio, task info]

3 Dictionary

3 Chart [e.g., hiragana]

3 QI Question for information that is unknown or for general help—spelling, word meaning, translation

2 RECALL STRATEGIES

3 Sequence [think through memorized sequence]

3 Association — Sound associations

3 Brainstorm L2 Vocab (writing/speaking)

3 Viswd/char visualize word or character

3 Aud recall hear words/say aloud to retrieve meaning

1 *METACOGNITIVE AWARENESS*

Includes general awareness of task requirements or how one is approaching task.

[No level 2 strategies here.]

3 Automatic understanding in L2; don't need to translate

3 Easy/Hard [Assess task difficulty]

3 Tie to L1/L2 [Relate to L1 or another L2]

4 Contrast L1/L2

4 Interference of L1 or another L2

3 Why [strategy value]

4 When [conditional knowledge of when strategy is more useful or less useful]

3 Self awareness (+/-/0) [comments on own ability; not directly tied to how performing task
 (compare Monitor)]

3 Affect (state whether + or –) emotional reaction to doing task

PLANNED PROBES FOR IMMERSION STUDENTS

READING

What do you do when you don't know a word you are reading in L2?

What language are you thinking in when you read in L2?

WRITING

What do you do when you want to write a word you don't know in L2?

How do you know how to spell/write words in L2?

What language are you thinking in when you write in L2?

APPENDIX B

Sample Excerpt from Coding Guide for Cognitive Strategies

MAKE CONNECTIONS WITH *BACKGROUND KNOWLEDGE* TO MAKE MEANING

STRATEGY DEFINITIONS

Inference: Pulling together elements not stated in text. Guessing based on some information; not just wild guessing.

Ititle Infer based on title

Ipic based on picture

I# (text-specific) based on numeral in text

Iknwds Take words I recognize in the text & try to make sense w/ those I don't know; if using strategy (not just describing it), must indicate which words inference is based on.

Itext context clues and text-based inferences from other parts of the same text

Ilit/med inference based on literary knowledge; knowledge from media (TV, movie, song . . .)

Iwrld World knowledge about topic/content, as well as logic, common sense.

Pred Predict

What's next? What kinds of information am I likely to get later? [Distinction between inference & prediction—inference as educated guess about meaning; prediction as educated guess about information that will follow (after predicting, student would continue reading or looking for meaning, ideally checking if prediction is correct).]

Pred title

Pred pic (picture)

Pred # (numeral)

Pred knwds (known words)

Pred text

Pred lit/med (literary or media)

Pred wrld

IMMERSION STUDENT EXAMPLES

Iknwds I don't know what that word means. (xxx) *kuro* was black. I: Un. S: He was all dressed in black?

Itext S: *Rippana* (fine) I don't know what that word means. *Kasa wo motte imashita* (had an umbrella). Maybe he takes it to like a store or something? I don't know *rippana*. I: Why did you think that? S: Um . . . I don't know but maybe he was like, they are telling about how many, like the grandfather like loves his umbrella so much and takes it everywhere or something.//

Ipic S: . . . I'm trying to think about that picture. What is he doing? . . . Like put the umbrella? It looks like he's trying to not anybody take it.

Iwrld S: (I knew it but when the alarm clock says ring ring, that says that, because the alarm clock rings ring ring in the morning.)

Pred I: (First, before reading, what are you thinking, before beginning to read?) S: (That this story . . . may be fantasy) I: (It may be fantasy? Why do you say this?) S: (Because I think the story is going to be very funny and things are going to happen that can't possibly happen.)//

I: Are you thinking anything now? S: (a thief). I: (A thief? OK. Why is that?) S: (Because those who wear black clothes are mostly thieves) [could be based on picture and/or word black in text].

Pred pic

S: Looks like everybody's getting hurt in the picture, so it might be everybody's getting hurt in this story.

APPENDIX C

Sample Annotated Tally for Recording Strategy Codes: Reading

A Agree	R ² Resolved within Level 2	RD Resolved Discrepancy	X Resolved—Excluded	U Unresolved
predpic ///				
Coders agreed on 3 predictions based on pictures.				
	Itxt /// (I //) (Iknwds /)			
2 different codes, but in the same level-2 category (here, Inference). The strategy on the left indicates the final coding decision. Parentheses indicate the original disagreement.				
		contrast L1/L2 (∅)		
∅ One coder had no strategies identified on that part of the transcript. Here, agreed to code as contrast.				
			Elab pic	
Coders agreed to leave the episode out—not a clear example of Elab pic strategy.				
				SAPic/Elab pic
After 5 minutes discussion, coders cannot make a clear-cut choice between SAPic and Elabpic.				

APPENDIX D

Section from Descriptive Profile

General Information/Global Impressions

CODER(S): STUDENT: SCHOOL:
 LANGUAGE: TEACHER:
 DATE CODED: GRADE/LEVEL: YEAR OF TRANSCRIPT:

Compared to other students in this group (language/grade/level), rate this student's

[Write N/A if Not Applicable]

General verbosity: High___ Medium___ Low___

IMM—Overall ability to communicate in L2: High___ Medium___ Low___

IMM—Overall ability to use L2 correctly orally: High___ Medium___ Low___

Overall metacognitive awareness: High___ Medium___ Low___

Overall appropriateness of strategies use: High___ Medium___ Low___

Overall length/content quality of L2 production: High___ Medium___ Low___

(HS speaking task; imm writing task)

Overall correctness of L2 production: High___ Medium___ Low___

Overall writing and spelling skill: High___ Medium___ Low___

Reading ability in L2: High___ Medium___ Low___

Which level(s) of text did the student read
(if unsure, list titles)? _____

For the student, the text was: Easy___ Medium___ Hard___

Which of the following did the student tend to do when reading?

- ___ Translate verbatim, word-by-word ___ Read silently
 ___ Translate verbatim, a phrase or sentence at a time ___ Read aloud
 ___ Translate verbatim, several sentences or paragraphs at a time ___ Whisper words
 ___ Paraphrase most of what was read
 ___ Paraphrase selected parts, not necessarily main ideas
 ___ Summarize main points

Prompting (check any that apply):

- ___ Responded without being prompted ___ Described thoughts in rich detail
 ___ Responded with moderate prompting ___ Described thoughts; little detail
 ___ Responded only when heavily prompted ___ Responded but didn't describe thoughts
 ___ Did not respond to heavy prompting ___ Minimal responses
 ("Yes/No, I don't know, nothing")

Especially unique strategies:

Clearly inappropriate strategies:

Strategies student talks a lot about but does not seem to use in the task:

Creative content/rhetorical devices in production task:

Anything that seems to distinguish this student as High/Low or more/less mature):

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