ABSTRACT

Title:	CONSTRUCTING A MODEL OF ESOL CONTENT-BASED INSTRUCTION WITH NATIVE LANGUAGE SUPPORT: SELF-REFLECTIVE ACTION RESEARCH GROUNDED IN CULTURAL HISTORICAL ACTIVITY THEORY
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The study started as a critical response to a new sheltered science content course introduced by the school district where I teach ESOL students. Although the course was a bold and timely initiative, it was not supported by a well-built curriculum, realistic educational goals, and appropriate instructional materials. As I was unsatisfied with what I was doing at my workplace, I embarked on the road of self-reflective, practitioner action research grounded in cultural-historical activity theory (CHAT) in order to elaborate an alternative approach for how to teach science content and English to high school students using native language support.

The following research questions guided my inquiry:

1. How can I, as an ESOL teacher, effectively use native language support in a particular high school freshmen ESOL science class in order to help students master both content and language?

2. What instructional activities could be useful to promote students' mastering content and language?

3. What measuring techniques could be applied to monitor students' progress?

In my study I effectively complimented traditional qualitative and quantitative action research methods with novel instrumentality of CHAT theory, such as a model of expansive learning and a model of the human activity system.

During my study I (a) developed instructional methods and materials for the ESOL science content course, (b) examined the process of their development by means of self-reflection, and (c) evaluated the benefits of these methods and materials for students' learning.

The findings of the study displayed that four instructional activities with native language support, such as (1) bilingual dictionary activity, (2) vocabulary development activity, (3) functional grammar activity, and (4) translation practice activity were beneficial for students' mastering English and science content. The findings of the study also demonstrated how the process of teacher learning and improvement of teacher practice develop.

CONSTRUCTING A MODEL OF ESOL CONTENT-BASED
INSTRUCTION WITH NATIVE LANGUAGE SUPPORT:
SELF-REFLECTIVE ACTION RESEARCH GROUNDED IN
CULTURAL-HISTORICAL ACTIVITY THEORY

By

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Chapter I: Introduction

*The struggle to make sense **is** the research.*
McNiff & Whitehead (2002, p. 103*)*

Specific Problem

In 2004 the school district where I teach English language learners introduced a new science content course for high school ESOL freshmen as a response to the No Child Left Behind Act of 2001 to improve achievement and set up more rigorous standards for the minority students.

The course was a bold and timely initiative on the part of the district Office of ESOL and Language Minority Programs. However, it was not supported by a well-built curriculum, realistic educational goals and appropriate instructional materials, due to several reasons. The available models of content-based instruction, such as the SIOP model (Echevarria, Vogt, & Short, 2000, 2004), the CALLA model (Chamot & O'Mally, 1994), "structured English immersion," and an array of locally designed programs, give an eclectic picture of course objectives, instructional strategies, definitions of topics, and the criteria (language proficiency levels) for selecting students for a science content class. For this reason it was difficult to compile an exemplary sheltered curriculum free from conceptual confusions. There was no high-quality, commercially available science textbook specially designed for ESOL students which could have been the backbone of the novel course and, last but not least in my view, a team of teachers and coordinators who volunteered to design the course underestimated its complexity and innovation.

As a result, teachers who were assigned to teach the course experienced many difficulties in the classrooms, as they felt they were unable to meet the course

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objectives with their students learning English. I was among those teachers who implemented the new course. Having been unsatisfied with what I was doing at my workplace, I was looking for possible ways to improve my practice. It was not easy. I have been struggling in my classroom to reach a balance between the demands of authority with its prescription for what should be taught in the curriculum and my personal professional knowledge of how better to serve the needs of my students. It was a constant personal struggle learning how "to create a performance rather than compliance work culture and unleash innovation in order to improve teaching and learning" (Deasy, 2008, p. 5).

The result of this four year struggle is a practitioner action research study on the basis of the Russian cultural-historical activity theory, which makes an attempt to incorporate "personal practical knowledge" (Connelly & Clandinin, 1988, p. 25) into the official course curriculum with the aim to suggest the alternative curriculum solutions from the practitioner/researcher's perspective.

Justification of the Practitioner Action Research Study

My professional honesty and competence as a foreign language teacher were the driving wheels that initiated my research. By the time the new course was introduced I was already a doctoral student at the University of Maryland and had completed graduate studies in Russia. I decided to use my knowledge to find the best ways to implement teaching instruction in the ESOL science content class so that the immigrant students at the beginning level of learning English in high school could benefit from a content science course taught in English.

As a foreign language teacher with 15 years of professional experience in Russia, I have realized that the huge potential of foreign language teaching methodology, particularly with the native language support as its main component, is not used to its full extent in the ESOL classes of American high schools. The fact that the 14 to 18-year-old English language learners start living in the country of the target language doesn't automatically grant them painless, effortless and quick acquisition of academic standard American English. As a foreign language learner myself, I have gone through numerous pitfalls and many days of tedious practice with a bilingual dictionary in my hands in order to be proficient in English. Only a person without experience living in a foreign country can assume that mastering a foreign language in high school can be done in a natural way without the mediation of a mother tongue. It is especially unrealistic to deny the use of L1 when we expect students to master both English and science in a science content-based class.

Overall, the research conducted in either bilingual or mainstream classrooms indicates "that students' limited proficiency in English constrains their science achievement when instruction and assessment are undertaken exclusively or predominantly in English" (Abell & Ledeman, 2007, p. 180).

The use of the native language as a mediational tool to comprehend instruction in content areas is supported by the following researchers: Allen & Howard (1981); Brisk, (1998); Cummins (1996, 2000); Echevarria et al. (2000, 2004); Garcia (1993, 2002); Garcia-Vazquez, Vazquez, Lopez, & Ward (1997); Hakuta (1986, 1990); Leontiev (1981); Malakoff & Hakuta (1991); Ovando & Collier (1998); Padilla, Fairchild, & Valadez (1990); Snow (1990); Rosenthal (1996);

Shannon (1990); Skutnabb-Kangas (2000, 2002), Valdes (2002), Vygotsky (1935, 1962, 1978), and others. However, most of the studies examining the effects of the mother tongue on learning science in a foreign language have been done by academic researchers using quantitative comparison methods or in classes of different bilingual programs (Duran, Dugan, & Weffer, 1998; Ho, 1982; Malakoff & Hakuta, 1991; Merino & Hammond, 2001; Torres & Zeidler, 2002; Milk, 1985; Riccardelli, 1989; Skutnabb-Kangas & Toukomaa, 1976; Stewart, 2004; Yangambi, 2005; Yip, Din Yan; Tsang, Wing Kwong; Cheung, Sin Pui, 2003). Few qualitative studies (Chacon, 2002; Hoare, 2003; Tiede, 1996) have assessed the effectiveness of the use of L1 in teaching science in ESOL classes at the high school level; furthermore, educational scholars have not clearly defined activities (or interventions) that might qualify for L1 support.

In an effort to explore "curriculum potential" (Connelly & Clandinin, 1988) and to improve teaching science content in a class of ESOL high school beginning learners, who are predominantly Spanish language speakers, I conducted a practitioner developmental action research study (self-study) on the basis of the Russian cultural-historical activity theory, which reports on developing and implementing innovative teaching instruction with L1 support over a four-year period. However, only the last year, the implementation stage, was done as a doctoral dissertation project. The study has been conducted within a constructivist paradigm, which investigates how the participants in a particular situation use different psychological tools such as language, diagrams, charts, sign systems, and others as

mediating instruments (Vygotsky, 1978) in order to construct new meaning in a new cultural-historical context.

I chose to conduct a practitioner action research self-study for the following reasons. First, I wanted to get a better understanding of curriculum problems; second, I was concerned with how to improve the quality of my practice; third, my focus was on problems of immediate concern which I encountered in my classroom; fourth, my study was a collaborative effort in which my students and I searched for a solution together; fifth, I focused on a local case rather than a sample population, since the variables for the topic which I explored were not yet available; sixth, my study was supposed to have an emancipatory motive, because I wanted to find more reasonable and just teaching instruction for minority students. The above-stated reasons are supported by action research principles and practice (Bogdan & Biklen, 1982; Burns, 1999; Carr & Kemmis, 1986; Elliott, 1978, 1991; McKernan, 1991; McNiff & Whitehead, 2002; Whitehead, 1989; Winter, 1989).

Positionality

Since I dedicated my study to helping students master both science content and the English language, it is necessary to delineate my professional competencies and to outline the boundaries of the teaching-learning model which I was examining.

I am a certified ESOL/foreign language teacher, not a science teacher. For this reason, the scope of my research is limited by the boundaries of my profession and my university degree in the field of second/foreign language education and general linguistics. My knowledge of general science is adequate enough to teach students basic scientific concepts and processes--in other words, conceptual understanding--

but I don't feel myself adequately prepared to teach students how to perform practical scientific activities (inquiry) which, according to standards in primary science (Newton, 2000), constitute different kinds of understanding in science, that is, situational and procedural understanding. Besides, as a language teacher, I am not provided with appropriate resources, which a science lab class has.

The adjunct instructional model (see Definition of Terms) which I am developing in this dissertation is a preparatory course, which falls into the category of courses of "English for Specific Purposes" (Hutchinson & Waters, 1987) and is meant to be taught by ESOL teachers who apply additional knowledge of content material commensurate with their general level of scientific competence. Designing and teaching this kind of course is in compliance with the NCLB Act (2001) and the ESOL professional license code. This course puts emphasis on conceptual understanding, mastering general science vocabulary, and developing reading and writing skills in a scientific context. It serves a transitional purpose, that is, to provide opportunities for students to acquire basic scientific knowledge in a foreign language, which later will be refined and enriched in a mainstream science content course.

The Goals and Research Questions

The goals of my study are the following: (1) To find the ways in which the native language support can be used effectively to teach ESOL science content to beginning learners at the high school level; (2)To report on the development and implementation of the theoretically based supplementary materials and instructional techniques that use native language support in ESOL content-based instruction, with the aim to design an adjunct ESOL science content course for freshmen at the high

school level; (3) To understand the process of teacher learning involved in action research on the basis of the cultural-historical activity theory in order to help teacher-researchers become more involved in reflective, inquiry-based practice.

With these goals in mind, the basic research question that guided this study is the following:

1. How can I, as an ESOL teacher, effectively use native language support in a particular high school freshman ESOL science content class in order to help students master both content and language?

This question is supported by the following two additional research questions:

2. What instructional activities could be useful to promote students' mastering content and language?

3. What measuring techniques could be applied to monitor students' progress?

Significance of the Study

ESOL high school students have shown for many years lower results in science compared to language arts and mathematics. For example, recently published NAEP (National Assessment of Educational Progress) comparative science scores (see Figure 1), testify that there have been no gains in science scores for ELL twelfth-graders since 1996.

The data reveal that ELL students are not performing well and that strategies employed in teaching ELL students need to be reconsidered. In order to reconsider these strategies, a new type of action research self-study based on cultural historical activity theory was conducted. Its aim was to explore teachers' learning actions while

developing reform-oriented instructional methods and materials, with the promise of providing more meaningful science learning and responsible innovative teaching.

The study is significant because it is a unique, prolonged field-initiated research in a secondary ESOL classroom, which has a practical application to teachers. It is a response to the NCLB Act (2001, Sec.3222) to provide innovative, locally designed, high-quality instruction to help limited English proficiency children.

> **Average Scale Scores** | **Achievement Levels**
>
> Trend in twelfth-grade average NAEP science scores, by students' status as English language learners
>
> SCALE SCORE
>
> 151*   147   149 Non-ELL
>
> 108   107   108 ELL
>
> '96   '00   '05   YEAR
>
> * Significantly different from 2005.
> NOTE: ELL = English language learners. Prior to 2005, students were identified as either ELL or non-ELL; in 2005, students were identified as ELL, non-ELL, or formerly ELL. For this figure, non-ELL and formerly ELL data were combined for comparability. The results for English language learners are based on students who were assessed and cannot be generalized to the total population of such students. View complete data with standard errors for grade 12.
> SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1996, 2000, and 2005 Science Assessments.

Figure 1. Trend in twelfth-grade average NAEP science scores.

Note. Retrieved and adapted on December 18, 2006, from The National Assessment of Educational Progress: http://nationsreportcard.gov/science_2005/s0115.asp

Limitations

This study

(1) explores concepts and hypotheses of language acquisition theories that are applicable to the teaching of a second/foreign language and content teaching. It doesn't attempt to give a full account of language acquisition theories with a detailed analysis of their conceptual apparatus and research methodology, which is a domain of psycholinguistics;

(2) informs the body of research rather than claims to propose a new SLA theory;

(3) explores theories, hypotheses, and studies that apply primarily to secondary education recognizing differences between older and younger learners in the way they acquire a second/foreign language;

(4) uses the Spanish language as a primary native language support for creating supplementary instructional materials;

(5) does not intend to discuss the use of L1 support for instruction in light of relationship between discourse and power.

Definition of Terms

Adjunct instructional model: An instructional model that combines features of several instructional models or programs. In my dissertation I use the term "adjunct model" for the ESOL sheltered science content model with native language support, which I am examining in my study.

Bilingual Education Act (BEA): Title VII of the Elementary and Secondary Education Act; first passed by the United States Congress in 1968 and reauthorized in

1974, 1978, 1984, and 1988; provides funding and guidelines for the education of limited English proficient school children.

CHAT: Cultural-historical activity theory, which was developed in Russia in the 20th century by a cohort of Russian psychologists and psycholinguists, such as Vygotsky, A. N. Leontiev, Luria, Rubenstein, Elkonin, Zhinkin, Davydov, Zinchenco, and others.

Cognitive Academic Language Learning Approach (CALLA): An approach developed by Chamot and O'Mally (1986, 1987, 1994) for students who learn English as a second language in the U.S. public school system.

Cognitive Academic Language Proficiency (CALP): A term used by Cummins to refer to the kind of language competency needed to learn cognitively demanding academic subject matter where clues to meaning are often lacking.

Content-area: An umbrella term for a specific curriculum area such as science or history.

Context embedded: Language for which there are physical and social clues as well as shared background and linguistic knowledge that help clarify the meaning of the words.

Content reduced: Abstract language which requires higher levels of content knowledge and language proficiency in order to be understood; language which is lacking in physical and social clues or shared background and linguistic knowledge.

ELB: English language development.

ELLs: English language learners.

ESOL: This term may refer to (1) courses or programs of English instruction offered in English speaking countries for speakers of other languages, or (2) to students whose first language is not English and who do not write, speak, and understand the language as well as their classmates.

HSA: High School Assessment tests that measure school and individual student progress in high school core learning goals, that is, in English, Algebra/Data Analysis, Government, and Biology. Passing the HSA is a graduation requirement beginning with the graduation class of 2009. The tests contain multiple-choice questions and questions requiring written responses.

L1: An individual's native (first) language.

L2: An individual's second language.

Language minority student: Generally used to refer to students who are members of ethnic minority groups and whose native language is not the dominant language of the country; in the United States.

Latino: A category used in the United States Census: self-identification as a person of Mexican, Cuban, Puerto Rican, Dominican, Spanish, or Central or South American descent regardless of race.

Second/foreign language: Although there are some differences in teaching a second language and a foreign language, I use these terms interchangeably.

Sheltered instruction: An approach to teaching that extends the time students have for receiving English language support while they learn content subjects. Teachers scaffold instruction to aid student comprehension of content topics and objectives by adjusting their speech and instructional tasks, and by providing

appropriate background information and experiences. Sheltered instruction

classrooms may include a mix of native English speakers and English language

learners or only ELLs. Sheltered instruction integrates language and content while

infusing sociocultural awareness.

SIOP (Sheltered Instruction Observation Protocol): A comprehensive

model of instruction for preparing teachers to work with English learners developed

by J. Echevarria, M. Vogt, and D. Short. The SIOP operationalizes sheltered

instruction that provides English learners with access to grade-level content

standards.

Structured English Immersion: Immersion programs, which involve

structured curricula in English for both language and non language subject areas.

Chapter II: Literature Review

Theory and practice are not separate entities;
they are different perspectives of the same experience,
rather like … the inside and the outside of a teapot.
McNiff & Whitehead (2002, p. 37)

Introduction

In this literature review I give a brief account of theories that provide a framework for understanding the use of native language as an instructional support for teaching a second/foreign language. Although many researchers have contributed to our understanding of how languages are learned, two researchers in particular (Jim Cummins and Stephen Krashen), have had a tremendous influence on the landscape of theoretical thinking in the field of second language acquisition in the North American educational research community. For this reason, their theoretical hypotheses will be discussed and analyzed with regard to their views concerning transfer from L1 to L2. Second, I provide examples of studies that explore the interference between L1 and the target language in general and in science content-based instruction in particular. Third, I give an account of Leontiev's (1981) speech activity theory as an alternate language acquisition theory in order to show how its tenets could be used creatively for ESOL science content teaching. Fourth, I discuss ESOL sheltered instruction at the high school level today and propose some alternative ideas for ESOL content teaching. Fifth, I present some views regarding the creation and adaptations of supplementary instructional materials. And sixth, I describe principles and aspects of action research as curriculum inquiry, and discuss which models of action research I use in my study as research constructs.

Native Language and Second Language Acquisition Theories

Interdependence hypothesis. Over the last 40 years since the adoption of 1968 Bilingual Education Act, there has been an ongoing debate in American educational research literature about the benefits and drawbacks of the use of native language support in classrooms where minority students are learning English. Over the last 20 years, this debate has been intensified due to the theoretical contributions of such researchers as Jim Cummins and Stephen Krashen. While Cummins took particular interest in the interdependence of first and second language literacy, the different kinds of language proficiencies, and their implications for bilingual education, Krashen concentrated on the development of a theoretical framework for understanding the process of second/foreign language acquisition.

According to Cummins (1996), language proficiency in one's first and second language are interdependent. In concrete terms this means that, for example, in a Spanish-English bilingual program, Spanish instruction that develops Spanish reading and writing skills (for either Spanish L1 or L2 speakers) is not just developing Spanish skills, it is also developing a deeper conceptual and linguistic proficiency that is strongly related to the development of literacy in the majority language (English). Although the surface aspects (e.g. pronunciation, fluency, etc.) of different languages are clearly separate, there is an underlying cognitive/academic proficiency that is common across languages. This "common underlying proficiency" makes possible the transfer of cognitive/academic or literacy-related skills from one language to another. Transfer is likely to occur from the majority language because of the

generally greater exposure to literacy in the majority language outside of school and the strong social pressure to learn it.

      Separate underlying proficiency hypothesis. In contrast to Cummins's position is the separate underlying proficiency hypothesis or model which implies that proficiency in L1 is separate from proficiency in L2 and that there is a direct relationship between exposure to a language (in home or school) and achievement in that language. It also implies that if L1 and L2 proficiency are separate, then content and skills learned through L1 cannot transfer to L2 and vice versa (Hirsch, 1987; Imhoff, 1990; Porter, 1990, Schlesinger, 1991).

Figure 2. The two models of bilingual proficiency.

Note. From *Negotiating Identities: Education for Empowerment in a Diverse Society* (p. 110), by Jim Cummins, 1996, California: California Association for Bilingual Education. Copyright 1996 by the California Association of Bilingual Education. Reprinted with permission.

The balloon metaphor (see Figure 2) means that blowing into the L1 balloon

will succeed in inflating L1 but not L2. This hypothesis found its practical realization

in the "maximum exposure" or "time-on-task" approach (Imhoff, 1990; Porter, 1990).

For example, Porter (1990) articulates the "time-on-task" principle in the following

statement:

> My personal experience and professional investigations together impel me to
> conclude that the two overriding conditions that promote the best learning of a
> second language are (1) starting at an early age say at five, and (2) having as
> much exposure and carefully planned instruction in the language as possible.
> Effective time on task – the amount of time spent learning – is, as educators
> know, the single greatest predictor of educational achievement; this is at least
> is true, if not more so, for low-socioeconomic-level, limited-English students.
> Children learn what they are taught, and if they are taught mainly in Spanish
> for several years, their Spanish-language skills will be far better than their
> English-language ones. (Porter, 1990, pp. 63-64)

Gary Imhoff (1990) agrees with Porter in principle but thinks that the native

language instruction might be acceptable "for the first few months" (p. 51). Beyond

this initial adjustment period, he thinks, the educational rationale for bilingual

education is seriously deficient.

A group of neo-conservative academics (Hirsch, 1987; D'Souza, 1991;

Schlesinger, 1991) used the "maximum exposure" hypothesis in a broader spectrum

than just a narrow concern with bilingual education. They expressed a set of concerns

in relation to the more general infiltration of cultural diversity into American

institutions. For instance, Hirsch (1987) argued that the fabric of nationhood

depended on a set of common-knowledge understandings and values shared by the

populace. Multilingualism in this case represents a threat to cultural literacy and

hence to nationhood; "in fact, multilingualism enormously increases cultural

fragmentation, civil antagonism, illiteracy, and economic-technological ineffectiveness" (Hirsch, 1987, p. 92).

Studies that support L1-L2 transfer. In psycholinguistic research literature, the problem of separate or joint localization of speech production mechanisms belonging to different languages has been discussed for several decades (Vereshchagin, 1969). Although there is experimental evidence supporting both points of view, the majority of researchers side with the second point of view, that is, joint localization of language production mechanisms (Holloway, 1951; Leopold, 1939; Penfield, 1953; Vygotsky, 1935).

Empirical educational research literature also strengthens the case for the common underlying proficiency and suggests that the interdependence principle is more likely to account for the data on immigrant students' L2 acquisition. For example, Verhoeven (1991, 1994) reported the results of two experimental programs in transitional L1 literacy instruction with Turkish-background students in The Netherlands. It was found that a strong emphasis on instruction in L1 does lead to better literacy results in L1 with no retardation of literacy results in L2. On the contrary, there was a tendency for L2 literacy results in the transitional classes (using L1) to be better than in the regular submersion classes. Moreover, it was found that the transitional approach tended to develop a more positive orientation toward literacy in both L1 and L2, and, finally, there was positive evidence for the interdependence hypotheses. From the study on biliteracy development it was reported that literacy skills being developed in one language strongly predict corresponding skills in another language acquired later in time (Verhoeven, 1991).

Other European researchers support the interdependence hypothesis in their studies as well. For instance, a German linguist Jochen Rehbein (1984) found that the ability of Turkish children to deal with complex texts in German was affected by their ability to understand these texts in their first language. Rehbein's investigations demonstrate that there is a strong developmental interrelationship between the bilingual child's two languages, and that conceptual information and discourse strategies acquired in the first language transfer to the second. A study of Italian-English bilinguals in Australia and Italy (Ricciardelli, 1989, 1992) reported significant relationships between Italian and English proficiency among both the Australian and Italian samples. In the Italian data it was reported that:

> there is a large degree of overlap between the standard cognitive measures which were given in the two languages… These [findings] suggest that bilinguals' linguistic abilities are interdependent and are not separate, and therefore any instruction which bilingual children receive in either language is capable of promoting academic skills in both languages. (Ricciardelli, 1989, p. 137)

Diaz and Klinger (1991) demonstrated in their studies that exposure to two languages at an early age in a systematic additive fashion results in an objective awareness of grammatical rules and language functions. They concluded that this greater awareness of the cognitive functions of the language leads to increased and more efficient use of language as a tool for thought. As a result, they suggest that bilinguals' increased reliance on private speech and verbal mediation would promote the development of cognitive executive functions.

Malakoff and Hakuta (1991) explored the relation between bilingualism and metalinguistic awareness in two studies that investigated bilingual students'

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translation from one language to another. They report that translation skill is widely found in bilingual children in late elementary school. This ability appears to be related both to language proficiency in the two languages and to a separate metalinguistic ability that is unrelated to proficiency in the two languages. They also suggest that translation offers an excellent pedagogical tool to enhance students' metalinguistic awareness and their pride in bilingualism.

In sum, the studies reviewed above conclude that the development of academic skills in English depends not only on exposure to English, as "time-on-task" advocates argue, but:

> equally on the knowledge and concepts that children have inside their heads that help them make sense of English. Thus, instruction that builds up Latino/Latina children's reading and writing in Spanish is creating a conceptual foundation upon which academic skills in English can be built …. (Cummins, 1996, p. 112)

Krashen's theory of second/foreign language acquisition. Krashen presents his theory in the format of five hypotheses (Krashen, 1981). According to the Acquisition-Learning Hypotheses, we have two independent ways of developing language ability: acquisition and learning. Language acquisition is a subconscious process; while it is happening, we are not aware that we process any new knowledge; the knowledge is stored in our brains subconsciously. We may refer to this kind of acquisition as "picking up" a language. Krashen explains that when someone says, "I was in France for a while and I picked up some French," it means he or she acquired some French. Language learning is what we do in school. It is conscious process; when we are learning, we know we are learning. Also, learned language is

represented consciously in the brain. When we talk about "rules" and "grammar," we are usually talking about learning (Krashen & Terrell, 1983).

According to the Natural Order Hypothesis, we acquire the parts of a language in a predictable order. Some grammar items, for example, tend to be acquired early, while others come later. The order of acquisition for first and second languages is similar but not identical. It has been established, for example, that the *-ing* marker in English, the progressive, is acquired fairly early in first language acquisition, while the third person singular -s is acquired later. Not every acquirer proceeds in exactly the same order. There are variations among acquirers, but according to Krashen, there is clearly an "average" order of acquisition (Krashen & Terrell, 1983).

The third hypothesis, which is called "The Monitor Hypothesis," explicitly states what role conscious learning plays in the second language acquisition. Using the term "monitor," Krashen emphasizes that conscious learning has a limited function. It only allows students to monitor or edit language after they have produced that language. Conscious learning doesn't contribute to the learner's fluency, and it has small contribution to accuracy. Only acquisition, according to Krashen, leads to both fluency and accuracy. To support this claim Krashen cites three conditions which are necessary for successful use of Monitor or, in other words, for successful conscious learning. These conditions are as follows: if there is plenty of time, if correctness of the language use is considered very important, and if the individual can remember the "rules" (Krashen & Terrell, 1983).

The Input (Comprehension) Hypothesis attempts to answer the most important question in the field of language acquisition and language education: How does

language acquisition occur? Krashen postulates that we acquire language only in one way – when we understand messages or when we obtain "comprehensible input." The most important claim of this hypothesis is that we are able to understand the message or input only if it is slightly beyond our current level of language competence. Krashen writes:

> The input hypothesis claims that we move from i to $i + 1$ by understanding input containing $i +1$. We are able to do this with the help of our previously acquired linguistic competence, as well as our extra-linguistic knowledge, which includes our knowledge of the world and our knowledge of the situation. In other words, we use context. (Krashen, 2003, p. 4)

The first implication of this hypothesis, according to Krashen, is that language acquisition is effortless. "It involves no energy, no work. All an acquirer has to do is understand messages" (Krashen, 2003, p. 4). The second implication is that language acquisition is involuntary. "Given comprehensible input and a lack of affective barriers, language acquisition will take place. The acquirer has no choice" (Krashen, 2003, p. 4). Thus, in a theoretical sense, Krashen's "language teaching is easy: all we have to do is give students comprehensible messages that they will pay attention to, and they will pay attention if the messages are interesting" (Krashen, 2003, p. 4). In a practical sense, this means that there is no need for direct instruction of grammar, because, according to Krashen, if we provide students with enough comprehensible input, the structures they are ready to acquire will be present in the input. For this reason, we don't have to deliberately focus on certain points of grammar. However, Krashen emphasizes that he is not discarding grammar completely, but, instead, he only argues that the comprehensible input is a better way of developing grammar accuracy than direct instruction in grammar.

The final hypothesis, "The Affective Filter Hypothesis," claims that attitude and all variables relating to success in second language acquisition generally relate directly to language acquisition but not necessarily to language learning. Performers with certain types of motivation, usually but not always "integrative," and with good self-images do better in second language acquisition. "If the acquirer is anxious, has low self-esteem, doesn't consider himself or herself to be a potential member of the group that speaks the language he or she may understand the input, but it will not reach the 'language acquisition device' [term coined by Chomsky]. A block, the affective filter, will keep it out." (Krashen, 2003, p. 6) He emphasizes that although increasing the stress on students in class may improve their short-term learning, it has negative effects on their long-term acquisition.

Contradictions between theory and practice. For the purpose of the present study it is necessary to reveal three important contradictions between Krashen's theory and its practical implementations. I want to stress that I am not going to critique his theory. It has received a lot of criticism (Cummins, 1996; Gregg, 1984; Lewis, 1993; McLaughlin, 1986, 1992) and even vilification since the time of its first publication. I want to look at this theory from another perspective, that is, to reveal the contradictions between what was stated in the theory itself and its practical implementation in school life, particularly in ESOL content-based instruction which, I think, was somehow overshadowed in the research literature.

The first contradiction is as follows: Krashen's second/foreign language acquisition theory found its practical application in his Natural Approach of teaching and learning a second/foreign language, which Krashen himself defines as "direct

method rediscovered" (Krashen and Terrell, 1983, p. 17). Under this approach the use of native language is excluded from the classroom activities and teaching instruction. Strict oral-aural method is used at the beginning level of teaching English. Explicit grammar explanations are vehemently rejected, and consequently, translation as a powerful teaching-learning strategy is discarded. As clearly seen from its characteristics, the Natural Approach was originally designed to develop basic communication skills. It was not developed specifically to teach academic leaning skills. That is why its curriculum is organized around topics and situations related to the expression of basic personal oral and communication goals, for example, how to introduce oneself, how to greet a person, how to order food in a restaurant, how to make a doctor's appointment and so forth. Krashen writes in this respect, "we do not mean to imply that academic learning skills (the reading of literature, for example) are not important – they certainly are, but only that other methodologies , or modifications of the method presented here [in his book] may be called for" (Krashen and Terrell, 1983, p. 67).

In relation to this statement, I pose two questions: (1) Why do many teachers in the ESOL content-based classes of public high schools rely completely on Krashen's approach aiming at teaching basic communication skills when the goal of high school curriculum is to teach academic skills, primarily reading and writing? Teaching minority students academic reading and writing is especially urgent in view of high-stakes, HSA exams, which assess students' academic knowledge. (2) Why do many researchers whose interests are in the domain of content-based instruction in the second language (Crandall, 1987; Cummins, 1996; Echevarria et al., 2000; Ovando &

Collier, 1998; Rosenthal, 1996) often refer to Krashen's five hypotheses and his Natural Approach, when they talk about teaching content to ESOL students? This approach was not meant to teach how to read specialized texts (for example, science texts) or understand content concepts in a second/foreign language. Krashen points out that for these purposes, different methodologies should be used.

The second contradiction is that in his second/foreign language acquisition theory, Krashen postulates exclusion of the mother tongue at the beginning level of second/foreign language learning. He worries about its interference effects that put severe constraints on the learner, because the learner has to be constantly vigilant, functioning between L1 rules and L2 rules, which may not be the same. Krashen writes, "use of L1 rules requires constant vigilance on the part of the Monitor. It requires an immense amount of mental gymnastics that most people are not capable of" (Krashen & Terrell, 1983, p. 42). In practice, however, Krashen is known as a strong supporter of bilingual education (Krashen, 1991; Krashen, 1999; Krashen and Biber, 1987), and believes that native language is a shortcut to English literacy and that teaching subjects in the first language stimulates intellectual development. In the editorial of *USA Today*, we read:

> Teaching subject matter in the first language stimulates intellectual development and provides valuable knowledge that will help the child understand instruction when it is presented in English, which helps English-language development. (Krashen, 2006)

The third contradiction is that Krashen's theory of second/foreign language acquisition does not specify the difference between acquiring a second language and acquiring a foreign language. It explains the universal ways of acquisition of a non-native language. However, in practice there are two instructional approaches in

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schools for teaching the mainstream students who learn a foreign language, and for teaching the ESOL students who learn English as a second language. The mainstream students are taught with the native language support, and they use bilingual textbooks, while the ESOL students are taught without native language support and use monolingual textbooks, although both approaches theoretically draw on Krashen's second/foreign language acquisition theory.

These contradictions, which I discovered through reading research literature as well as working at my school, made me feel very dissatisfied as a professional and urged me to look for more sound and consistent theories in the field of second/foreign language acquisition. I wanted to better understand the logic of my practice and improve it by changing the ways language minority students were required to learn science in the ESOL content-based classes at the high school level in my school district. This motive led me to discover, or perhaps rediscover, Leontiev's ideas on foreign language acquisition on the basis of the Russian cultural-historical activity theory.

Leontiev's Speech Activity Theory

Who is Leontiev? Professor A. A. Leontiev was a renowned Russian psychologist who passed away in 2004. He published over 800 articles and books from the 1950s until his death. The majority of his works have not been translated into English. He is the son of A. N. Leontiev, a founder of the Russian activity theory and one of the closest collaborators with Vygotsky during 1920s. In this paper I will use the name Leontiev while referring to A. A. Leontiev. In his research work, Leontiev continued the traditions of both Vygotsky and his father while forging new

paths for foreign language learning, semiotics, psycholinguistics and education

(Robbins, 2003). As early as 1981, James Wertsch called him "the leading

psychologist in the USSR today" (Wertsch, 1981, p. 241). In this chapter I am going

to present a concise version of his speech activity theory on the basis of his book,

Psychology and the Language Learning Process (1981), and to discuss its possible

implications for the content-based second language instruction. Since Leontiev's

speech activity theory is based on the Russian cultural-historical activity theory,

which I use in my study as a theoretical framework and research method, I will

briefly touch upon the sources and the main tenets of this theory in the following

section.

CHAT as the basis of Leontiev's speech activity theory. Leontiev's speech

activity theory is based on the main tenets of the Russian cultural-historical activity

theory (CHAT), which was developed by a cohort of Russian psychologists and

psycholinguists such as Vygotsky, A. N. Leontiev, Luria, Rubenstein, Elkonin,

Zhinkin, Davydov, Zinchenko and others.

The philosophical foundations of this theory include the ideas of Hegel, Kant

and Spinoza, as well as the theory of dialectical materialism developed by Marx and

Engels. Initially the theory evolved from the work of Lev Vygotsky, as he formulated

a new method of studying thought and consciousness. Vygotsky (1962) argued that if

one is to take consciousness as a study, then the explanatory principle must be sought

in some other layer of reality. Vygotsky suggested that socially meaningful activity

may play this role and serve as a generator of consciousness. His first step toward

concretization of this principle was the suggestion that individual consciousness is

built from the outside through relations with others. As Kozulin comments,

"According to Vygotsky, human higher mental functions must be viewed as products

of mediated activity. The role of mediator is played by psychological tools and means

of interpersonal communication" (Kozulin, 1996, p. xxiii-xxiv).

Vygotsky's ideas about the mediation of consciousness were derived from

Marxist ideas about how tools or instruments mediate the labor activity. He extended

these ideas to include how psychological tools mediate thought.

> For Marx and Engels, labor is the basic form of human activity…. Their
> analysis stresses that in carrying out labor activity, humans do not simply
> transform nature: they themselves are also transformed in the process… The
> tools that are available at a particular stage in history reflect the level of labor
> activity. New types of instruments are needed to carry out the continually
> evolving new forms of labor activity. The other side of the dialectical coin is
> that each new level of tools or instruments gives rise to yet another round of
> ways of conceptualizing and acting on the world. [For Vygotsky] One of the
> main cornerstones of his psychology was the similarity between Marx's
> notion of how the tool or instrument mediates overt human labor activity and
> the semiotic notion of how sign systems mediate human social processing and
> thinking. In both cases the point is that instruments are not only used by
> humans to change the world but also transform and regulate humans in this
> process. (Wertsch, 1981, p.134-135)

After Vygotsky's death, his theory was extended by A. N. Leontiev (1974),

who added several features based on the need to separate individual action from

collective activity. On the whole, activity theory in Russia can be divided into three

phases up to the present: 1930s through 1950s, focusing on the activity as such; 1960

through 1979, with the focus on consciousness; and 1980 to the present, with a focus

on socially mediated learning.

According to Russian activity theory, it is impossible to approach the concept

of personality empirically and to define it by objective definitions of its individual

traits (usually by means of special tests). The basic element in defining man's

personality is the *social relationships* into which he enters, in which he is both the subject and the object. Man enters into these social relationships through his activity (Leontiev, 1981).

(a) Human activity is always *material* and *significant*. Humans do not simply "behave," nor do they simply perform abstract deeds; any of their actions constitutes at the same time an interaction with objects outside the self, and it can influence or alter them. There is no human who simply "acts"; there is the human, and there is that which he or she affects or influences. There is no abstract subject of activity; in activity there is always an object as well as a subject, and the character of the interaction arising between them depends no less, if not indeed more, on the object than on the subject. It is important to highlight that activity is not a mere process of "drinking in" some sort of external information. A necessary condition for cognition is active interaction with its objects, and only as a "ricochet" do we come back to the subject of the activity (Leontiev, 1981).

(b) Human activity is primarily *social* and embodies social relationships. It is never the activity of a given concrete individual, considered separately from society, and it only emerges as material and meaningful action rather than a mere manipulation of things when its social, objective necessity becomes manifest, and one shows the socially elaborated prerequisites necessary for that action. For example, when a bricklayer is building a house, he is not merely cementing bricks. The house is going to be used by people, by society. The sort of edifice he constructs and the way in which he cements the bricks is also determined by society, and society includes a special group of people, such as architects, engineers and builders, whose

working activity is to make models of future houses which will satisfy social needs as well as possible (Leontiev, 1981).

(c) Human activity has a *systematic* structure. First of all, it is characterized by motive and aim. Both are prescribed to humans by society, and both have a material character. The motives of an action as embodied in its aims can be very different. For instance, all school children can master a foreign language to a more or less similar degree of competence. Their aim will be the same, but the propulsive forces, the motives for their cognitive activity, are certainly not the same. For one child, the motive will be to get top marks in his examination and go on to an institution of higher education without sitting for entrance examinations; another will want to get the same top marks in order to impress his teachers and parents by being a "good boy," an "outstanding pupil." A third will want to prove to himself that he is no worse than the rest. A fourth will want to be able to read the literature of a given language in the original. So it may be stated that the activity becomes cognitive not only in view of its goal, but also on the strength of its motive. Psychologists call this occurrence "transition from motive to aim." Such activity, points out Leontiev, is particularly effective, since "any language teacher knows how important it is for the success of his teaching to make mastery [instead of the term "acquisition" Leontiev prefers to use the term "mastery"] of the language not a compliance with a tedious obligation, but the additional or even fundamental "intrinsic propulsive force" of the cognitive activity of the learners" (Leontiev, 1981, p. 16).

But the structure of activity cannot be reduced merely to the correlation between an aim (product) and a motive. Activities directed toward attaining one and

the same aim and impelled by the same motive can be organized in different ways.

Humans act in such a way as to attain their goals by the best possible means and

avoid unnecessary expenditure of time and energy. In order to do this, humans set a

consecutive series of intermediate aims; once one has been achieved, a person moves

on to the next one, retaining all along the sense of the general motive which is

guiding and directing his actions. These intermediate goals break up activity into an

aggregate of separate actions, which are also psychological units, but of a lower order

in relation to the overall activity, since they are always subordinate to it and defined

by it. A. N. Leontiev illustrates it with the following statement:

> A beater, for example, taking part in a primeval hunt was stimulated by a need
> for food or, perhaps, a need for clothing, which the skin of the dead animal
> would meet for him. At what, however, was his activity directly aimed? It
> may have been directed, for example, at frightening a herd of animals and
> sending them toward other hunters, hiding in an ambush. That, properly
> speaking, is what should be the result of the activity of this man. And the
> activity of this individual member of the hunt ends with that. The rest is
> completed by the other members. This result, i.e. the fighting of game, etc.,
> understandably does not in itself, and may not, lead to satisfaction of the
> beater's need for food, or the skin of the animal. What the processes of his
> activity were directed to did not, consequently, coincide with what stimulated
> them, i.e., did not coincide with a motive of his activity; the two are divided
> from one another in this instance. Processes, the object and the motive of
> which do not coincide with one another, we shall call "actions". We can say,
> for example, that the beater's activity is the hunt, and the frightening of the
> game his action. (A. N. Leontiev, 1981, p. 210)

An action, in its turn, may be also completed in very different ways,

depending on the concrete conditions and on the material situation in which it is being

carried out. Thus, we say that the activity may be correlated to motive, action to aim,

and operations to conditions:

> The correlation between activity, actions and operations is dynamic.
> Operations can at first be directed toward a conscious aim, i.e. actions; they
> then become automatic and vanish from man's consciousness. There is,

however another type of operation, which emerges as the result of unconscious adaptation and probing for the right way to act. On the other hand, an action may again become conscious if in carrying it out one comes up against difficulties. For example, a pupil may automatically write a word correctly; but if he has forgotten how to spell it, he will need to pause and try consciously to make use of the spelling rules he knows. (Leontiev, 1981, p. 18)

When we talk about the formation of any type of activity or, in other words, about how to teach it we always should bear in mind that "there always takes place an 'increase' of the units of psychological activity; what as a sequence of actions becomes one action, a chain of operations; and separate, independent activities become actions and merge into one simple activity" (Leontiev, 1981, p. 18).

Psychological aspects of foreign speech activity. According to Russian activity theory, speech is identical to any other psychological activity. It has a definite aim and is impelled by a motive, or more often by a system of motives which can be external or internal. External motives, points out Leontiev, are social not only in their provenance but also in the way they are carried through. For example, the teacher who asks his pupil a question on the lesson is at the same time shaping a motive or a series of motives for the pupil's subsequent utterance. The pupil, on the other hand, has his own motives (such as to look smart in the eyes of the teacher and of the whole class, etc.). However, more often than not, the motives impelling one to speech cannot be correlated exactly and exclusively with the speech; they are of a more general character, and speech turns out to be just one of the steps towards the satisfaction of the motive, toward the attainment of the final goal of the activity. "Thus, in real life man's speech usually has the status not of independent (speech)

activity, but of a *speech act* included in a non-verbal (or to be more precise, not exclusively verbal) activity" (Leontiev, 1981, p. 22).

This doesn't mean that speech cannot be an independent activity. It is such when a human has a specific motive which can be satisfied by speech itself, for example, when a pupil practices the pronunciation of foreign sounds or participates in a dialogue in a foreign language lesson. When Leontiev talks about psychological aspects of foreign speech activity he emphasizes two points:

> On the one hand, the pupil should learn how to convert this activity into a speech act, how to apply it to non-verbal tasks and make it a part of his non-verbal activities. In order to achieve this he must learn to form the new language automatically without any participation of the conscious mind, or at least with its minimum participation; he must learn to think about *what* to say, rather than *how* to say it. … On the other hand, the student must learn to establish, with the help of the new language, an independent *communication activity,* that is the activity the aim of which is not the immediate satisfaction of concrete practical objectives, but the setting up of contact and mutual understanding, the establishing of interaction with the other members of his social group (collective), the impact on the knowledge, skills, system of social values (convictions), or emotions of another individual or group. (Leontiev, 1981, pp. 22-23)

In the manner of its manifestation, when it is restricted exclusively to speech, communication activity is identical with pure speech activity, but its motive is totally different.

> By achieving, with the help of the foreign language, such communication activity, the student is not speaking for the sake of speaking, nor in order to say what he has been asked to say; he speaks for a different purpose, and his motive takes him beyond the limits of speech as such: his aim is now to structure speech in view of the needed effect. He says not only *what* he has to say, but also *as* it needs to be said in order to influence or to promote interaction. Naturally, in order to achieve this, he has to free the actual speech process from the participation of the consciousness, but here his task is more complex than in the first case. (Leontiev, 1981, pp. 22-23)

According to Leontiev (1981), when we teach a foreign language we are setting for the learners a series of psychological tasks. First, we initiate them to speech activity as such, that is, we teach them to construct speech utterances or organize chains of speech utterances. Second, we teach the use of the language for non-verbal purposes, that is, in the psychological sense we insert into the speech activity a different motivation and direct it to a different aim, we include it in a structure of non-verbal activity. In order to effect this transformation, we somehow have to turn speech activity into speech acts and render it automatic. At this level the learner needs to have fluent mastery of the structures of the verbal utterances or, to put it more accurately, the rules governing the structure of the utterances must be obliterated from the learner's conscious mind. They must no longer be discrete speech acts and discrete tasks resolved in the process of speaking, but only automatic operations. Third, we teach students to deploy their transformed speech acts at a new and higher level within the ambit of communication activity. In so doing, we set in front of the learner the task of producing not only linguistically correct speech, appropriate to the situation, but also of attaining the best possible utterances.

Stages of acquisition of foreign speech. Leontiev considers the acquisition [he uses the term "mastery"] of foreign speech as the sequence of work which the learner has to do. It has several stages. He writes:

> Clearly one cannot perform any speech activity in a foreign language without having the linguistic material for the construction of utterances, without some knowledge of vocabulary, grammar or phonetics. At this stage, however, one only needs to know them to the extent to which they are really indispensable for the speech activity. For this reason it is important when beginning the teaching of a new language to set a sort of "absolute minimum", to lay the foundation of the language, without which the teaching of any speech activity would be impossible. (Leontiev, 1981, p. 25)

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What is important for this stage is the consciousness of the learner that must be necessary involved in this process. When such foundation has been laid, we must build a "ground floor." It means that we must incorporate discrete speech acts in the new language speech activity in order subsequently to turn them into operations and then transform them into habits. At this stage we also must call on the conscious mind of the learner for help. Then we proceed to the "first floor," transforming the foreign speech activity into foreign speech acts. For this purpose it is necessary to alter the character of the task set before the student, change the motives and aims of his speech and place him in a situation where he will be compelled to use speech as a tool. Then it will be in order to add a "second floor" by progressing to a more complex situation and placing new demands on the learner's speech. Leontiev warns that this sequence is of a very general character, and merely indicates which "floors" would be unthinkable if the others have not been built. "In practice," he writes, "we always put the finishing touches to the lower floors while work on the upper floors is already under way; the mastering of vocabulary and grammar, for instance, continues in parallel to the formation of speech activity and its conversion into speech acts" (Leontiev, 1981, p. 25). Graphically, the sequence of work involved in the acquisition of foreign speech can be summarized in the following matrix (see Figure 3).

Leontiev also makes a remark concerning speech operations included in fully formed (automatic) speech acts. He thinks that they can be formed in the learner not only and not necessarily as the result of the conversion of previously conscious acts. As in the other forms of activity such operations may emerge in part as the result of unconscious probing, adaptation and correlation with some external standard. "There

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runs, parallel to the analytical path towards the acquisition of a foreign language, the

path of imitation; but the method of "pure" imitation without the participation of

conscious analysis is less fruitful" (Leontiev, 1981, p. 26).

Steps of language acquisition	Speech activity	Types of psychological operations
Second floor	Modification of speech acts (communication activity)	Automatic, unconscious operations
First floor	Modification of speech acts (non-verbal activity), speech as a tool, change of motives.	Automatic, unconscious operations
Ground floor	Discrete speech acts are turned into integral utterances	Conscious operations, mother tongue as a mediator
Foundation	Separate operations, "absolute minimum," some knowledge of phonetics, vocabulary and grammar	Conscious operations, mother tongue as a mediator

Figure 3. Steps of foreign/second language acquisition.

The structure of speech acts. In order to understand the mastering (or

acquisition) of a foreign language, one needs to know the operational structure of

speech acts. The study of speech acts is the field of psycholinguistics. For the purpose

of this literature review I will briefly touch upon two psycholinguistic terms, "inner

speech" and "inner programming," which Leontiev uses in his theoretical framework.

When a human begins speech, one doesn't begin immediately with the choice

and combinations of sounds, words and constructs. He needs to have a plan first:

> As in every purposive activity, there has to be a plan (or intention, or
> program) for any future utterance. Such a program is generally of a visual
> nature; the content of the utterance emerges as it were in the mind's eye of the

speaker in the form of a picture, schema, etc. This program is retained in the conscious mind (operative memory) until it is no longer necessary, i.e. until we have said what we wanted and passed on to the next utterance. The speech process consists in the translation of the program into a strict linguistic form, which in the mother tongue is a more or less automatic procedure…. In the early stages of mastering a foreign language, the transition from the program to the actual utterance is not achieved directly as "program $\Rightarrow$ utterance", but is effected through the mediation of the mother tongue, viz "program $\Rightarrow$ utterance in the mother tongue $\Rightarrow$ utterance in the foreign language".

Secondly, the translation itself is not automatic, and the learner will not immediately or without effort come up with the foreign equivalent to the utterance in the mother tongue, remember the rules and successfully apply them. (Leontiev, 1981, pp. 26-27)

Here a major role is attributed to the teacher, whose task is to "get rid of" the intermediate stage as quickly as possible and to bring the psychological structure of the utterance in the foreign language as close as possible to that which operates in the mother tongue (L1). This means that the teacher should expediently provide the student with a system of operations which will not only correspond to the real psychological structure of the speech act and will be easy to convert and put into effect but will also ensure maximum support from the habits for the construction of utterances in the mother tongue. "In this way," states Leontiev, "we can make the student's subsequent work much easier" (Leontiev, 1981, p. 27).

Leontiev distinguishes three different types of transition from operations in the mother tongue (L1) to those used in the foreign tongue (L2). The first type is simple transference of the operation to new linguistic material. The second is the sort of transference which requires corrections and clarification (for example, Spanish and English tense systems require some clarification). The third type is when the operation has to be formed from scratch (if we teach English to a Vietnamese student, he will have to form all the operations connected with the grammatical aspects of the

utterance). More detailed taxonomy of particular speech operations can be found in the research literature related to psycholinguistics.

Implications of Leontiev's speech activity theory (SAT) for content-based instruction. Leontiev's speech activity theory allows for the formulation of important methodological (instructional) principles for content-based instruction at the beginning level of ESOL classes. First, it enables teachers to look at a student as an active subject of the teaching-learning process. Contrary to Krashen's hypothesis of amorphous input, which assigns a student the role of a passive consumer of information that is meaningless (at the beginning stage) for the learner, Leontiev's speech activity theory puts the student from the very beginning in a position of an active, conscious participant of the language-learning process. The student is supposed to consciously construct his learning through a planned sequence of actions and operations with the help of a teacher as a mediator. Making the student both the subject and the object of the educational environment promotes his/her personal development and eventually leads to personal self-regulation and self-mastery. In the conditions of an ESOL classroom, active participation of student in learning process can be viewed as pedagogy of empowerment and social equality.

Second, speech activity theory theoretically justifies the use of mother tongue for instructional purposes (the concept of mother tongue as a mediator) at the beginning level of content-based instruction in junior high school. Within Vygotskian theory and method, it is assumed that the degree of success a student of a foreign language has in the L2 classroom is contingent on the student's mastery of grammar in the mother tongue. Vygotsky stated (quoted in Leontiev, 1973) that "The

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development of one's native language proceeds upward, whereas the development of a foreign language proceeds downward" (p. 19). When a student is at the beginning stage of mastering English (which Leontiev compares to a "foundation" and a "ground floor" of a house) reliance on mother tongue optimizes the process of second language learning. But at the same time Leontiev warns that:

> One of the major problems in using the L1 as the support grid (or transference model) for learning/acquisition an L2 is that neither the mother tongue, nor the L2 can be reduced to the simple accumulation of certain skills, and even more, of certain ready-made elements. (Leontiev, 1973, p. 20)

This means, according to Vygotsky and Leontiev, that both the L1 and L2 represent more than the sum of total of their parts. With this in mind, it is possible to creatively use native language for content-based instruction depending on the situation in the classroom: the number of students, their origin, levels of literacy, and other factors. One of the possible examples of native language support can be the creation of supplementary instructional materials (vocabulary lists, translation practice excerpts, grammar commentaries and lingua-contextual exercises) which could be organized into language modules that use different mother tongues. This type of scaffolding doesn't mean switching over to the bilingual education model, it just gives more opportunities and creative ways to enhance academic achievement of minority students at the high school level, where usually they lack enough time to catch up with mainstream native speakers. According to Cummins (1981, 1996), Collier (1987, 1989, 1992) and other researchers, it usually takes more than five years for minority students to attain a level of academic proficiency.

Third, speech activity theory considers grammar as an indispensable tool in the process of concept formation (Leontiev, 1968; Vygotsky, 1962, 1978). Unlike Krashen's view that grammar is of minor importance in teaching and learning a foreign language, Leontiev and Vygotsky attribute to grammar one of the most important roles in concept formation in a foreign language. One of the problems in learning content English is that it requires understanding of scientific concepts. This implies a focus on intellectual, formalized ideas; however, the mother tongue is acquired via spontaneous concepts, or every-day, experientially based learning. For Vygotsky, successful education results from the convergence of the top-down approach (scientific concepts) with the bottom-up approach (spontaneous concepts), whose constant dialectical cross-referencing occurs. At this juncture, grammar serves, metaphorically speaking, as the contact point or bridge (Robbins, 2003). Grammar is an area acquired via spontaneous concepts, yet must be enhanced via scientific concepts if intellectual maturing and mastering are to be reached. Cummins (1996) replicates Vygotsky's ideas with his context-embedded/context-reduced continua, yet he nowhere stresses the importance of grammar for acquiring cognitively demanding skills. Instead, he puts more emphasis on the use of visuals, manipulatives, prior knowledge of students and cooperative learning as the major accelerators of this process. From my professional experience I can say that these suggestions very often don't work in practice (low science scores confirm it), and today there is a discrepancy between the goals of content-based courses (science) and how the actual teaching is being implemented at the beginning level of ESOL programs in junior high school. While the goals call for the mode of scientific, conceptually based

learning, teaching instruction often doesn't go beyond spontaneous, everyday, experiential learning. It happens because teaching science requires the use of abstract language, but students being taught by the direct method are unable to understand what the teacher is talking about. That is why teachers are destined not to go beyond everyday talk. Additionally the ESOL teacher very often doesn't have an opportunity to appeal to students' prior knowledge because very often they don't have prior schooling. As for visuals, from my professional experience, I can say that their role in content teaching for beginning learners is exaggerated, because as Leontiev rightly points out, quoting Belyaev, "the showing of an object does not give the student the possibility of working out the appropriate concept, since he has no way of telling which other objects may be denoted by that same word and which may not" (Leontiev, 1981, p. 134). For this reason, it may be argued that recourse to visual semantization alone, without referring concurrent translation, as advocated by Cummins and other researchers, is not quite legitimate. "It is pointless to provide pictures which are not immediately perceived by learners as visual equivalents of the corresponding concepts" (Leontiev, 1981, p. 134). In this case translation of basic terms and concepts into the mother tongue can be a helpful clue in teaching and learning science content.

Fourth, speech activity theory requires creating task-setting exercises which enable both students and teachers to move beyond this spontaneous, everyday, experiential learning. Such exercises teach students to choose the speech strategy best suited for a given situation. Since speech activity always aims at solving a particular communicative problem, these exercises are not supposed to train students to do

multiple fill-in-and-match manipulations but to develop in them "communicative

skills which have to be flexible, easy transferable, capable of external and internal

variations" (Leontiev, 1981, p. 98). The call for creating and using task-setting

exercises echoes Cummins's idea of context-embedded/context-reduced support

(Cummins, 1996, p. 56), which I transformed into the following matrix (see Figure 4).

A quadrant (cognitively undemanding, context-embedded) Casual conversation about: Every day plans and events TV programs Sports Pop stars	C quadrant (cognitively undemanding, context-reduced) Drills and mechanical exercises Copying Taking notes from the board Filling in worksheets Doing "comprehension" exercises Giving rote-learned answers
B quadrant (cognitively demanding, context-embedded) Talking or writing within the context of structured exercises and activities that require genuine communication Class discussions using question/answer format Translation practice Cooperative learning	D quadrant (cognitively demanding, context-reduced) Writing answers on SATs Working on and presenting projects

Figure 4. Matrix of communicative tasks and activities.

Note. Adapted from *Negotiating Identities: Education for Empowerment in a Diverse Society* (p. 57), by Jim Cummins, 1996, California: California Association for Bilingual Education. Copyright 1996 by the California Association of Bilingual Education.

According to Cummins, the progression of academic skills should go from quadrant A (context-embedded, cognitively undemanding) to quadrant B (context-embedded, cognitively demanding) and then to quadrant D (context-reduced, cognitively demanding). Quadrant C tasks (context-reduced, cognitively undemanding) usually fail, Cummins believes, to supply either cognitive challenge or "learner friendly" language, and, consequently, are not useful for promoting academic language acquisition.

Fifth, speech activity theory looks at the language learning process as hard work. Because, according to Vygotsky and Leontiev, conceptual processing takes place first on the social plane before being internalized, techniques and assimilation are necessary:

> The successful process of internalization of an L2 is long and arduous and is ultimately a result of what Vygotskian terminology refers to as catharsis. In other words, the road to proficiency and fluency is filled with tension and anxiety at levels beyond the beginning stage, rather than focusing on fun and spontaneous conceptualization. Students will be aware of the fact that at some point the cathartic experience or the so-called magic moment, is experience within an atmosphere where the tension level is simply transcended (i.e., the cathartic moment), and the learner can deal with the ambiguity needed in becoming proficient in the L2. The entire approach leading to the point of catharsis might be labeled the "principle of maximum frustration." (Robbins, 2003, pp. 89-90)

This approach has far reaching implications. According to Vygotsky, through the mediation of

> psychological tools and signs there will be an understanding and implementation of not only learning a new language, but of actual empowerment to mediate one's personal and social environment, with the ultimate goal of mediating one's actions, using the process of object-regulation, other-regulation and ultimately self-regulation. (Robbins, 2003, p. 90)

Orienting students to hard work while learning a second/foreign language contradicts Krashen's slogan that "language acquisition is effortless" and that, "it involves no energy and no work" (Krashen, 2003, p. 4). As a result of the dominance of Krashen's theory, the language teaching methodology in the classrooms calls for the lessening of frustration as a goal. This approach contributes to the false assumption that high academic achievement can be attained without hard work, thus preventing minority students from actual realizing what it means to be an educated citizen.

Sixth, the psychological structure of foreign speech activity, outlined by Leontiev, enables one to look at content teaching from a psycholinguistic perspective, which has never been done before in the ESOL content-based courses. Learning content by a student corresponds psychologically to a stage of foreign language acquisition when a student has already mastered some minimum of second language competence (phonetics, vocabulary and grammar) and now is ready to move to a communicative level, where it is necessary to transform some of his conscious operations into speech acts of non-verbal activity, which are done unconsciously. In other words, he is moving from the level where he thinks about *what* to say to the level where he says not only *what* he has to say, but also *as* it needs to be said in order to promote communication. At this level, students function within *pseudoconcepts* (a term coined by Vygotsky) and functional equivalents, since their level of mastering L2 doesn't yet allow them to function on a purely communicative level of mainstream science classes. This means that at this level, students begin to formulate quasi-concepts as part of a broader activity, which is comprised of earlier

mastered and internalized actions and operations. Applying psycholinguistic principles of speech activity theory to content learning makes it possible to discriminate between stages of content learning and stages of language learning, which is impossible to do relying on Krashen input hypothesis. Using Leontiev's metaphor in which he compares learning a language with building a house consisting of several floors, it seems adequate to correlate content learning with the first floor (see Figure 3). This floor corresponds to the intermediate level of ESOL students. For this reason, content-based courses are usually taught to ESOL students when they reach the intermediate level of English proficiency. In the adjunct ESOL sheltered science content model which I suggest, content and language are supposed to be learned simultaneously at the beginning level of the ESOL content-and-language class on condition that native language support tend to be used as a scaffolding and optimization strategy.

The Need for a New Type of Content-Based Instruction

   Field studies related to ESOL content-based instruction. Contradictions which I revealed between Krashen's theory and its practical implementation (see discussion on p. 20) have their worst effect on the content-based (or sheltered) instruction for the minority students, because the oral-aural method is not efficient and even detrimental in the situation where an abstract, de-contextualized foreign language should be mastered. Research is needed to understand what other ESOL science content teaching models could be effective at the high school level.

   The research literature related to the content-based instruction provides strong evidence justifying the necessity to try some new, non-traditional approaches towards

teaching content courses and content science in particular. Because scientific and mathematical skills and knowledge acquired through L1 are transferred across languages, many researchers (Collier, 1989, 1992; Cummins,1996; Diaz & Klinger, 1991; Garcia, 1993; Genesee, 1987, 1994; Hakuta, 1986; McLaughlin, 1992; Snow, 1990; Wong Fillmore & Valadez, 1986) believe that instruction in such subjects with the use of native language support is an efficient and culturally appropriate way of developing math and science literacy for language minority students while they are learning English.

The following three studies provide evidence of the effectiveness of L1 instruction for math and science. Students in bilingual education programs in Fremont and San Diego, California, outperformed a control group of students of the same socioeconomic status who were not in bilingual programs in the math portion of the California Test of Basic Skills in grades three through six (Krashen & Biber, 1987). Ramirez (1992) likewise found in his research that primary language support through bilingual instruction enhanced mathematical achievement. In a study of alternative instructional programs such as newcomer centers, sheltered English programs, and content ESOL programs, researchers also found use of L1 to be one of the important factors for content development in subject areas such as math and science (Tikunoff, Ward, von Broekhuizen, D., Ramero, M., Castaneda, L. V., Lucas, T., & Katz, A., 1991).

Although there is strong evidence supporting the use of L1 for instruction in science and math, there are a number of researchers who hold the view that comprehended input in the target language is a sufficient condition for acquiring

productive skills in the second language. According to some data (De Avila, 1983; Ho, 1982; Milk, 1985) ESOL students can develop science concepts as readily as mainstream students while they acquire English proficiency, provided certain conditions are met. For example, Ho (1982) conducted a study of the relationship between physics achievement and the language of instruction with 10th graders in Hong Kong. Chinese students who were taught physics in English, their second language, by a native speaker of English learned the content of physics as well as peers who were instructed in Chinese, their native language. The study concluded that achievement in physics was not impeded by using a second language as a medium of instruction. In a case study of the acquisition of ESOL by a native speaker of Gujarati, Kessler and Quinn (1984) also provided evidence of substantial English-language development in the context of a physical science course. However, in recent longitudinal studies conducted in Hong Kong (Yip, Din Yan et al., 2003), it was found that Chinese students learning science through a second language performed much more poorly on a science achievement text then their Chinese-medium peers. They were particularly weak in problems that assess understanding of abstract concepts, in the ability to discriminate between scientific terms and in the ability to apply scientific knowledge in novel or realistic situations. The researchers concluded that the English-medium students were handicapped in science by their low levels of English proficiency, and learning English as a subject through the primary years is not sufficient to prepare them for a full English immersion program in secondary school.

ESOL content-based instruction at the high school level. Content-based instruction (within English-only instructional models) is implemented today at the high school level by means of two instructional approaches (Brisk, 1998). Under the first approach, which is also called the sheltered model, the subject matter teacher presents content at the cognitive level of the students but matches communication strategies to the students' language level. In other words, the content teacher modifies instruction, making the information comprehensible to the students. This model is usually applied to teach ESOL students at the intermediate level of English proficiency.

Under the second approach, known as the theme-based model (Brinton, Snow, & Wesche, 1989), or CALLA model (Chamot & O'Malley, 1986, 1994), the ESOL teacher integrates language instruction with content. In other words, the language teacher uses the language as the medium of learning rather than the only focus of learning. In this model, students develop language skills and functions using the content of the subject matter rather than the content of every day situations, or so-called survival English. This model is usually applied to teach ESOL students at the lower levels of English proficiency.

Although in theory the two models are strictly delineated, in the practice of schools it becomes difficult to classify to what model the course a particular teacher is teaching belongs. For example, observation of many schools throughout the country led Echevarria et al. (2000) to the conclusion that a sheltered instruction classroom even in the same school

> doesn't look like the next in terms of the teacher's instructional language; the tasks the students have to accomplish; the degree of interaction that occurs

between teacher and student, student and student, and the student and text; the amount of class time devoted to language development issues versus assessing content knowledge; the learning strategies taught to and used by the students; the availability of appropriate materials; and more. (Echevarria et al., 2000, p. 10)

The lack of consistency across ESOL content teaching and sheltered instruction is somewhat predictable, researchers think, because sheltered curricula for all content areas are few in number and, even if they exist, they vary from school district to school district. Another reason that contributes to such situations is that there are very few commercially available instructional and pedagogical resources for content-based courses. Most of the literature on ESOL content-based instruction has focused basically on identifying a wide variety of instructional strategies and techniques that teachers might use to make content comprehensible. Teachers have been encouraged to pick and choose those techniques they enjoy or believe work best with their students, but very few teachers are specifically prepared to be ESOL content-based instruction teachers through undergraduate or graduate work. As a consequence, teachers do not have sufficient preparation at colleges and universities to implement sheltered instruction effectively. Through in-service workshops, school districts try to address sheltered instruction techniques on occasion, but the common, traditional models of teacher training – one-shot or short-term workshops or conferences – have been shown to be ineffective (August & Hakuta, 1997; Berman, Minicucci, Nelson, & Woodworth, 1995; Echevarria et al., 2000; Kaufman, Burlart, Crandall, & Short, 1994; Sheppard, 1995; Short, 1998).

The adjunct model as a possible way out. For the efficient implementation of content-based ESOL instruction, I suggest, first, that researchers focus separately

on elementary and secondary school level objectives, which has not been done so far.
The ESOL elementary students and high school students differ significantly in terms
of needs, interests, background knowledge and mechanisms of second language
acquisition. For example, a recent study (Slater, 2004) conducted in Canada
compared science discourse practices in primary and high school grades in four
settings. It was found that the teachers in the four contexts differed in their
approaches to teaching, with the primary school mainstream teacher focusing largely
on the hands-on principle, the primary ESOL teacher moving from practice to theory,
the high school mainstream teacher moving from theory to practice and the high
school ESOL teacher relying primarily on theory. I think it would be more
methodologically correct to have separate guidelines for primary and high school
content instruction levels. For example, teaching my ESOL science content course, I
also relied primarily on scientific explanations rather than hands-on activities.

Second, I suggest creating a modified version of content-based instruction
(within the ESOL program model) at the beginning level of high school that
combines some of the features of the already existing models and adds some new
ones. One example would be a model that permits restricted use of L1support in the
form of supplementary instructional materials. The possibility of creating an adjunct
content-based instructional model was outlined by Brinton et al. (1989), who
considered it to be a third variation combining features of the theme-based model and
sheltered model. "A modified model," they comment,

> might combine features of sheltered and adjunct programs or of theme based
> and sheltered programs. For example, as a supplement to a sheltered content
> course a language model might be attached. However, this language module
> would differ from a full-blown adjunct in that the language component of the

modified adjunct would exist specifically to aid students in their content course needs and would not have any independent language objectives. (Brinton et al., 1989, p. 23)

In my study I attempted to show how I implemented in practice on the local level the idea of creating the ESOL adjunct model of content-based instruction at the beginning level of high school with native language support.

Developing and adapting materials for content-based instruction. As was stated by Echevarria et al (2000), there are basically three reasons that contribute to the inadequate situation in ESOL content teaching. The first is the lack of quality curricula for content areas. The second is the scarcity of commercially available instructional and pedagogical resources for content-based courses, and the third is insufficient preparation of teachers at colleges and universities to implement content-based instruction efficiently. Since I am unable to improve curricula or preparation of teachers, because of my work situation, it has come naturally to me to start developing supplementary instructional materials for teaching my content-based course.

Many researchers and educators indicate among the strategies that facilitate content learning such variables as adapting materials and using materials in L1 (Brisk, 1998; Collier, 1998; Crandall, 1987; Crandall & Kaufman, 2003; Kessler & Quinn, 1985; Rosenthal, 1996; Brinton et al.,1989). Yet most of them do not go beyond general statements and recommendations which can be found in much of the educational literature. They primarily focus on meta-strategies that teachers use in this process. For example, Madsen and Bowen (1978) indicate that teachers may (1) individualize materials so that they more closely correspond to the needs and types of

students enrolled in a given language class; (2) they may fill in gaps to compensate for deficiencies in the materials by creating additional exercises that extend from the text and expand upon it; and (3) they may modify existing materials for purposes which were not intended by the author(s).

Candling and Breen (1979) suggest a definition of the development and adaptation of materials as a "before the event" phenomenon and as a "during the event" phenomenon. As the "before the event", they [materials] serve as the driving force of the teaching and learning which occur in the language classroom. As the "during the event", when they [materials] emerge from teaching and learning, "as ongoing achievements of the process," and as a "resource created by … [the teaching-learning] process" (Candlin and Breen, 1979, p. 95), the development and adaptation of materials, researchers think, characterizes content-based language teaching. However, they caution, that "adaptation is and will remain an art. We cannot here offer a mechanical procedure for accomplishing it" (Steivick, 1972, p. 95).

A non-traditional perspective on developing and adapting materials is expressed by Michael Lewis (Lewis, 1993) when he suggests that we reconsider the role the learner's L1 should play in the classroom. Talking about the importance of translation and interference in the context of a lexical view of language, and speculating on the reasons why grammar-translation methodology became a taboo in educational circles, he gives, along with some well-known reasons, some very bold and original ones. He writes:

> It is worth a brief digression to see quite why translation has had such a bad name for the last 30 years. Two powerful forces have worked against it. Much of the innovation during that period in both materials and methods has come from Britain and the United States. Native speaker teachers (NSTs) and

materials perceived as linguistically reliable have had high status, and have been supported by powerful financial interests. The publishers prefer global to country-specific textbooks; NSTs often work in polyglot private schools with multi-lingual classes where translation would be impractical or impossible even if it were desirable. These powerful factors mean translation had to be condemned – but for commercial rather than theoretical or pedagogical reasons. It is a surprise that so many non-native teachers (non NSTs) have been persuaded so easily to undervalue their own abilities, and discard a classroom technique of great potential value. (Lewis, 1993, p. 61)

Connelly and Clandinin (1988) also hold the view that official curriculum developers and implementers exercise too much power in curriculum materials development, overlooking the experience of teachers and students and very often even dismissing this experience. Researchers suggest shifting "the curriculum emphasis from the prescription of outside developers, policy makers, academies, and others to the decision of teachers" (p. 147). Instead of looking at the teacher as "someone else's servant" they encourage the teacher to play a leading role in exploring "curriculum potential."

"Curriculum potential" here refers to the notion that curriculum materials are more than just the embodiment of their developers' intentions. It is not only what may be "read out of" curriculum materials, as implementers would insist, but also what may be "read into" them. Researchers claim that teachers using materials in their classrooms may uncover different uses and learning outcomes not intended by developers. "And just as any text," they write,

> may be read in different ways by the same person, it is possible that any one teacher will discover and create a variety of potentials in the text depending on his or her particular curriculum situation, the students, the community, and so forth. (Connelly and Clandinin, 1988, p. 151)

New Reform Oriented Program → CHOICE → Act on Curriculum Potential of Materials ⇄ Teacher Inquiry / Action Research ⇄ Teacher Adapts Program to his/her intentions for a class (May not coincide with developer intentions)

Implement Program with Workshops, PA days, etc.

Teacher uses program the way developer and implementer intend
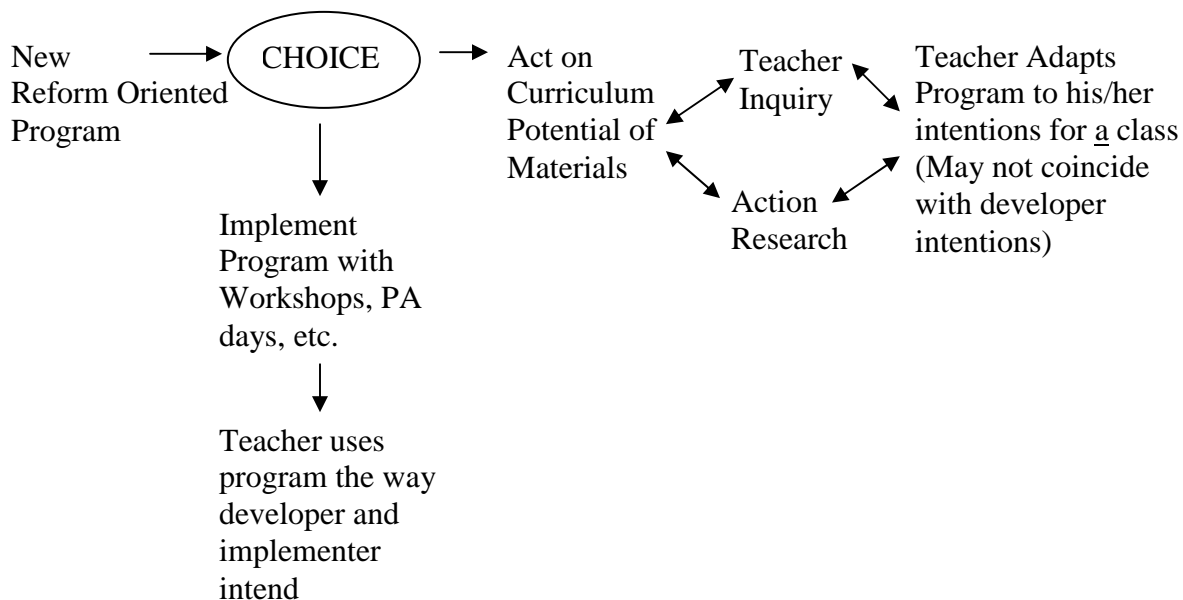
Figure 5. Choice on what to do with a new program.

Exploring curriculum potential is inevitable, researchers think, when a school is implementing a new program or a course. However, there are two choices which teachers or administrators might make in implementing it (see diagram in Figure 5).

The first option is to implement the program as it is, taking everything, including the curriculum, the textbooks, and the instructional materials, for granted. The second option is to act on curriculum potential, which is realized by means of teacher inquiry or action research. Although I agree with how the authors present the

dilemma, in which teacher and administrators face the challenges of the new program (or the course), I do not share their view on curriculum inquiry, which they define as "a process in which teachers read and study curriculum materials in the same way as they would read and study potentially interesting texts" (Connelly and Clandinin, 1088, p. 151).

In my study I propose to go further, not only trying to find or recover a new meaning in curriculum materials, but to create my own materials and implement them. For this reason, in the next section of my dissertation I describe how I understand teacher inquiry and action research.

Action Research as Curriculum Inquiry

Principles and aspects of action research. Action research may be defined "as a family of research methodologies with dual aims of action (that is, change) and research (that is, understanding)" (Dick, 1999, p. 2). According to its features, action research may be described as participative, qualitative, cyclic, emergent, responsive, flexible, educational, and political.

In most of its forms action research is participative, though writers differ on how participative it is. The range of participation may vary from minimal to substantial. In some instances participation may be limited to being involved only as an informant. On other occasions there may be a genuine partnership between researcher and others. In other cases the researcher may choose for whatever reasons to maintain a separate role. As points out Dick (1999), eventually the level of participation depends on a design choice. However, "the greater the involvement of participants, the greater their likely commitment to whatever action is planned"

(Dick, 1999, p. 4). When participants are involved as co-researchers the advantages can become greatest. "Participants are then still informants, but can also become interpreters and research designers. The discussion between different participants, and between participant and researchers, can offer a dialectic. This can challenge weak or inconsistent data or interpretations" (Dick, 1999, p. 5). For the purposes of my research, I was a participant as I played the dual roles of teacher/researcher. My students were also participants in my study; however, they did not participate directly in the research design or analysis.

Another characteristic of action research is that it is usually qualitative. Some action research may be a mix of qualitative and quantitative. As a qualitative methodology, action research focuses on the themes which emerge from more than one participant. An action researcher tries to understand if there is agreement about the nature or the interpretation of a theme. If there is agreement about the nature or interpretation of a theme the researcher tests and challenges this agreement in later data collection looking for exceptions. If there is disagreement about the nature or interpretation of a theme, the researcher tries to look for explanations for the disagreement in the next cycle of data collection. The purpose of generating agreement and understanding is to inform the action which follows. Action alternates with critical reflection. By doing this, action research achieves two aims continuously, that is, action and research. "Reflection after the event," writes Dick, "draws lessons from the action and its consequences. What worked? What didn't work? In the light of what worked and what didn't, which of our assumptions about action were correct? What do we now understand? How will we now act?" (Dick,

1999, p. 6). According to Dick (1999), the "What?" questions usually produce the action plan, while the "Why?" questions surface the assumptions on which the action plan was based. "More aware of their assumptions, people are then better able to pay attention during action to what they are doing and with what consequences. After the event their critical reflection is often richer, and their planning for the next step is more assured" (Dick, 1999, p. 7). Using the cyclic format of planning, acting, reflecting, and again planning it is possible to set up an action research process in such a way that both planned actions and assumptions are tested immediately in action.

Action research has emergent methodology. This means that method, data, interpretation, and action develop simultaneously, and from cycle to cycle. The cycles may proceed one after another, or be within cycles, within cycles, and within cycles.

Because action research relates to learning and learning relates to education and growth, it is regarded as a form of educational research. As a form of educational research, action research involves issues of politics because it is always socially embedded and "done by real people with intent of illuminating, explaining and improving human interaction in educational setting" (McNiff & Whitehead, 2002, pp. 16-17).

Action research is responsive and flexible. Since it is driven by the data, by the situation, and by the people, it is possible to respond to the emergent situation and refine interpretations as they proceed. It is also possible to improve methodology while the researcher is being informed by the growing understanding. According to

Dick (2000), good action research eventually is research where, among other features, appropriate choices are made.

A**ction research as self-reflecting inquiry.** I define my research as self-reflective inquiry or action research self-study. I was guided by the teachings of McNiff and Whitehead (2002), who define this type of action research as follows:

> Action research is a name given to a particular way of researching your own learning. It is a practical way of looking at your practice in order to check whether it is as you feel it should be. If you feel that your practice is satisfactory you will be able to explain how and why you believe this is the case; you will be able to produce evidence to support your claims. If you feel that your practice needs attention in some way you will be able to take action to improve it, and then produce evidence to show in what way the practice has improved. (McNiff & Whitehead, 2002, p. 15)

The definition of action research as a particular way of researching one's own learning involves one's own thinking and analysis of what one is doing. For this reason it can be called a kind of self-reflective practice. The idea of self-reflection here is central. In traditional (empirical) forms of research, researchers do research on other people. In self-reflective action research, researchers do research on themselves in company with other people who act as research participants.

Since the idea of teacher learning is critical for the understanding of action research as self-study, below I provide the definition of learning given by the same authors. They define it as

> a process of investigating what is already in the mind and bringing that to consciousness for critical examination through a process of critical discernment, and then developing and refining the knowledge in company with others. The development and refining processes are undertaking within practice: by examining practice and checking that it is a living-out of the values as part of the I-believe system of the knower, a knower is able to modify their practice so that it does become a living-out of values. (McNiff & Whitehead, 2002, p. 66)

According to McNiff and Whitehead (2002), at the moment, three distinct developmental trends are visible in the literature of action research: an interpretative, a critical theoretical, and a living theory approach. Interpretative and critical theoretical approaches mostly work at the levels of observation and description. While they also offer explanations for practice, these explanations are offered within sets of propositional relationships. These approaches work from a behaviorist orientation, in which an external researcher offers accounts of other people's actions. In a living theory approach, or self-study approach, researchers accept responsibility for accounting for their own practice, and, in work context, accounting for their own professionalism. In this case, practice becomes a form of action research which involves data gathering, reflection on the action as it is presented through the data, generating evidence from the data, and making warrantable claims based on conclusions drawn from validated evidence. When it comes to producing reports, researchers do them as professional narratives where they offer not only descriptions and activities lists, but also explanations for the activities they used in terms of the researcher's values, intentions, and purposes for doing the research. In these narratives, or formative reports, they need to show that the work did impact others beneficially. They also may show how they themselves experienced their own transformative process.

Second language teaching and action research. As I proceeded with my dissertation, it became evident that the practitioner action research is not a popular form of inquiry in the United States compared to Great Britain (Carr & Kemmis, 1986; Elliott, 1978, 1981; McKernan, 1991), Ireland (McNiff & Whitehead 2002) or

Australia (Burns, 1999). In the American ESOL community it is just beginning to grow. But even in the countries where action research has been productive in the ESOL field, researchers know little about how second language teachers view and carry out action research, what kinds of support structures or information are needed as they conduct research simultaneously with their regular class activities, or what conditions promote or hinder the doing of action research. As Burns points out (1999), although in the nineties numerous publications on classroom-based and teacher-initiated research and reflection appeared, few of these publications have focused specifically on action research as it is practiced and perceived by teachers and researchers working together to conduct it. She also emphasizes that much of the literature on action research in second language teaching aims at discussing action research as a collaborative process, without providing clear distinction between collaborative and individual forms of action research. This leads to a situation in which there are few discussions on how action researchers can link their investigative work to that of other colleagues so that the collaborative process can make an impact upon whole-school changes and priorities.

Models of action research. At present there are several linguistic and visual action research models in the action research literature that try to structure knowledge in order to communicate ideas about practice or to give an account of the logic of practice. The authors of the most influential models are Kemmis and McTaggart (1988), Ebbut (1985), Elliot (1991), McKernan (1991), McNiff and Whitehead (2002). All of these models are based on the theory of action research developed by

Lewin (1946), which later came to be understood as an action-reflection cycle of planning, acting, observing and reflecting.

These models can be considered as research constructs which were designed by their authors to fulfill a particular research goal. For this reason, none of them is perfect. Some of their drawbacks are their prescriptiveness, ignoring of the values base of practice, and their sociological rather than educational perspective (McNiff &Whitehead, 2002). What I consider to be their main drawback, however, is that these models are built on practice and developed from practice taken as a separate segment of human activity. In other words, the authors of these models view practice solely in a work context. These models are not backed by a solid theory that explains what human activity actually is in itself, what components it is made of, how human activity can be structured from psychological and philosophical perspectives. But such a theory exists. It is the Russian cultural-historical activity theory, and there are models of action research that try to structure the logic of practice using its tenets. Two such models are designed by Engeström (1987, 2000). They are a model of human activity system and a model of expansive learning, which I use in my action research study as research constructs. I describe them in the Methodology chapter.

Conclusion

This chapter's review of the literature aimed at providing theoretical rationale for the four propositions that I am defending in this dissertation as I developed a new model for content-based instruction.

The first argument is as follows: The majority of researchers agree that there is a common underlying language proficiency that leads to a transfer of reading and

writing skills from L1 to L2. For this reason teaching science content to beginning

learners of English at the high school level using native language support is quite

legitimate and beneficial for students. This argument is supported by the section of

this literature review entitled "Native Language and Second Language Acquisition

Theories".

The second argument is that learning a second language, especially in a

content-based class of high school, cannot be viewed as a painless and effortless

endeavor. It requires from learner to pass trough several stages of second/foreign

language acquisition applying conscious learning strategies and performing various

language exercises with the guidance of a teacher, as a mediator of teaching-learning

activity. This argument is supported by the section of this literature review entitled

"Leontiev's Speech Activity Theory (SAT)".

The third argument is that ESOL sheltered science content instruction at the

high school level needs clearer definition in terms of goals, curricula, and

instructional materials to be used. Locally designed adjunct instructional models are a

possible solution for meeting the needs of ESOL students in content areas. This

argument is supported by the section of this literature review entitled "The Need for a

New Type of Content-Based Instruction".

The fourth argument is that teachers are able to conduct curriculum inquiries

in the form of action research in order to defend their vision on the development of

curriculum materials and on the implementation of a new course in general. This

argument is supported by the section of this literature review entitled "Action

Research as a Curriculum Inquiry".

These arguments implicitly relate to my overarching research question: How can I, as an ESOL teacher, effectively use native language support in a particular high school freshmen ESOL science content class in order to help students master both content and language?

The relationship is seen if I segment the question into four research areas or topics.

- Why do I need native language support in my sheltered ESOL content-based class?

  This topic relates to the first argument.

- How can I, as an ESOL teacher, effectively use native language support?

  This topic relates to the second argument.

- Why am I not satisfied with the existing models of ESOL sheltered courses?

  This topic relates to the third argument.

- Can I, as an ESOL teacher, express my own view on how to implement content-based instruction?

  This topic relates to the fourth argument.

Chapter III: Methodology

*Contrary to what I thought … action research
does not refer to a methodology that leads to
harmonious thought and action but to a problematic
practice of coming to know through struggle.*
McNiff & Whitehead (2002, p. 3)

Introduction

In this chapter I give a brief account of the Russian cultural-historical activity theory which guided my methodology. I further describe how my action research design was implemented on the basis of the model of expansive learning (Engeström, 2000) as one of the interpretations of the cultural-historical activity theory. I explain why I found it necessary to distinguish two phases in my research inquiry. I further demonstrate how I use the model of human activity system (Engeström, 1987, 2000) as a research instrument to uncover the anatomy of my actions as successive, momentary segments of the teaching/learning activity and as a method of data collection. Finally, I provide the classification of methods used in the study and describe the research site and participants.

CHAT as Theoretical Framework

Following the logic of my study, which evolved as developmental self-reflective inquiry with elements of case study, and relying on my personal professional heritage, I have chosen the self-reflective action research design for my study, which uses the Russian cultural-historical activity theory as its theoretical framework.

In the United States the Russian cultural-historical theory, or its recontextualized version, is known under the name of socio-cultural theory (Lantoff

& Pavlenko, 1995). Developed by Vygotsky et al., the cultural-historical activity theory is not a theory in its usual sense but rather a theory and a method at the same time, which is used to explore human activity. Activity is understood as an interaction between the subject and the object (the object may include not only physical objects but goals and objectives), mediated by physical or symbolic tools such as language, sign systems, diagrams, algebraic symbols and so forth (also called cultural artifacts). The basic unit of analysis in the activity theory is the activity itself, which is understood as a developmental process driven by a certain motive, experienced by the participants of the activity and unfolding in real time. This process is composed of actions and operations and has a cyclic nature. Actions are conscious, and different actions may be undertaken to meet the same goal. Actions are implemented through automatic operations. Operations do not have their own goals; rather, they provide an adjustment of actions to current situations. This hierarchical conception of activity can be diagramed as follows: activity-motives, actions-goals, operations-conditions.

The cyclic nature of the activity manifests itself through the repetition of internal and external phases of the activity. Internalization provides a means for people to try potential interactions with reality without performing actual manipulation with real objects. It is done with the help of mental simulations, imaginings, considering alternative plans and so forth. Externalization is the transformation of internal activities into external ones with some "repairs" or improvements done to the internal action (Kaptelinin and Nardi, 1997). In other words, it means that activity proceeds in a spiral mode. When one cycle of the activity is finished, the second cycle starts, but on a different level, adding new

features and parameters to the activity while still retaining some characteristics of the activity of the previous level. The crucial point here is that external and internal are fused and united and are treated separately only for the purpose of analysis of the activity.

"Cultural" in the theory's name means that human activity is a social process and as such cannot be separated from cultural processes going on in a certain society; what is more, it shapes these processes. "Historic" means that activity as development is happening within a certain period of time and hence is historic by definition.

Using cultural-historic activity theory as a method of study allows researchers to carry on scientific inquiry not as a traditional laboratory experiment, which tests the hypothesis using the five steps of the scientific method proceeding in chronological order, but as a formative experiment which explores multidimensional human activity where active participation is combined with monitoring of the developmental changes of the study participants (Engeström, 1987, 2000). While scientific experiment is a particular combination of empirical and rational processes, activity theory method is another combination of empirical and rational procedures. Methodology for implementing activity theory in practice as developmental work research originated in the 1990s, in Finland, in the world of work, technology and organizations. It doesn't easily fit into the boundaries of either psychology or sociology or any other particular discipline, but has been shown to be a useful lens in education (see Feryok, 2009; Johnson, 2006; Johnson and Golombek, 2003; Oxford, in press; Roth & Lee, 2007). It is a new framework aimed at exploring specific processes or actions that make up learning process and as points out Engeström

(2000) this methodology is best developed when researcher himself/or herself enters actual activity system and transforms it.

Research Design

I use a model of expansive learning, which is also called an expansive cycle of learning actions (see Figure 6), suggested by Engeström (2000), as one of the interpretation (expansions) of the cultural-historical activity theory to describe my research design.

Figure 6. Expansive cycle of learning actions.

Note. From "Activity Theory as a Framework for Analyzing and Redesigning Work" by Y. Engeström, 2000, *Ergonomics, 43,* p. 970. Copyright 2000, by Taylor & Francis Ltd. Reprinted with permission.

The advantage of this model over traditional action research models (Ebbutt, 1985; Elliot, 1991; Kemmis & McTaggart, 1988; McNiff & Whitehead, 2002) is that (1) it is based on a strong theoretical foundation; (2) it allows for interactive analysis of a teacher's practice (activity) based on Vygotsky's (1978) concept of mediating instruments between the subject and the object of the activity; (3) it creatively extends Vygotsky's concept of zone of proximal development from application solely in the student's context to the teacher/practitioner domain; and (4) it helps teachers to observe individuals' transformation through the change and development process.

I used the model (1) to describe my overarching (large) expansive learning cycle that covered four years of my research inquiry, (2) to spell out specific processes and actions that made up my learning process during the intermediate expansive learning cycles, which correspond to different stages of development of the four instructional activities with L1 support, and (3) to uncover the anatomy of my actions and operations during small expansive learning cycles when I conducted critical trials in classroom settings.

Unlike other models of action research cycles, which operate under "the assumption that the assignment for knowledge creation is relatively unproblematically given from above" (Engeström, 2000, p. 967), in the model of expansive learning the crucial triggering action is the conflictual questioning of the existing standard practice.

In my overarching cycle of expansive learning, conflictual questioning was aimed at finding and defining contradictions in the draft curriculum of the new ESOL sheltered science content course introduced by the school district, where I work as an

ESOL teacher. Teachers, who were assigned to teach this course in 2005/06 school year, including me, experienced many difficulties in their classrooms implementing the course curriculum. It has become evident that the goals set up for the students to learn language and science simultaneously could not be met using this curriculum alone. I began to ask myself questions such as, "Why is the curriculum not working?" "Why are students not performing as expected?" "How am I to change the existing situation?" "What textbook should be used as the basic instructional material to teach both science concepts?"

I want to emphasize here that initially my questioning and subsequent experimenting was done as intuitive thinking rather than as a planned self-reflective action research. Conceptually, action research design as a model of expansive learning began to materialize itself when I started writing my proposal for the study. I should confess that in practitioner research, it is sometimes difficult to delineate the boundaries between the classroom experimenting and action research format.

This initial questioning led to deeper analysis (2005/06 school year) of my teaching practice and students' participation in class activities and then to sharper and more articulated questioning. I began to see many contradictions between what was declared in theory of content and second language teaching to minority students and what was actually happening in the classrooms. I was dissatisfied and decided to commit myself to find the origins of these contradictions. At that time I was a doctoral student at the University of Maryland preparing for my comprehensive exams and at the same time looking for a possible topic for my dissertation. The situation with the new sheltered course prompted me to search for some literature in

the field of ESOL content-based instruction. Soon I became very interested in the topic and excited at the opening perspectives. On the one hand, I found a lot of useful information shedding light on the problems which I encountered in my science content class, on the other hand, I realized that I was given a perfect opportunity to start a dissertation research project right at my workplace, turning my teaching practice into a research field. At this stage I took part in the region's professional development workshops challenging the draft curriculum of the new course, I asked opinions of fellow teachers about the new course and persuaded the ESOL Office to let me pilot an alternative science course textbook, the *Pacemaker General Science*, in order to see how students would respond to the introduction of Spanish supplement (provided by the publisher) for this textbook. I did the review of literature on theories of second language acquisition and methods of science content teaching, which took the form of comprehensive exams. In the model of expansive learning (see Figure 6), this stage corresponds to the historical analysis of the activity system versus empirical analysis.

The third strategic action in the expansive learning cycle (see Figure 6) is modeling (2006/07 school year). Modeling is already partially involved in the formulation of the framework and results of the analysis of contradictions, but it reaches its full manifestation in the modeling of the new solution, the new instrumentation, and the new pattern of activity. This stage, according to Engeström, can be looked at as modeling of a zone of proximal development (Vygotsky's idea of ZPD is creatively used here, that is, extended to the work situation). In my informal inquiry at this stage I came up with the idea of creating supplementary bilingual

instructional modules for each unit of the textbook with L1 support. These modules incorporate four activities or themes: (1) bilingual dictionary activity, (2) bilingual vocabulary development, (3) functional grammar activity with L1 support, and (4) translation practice activity. The selection of these activities was based on my professional knowledge and experience working with ESOL students, and it was supported by research literature in the field of second language acquisition (Baily and Butler, 2005; Ellis, 2006; Harvey & Yuill, 1997; Hill, 1994; Kelly, 1992; Leontiev 1981; Lewis, 1993; Long, 1991, 1996; Nation, 1990, 2001; Savelkova, 1988; Schmitt, 2000; Scott, 1990; Striker, 1997; Thompson, 1987; Thorndike, 1908).

These activities were also designed as an attempt to connect language learning objectives and science content objectives in daily lesson planning, as a response to NCLB (2001) demands to link state content objectives and state language development standards.

In the 2006/07 school year, I accumulated enough data from my informal personal observations and the results of students' performance that permitted me to formulate my research questions and the goals of the study. After the defense of my proposal in May of 2007, I was ready to start my dissertation project. However, I encountered tremendous difficulties on the way in obtaining the official permission for my study in my school district. It took me a year and a half to persuade the district Research Office and the ESOL Office (through multiple interactions and explanation letters) to grant me permission to conduct the study in my classroom. I had to make several changes in the proposal to satisfy all interested sides (for example, I had to

include the Chinese and French languages in bilingual vocabulary lists) and convert my very often aggressive stance into more peaceful and conciliatory disposition.

During this stage I went through multiple cycles of action research spirals, which were not directly connected to my teaching practice and answering my research questions, but which were an essential part of my expansive learning cycle and which promoted my personal and professional growth tremendously. As Burns says (1999), action research should not be seen as prescriptive steps, which must be carried out in a fixed sequence, but rather as suggestive of various points in the research process. Many of these phases will overlap or will occur simultaneously. Some phases may occur in a different order. They may also be recursive and cycle back into each other. In practice, action research turns out to be much more "messy" than commonly presented models suggest, and the process should be adapted to suit the needs and circumstances of the particular participant.

At stage four (2007/08 school year) of my overarching learning cycle (see Figure 6), I was examining the new model of teaching/learning activity by conducting critical trials of supplementary instructional materials with L1 support and was continuing my self-reflection in the form of field notes and a personal diary. I spent a lot of time at this stage referring to research literature for confirmation or disconfirmation (Dick, 1997) of the emerging interpretation of my data. In a parallel cycle, I was communicating with the school district administration and my advisors about how to get the project approved. This cycle is documented in my personal diary and kept as data in the form of my e-mail communication.

The fifth stage (2008/09 school year) of my research design, implementation of the new model, coincided with the official permission by the district, in January of 2009, to conduct the study in my classroom. This meant that I was allowed to officially collect data from myself, as a school district employee, in the form self-reflective observation field notes, and from my students in the form of checklists, rating scales, observation charts, samples of their work, grade reports and, last but not least, video data.

Since my project had been continuing for four academic school years, three of which involved personal informal inquiry, with only the last year having the format of official doctorate research, I have to distinguish two phases in my action research design. The first, informal inquiry, was the developmental stage, during which I conducted critical trials and created most of my supplementary instructional materials with L1 support; during the second, implementation stage, I summarize the work of the first stage, test the effectiveness of the created materials, and discuss the results of my formative experiment. We find the possibility of such division in McKernan (1991), who states:

> The technique of *critical trialing* refers to the ongoing monitoring of a curriculum project during the *development* stage; or it can be used to monitor a course of action during its *implementation* phase. The twin notion of *critique* and *trialing* further indicate that the purpose of this activity is to gather informed data about the appropriateness, impact, effectiveness, etc. of an innovation while it is being *field tested* through *trials*, so that the innovatory project, innovation or action response may be improved. (McKernan, 1991, p. 216)

In conclusion, I need to discuss one limitation that pertains to any self-reflective action research design. It is connected to the questions of how many research cycles should be completed, and how the researcher knows when to end the

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research. As Burns points out, "The answers to these questions are not clear cut. They depend to a large extent on personal and group time and resources and the nature and purpose of the research." (Burns, 1999, pp. 155-156)

Data Collection

In contrast to quantitative and most qualitative studies, where the analysis follows data collection, in my study it is not always possible to strictly delineate the process of data collection from data analysis. This is due to the nature of the self-reflective process of action research when data collection and its analysis occur simultaneously. As Burns writes, "They are "dynamic" in the sense that they inevitably overlap, interrelate and recut" (Burns, 1999, p. 154). The "reflexivity" which I use as a research technique results from cycling backwards and forwards, from data collection to analysis, to further data collection and so on as the need arises. As Somekh (1996) points out, this reflexivity is "a belief that interpretations, theories and meanings must be subjected to a continued process of questioning and scrutinizing, in which the researcher's attention shifts back and forth between interpretation and evidence – exploring, hypothesizing, checking and reformulating" (Somekh, 1996, p. 33).

A model of the human activity system (see Figure 7) captures this recursive, multi-dimensional nature of the action research process and attempts to overcome dichotomies between micro and macro, mental and material, quantitative and qualitative, observation and intervention with the help of a complex mediating set-up.

INSTRUMENTS

SUBJECT   OBJECT   OUTCOME

RULES   COMMUNITY   DIVISION OF LABOR
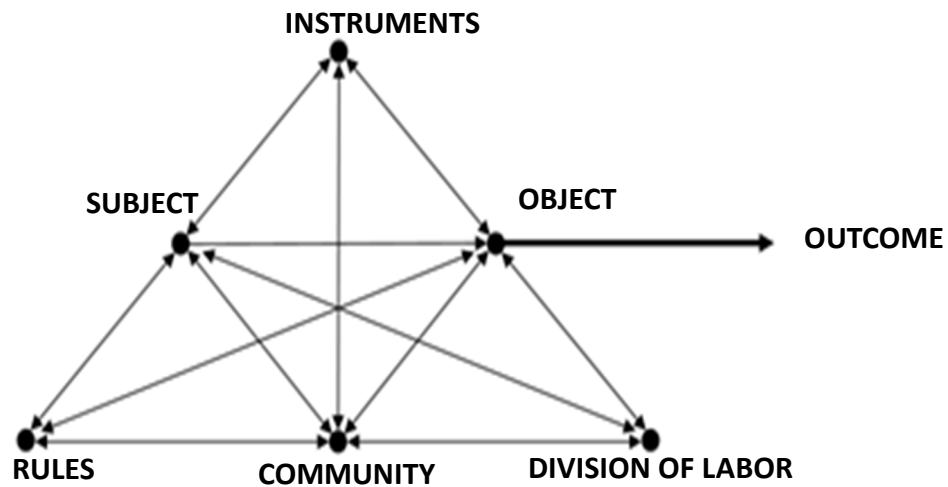
Figure 7. A model of the human activity system.

Note. From *Learning by Expanding: An Activity – Theoretical Approach to Developmental Research* (p. 78). By Y. Engeström, 1987, Helsinki, Orienta-Konsaltit. Copyright 1987 by the Orienta-Konsaltit. Adapted with permission from "Activity theory as a Framework for Analyzing and Redesigning Work.," by Y. Engestrom, 2000, *Ergonomics, Vol. 43(7),* 960-974. Copyright 2000 by Taylor & Francis Ltd.

The model is based on the instrumental method developed by Vygotsky (1978), which was later creatively extended by A. N. Leontiev (1981) and Engeström (1987). The model can be viewed as a way of visualizing the total configuration of an activity.

In this model, the *subject* refers to the individual or group whose point of view is taken in the analysis of the activity within the system. The *object* (or objective) is the target of the activity within the system. Objects can be material (physical, chemical and biological) objects or societally and culturally determined properties, such as experiences, practices and knowledge. The *instruments* (or tools) refer to

internal or external mediating artifacts (symbolic or physical) which help to achieve the outcome of the activity. They include language, specific knowledge, references, documents, plans, materials, textbooks and devices. The *community* is comprised of one or more people who share the objective with the subject. The *rules* regulate actions and interactions within the activity system. They include collaboration, practices, specific instructions and learning cycles. The *division of labor* discusses how tasks are divided horizontally between community members, as well as referring to any vertical division of power and status.

The model allows the researcher to identify aspects of practice that are coherent and those aspects that cause contradictions, which should be resolved in order to improve practice. According to Engeström (2000), these contradictions are sources of difficulties in the activity system and at the same time are catalysts for change and learning. He understands learning as a long-term process of internalization and externalization in response to contradictions as the subject attempts to achieve his or her outcome. While achieving this outcome the subject appropriates available cultural resources in order to design a novel form of practice.

In my study this model represents the structure of my teaching-learning activity system. The role of the subject is performed by me, the teacher/researcher, while I investigate my practice. The objects of this teaching and learning activity system are taken by different material and immaterial agents such as students, their knowledge and skills, instructional strategies, supplementary instructional materials. The community consists of teacher and students, as participants of the teaching-

learning activity. Other members of the community are specified depending on the situation and goal of the action.

It is important to emphasize that I use this model in my study as a research instrument to structure and analyze my own actions, as the subject of the teaching-learning activity, in order to explain my learning process and to understand the developmental potential of my practice. This model is not meant to display the learning processes and actions of my students. The model helped me to separate my actions into temporal and spatial segments, which allowed data collection and analysis. I used the model to describe the mediational set-up of my actions in intermediate cycles (on a macro level that corresponds to a school year) and in small cycles (on a micro level that corresponds to a particular classroom situation).

Below I explain how I used the model of human activity system in a small learning cycle (in a concrete classroom situation) as a means to interpret the recurrent and cyclic nature of data collection and on-site analysis.

Imagine the following situation: I, as an ESOL teacher, instruct students in the ESOL sheltered science content class. I am checking how students understood the sequence of the steps of the scientific method after reading the text.

Teacher: What is a hypothesis?
Students: No answer.
Teacher: What is a guess?
Students: No answer.

I ask students to look at the pictures in the textbook. The pictures don't help. Students still can't answer questions. (In the course curriculum there is a suggestion to use additional pictures which teacher ought to prepare on an individual basis. But they also do not produce the desired effect.) I put up a transparency (prepared before

class) with a list of words translated into Spanish on the overhead projector. Students

read the words and understand their meanings. I see it through their reaction.

I ask the question again: What is a hypothesis?
Angel answers: A guess.

Some students still don't understand it. I see that they have problems with

reading the words. At the same time I am reprimanding Ervin for not listening. I see

that he is drawing something in his notebook and doesn't pay attention.

Simultaneously, I am already reflecting how to improve students' understanding,

because I am still not satisfied with how they perform.

Action 1: Checking students' understanding
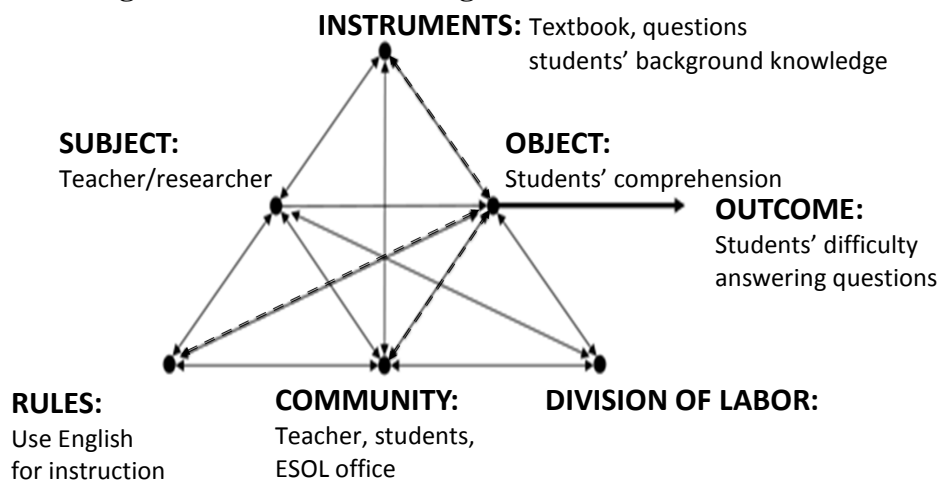
Figure 8. First learning action in a classroom situation.

How can one make sense of these actions in terms of their impact on the

participants of the situation and their developmental potential? In other words, how

should I segment my actions and the actions of my students so that these segments

can provide data that could be interpreted as the evidence of my learning and my students' learning, as well as improvement of my practice? The above presented classroom situation can be displayed by the following successive actions (see Figures 8, 9, 10, 11).

Action Model: In the first action in Figure 8, the subject is the teacher/researcher, because my point of view is taken in the analysis of the situation. The object of the action is the students' understanding of the question, "What is a hypothesis?" The action is mediated by the textbook and by my questions and students' prior background knowledge. The rules of this action are determined by the objectives of the draft curriculum of the ESOL science content course, which is to use the English language for communication and instruction. The community is represented by the teacher, students, and the ESOL office that introduced the new course. The outcome of the action is students' difficulty answering questions. This outcome I document in my field notes when time permits to do it, either in this class, when students are doing independent work, or in between classes or during planning time. As I start reflecting on and analyzing this action, I am able to discern disturbances or contradictions (they are displayed on the diagrams with the help of dotted lines) between the interacting elements of this action. They occurred along the object-rules pathway, the community-object pathway, and the instruments-object pathway. It can be explained by the fact that the use of a non-adapted general science textbook for instruction in a science content-based class for beginning learners of English produced the conflict between the curriculum objectives and the performance

of students. Uncovering these disturbances makes me think further about how to improve my practice.

Action 2: Using overhead projector to present vocabulary

INSTRUMENTS: Overhead transparency, bilingual vocabulary

SUBJECT: Teacher/researcher

OBJECT: Students' comprehension

OUTCOME: Ability to construct meaning by students

RULES:

COMMUNITY: Teacher, students

DIVISION OF LABOR:
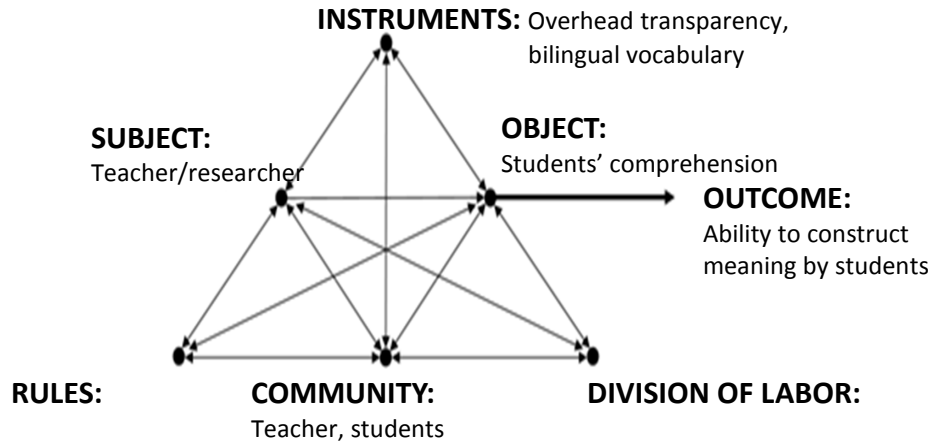
Figure 9. Second learning action in a classroom situation.

Action Model: In the second action (see Figure 9), the subject, the object and the community of the action remain the same, but the mediating tools have changed. Instead of the textbook, I use an overhead transparency of the bilingual vocabulary list which is projected on the screen. The outcome of this action – construction of the meanings of the words by students – is reached by students reading English words and phrases and their Spanish equivalents. The overhead projector remains here at the level of automatic operations, because it is not a central element of the goal-directed, conscious action in this case. The overhead projector would only become the focus of my attention if the light went off and I had a problem operating it. The rules slot and division of labor slot are not actuated in this action, because they are not included in the mediational set-up of this action.

Again, afterwards, I would jot down my reflection on this action, how it went on and its outcome. For example, in my *Field Notes dated November 20, 2008*, I

wrote, *"Alex, Ana, Celia and Henry didn't copy the words correctly from the screen*."
Several days later I added, *"some students couldn't find the list of words in their notebooks."* Further analysis on this action would uncover disturbances or frictions that caused teaching/learning problems.

Action 3: Resolution of behavioral problem
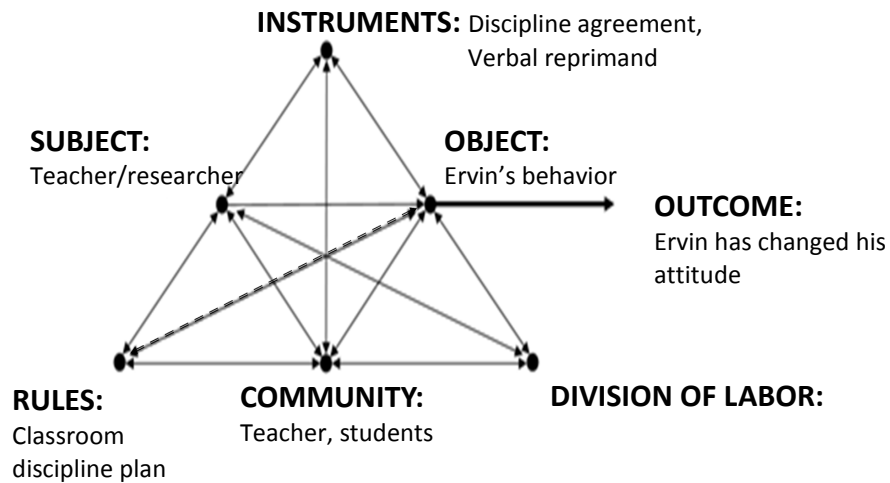
Figure 10. Third learning action in a classroom situation.

Action Model: In the third learning action (see Figure 10), the focus shifts from my explanation and instruction to the behavior problem with Ervin. Instead of proceeding with my planned instruction, I had to deviate from my plan, or so called "standard script" (Engeström, 2000), because Ervin violated the rules of our teaching/learning activity system, that "students should listen to the explanation of the teacher," and he was not paying attention. His behavior caused a contradiction between him, as the object of the educational process, and the classroom rules, which he did not want to follow. I, as the subject of the action, had to reprimand him. The mediating instruments in this action are the discipline agreement, which students and their parents have signed, and my verbal reprimand. The outcome of this action is that

"Ervin has changed his attitude." I document this deviation in my *Field Notes dated*

November 20, 2009: "Ervin didn't listen during explanation, was drawing something

in his notebook." Later I put this note in the students' behavior protocol, which I use

as my observation research instrument. It also serves as an alternative assessment of

students' performance and as a methodological triangulation technique. Repeated

violation of classroom rules by particular students would draw more careful attention,

resulting in the analysis of the causes. The rules of this action are represented by the

classroom discipline plan. The community slot is taken by the teacher and students as

representatives of the teaching-learning community. The division of labor slot is not

actuated in this action.

Action 4: Modeling the new situation
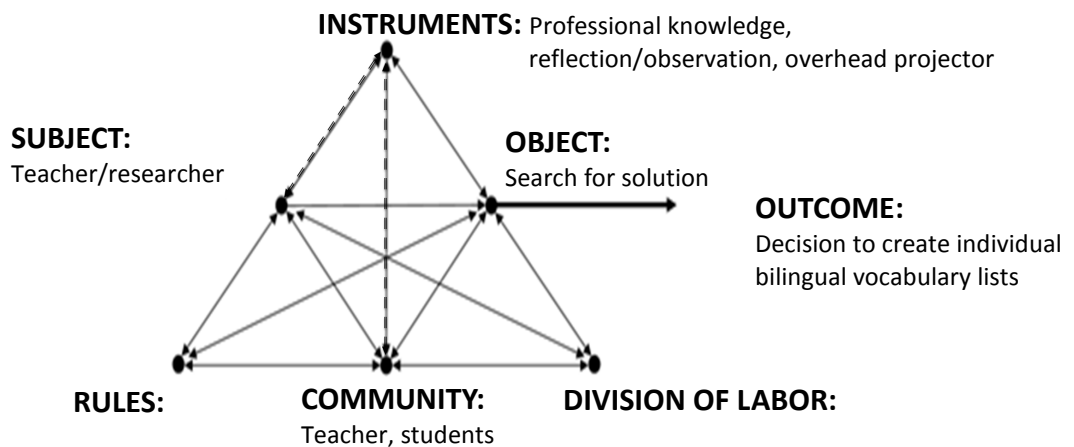
Figure 11. Fourth learning action in a classroom situation.

      Action Model: Finally, in the fourth action (see Figure 11), when I reflect on

how the action went on and what improvements could be made, the instrument slot is

taken by such mediating tools as my reflection and professional knowledge, or

expertise. In other classroom situations (actions), it can be mediated by reading

research literature or any other appropriate, non-material mediating tool. The object

of the action shifts from students to my thinking, or search for solution. The outcome of my reflective thinking on my own actions and on the students' actions is my reflective field notes on how to improve my practice in order to help my students master both language and content. At this point I start mentally (internally) modeling a new situation, which can be viewed as expanding my professional zone of proximal development (Vygotsky, 1978). At this moment, in the form of an insight, I came up with the idea of creating bilingual vocabulary lists on hard copies for individual student use. I made this decision on the basis of disturbances that emerge in the class. For example, a few days later, after presenting vocabulary, when I checked the students' notebook to see how they had copied the vocabulary words, I couldn't make out what words some of them had copied from the screen. Students could not pronounce them to me or say what these words meant. Some other students had lost the vocabulary list altogether and did not remember any of the words which had been presented. This situation indicated to me that the overhead projector had only partially solved the problem of presenting vocabulary, and that I need to continue to look for a solution. My reflective notes pinpointed my decision (insight) to create typed, bilingual vocabulary lists for students' individual use. Action 4 illustrates how disturbances served as catalysts for change and learning and ultimately led to the improvement of my practice.

Shifting focuses between the slots of the model means that, depending on the action taken, different elements of the activity take the leading role in goal-directed actions. The community slot, for example, can be activated when a student asks for a pass to go to the nurse because of some health problem. The division of labor slot can

become active when I ask for a substitute teacher (who leaves her comments about the students' performance, which I use for artifact analysis), or when I have to convene a teacher-parent conference, or enlist the help of ESOL crisis-intervention specialist. The reasons and results of these actions are also documented as evidence in a student behavior protocol to be later analyzed to produce the findings of the study.

In a broader sense, the model can be used as an instrument to examine the teacher/students interactions in a wider context, that is, at the school and school district level. For example, the community in which the activity is being carried out may support or oppose the activity. It may support or impose rules on the behavior of subjects that are undertaking the activity. In addition, there may be "rules" about the kind of products, knowledge and experience that will be approved or acceptable.

Classification and Description of Methods Used in the Study

Because the design of my study comprises multiple spirals of research cycles which overlap and perform different functions, I am using various methods of data collection and analysis. Overall, I divide them into three groups:

Group I: The overarching formative inquiry method which embraces the whole study, or the global cycle of my research. Its contextual variations are (1) the model of expansive learning and (2) the model of the human activity system.

Group II: Observational methods that I used during the developmental and implementation phases of my research, when I conducted critical trials of the supplementary instructional materials with L1 support. They are (3) self-reflective field notes and (4) personal diary.

Group III: Methods that I used during the implementation stage to check the effectiveness of the suggested interventions. They are (5) pre-test/post-test, (6) rating scales, (7) checklist, (8) behavior protocol, (9) artifacts analysis, (10) video recording, (11) triangulation.

In creating my methodology, I relied on the works of the following researchers: Bogdan and Biklen (1982); Burns (1999); Castello (2003); Creswell (1998); Dick (1997); Engeström, (1987, 2000); Glaser and Strauss (1967); Maxwell (1996); McKernan (1991); Mcniff and Whitehead (2002).

I want to emphasize that the overarching method of data collection and analysis in my study is the formative or developmental inquiry, which is the most adequate method and is characteristic of the activity theory. The method should not be equated with naïve forms of "action research," idealizing so-called spontaneous ideas and efforts coming from practitioners. On the contrary, the type of methodology I am using in my study requires that general ideas of activity theory (such as that the activity is material, social, and has systematic structure) are put into practice through interventions, which aim at constructing of new models of activity jointly with the local participants of the study, my students.

In implementing this methodology, I not only set myself a task of forming experimental skills and mental functions in students, but I engaged myself, according to Engeström, in forming societally new artifacts and forms of practice (Engeström, 1987). This complex and multilayered research instrumentality required from me a bold experimental attitude rather than the attitude of a casual observer and facilitator (Engeström, 1987). I describe in more detail each method of data collection and

analysis, starting from Group II, since the model of expansive learning and the model of the human activity system were discussed above in this chapter.

(3) Self-reflective field notes: I had been using field notes during the developmental and implementation stages of my research design. I used them for three years in my classroom during instructional time, during those moments when students were doing assigned work and I had the time to pause and reflect. I jotted them down all over my lesson plans and on supplementary instructional materials that I was creating. Often I used moments of planning time to summarize what had caught my attention during the previous lesson, and sometimes I wrote them in my personal diary at home, when thoughts and reminiscences came abruptly, like insight. These field notes, for example, document how an activity went on during the first period of my school day (first trial) and what changes I have to make. They also report how it went on during the second period (second trail), when the composition of students was different, and finally, how it went on during the third (third trial), with another composition of students.

I have four binders of lesson plans for each academic school year, 2006/07, 2007/08, 2008/09, twelve in total, which display this type of data. Multiple trials produced saturated data. My field notes, which were related to the trials of the instructional materials, were transcribed and analyzed immediately after each lesson or soon after in order to model the new version of the activity in question. Yet the new version had to wait for the next academic school year to be tried out. For this reason this type of data in my study doesn't need a separate categorization for the purpose of analysis, because analysis was done simultaneously with data collection.

The field notes which were related to other aspects of my study were analyzed afterwards, during the analysis cycle.

(4) Personal diary: I started writing in my personal diary after the defense of my proposal in 2007. When I started it, I planned to use it as a source of case records in order to keep information on the status of my project and cycles of inquiry. It contains important events related to my study, such as communication with my advisors, with the Research Office, with the ESOL Office, and with school administration, as well as feelings about certain actions and situations and observations of students' behavior. I wrote entries in the diary mostly after school hours, sometimes during planning time. However, as the study evolved, it turned out that I was not able to use all of its records, as it contains names and documentation which I cannot disclose under the terms of my study. For this reason, I used the personal diary only for case records of my students. They helped me analyze students' performance in relation to some out-of-class events happening to them during the course.

(5) Pre-Test/Post-Test: I used pre-tests in three research situations; I used them, first, to assess students' science knowledge, second, to assess students' dictionary strategies, and third, to assess students' literacy level in their native language.

For the Science Knowledge Pre-Test I used the Introduction Test (the *Longman Science Teacher's Guide*, p. 187) translated into Spanish (students who spoke World English were given the Pre-Test in English). For the Science Knowledge Post-Test I used the Lesson 2 Test (the *Longman Science Teacher's Guide*, p. 217),

which was in Unit 4, the last unit of the course that I covered with my students. The Introduction Test has 15 multiple choice questions, each worth 1 point. The Lesson 2 Test has 11 multiple choice questions, each worth 1 point, and the writing section (BCR) is worth a maximum of 4 points, making the maximum score for a Lesson 2 Test 15 points. The Pre-test was given in Spanish, because students had no command of English to assess their science knowledge at the beginning of the course. The post-test was given in English at the end of the course in order to assess how well students have progressed in learning English and science content simultaneously.

For the timed Bilingual Dictionary Pre-Test, I designed a test consisting of a list of 14 English words, which the students were supposed to translate using a bilingual dictionary the first day they were enrolled in the course. At the completion of the test I checked the accuracy of students' translation, such as the ability to distinguish between verbs, nouns, and adjectives, and measured the time of performing this test. The Bilingual-Dictionary Post-Test included a list of 14 new words, which the students were supposed to translate using a bilingual dictionary at the end of the course. At the completion of the test I again checked the accuracy of the translation (ability to differentiate between verbs, nouns, and adjectives) and measured the time of performing the test. The time component is important in this test because it measures the students' acquired skill to work with the dictionary within the time constraints of a school lesson and subsequently in the conditions of HAS exams, which all have time limitations.

The Pre-Test to assess students' literacy levels was given in order to determine students' literacy levels needed to use the supplementary materials

provided in Spanish. Students were asked to write a brief constructed response (BCR) about their native country in their native language. The evaluation rubric for the BCR is provided in Appendix S. I designed the rubric by analogy with the State English Language Proficiency Standards and the IDEA Proficiency Test for ELLs, which subdivides English language learners into non-English writers, limited English writers, and competent English writers. If students who did not have prior formal education were enrolled in the course, they would have been provided with individualized, differentiated instruction that would have been implemented parallel to the regular classroom activities.

In the dissertation proposal I planned one more pre-test to assess students' translation skills, but it became clear, as the study proceeded, that this pre-test was not going to serve its purpose, because students were entering the course throughout the whole year and it was impossible to assess them all simultaneously on the same translation test. For this reason, I assessed students' translation and self-editing skills on the basis of the Final Translation Skills Test given at the end of the course. Students were supposed to translate an excerpt from Unit 4 of the *Longman Science* textbook. The test was administered using the following criteria: how well students understood the meaning of the text and how well they used their self-editing skills applying the translation key.

(6) Rating scales (see Appendices J, K, and L): I used rating scales as students' feedback data at the end of the course. They helped to determine the effectiveness of the proposed interventions on the part of the local participants (students) of the study.

(7) Checklist of student ratings of instructional activities (see Appendix M): The checklist was used for the purpose of triangulation. I used it at the end of the course. I asked students to choose the five most helpful instructional activities (that helped them to learn science and English in class) from the list of 16 activities that I used in class, in order to determine how they evaluate the instruction which I provided to them in general, and how they evaluate the four interventions which use L1 support.

(8) Behavior protocol (see Appendix N): I used the behavior protocol as an alternative assessment for an individual student and for the purpose of triangulation as a means of keeping data on students' performance (excluding grades) quarterly. For example, it helped me to keep track of students' performance on the four activities under study, to see the overall dynamics of their functioning in the course, and to pinpoint the areas of disturbances that prevented students from performing successfully. The behavior protocol was filled in on the basis of my daily observations, field notes and diary notes. Cumulative behavior protocols for each student of the course are kept in files of this study.

(10) Video recording (see Appendices Q and R): This source of data was used in the study in order to illustrate how all four activities with L1 support were implemented in the class in real time format. It performed an explanatory function rather than an observational one. It aimed at showing how all four activities can be incorporated into the course curriculum, creating an adjunct model of the teaching/learning activity in the ESOL science content sheltered class at the beginning level of high school. Videotaping occurred during five days, in each period

of the day, during regular instructional time. It recorded how I followed the curriculum pacing guide of Unit 3, "Rocks and Minerals." The total video recording time is 20 hours. All video segments are described in Appendix Q. The video data captures students' responses and reactions. Two video clips are assembled in order to be viewed at the dissertation defense.

Research site and participants

The research site of the study was my classroom at a metropolitan high school, where I taught a sheltered ESOL science content course to freshmen students. I taught the course three periods (about 90 minutes each) every day for four academic school years. Three years of the study were conducted in the form of personal informal inquiry, and the last academic school year, 2008/09, was conducted in the format of a doctoral dissertation project approved by the school district. The participants of the study, or subjects, were my students and me. I described my positionality in Chapter I of this dissertation.

In this study I obtained information from (1) my teaching practice and my analysis of how an ESOL teacher can effectively use L1 support in teaching science content and language to freshmen ESOL students at the high school level and (2) from my 30 students who provided samples of their work, test results, quarterly grade reports, responses on rating scales and checklists, and reactions during video recording and during daily class instruction.

In my classes in the 2008/09 academic school year I had 27 Spanish-speaking students from Central America and Mexico, one World English-speaking student from Africa, and one French-English speaking student from Africa.

All students were voluntarily participating in the study. They and their parents/guardians submitted consent forms giving them permission to withdraw from the study at any time. I assured the students that their non-participation would not affect their grades.

Conclusion

Self-reflective action research is a relatively new research approach, particularly in the field of second language education. The issue of how research data should be collected and analyzed is a challenging one for the teacher and researcher. In action research literature, when it comes to discussing methods of data collection and analysis, the authors usually take a defensive stance, because, in comparison to experimental research, the action research methodology is still at a stage where some academic researchers would question that it qualifies as research at all.

In this chapter I attempted to show that the traditional methodology of action research study (and self-reflective action research in particular) that uses qualitative methods of data collection and analysis could be well integrated with the cultural-historical activity theory method. This integration allowed me to conduct my study as a formative experiment and effectively use the CHAT instrumentality, such as the model of expansive learning and the model of a human activity system, to scrutinize my work activities and redesign my practice.

Chapter IV: Constructing a Model of Teaching-Learning Activity

Learning can be accelerated and intensified through
critical awareness, and reinforced through intellectual study.
McNiff & Whitehead (2002, p. 18)

Introduction

In Chapter IV I describe how I had been creating the four

supplementary instructional activities with L1 support using cycles of expansive

learning. Each activity – bilingual dictionary activity, vocabulary development

activity, functional grammar activity, and translation practice activity – described in a

separate section as an expansive cycle of learning actions, which I structure and

analyze using a model of the human activity system (Engeström, 1987, 2000). The

description of the creation of the activities is supported by data in the form of field

notes. In order to confirm and validate my actions I provide examples of multiple

studies in the field. Further, I display two examples of critical trials of supplementary

instructional materials with L1 support, as illustrations of how I was constructing my

teaching/learning activity model as cycles of innovative learning. A substantial part of

this chapter is devoted to my self-reflective analysis, which was aimed at explaining

and interpreting my actions and their outcomes during cycles. In conclusion, I

summarize the content of this chapter providing the algorithm of improvement of my

practice.

Bilingual Dictionary Activity as a Cycle of Expansive Learning

The use of bilingual dictionaries on a day-to-day basis is stipulated in the

NCLB Act (2001) as appropriate instructional and assessment accommodation.

However, that use of bilingual dictionaries in ESOL classrooms has not been

encouraged. There is a limited number of bilingual dictionaries per school, and

students are not motivated to buy them on their own for their individual use. For example, at my school, when I started to teach the new sheltered science content course in the 2005/06 school year, there were only five bilingual dictionaries for sixty students.

This situation can be explained by the fact that until recently, the default stance taken by most researchers and teachers in the ESOL community was that a monolingual rather than a bilingual dictionary should be encouraged in ELL classrooms (Baxter, 1980; Hartmann, 1991).

In educational research literature (Crandall & Kaufman, 2003; Cummins, 1996, 2000; Echevarria et al., 2000, 2004; Kaufman & Crandall, 2005), the use of bilingual dictionaries is rarely mentioned as an efficient strategy for developing vocabulary in content-based instruction; instead preference is given to the comprehensible input strategies. For example, although the authors of the SIOP model (Echevarria et al, 2004) mention the use of bilingual dictionaries as a useful instructional ESOL strategy within the SIOP model, they provide little explanation or critical reflection. The lack of attention to the use of bilingual dictionaries was also reflected in the draft curriculum of the ESOL sheltered science content course, which did not state as one of its objectives the goal of teaching students how to use a bilingual dictionary as an accommodation tool to master English and content.

However, for me, as a foreign language learner, the bilingual dictionary has been an indispensable tool throughout my elementary, secondary and university studies. For this reason, I could not accept the fact that in a science content class, where the emphasis was on teaching abstract concepts, and where 95 percent, in some

classes even 100 percent, of students were Spanish-speaking, bilingual dictionaries were not available for each student. This contradiction, as well as my personal and professional values, motivated the creation of this activity. As I mentioned before, there were only five dictionaries per sixty students in my course; in other words, I had five dictionaries per twenty students in each of my classes. But, to be honest, students did not care, because nobody had taught them before how to use a dictionary. They did not realize what opportunities it could provide for them in mastering a second language. During my four years of teaching this course, only four students came the first day of class with their own bilingual dictionaries. One Spanish-speaking student (2008/09 school year), two French-speaking students--a brother and a sister from Cameroon (2007/08 school year) who attended a private Catholic school--and one Chinese student (2007/08 school year) who came with an electronic portable translator. As Lewis laments, "Most serious language students start with L1/L2 dictionary and later graduate to an L2 dictionary. For many, however, it remains a greatly underused resource …." (Lewis, 1993, p. 132) I documented this sad situation in my classes in my following field notes.

Field notes dated August 20, 2007: I wrote, "A Chinese student was the only student who came to class with his own dictionary (electronic), like in the previous year when only Mariama and her brother came with French-English/ English-French dictionaries."

Action Model: The discrepancy (contradiction) between the demands of my students and the objectives of the draft curriculum triggered my first learning action (see Figure 12.1). The subject of the action is the teacher. The object of the action is the draft curriculum. The rules slot is represented by the NLCB Act (2001), which stipulated the use of bilingual dictionaries in ESOL classrooms as instructional and

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assessment accommodation. The community is represented by the ESOL Office, which introduced the new course, and by teacher and students, as participants of the teaching-learning activity. The division of labor slot is not activated in this action. In this action I, the teacher, used my professional knowledge and critical questioning as the mediating instruments to analyze the curriculum situation in my class. As a result of this analysis, the disturbances, or contradictions, were uncovered (1) between the subject of the teaching-learning activity and the object, (2) between the rules of the activity and the object, and (3) between the community of the activity and the object (disturbances on the diagrams are marked with dotted lines).

Action 1: Revealing contradictions in the curriculum
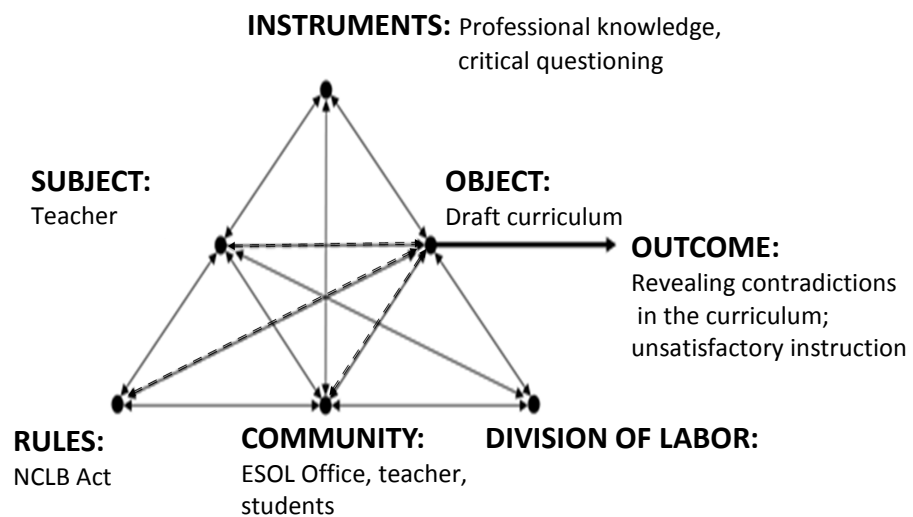
Figure 12.1. Learning actions of bilingual dictionary activity.

The first pair of contradictions could be interpreted the following way. I, as teacher, am confronted with problems teaching students on the basis of this curriculum. My teaching strategies do not work to meet the objectives of this course.

The second contradiction reveals the fact that the objectives of the NCLB Act and the

objectives of the draft curriculum do not match. The objective to teach students how

to use a bilingual dictionary as an accommodation tool is missing in the draft

curriculum; and the third contradiction stems from the situation, when it is assumed

that students are mastering content and language with the help of curriculum

materials, while in the reality, they are not meeting these learning goals. The

outcome of the action is my unsatisfactory instruction as a result of revealed

contradictions.

Action 2: Selecting bilingual dictionary
2005/06

INSTRUMENTS: Publishers' catalogues

SUBJECT:
Teacher

OBJECT:
Bilingual dictionaries

OUTCOME:
Selection of the Larousse dictionary

RULES:
Criteria for student
dictionary

COMMUNITY:
Publishers,
book vendors

DIVISION OF LABOR:
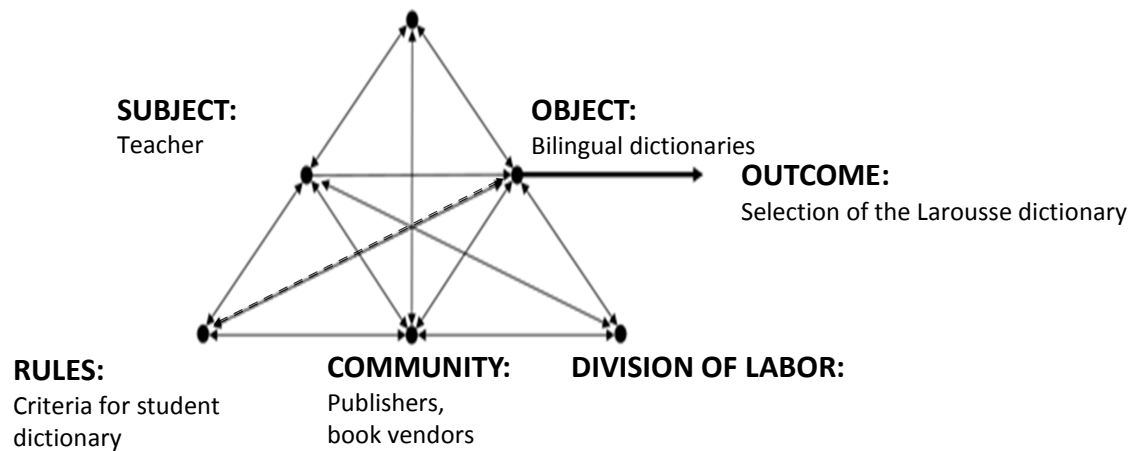
Figure 12.2. Learning actions of bilingual dictionary activity.

Self-reflective analysis: Revealing conflicting situations in my practice which

called for a solution confirmed Engeström's hypothesis (2000) that the crucial

triggering action in the expansive learning is the conflictual questioning of the

existing standard practice in contrast to other models of organizational learning,

which are based on the assumption that the assignment for knowledge creation is relatively unproblematic given from above.

Reflecting on the teaching-learning situation of the 2005/06 school year, I understood that routine assumptions by teachers that a course curriculum provides unchallenged ways and strategies of teaching leads, on the one hand, to passive and non-creative practice, and on the other hand, to personal frustrations and an unhealthy mood in a work place. I also understood that the analysis of my teaching practice should be done within a broader educational context drawing on multiple sources of information.

The solution to the revealed contradictions was my decision to find an appropriate Spanish-English/English-Spanish dictionary and provide all my Spanish-speaking students with it, so that they could use it on daily basis in class and at home. This solution corresponds to the modeling of the new situation in the model of expansive learning, which I structure with the help of learning Action 2 (see Figure 12.2).

Action Model: The subject of the action is the teacher. The object of the action is a number of bilingual dictionaries which I evaluate in order to select the most appropriate one. The rules slot is the criteria which I set for selecting a bilingual dictionary for my classes. The mediating instruments are the publishers' catalogues. The community in this action includes publishers and book vendors. The level of operation is not a focus of attention in this activity, such as navigating the Internet while looking through the catalogues, or driving my car to the book stores. Disturbances occurred along the rules-object pathway, because it turned out that

many dictionaries were not designed well to suit my students' needs. The outcome of the activity is the selection of the Larousse Student Spanish-English/English-Spanish dictionary for my course. This dictionary was the only one which met the criteria I was looking for. For example, it had highlighted word entries which were important for struggling readers. It provided examples of sentences in English and Spanish to illustrate how a word can be used in context. It also provided explanations in Spanish of some lexical and grammatical difficulties. It had colored separation of English-Spanish and Spanish-English parts of the dictionary, and, last but not least, under the name of this publisher the unabridged English-Spanish/Spanish-English dictionary was available for students to purchase later in their senior classes to refine their language and content learning skills.

Self-reflective analysis: Reflecting on second action, I understood that finding an appropriate bilingual dictionary was an expansion of my standard teaching practice, which demanded from me a series of new actions, such as more careful observance of my students' performance, looking through the publishers' catalogues and reading research literature. These actions produced in me a new kind of learning and aspiration for a change which materialized in selecting the Larousse bilingual dictionary. The deeper search for a motive behind this action makes me to admit that it is my critical thinking that initiated the whole process of personal and professional change. I argue that nonconformity with established school practices and routines is a driving force for any educational action research. What is important, however, is that this critical thinking be applied not only for the analysis of others' imperfections but, first of all, for the analysis of one's own actions and workplace situations. The

critique should also be constructive and should be supplemented with professional alternative suggestions and actions. In other words, it should be dialectical. Unfortunately, we, as teachers teaching our students to apply critical thinking in real life, fail ourselves to demonstrate what critical thinking means in the realities of school life. For example, in the situation with the first draft of the sheltered curriculum, only I openly expressed my disagreement with the curriculum content and its objectives at the district level. Other teachers, who expressed their frustrations about teaching the course during small talk, were silent when it became necessary to express their opinions openly.

Another important conclusion to which I have come as a result of my self-reflective analysis of this stage of my expansive learning is that my personal values and beliefs played a decisive role in the initiation of my first two actions and the whole study in general. Through teaching ESOL students, I have realized that I have a very socially oriented belief system in comparison to other teachers with whom I work. The explanation for this lies in the fact that I was born and brought up in a socialist country, the USSR. Before I came to the United States, I had never seen a person who could not read or write. I have never seen a child who did not go to school. When I began teaching ESOL students in the American public high school I met children in my classes who did not go to school at all in their countries or completed only elementary classes, who suffered the traumas of illegal immigration and very often the loss of one of their parents (through natural death or separation), who, eventually, found themselves in a new environment completely different from where they used to live, who had to study in a foreign country using a foreign

language. For me, social justice and equal opportunities for education (which all action researchers mention as desirable goals and aspirations) were every-day realities back in my country, which I took for granted as an educator and a person. For this reason, it was quite natural for me to start projecting my previous patterns of teaching experience onto the new situation in my ESOL classes. When I saw that my students needed real help, I started to help them with real actions. As a professional, I truly believed that depriving 15-19-year-old students of the use of their native language for learning science concepts in a content-based class was a methodological and pedagogical mistake which impeded their educational success and which I wanted to correct. As McNiff and Whitehead emphasize:

> Practice can be enhanced, however, when we reflect on what we are doing and decide to improve it. In action research this means becoming aware that we have a vast fund of personal knowledge, valuing it, and understanding it at a cognitive level how to use it for other's benefit. We raise our deep tacit knowledge which contains our values base to an explicit surface level where we try to live our values in our practice. (McNiff & Whitehead, 2002, p. 103)

The next stage of the development of the bilingual dictionary activity started in the 2006/07 school year, when I began to use the Longman Science program in my classes. As a result of the outcome of Action 2 (see Figure 12.2), I purchased 40 Larousse bilingual dictionaries and brought them to school the first day of classes. I recommended all of my Spanish-speaking students to purchase one for their individual use in class and at home. The students responded very positively, and within the next two days, all brought money to purchase the dictionaries. Some of them even asked for an extra one for a relative or a friend. Students kept asking to purchase extra dictionaries throughout the school year. The following field notes documented these episodes.

Field Notes dated October 20, 2006: I wrote, "Ana came to me and asked if she could buy the dictionary for her friend."

Field Notes dated April 2, 2007: I wrote, "Edgar asked to buy a dictionary for his mother."

During this stage I observed more carefully how students used dictionaries in class to construct meaning, since all of them had dictionaries for their individual use.

Field Notes dated September 28, 2006: I wrote, "Students feel satisfaction (their faces show this) when they find the word in the dictionary and immediately understand what the text says. At the beginning it is hard for them to refer to dictionary very often, but soon they acquire a habit."

Although I saw that students expressed satisfaction at having found the meaning of unfamiliar words, which helped them to understand reading assignments and do practice exercises, I constantly had to push them to use dictionaries in class. For the majority of them, using a bilingual dictionary as a daily tool for learning English was a challenge.

Field Notes dated January 11, 2006: I wrote," I always had to remind students to use dictionary when we start reading a new passage, many of them are not eager to use it, and say to me that I give too much work for them."

It is true that looking up words in the dictionary is a tedious and time-consuming activity that only later brings desired results. Many of my students were using a bilingual dictionary for the first time in their lives. I observed how, at first, they could not distinguish the English and the Spanish parts of the dictionary while looking up the translation of a word. They looked up an English word in the Spanish-English section rather than in the English-Spanish one. I had to provide more scaffolds for them to be able to use a dictionary. I made it a class rule for students to bring a dictionary every day and held them accountable if they forgot it at home or

told me that it was in their locker. Constant reminding brought positive effects.

Students started to bring dictionaries daily, and they used them for reference. A few

students even tried to use handheld electronic dictionaries in addition to the regular

ones. The following notes captured this episode.

Field Notes dated May 4, 2007: I wrote, "Dunia started to use electronic dictionary. She is, apparently, looking at Jorje and Adan who had started to use them before."

I advised students to use the regular dictionaries at the beginning, because the

electronic dictionaries often did not provide the necessary context for the word they

were looking for. Soon, the students discovered it themselves and returned to the

Larousse dictionary again.

Action 3: Examining the new instructional solution 2006/07

INSTRUMENTS: Observation/reflection, research literature, dictionaries

SUBJECT: Teacher/researcher

OBJECT: Students' performance

OUTCOME: Meaningful communication between teacher and students

RULES: Classroom rule to use dictionary daily

COMMUNITY: Teacher, students

DIVISION OF LABOR:
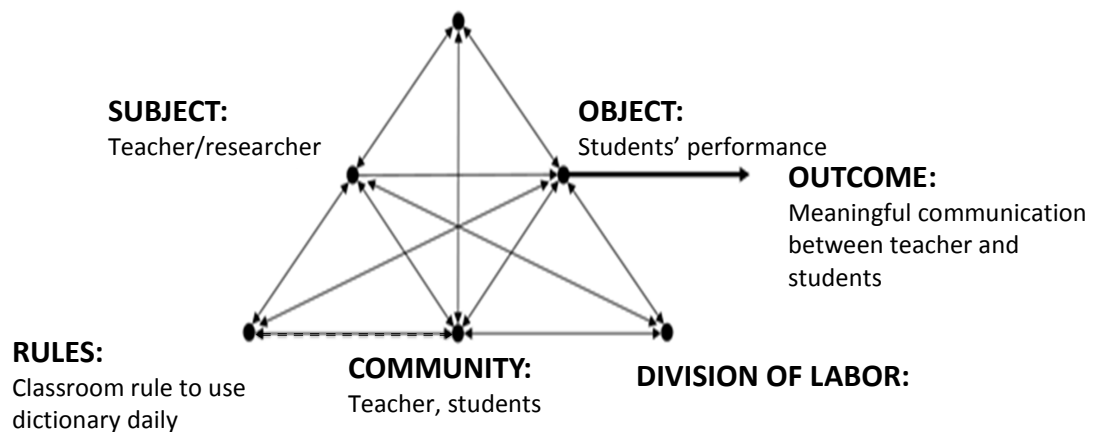
Figure 12.3. Learning actions of bilingual dictionary activity.

Action Model: In the diagram of Action 3 (see Figure 12.3), the subject of the

action is taken by the teacher/researcher, because this year I started my personal,

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unofficial research inquiry as a doctorate candidate. The object of the action is students' performance; in other words, I was focusing on how students were constructing meaning using bilingual dictionaries. The mediating instruments are bilingual dictionaries for students, as the participants of the teaching-learning activity, and reflective observation and research literature for the teacher/researcher, as the subject of the action, whose point of view is taken in the analysis of the situation. The additional mediating factor in this action is the class rule "To bring the dictionary every day to class and use it." The outcome of this action is the establishing of meaningful communication between me and my students, which has become possible as a result of teaching my students how to use a bilingual dictionary as their native language support. Disturbances in this action occurred along the rules-community trajectory. They were uncovered when I analyzed my field notes and reflected on the episodes in class.

Self-reflective analysis: Implementing Action 3, I found myself in a research situation which I had a chance to observe more carefully, since all my students had bilingual dictionaries as their accommodation tool. What this situation revealed was that the availability of dictionaries did not automatically provide native language support for students. On the one hand, the majority of students did not know how to use the dictionary effectively, and, on the other hand, many students did not want to use it on a regular basis in class, because they thought it was boring. I had to support their acquiring of dictionary competence the first day of classes and be very consistent and strict in my demands. My goal was that students would start using dictionaries on their own, of their own free will. Only as such could it be established

as a study strategy which they can use by themselves beyond my class, for their educational growth. I was delighted to see the emergence of this internalized free will later in the course. When some students forgot to bring the dictionary to class, upon entering the classroom they would immediately ask for an extra one, because, as they said, they needed it for today's class. They needed it to construct meaning for themselves and by themselves. Unfortunately, not everybody could reach such a level of self-regulation and responsibility, but I was happy to see that I promoted a positive change in some of them.

Literature support: In order to find support for my instructional intervention, I referred to research literature for confirmation or disconfirmation. It turned out that empirical research on dictionaries has largely focused on comparing the usefulness of dictionaries with that of guessing (Knight, 1994; Laufer & Hadar, 1997; Laufer & Hill, 2000), mostly in L1 settings. Dictionary strategies, if at all encouraged, have normally been proposed in a prescriptive manner (Nation 2001; Scholfield, 1982; Thomson, 1987). For example, Scholfield (1982) argued that making use of a dictionary should not be seen as a straightforward technical and passive activity. It is rather a complex process of hypothesis testing that involves the active participation of the learner.

During the 2007/08 school year I continued to observe and reflect systematically. For example, I observed that students expressed difficulties in determining the parts of speech of a particular word that impeded their understanding of the text. In the sentence, "Science is the study of the natural world," students incorrectly associated the word "study" with a verb, not a noun. In the sentence, "The

planets orbit the sun," students were confused with the meaning of the word "orbit" and assigned to it the meaning of a noun, not a verb. More systematic observations and reflections resulted in the necessity to develop supplementary dictionary skills exercises, so that students could use the dictionary not only as a reference tool, to help them find translations of new words, but also as a learning resource. For example, they could use the dictionary to learn how to distinguish the parts of speech, how to identify prefixes and suffixes, how to understand the meaning of homographs and homonyms, and how to learn pronunciation.

Literature support: From referring to research literature, I found that my modeling of the creative extension was in tune with the findings of other researchers (Atkins, 1998; Harvey & Yuill, 1997; Lewis, 1993; Summers, 1988). For example, Lewis (1993) recommended broadening the curriculum skills syllabus by including "the students' ability to use the dictionary as a learning resource, rather than reference work" (Lewis, 1993, p. 114). Inspired by confirmation from other educators, I began to develop bilingual dictionary exercises as an extension of the traditional use of the bilingual dictionary, which is just looking up unfamiliar words. Below I provide examples of data that exemplified the process of creating a bilingual dictionary exercise (activity) as small cycles of expansive learning, or critical trialing, in the format of an actual lesson.

Example of small cycles of innovative learning. *Conflicting situation:* I realized that the language tip on page 101 of the *Longman Science* textbook did not perform its educational function when it was left as it was (see below).

Language tip: **nature**   **> noun**

                              natural   **> adjective**

                              naturally **> adverb**

Students just skipped over this little note without paying attention, if I did not draw their attention to it. As an action researcher, I reflected on how I could approach this conflict. I started with questions.

Questioning (or planning): How could I extend or elaborate this little grammar note into a bilingual dictionary practice activity? Should I just ask students to refer to dictionaries? Should I give more examples of words with indications of their parts of speech? Should I provide these words in context? After reflecting on student needs (or zone of proximal development), I decided to present this language tip in the format of a table so that I would be able to include more examples of words in it and to organize them in columns.

Modeling the new situation (or acting): I create a table with three columns for each part of speech: a noun, an adjective and a verb. I decide to include a verb instead of an adverb, because there are more examples of verbs for students to identify in the reading excerpt, and there was only one example of an adverb. I then provide 17 rows for the examples of words. I write the following directions: "Find in the text examples of nouns, adjectives and verbs. Write down your examples in three columns. Find translations of the words which you don't know in the dictionary." Then I make copies and distribute them to students during the first period (see Version 1, in Appendix T).

Examining the new situation: During the first trial I observed that immediately after I distributed the worksheet, Jose, Ana, Diana and Alex figured out that they could copy examples of the parts of speech of the words they needed from the vocabulary lists instead of reading the text and finding examples of words of the three parts of speech while also referring to the dictionary, as required by the directions. The rest of the students looking at this group of students (who figured out the easiest way of doing this activity) stopped reading the text using their dictionaries and started doing the same thing, copying examples of the parts of speech from the vocabulary lists.

Reflecting and Analyzing: Analyzing this episode, I again began with the question, "How could I make this exercise more effective so that students will use the dictionaries and not the vocabulary lists to distinguish the parts of speech of the words from the reading passage?" However, I was pleased that they referred to their vocabulary lists for help, since I wanted the students to use these lists in class as supplementary material. I also asked, "Should I state in the directions not to use the vocabulary lists?" "Should I reduce the number of examples?" Instead of asking students "to find the parts of speech of separate words in the passage", should I ask them "to copy several sentences from the passage and mark the parts of speech of the words in context?"

Observing: To my surprise, during the second period students did not figure out so quickly that they could copy the parts of speech of the words from the vocabulary lists to fill in the table. They all started reading the text, simultaneously referring to dictionaries to find out what part of speech a particular word was. I

observed that many students needed dictionaries for this activity, because without them they were experiencing difficulties in determining the parts of speech of the words from the context.

Reflecting and Analyzing: Students' inability to identify the parts of speech intuitively while reading the text, without referring to dictionaries, means that they had not been taught before how to do it. They did not have prior knowledge of how to segment language into grammatical categories.

Observing: In this class, only Rosa referred to vocabulary lists to indicate the part of speech of the word from the passage. She did it after some time, as a double check strategy (which is good), not immediately, but only after I had instructed the students to use the dictionary for this type of activity.

Reflecting and Analyzing: Reflecting on the situation from this trial, I realized that, as an extension to this practice, it would be useful for students to practice distinguishing parts of speech in the examples of different sentences, beyond this particular passage, in order to provide them additional opportunities to hear and use a wider vocabulary in English. I also observed that I should reduce the number of examples because many students could not finish all of them within the assigned time.

Observing: During the third trial I observed the repetition of the same classroom episodes (examples of saturated data), such as the use of dictionaries and vocabulary lists simultaneously by some students, the lack of time for all 17

examples, and the necessity for additional practice to distinguish the parts of speech on more examples.

Implementing the new solution: On the basis of my reflection and analysis during these trials, I created a final version of the bilingual dictionary exercise (see Version 2, in Appendix T).

Self-reflective analysis: Reflecting on my critical trialing, I became aware of how it was only with the help of my students, as participants of the study and mediating agents in the given action, that I was able to improve my practice by creating better instructional material. They acted as my coauthors in the construction of meaning, helped me to understand better my intentions while teaching, refined my instruction, and, ultimately, improved my supplementary instructional materials with L1 support. As the trial (cycle) continued, it showed a change in my thinking as well as a change in my actions. This change in thinking, according to McNiff and Whitehead (2002), can be called teacher learning. Engeström (2000) defines it as expansive learning within the zone of proximal development.

Action Model: The diagram of Action 4 is depicted in Figure 12.4. The subject of the action is the teacher/researcher. The object is the bilingual dictionary exercises which I need to create. The community is represented by the teacher and the students. Students' participation in this action, as community members, is crucial, because as participants of the action research study they help to create lingua-contextual exercises.

This action is mediated by my observation and reflection, which I use during critical trials. I also use samples of students' work as the additional mediating instruments in this action. My reference to research literature is also highlighted as mediating factor.

Action 4: Creating bilingual dictionary exercises

2007/08

INSTRUMENTS: Critical trials, research literature, students' work

SUBJECT:
Teacher/researcher

OBJECT:
Bilingual dictionary exercises

OUTCOME:
Created bilingual dictionary exercises

RULES:
Directions hour to do exercises

COMMUNITY:
Teacher, students

DIVISION OF LABOR:
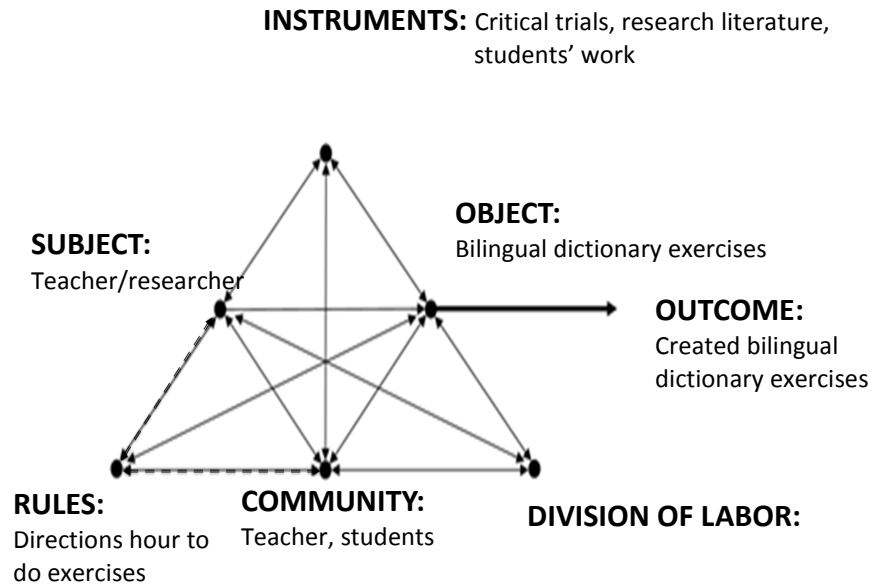
Action 5: Evaluating the bilingual dictionary activity

2008/09

INSTRUMENTS: Test scores, checklist, rating scales, videos

SUBJECT:
Teacher/researcher students

OBJECT:
Teacher's performance, students' performance

OUTCOME:
Results of evaluation

RULES:

COMMUNITY:
Teacher, students

DIVISION OF LABOR:
Video assistant
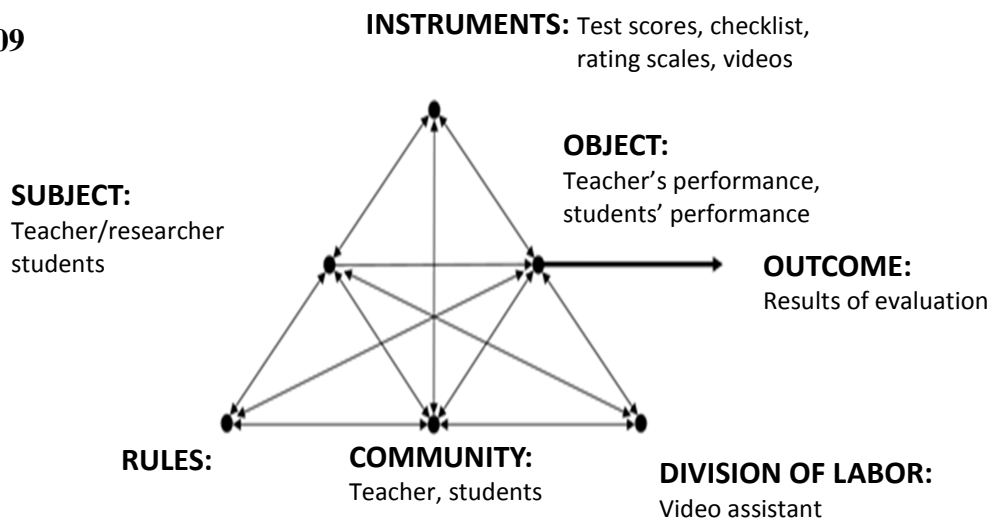
Figure 12.4. Learning actions of bilingual dictionary activity.

Although I did not use it directly in class during trials, it provided logistical support for my instructional innovation. The rules slot has two items: the classroom rule "to use the dictionary every day" and the directions telling how to do exercises. The outcome of this action is teacher-created bilingual dictionary exercises which represent the material innovative product of this action. The immaterial result of this action, which could be interpreted as the overarching goal of this action, is improved instruction. Disturbances in this action, according to my field notes and reflective analysis, occurred between the rules and the community, and between the subject and the rules. They were, on the one hand, the result of students misusing dictionaries and not following directions as specified in the handouts. On the other hand, these disturbances were caused by my inadequate planning of supplementary instructional materials. These disturbances were being resolved on-site during trials.

Action model: The fifth learning action (see Figure 12.4) took place during the implementation stage of my project. [I need to mention here that the diagram of action 5 can be used by default for all four activities with L1 support during the implementation stage. For this reason I am diagramming this action only once here.] The goal of this stage was to obtain results of evaluation of the bilingual dictionary activity. In order to obtain these results I decided to use two channels. The first channel I used as teacher/researcher to evaluate students' performance with the help of test scores, observation charts and students' work. The second channel was used by students to evaluate the teacher-created supplementary instructional materials with the help of rating scales and a checklist.

This learning action has two subjects: the teacher/researcher and the students, because both of their points of view are taken into consideration in the analysis of this action. Consequently, there are two objects in this action: (1) the students' performance and (2) the teacher's performance. The mediating instruments are the evaluation research instruments. The outcome of this action is the results of the evaluation.

Self-reflective analysis: With every new learning action, as I tried to improve my practice by means of self-study, it became clear to me that without systematic self-reflection and self-control it was impossible to do research on myself. There was a moment of insight when I clearly became aware of a split in my thinking. Before this reflection I had a linear mode of thinking in my head, yet after and during this inquiry I felt that I was elevated to a different thinking ability, which allowed parallel processing of information, or metacognitive awareness. For example, when I was performing some actions (giving instructions in class or explaining the material), I was constantly mentally watching myself and how I was performing these actions. This mental watching (mental witnessing) put me in a living mode when I was in constant vigilance and under self-regulation, even though sometimes I wanted to get rid of this mental alert. I have realized that doing self-study in order to improve one's own practice is comparable to upgrading a program by a programmer on which he or she is constantly working. In my work situation, I as the researcher/practitioner was upgrading myself and my model of the teaching/learning activity in order to make myself and my model work better. In this respect I agree with McNiff and Whitehead,

who consider action research to be "a highly rigorous process which goes far beyond method and becomes a form of praxis" (McNiff & Whitehead, 2002, p. 101).

Vocabulary Development Activity as Cycle of Expensive Learning

The beginning of the vocabulary development activity started in the 2005/06 school year when I obtained permission from the ESOL Office to pilot the *Pacemaker General Science* textbook with a Spanish supplement in my classes. When I searched through the ESOL publisher catalogues, it was the only science content-based program I found that provided a Spanish supplement in the form of a separate booklet. The booklet contained the key science terms for each lesson of the unit, the objectives of the lesson and the review questions in Spanish. However, during the first month of piloting this textbook and its Spanish supplement, it has become clear to me that the Spanish support provided by this program was insufficient to help beginning learners of English comprehend science content and master English simultaneously. The bilingual vocabulary (about 10 words for each lesson) provided in the Spanish supplement was not enough for students to comprehend the content of the lesson. A lot of English words and expressions still remained out of reach for beginning learners. Objectives of the lessons were aimed at mastering only content, not the English language, and the review questions were tailored to satisfy the learning needs of students of more advanced levels. Additionally, the situation was complicated by the growing number of students in my classes. The 2005/06 academic school year was the year of opening the new building of our school and, apparently, because of this we had an unusually big flow of incoming immigrant students. The ESOL freshmen classes were overcrowded. I had more than 20 students in each of my

three sheltered science content classes and only five bilingual dictionaries in each class to assist them. I didn't have any hands-on materials or science lab equipment to provide visual support. Faced with these disturbances, I had to devise effective and less time-consuming strategies to teach academic language and content, because the curriculum and its pacing guide did not work.

Literature support: Researchers (Carter, 1987; McCarthy, 1990; Nation, 1990, 2001; Schmitt, 2000) acknowledge vocabulary development as critical for English language learners because, according to Echevarria et al., "there is a correlation between vocabulary development and academic achievement" (Echevarria et al., 2000, p. 62). However, I found that there are still a lot of unanswered questions in the research field regarding the best ways for ESOL students to learn content-related vocabulary.

The prevailing view among researchers and practitioners on vocabulary learning strategies for ELLs for the last two decades was shaped by the approach of Krashen (1989), who concluded that incidental vocabulary learning, or "acquisition," achieves better results than intentional vocabulary learning. A major flaw in this conclusion, however, lies in the assumption, that spelling and vocabulary are developed in second languages as they are in the first language (Krashen, 1989). Besides, the prerequisite for effective incidental vocabulary learning, according to Krashen, is reading ability, which beginning foreign language learners possess only to a very limited extent. Currently, researchers (Huckin & Coady, 1999; Laufer & Huslsijn, 2001; Nation, 2001; Schmitt, 2000) tend to conclude that incidental

vocabulary learning through reading and writing is more effective for intermediate and advanced L2 learners.

In this study I found that intentional vocabulary learning is a necessary strategy for beginning learners of English in the science content class. I also found that the initial presentation of vocabulary in the form of bilingual vocabulary lists followed by intentional memorization is one of the most efficient ways to achieve comprehension at the beginning level of English proficiency in a sheltered science content class. Retention of the vocabulary can be further achieved by means of comprehensive input in English and meaningful communicative activities. Presentation of abstract academic vocabulary to beginning learners cannot be done solely in English without the help of such advocated strategies as the use of concept definition maps, repeated exposure, word wall and mnemonic strategies among others. I found it difficult to visually demonstrate such abstract concepts as "force," "plant kingdom," "space," "ground," "through," "by means of," "thickness," "trait," and many others.

In order to help my students quickly recognize abstract scientific terms and other words in the text they were reading, I began to create additional bilingual vocabulary lists for each lesson of the unit using overhead transparencies. The first reaction of students when they saw the English words and their Spanish equivalents displayed on the screen was very positive. I observed how some of them sighed with relief signaling that they were able to construct some meaning. I remember very well that it was this initial student response that made me continue developing this activity.

Action Model: The first learning action of the vocabulary development activity is diagramed in Figure 13.1. The subject of the action is the teacher. The object of the action is the bilingual lists which I am creating using the overhead projector as the mediating instrument. The additional mediating instrument is the Pacemaker *General Science* textbook (as well as my professional knowledge which is used in all diagrams by default), which provides vocabulary content for the vocabulary lists. This action is also mediated by the rules, which are "to copy vocabulary words onto the notebook." The community slot is represented by the teacher and the students as the active agents of the teaching/learning community. The outcome of this action is the ability of students to construct meaning of science content. Disturbances in the action were uncovered along the instruments-object pathway, the instruments-subject pathway, and the subject-object pathway.

Self-reflective analysis: While observing how students were using these vocabulary lists, I discovered several negative factors. For example, after having presented the vocabulary of the lesson, I checked the next day to see how students kept their notes. It turned out that I could not make out what words some of the students had copied into their notebooks. When I asked them to tell me what these words meant, they were at a loss and could not answer. It was evident that they had copied the words mechanically, without paying attention to the spelling and to the meaning of these words. Additionally, students did not memorize the words. I asked myself what I could do to improve the instruction. Reflecting on the situation during one of the lessons, an idea flashed through my mind; "I need to create printed vocabulary lists for students' individual use. These lists will save students' time. They

will not have to copy the words from the board. I also will have more flexibility using

the lists for instruction and memorization check-up."

Action 1: Using bilingual vocabulary lists on overhead transparencies

2005/06

INSTRUMENTS: Overhead projector, textbook

SUBJECT:
Teacher

OBJECT:
Bilingual vocabulary lists

OUTCOME:
Students' ability to construct meaning of science content

RULES:
Students have to copy vocabulary into the notebooks

COMMUNITY:
Teacher, students

DIVISION OF LABOR:
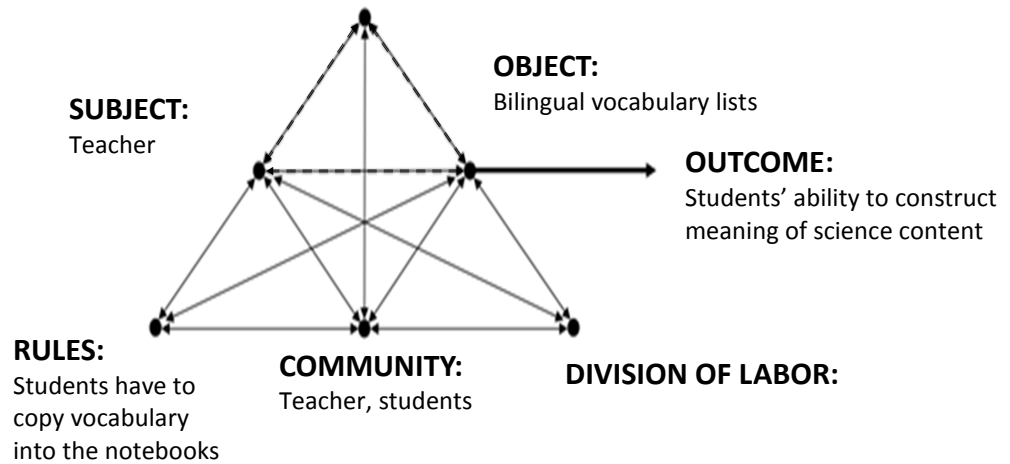
Action 2: Creating bilingual vocabulary lists

2006/07

INSTRUMENTS: Textbook, research literature, critical trials

SUBJECT:
Teacher/researcher

OBJECT:
Longman Science Bilingual vocabulary lists

OUTCOME:
Typed bilingual vocabulary lists

RULES:

COMMUNITY:
Teacher, students, ESOL Office

DIVISION OF LABOR:
Research assistant
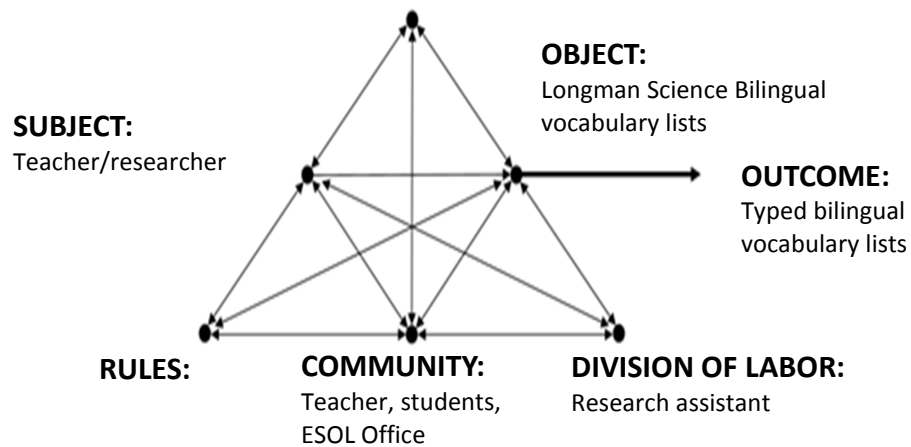
Figure 13.1. Learning actions of vocabulary development activity.

Literature support: The research literature I referenced corroborated my insight. I also found support for my other strategies that I instinctively used for vocabulary development in my science content classes. For example, a number of researchers (Crothers and Suppes, 1967; Thorndike, 1908; Webb, 1962) found that vocabulary lists and rehearsal of them is a productive vocabulary learning strategy which allows the learner to retain a significant amount of words within a relatively short period of time. Examining the list sizes ranging from 18 to 300, Crothers and Suppes (1967) discovered that when words were difficult, small sizes were better, and when words were easy, large sizes were more efficient.

The modeling of the new solution took the full academic school year of 2006/07. During this year I started to use in my classes a newly published *Longman Science* textbook, which was introduced a year before at one of the professional development workshops sponsored by the region's ESOL Office. This textbook looked to me like a promising solution to the existing situation with the sheltered course. In 2006/07 the Longman Science program was not yet officially adopted by the ESOL office as a course textbook, but teachers were not restricted in their choice of supplementary instructional materials in their classrooms, since the *SGA General Science* textbook proved to be too difficult for teaching and learning. I took advantage of this situation, bought a set of *Longman Science* textbooks, notified the ESOL Office that I was starting to use them in my classes and began to implement my project. In the next school year, 2007/08, the ESOL Office would officially adopt the *Longman Science* textbook as a new course book along with a new curriculum of the ESOL sheltered science content course for beginning learners of English. The ESOL

office also would buy additional sets of bilingual dictionaries for classroom use for each school. I felt that my actions contributed to some extent to these changes.

Self-reflecting analysis: Reflecting on my actions at the workshop and on my subsequent request to pilot a new textbook with a Spanish supplement, I see that I was trying to live out my personal values in practice, hoping to bring about a social change. I understood this social change in my local situation as improving education for my ESOL students. I did not want to be a "living contradiction" (McNiff and Whitehead, 2002, p. 72), saying one thing or believing in one thing and doing another in practice (see Bogdan and Biklen, 2003; Burns, 1999; Carr and Kemmis, 1986; McKernan, 1991). As McNiff and Whitehead write:

> Action research is always political, because an aim is to influence people to change their situations. Many people feel comfortable with the status quo, possibly because it is familiar. They might complain about where they are but familiarity gives security and it is difficult for many to break the emotional bonds, even if they know at a cognitive level that they should. Other people are comfortable with the status quo because it suits them, particularly if they have a position of power and are unwilling to encourage public participation in decision-making. (McNiff and Whithead, 2002, p. 90)

I think I was strong enough to stay true to myself without compromising my values and beliefs. I did not give up the struggle when the pressures began mounting. I acted in such a way that my voice as a teacher could be heard, and I would not be just a passive onlooker detached from the process of curriculum development but an active contributor and a transformer, even at my personal level as a practitioner. Undertaking the action research self-study, I embarked on the road of recreating myself in order to help my students recreate themselves.

The new textbook did provide fruitful opportunities for modeling the new solution in the 2006/07 school year. I started to try out in class hand-written vocabulary lists based on the content of the *Longman Science* textbook. I tried them in class and observed how students were using them; then I made certain changes in the lists, adding some new words that students failed to know or expressions that were difficult for them to understand. The following data illustrates how I changed my actions on the basis of my observations.

Field Notes dated September 10, 2006: I wrote: "I was surprised today when Henry could not translate the word "scientist." I did not include it on the list thinking that students could figure out how to translate it as a derivative of the word "science." I, then, should include it after the word "science" with the indication of a part of speech."

Literature support: Reference to foreign/second language learning literature was crucial during this stage, because I was looking for available options of bilingual vocabulary lists. I wanted to know, "What was the best way of positioning words on the list?" For example, in the *Foresman Multilingual Math Word Lists* (2004), words were positioned in two columns, a math word in English in one column and the corresponding word in the students' native language in the other column. The publisher has chosen this pattern on the ground that some school districts let ELL students use a reference book in this way when they are taking high-stakes tests. For this reason, no definitions were included in it. Dong (Dong, 2004) provided another example of the multilingual ecology glossary in which vocabulary words are positioned on the page in three vertical columns, while their native language translations, in eight languages, are positioned horizontally.

Bearing in mind these research findings and my professional experience, I decided to put words in two straight columns, with English words in one column and their corresponding Spanish equivalents in the other, to allow students to check themselves using the two column method, by covering the English word and trying to remember its Spanish translation and vise versa. I also noticed during my observations in class that the indication of the part of speech next to the vocabulary word on my lists was necessary, because students often mixed homonyms while comprehending the text (for example, "study" as a noun with "study" as a verb). Indication of the parts of speech also helped my students to learn grammar, because the list helped them distinguish nouns, verbs, adjectives, adverbs, prepositions and conjunctions as grammatical categories. Another important feature of my lists was that I decided to position the words not according to the alphabetical order (like in dictionaries and glossaries), but in the order they appeared in the text, so that students could use the lists as a quick reference guide while they were reading. I wanted these lists to be a kind of scribe or reading-translating tool.

Action Model: The structure of the second learning action (see Figure 13.1) is diagramed the following way. The subject of the action is now the teacher/researcher, because at this time I had completed my comprehensive exams and advanced to doctoral candidacy. The object of the action is the new version of bilingual vocabulary lists. The mediating instruments are my observation and reflection, the research literature and the *Longman Science* textbook, which provided new content material. The ESOL Office acts in this situation as another mediating factor, because it introduced the new textbook at the workshop and thus activated the

community slot, which simultaneously includes the teacher and the students as the representatives of the teaching/learning activity. During this cycle, I activated for the first time the division of labor slot as another mediating factor, because I had to hire my former student to be my bilingual research assistant. The outcome of the action is the first version of typed vocabulary lists.

Self-reflecting analysis: While I observed that vocabulary lists were a necessary complement to constructing meaningful instruction in the course, I also saw their deficiency. This deficiency manifested itself in the fact that students kept referring to dictionaries first in case they needed quick translation of a word, forgetting that this word was already translated on the list, and that the meaning of the word was the one needed by the context. This observation was documented in my field notes.

Field Notes dated September 26, 2006: I wrote, "Students again refer to dictionaries instead of vocabulary lists or textbooks. They translated "to look for" as "to see" ("mirar") instead of as "to find" ("buscar") as it should be translated in the context of the text."

This fact prompted me to search for solutions to help make students accountable for the vocabulary they were supposed to learn. I also needed additional activities that would teach students how to memorize words, and my students again provided me with some clues on how to teach them better. The following field notes illustrate how students played the role of active participants of my study.

Field Notes dated September 24, 2006: I wrote, "I noticed today that Celia highlighted some words on her list. That gave me a hint. I need to edge the students to do the same for the words they still do not remember or always forget".

***Field Notes dated November 10, 2006**: I wrote, "Today during the third period I observed how George checked with Carlos to see if he knew the vocabulary. George said the word in Spanish and wanted Carlos to translate it in English. I can use this technique for developing memorization strategies, think how to do it.*

On the basis of my observations and reflective analysis, I started to implement the new solution to suit the classroom situation. I introduced new teaching strategies for memorizing vocabulary, or the Memory Time activities, as I called them. In every lesson I tried to reserve 10 or 15 minutes for a Memory Time activity, which had two parts. During the individual Memory Time, students worked individually to memorize vocabulary words using the two column method, covering one column with the folded notebook page and writing words on it from the other column. During the cooperative Memory Time, students worked in groups of two or three, checking each other's knowledge of assigned vocabulary. Students had to take turns asking each other to translate a word orally from Spanish into English and vice versa. After this training activity, students were supposed to take a cloze vocabulary quiz in order to show how they had mastered the assigned vocabulary of the lesson.

Literature support: Referring to research literature, I have found support for my cooperative Memory Time activity. A number of studies (Gary & Gary, 1982; Hill, 1994; Kelly, 1992; Seibert, 1927) concluded that repeating words aloud helps retention far better than silent repetition. Empirical research (Carter, 1987) on vocabulary rehearsal also testified that employing various repetition strategies at the initial stages of vocabulary learning is necessary and legitimate. For instance, Carter states, "quantities of initial vocabulary can be learned both efficiently and quickly and by methods such as rote learning which are not always considered to be respectable. It may be dangerous to underestimate such a capacity" (Carter, 1987, p. 153).

Action Model: Action 3 (see Figure 13.2), captures changes in my mediation instrumentality. The subject of the action is the teacher/researcher. The object of the action is students' knowledge of specialized vocabulary. The mediating instruments are (1) the bilingual vocabulary lists for students, (2) observation charts for the teacher/researcher, and (3) cloze quizzes for both the teacher and the students as the assessment instruments of the teaching/learning practice. The diagram shows that I included the new rules in this action. These rules are my teaching strategies to help the students memorize content vocabulary. The structure of this action also shows how vocabulary lists from the object of the activity, as compared to Action 2, shifted to the position of the mediating instrument, thus displaying the interaction between the components of the action in complementary representational modalities. The outcome of this action is supposed to be my improved practice, which is based on the results of the students' scores on quizzes. However, this outcome was not fully realized because of the disturbances in the action which occurred along the object-rules pathway, because not all students memorized vocabulary to the extent that I wanted them to during the Memory Time activity; and disturbances along the instrument-object pathway, because my vocabulary lists were not exhaustive enough to prevent students from using bilingual dictionaries.

Self-reflective analysis: Reflecting on my method of teaching content vocabulary using bilingual dictionaries and vocabulary lists and looking through my field notes, I realized that I was most interested in comparing how often students used dictionaries versus how often they used vocabulary lists. Almost every lesson, I jotted down in my planning outline how many times students used dictionaries and how

many times they used vocabulary lists. The purpose of this comparing was to determine for myself or to get a better understanding of whether using vocabulary lists was helpful for students. The analysis revealed that students preferred to use dictionaries more often than vocabulary lists, because the alphabetical order was easier to follow, and not all words from the texts were included in the lists.

Action 3: Examining activities for memorizing vocabulary

2007/08

INSTRUMENTS: Bilingual vocabulary lists, observation charts, quizzes

SUBJECT: Teacher/researcher

OBJECT: Students' knowledge of specialized vocabulary

OUTCOME: Students' improved scores, improved instruction

RULES: Memory Time activities during each lesson

COMMUNITY: Teacher, students,

DIVISION OF LABOR:
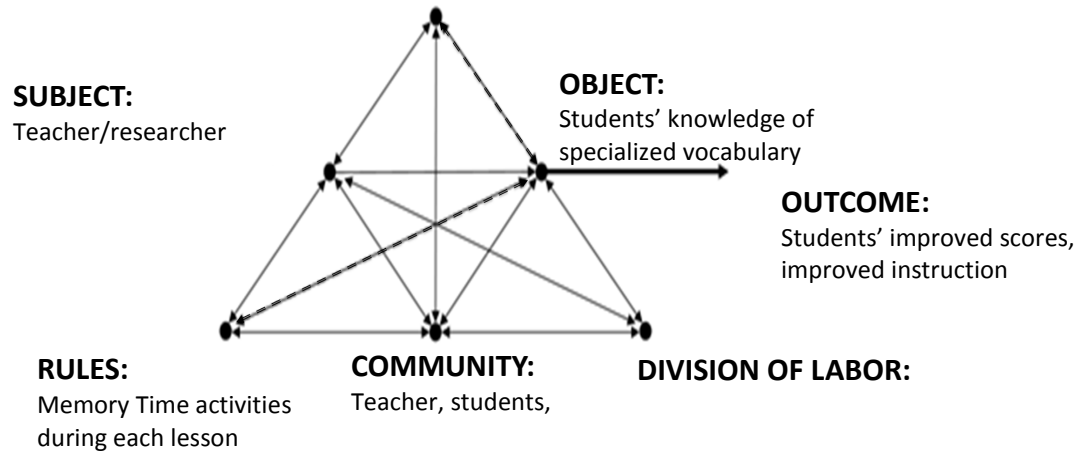
Action 4: Using colored vocabulary lists

2008/09

INSTRUMENTS: Colored paper

SUBJECT: Teacher/researcher

OBJECT: Vocabulary lists

OUTCOME: New product - the colored vocabulary lists

RULES:

COMMUNITY: Teacher/colleague, myself

DIVISION OF LABOR:
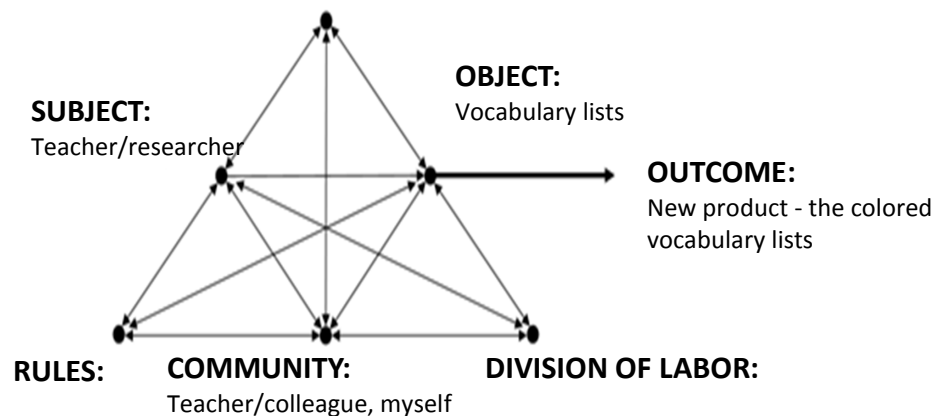
Figure 13.2. Learning actions of vocabulary development activity.

However, according to my interactions with students in class, it became obvious that vocabulary lists were more helpful in those situations when they contained words and expressions not listed in their dictionaries. The analysis also showed that students with previously well developed study skills used dictionaries and vocabulary lists more frequently than students with interruptions in their schooling. The latter group of students always needed pushing and reminding from me to use these accommodation tools in class in order to help themselves to understand the material. I should also confess that, in general, I was not satisfied with the extent to which students learned the vocabulary, because only the same group of students consistently performed well during Memory Time activities and on vocabulary quizzes. I concluded that different groups of students needed individualized approaches towards learning vocabulary.

Literature support: For confirmation or disconfirmation of my conclusion, I referred to research literature and discovered that in his study, Ahmed (1989) found that the good learners were more aware of what they could learn about new words, paid more attention to collocation and spelling, and were more conscious of context learning. By contrast, the underachieving learners refused to use the dictionary and almost always ignored unknown words. They were generally characterized by their apparent passiveness in learning.

An improved solution to this learning action is beyond the scope of this study. However, I think that the development of instructional materials for different groups of learners might be one of the options.

During the implementation stage, I started to use colored vocabulary lists, which helped students keep their notebooks organized and speed up their reference to vocabulary lists. I came up with this idea one day when I went to copy my vocabulary list for the next lesson and saw that somebody had left on the copier a pink list with lesson instructions. It suddenly occurred to me that it would be very helpful to use colored paper for my lists.

Field Notes dated February, 2009: I wrote, "I found it very helpful to make vocabulary lists in a different color, for example, blue. It helped students, especially those with undeveloped study skills, to organize their notebook and refer to vocabulary lists more quickly."

Self-reflective analysis: Interestingly enough, colored codes are used extensively in printed textbooks, and I knew about it. However, to apply a different color for vocabulary lists in order to help my students organize their notebooks had never occurred to me. I found myself in a special situation (see Figure 13.2, Action 4), in which I related to another colleague's practice and this relation triggered the necessary action on my part. This is one more example that, in action research, we improve practice in company with others.

Functional Grammar Activity as a Cycle of Expansive Learning

Teaching grammar has always been a necessary component of language instruction in all of my ESOL classes throughout my professional career both in Russia and in the US, because I believe that grammar provides the necessary foundation for the conscious mastering of a foreign language. I have never been an ardent supporter of Krashen's Natural Approach (1983), which favors comprehensive input strategies in teaching L2, eliminating direct instruction in grammar. In his historical analysis of different approaches to teaching a foreign language, Krashen

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(1983) correctly perceives that the study of grammar was highly valued by members of the upper classes in Roman and Greek societies, which, seems to have given them the opportunity to succeed in rhetorical disciplines and develop logical and abstract thinking skills. He also acknowledges that "the study of Latin grammar was highly valued and affected both the study of the grammar of one's native tongue as well as the more formalized study of other languages" (Krashen, 1983, p. 8). Unfortunately, during the last two decades, due to the spread of Krashen's view that grammar will be acquired by itself provided the teachers follow comprehensive, meaningful guidelines, a grammatical syllabus was almost dismissed for the benefit of communication goals. This situation led to the oversimplified second/foreign language instruction in secondary school, giving students the impression that learning a second/foreign language is always fun and easy.

Literature support: Recently, under demands of Title III of the NCLB (2001) which requires states to link state content objectives and state English language development (ELD) standards to the development of state English proficiency tests, the interest of researchers began to focus on grammar instruction again. For example, in the study "Standards-to-Standards Linkage Under Title III: Exploring Common Language Demands in ELD and Science Standards" conducted by Bailey at el. (2005), researchers made an attempt to link the identified language demands, including specific grammar topics, to content-based standards with the aim of ensuring that language learners are exposed to types of language that will assist them in being successful in academic areas. The study called for (1) a more explicit degree of complexity of the lexical and grammatical forms expected of ESOL

students at each ELD level and for (2) more explicit, adequate linkage between language and content standards in state standards documents. Researchers emphasized that it is necessary to broaden the linguistic understanding of the content areas.

An attempt to link language and content standards using specific grammar topics and language functions as the bridge points echoes with Vygotsky's and Leontiev's views on grammar as the contact point between spontaneous and scientific concepts formation (see discussion in Chapter II, p. 36), thus stressing the importance of grammar for language and content teaching from a psycholinguistic perspective.

In teaching practice, this means that there should be systematic work on developing instructional activities and materials that put into effect this linkage in content-based instruction. Developing my functional grammar commentaries with supplementary grammar practice exercises, I attempted to provide my perspective on how this linkage could be achieved while teaching a sheltered ESOL science content course.

I began creating the functional grammar activity in the 2005/06 academic school year when I started to pilot the *Pacemaker General Science* textbook. As I mentioned earlier, teaching grammar was not a new professional experience to me; however, teaching grammar to high school freshmen in the ESOL sheltered science content class presented a challenge. This challenge lay in the fact that, on the one hand, students in general were very poorly prepared academically to grasp grammar

instruction, on the other hand, I had to create my own language objectives for each lesson of the content-based class and develop instructional strategies of how to teach functional grammar, which took a lot of my planning time.

When an ESOL teacher teaches in a regular ESOL class, the sequence of grammar topics proceeds from the easy ones to the more complex. The curriculum usually starts with such topics as forms of the verb "to be," singular and plural nouns, construction of "there is/are" and others. The reading texts are composed in such a way that to incorporate all these grammar features in context provides more opportunities for students to practice. However, in my science content class, the first reading selection of the *Pacemaker General Science* textbook included passive constructions, comparative adjectives, Present Progressive, and multiple conjunctions and prepositions. All these grammar features are taught much later in a regular ESOL English language course. Lack of correlation of grammar topics between a language learning course and a content learning course presented a serious contradiction for teaching and learning. I tried to solve it by creating my own functional grammar mini-lectures explaining a particular grammar topic, which presented difficulty for students in a given lesson. To present this lecture, I used an overhead projector or the board. I also tried to provide a small grammar practice exercise to reinforce the usage of the given grammar feature. Explanation of grammar was done simultaneously with teaching new content vocabulary, which additionally complicated my language instruction in the science content class. Students felt this double pressure and resisted it, displaying behavior problems. Realizing the inefficiency of my efforts, I looked for a solution.

Action 1: Using grammar commentaries in English on overhead transparencies

2005/06

INSTRUMENTS: Overhead projector, textbook, grammar commentaries

SUBJECT:
Teacher

OBJECT:
Grammar commentaries

OUTCOME:
Inefficient grammar instruction

RULES:
Students have to copy grammar commentaries into their notebooks

COMMUNITY:
Teacher, students

DIVISION OF LABOR:
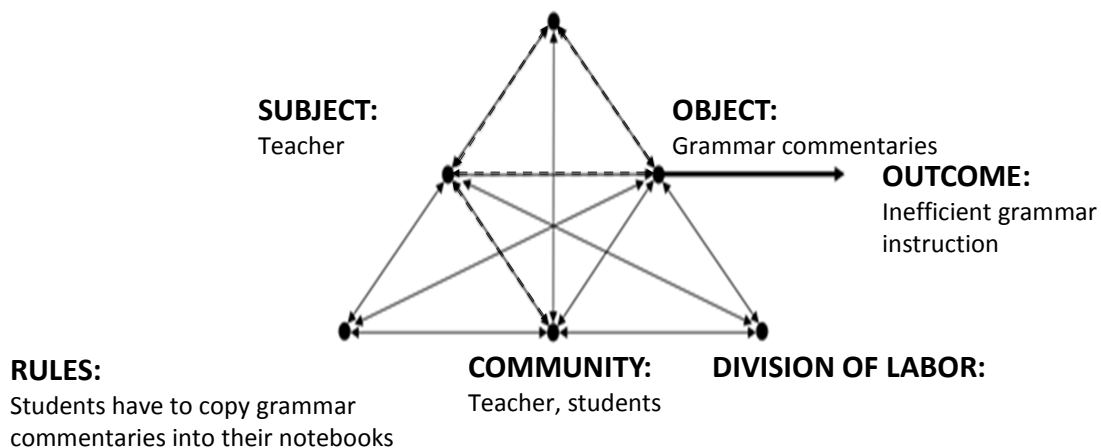
Figure 14.1. Learning actions of functional grammar activity.

Action Model: The structure of the first learning action of the functional

grammar activity is presented in Figure 14.1. The subject of the action is the teacher.

The object of the action is the creation of grammar commentaries in English using the

overhead projector, which serves as the mediating instrument paired with the

textbook. The community is represented by the teacher and the students. Another

mediating factor in this action is the rules, which specify that students should copy

grammar commentaries onto their notebooks. The outcome of this action is my

understanding of the inefficient grammar instruction in my sheltered class, which

calls for finding a solution. Disturbances occurred between the subject-object-

instrument pathway, displaying the difficulties which I experienced with my

mediation instruments, and between the community-object pathway, displaying the

difficulties which my students experienced while comprehending my grammar instruction.

Literature support: When I referred to research literature in order to confirm or disconfirm my first action, I found theories and studies that supported (Doughty &Williams, 1998; Savelkova, 1988; Schmidt, 1990, 2001; Scott, 1990) and rejected (Canale & Swain, 1988; Rutherford, 1988; Tomlin & Villa, 1994) grammar rule explanation instruction. For example, Rutherford (1988) argues that "classroom attention to language form is neither a sufficient nor a necessary condition for learning to take place…[and] grammar will, so to speak, take care of itself, as it does in the learning of a first language" (p.172). On the contrary, Scott (1990) provides evidence in her study that implicit grammar teaching strategies, which involve exposing students to grammatical structures in a meaningful and comprehensible context in order that they may acquire, as naturally as possible, the grammar of the target language, do not promote learning of the target language.

An experimental study conducted by Savelkova (1988) in Russia demonstrated that an intuitive approach towards teaching grammar is not only less effective than the conscious approach but in conditions of public school even hinders the formation of grammar skills in students. The researcher argued that the presentation of grammar rules should be supported by the native language and reinforced through reading, writing, listening and speaking.

There are also studies that advocated the middle ground (Alanen, 1995; Doughty & Williams, 1998; Leow, 1997, 2000; Long, 1991, 1996; Long & Robinson,

1998; Robinson, 1995; Rosa & O'Neill, 1999; Schmidt, 1990, 2001; Stryker, 1997), or the focus on form grammar instruction. For example, Stryker (1997) found that the elimination of grammar from content-based instruction resulted in students' demanding formal grammar instruction. In the same article, Stryker concluded that the use of content-based instruction does not preclude grammar instruction; rather it requires that teachers make informed decisions about how and when to teach grammar and encourage the use of self-correcting techniques, thus allowing students to develop responsibility for their learning and use of the target language.

As a supporter of the explicit approach on teaching grammar, I started thinking about creating grammar commentaries in Spanish, because in content-based language learning classes, where 95 or 100 percent of students are Spanish-speaking, native language support for understanding grammar seemed to me an efficient and reasonable strategy to help students simultaneously master content and language.

The modeling of the new solution began to materialize when, at the professional development workshop (which I described earlier, see p. 110) teachers selected the *Longman Science* textbook for ELL students as the future potential course textbook. I realized that the structure of this textbook provided a very fruitful opportunity to link grammar and content objectives within each lesson of the content-based language course. It was the first commercially published science content program for English language learners that attempted to incorporate grammar features in the form of "language tips" in each lesson of the course book. Some examples of these language tips are as follows: "The word *young* can be an adjective or a noun" ; "The word *tsunami* is Japanese. Its plural and singular forms are the same"; "To make

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the word *leaf* plural, change the *f* to *v* and add -*es*"; "*Weathering* is a process. Many things cause *weathering*. Weathering is a noun."

Unfortunately, the program failed to provide adequate instructional support for this innovation. For example, it did not provide explanations of these grammar features in such a way that beginning learners of English would benefit from it; it did not include practice activities to reinforce the usage of these grammar features; and it did not supply instructional strategies in its teacher's guide to explain how teachers should teach grammar in a science context using these "language tips." I realized that I could eliminate these drawbacks by creating my own standards-based, supplementary, functional grammar commentaries with complementing grammar practice exercises.

I ordered the textbook from a catalog and, while continuing to use the *Pacemaker General Science* for instruction in my classes, started creating functional grammar commentaries on the basis of the new *Longman Science* textbook for the next school year. My objective was to decipher the "language tips" so that students could benefit from these grammar inclusions in the course and not just skip them without paying attention. I was also planning to create grammar practice activities to reinforce the usage of these grammar features in writing and speaking. After the analysis of all "language tips," it became evident that not all grammatical difficulties that beginning learners of English might encounter reading the texts of this program were included in the "language tips." I decided to create my own additional grammar commentaries, because I thought that it would be beneficial for students to have

additional explanations of grammar topics in their native language that relate to the language of the science context and are critical for science studies.

While teaching the course in 2005/06 school year, I learned that teaching grammar in English to beginning learners of English in a science content-based class, using a mainstream general science textbook, is very challenging. My mini-grammar lectures in English were actions that attempted, to some extent, to implement the juncture of content and language objectives in my lessons, but they failed to produce the desired outcomes, because the content and language material of the course were beyond my students' level of science and English proficiency. The unsatisfactory outcome of my actions prompted me to look for another solution, which I saw in creating functional grammar commentaries with L1 support on the basis of the "language tips" of the *Longman Science* textbook.

Self-reflective analysis: This solution, as I reflected more deeply on my practice, was rooted in my personal values and professional beliefs. I wanted to provide fair and quality instruction to my students, and I thought that integrating the native language support in my daily instruction would be the best possible option in my teaching situation. However, I felt that my professional beliefs at this stage of my cycle of expansive learning should have strong theoretical support. I felt I needed to undertake substantial reading to clarify for myself what the issues of teaching grammar in a science content class are, as well as what effects native language support might have on content-based instruction. Overall, reference to research literature has made a significant impact on my professional growth. It also played a crucial role in the validation of actions. Each time, when I found support for my

teaching strategies, I felt satisfaction and confidence. When I found research that contradicted my prior thinking, I was able to reconceptualize and rethink my teaching in new ways similar to Johnson's (2006) discussion of praxis. While reading, I kept records of insights, which allowed me to draw very important conclusions. I felt that systematic reference to research literature for the support of my ideas or in order to get new ideas, put me, as a classroom teacher, not in the position of somebody else's servant as a passive implementer, but in the position of an active developer and a professional researcher. However, I should emphasize that I was able to accomplish this double role of a teacher and a researcher only because of my undergraduate studies and teaching experience in Russia. In the United States, ordinary school teachers are not provided with opportunities of conducting academic research work. They have extremely busy schedules, tuition for doctorate programs is expensive and they are not encouraged to voice their personal theories of teaching and learning that are not in tune with the established policies and educational goals. Because of this they are destined to implement somebody else's curriculum decisions and curriculum materials that often do not fit their classroom situations.

The next stage of the development of the functional grammar activity unfolded in the 2006/07 school year. During this year, I started to use the *Longman Science* textbook in my classes (see historical account of how I began to use this textbook in the course on page 109) and to conduct critical trials of my grammar commentaries and grammar practice activities. What I observed during the first month of my instruction was not encouraging. I realized that many students again, as in the previous year, resisted learning grammar and doing practice exercises, even

though the content material of the *Longman Science* textbook was appropriate for

their level. Below I provide several of my Field Notes dated from the 2006/07 school

year to illustrate some of the difficulties with which I was coping.

Field Notes dated August 30, 2006: I wrote, "I need to teach students how to organize their notebook, how to keep all assignments in chronological order. I need to put numbers on my grammar commentaries and ask students to refer to a particular number when I refer them to grammar commentaries. Check first two weeks how students keep their notebook."

Field Notes dated September 8, 2006: I wrote, "Students did not know how to change the verb 'to change' in the Past Simple, although we discussed it."

Field Notes dated September 13, 2006: I wrote, "Period 1: Students could not put verbs in Present Simple. They were putting all verbs in Past Simple. It is so difficult for students to make any changes with grammatical forms. They just leave everything as it is. Period 2 produced the same situation. Period 3: all students just wrote infinitives without any changes. They just like 'to copy.' Any grammar practice that asks students to perform changes with word forms, which demands from students some mental work, is resisted."

Field Notes dated September 15, 2006: I wrote, "I constantly remind students to put their grammar notes in front of them when we are doing grammar practice so that they will refer to grammar rules. Very few of students do it on their own. The majority of students lack this study strategy."

Field Notes dated September 15, 2006: I wrote, "If I challenge students offering them grammar exercises in science context they resist doing them. They are very reluctant to practice grammar. They don't want to challenge themselves. It is easy to say 'challenge students.' What if they don't want to be challenged."

Field Notes dated September 17, 2006: I wrote, "Students learn how to use their notebook for reference. They don't remember that they have already information what I am asking for. They need to practice how to retrieve this information from their notebook."

Self-reflective analysis: It was obvious that mastering grammar was a new

learning activity and not an easy one for most of my students. They experienced

difficulties with internalizing (memorizing) grammar rules and because of this could

not apply (externalize) grammar in substitution and transformation grammar

exercises. The two months of the course were the hardest because I was transforming

students' previous "learning" habits (often painfully for them), introducing new

challenges and asking them to consciously be engaged in class. I was pushing them to

be mentally active. After these first two months, students would perform grammar

activities throughout the course more enthusiastically; however, the quality of work,

which I liked to see (taking into consideration the amount of time I spent on creating

additional support), was not always satisfactory for me.

Reflecting on my teaching-learning activity, I should admit that I was

sometimes dissatisfied not only with how my students mastered grammar but also

with how I myself delivered my instruction and did lesson planning. Sometimes I

composed my grammar lectures and grammar practice exercises hastily. Sometimes I

would forget to include one important example, another time I would fail to connect a

certain grammar feature to the content material which I was teaching. Teaching

language and content proved to be difficult not only for students but for the teacher as

well. I experienced it as a very intense teaching-learning course which required a lot

of preparation on the part of the teacher, a lot of professionalism, and, ultimately, the

creation of a lot of supplementary instructional materials. The most difficult

instructional component in such a course was discovering how to constantly keep

intertwining language material and content material in a balanced way. The following

field notes confirm this problem.

> **Field Notes dated April 29, 2006/07***: I wrote, "When I give language
> activities, sometimes they interfere with discussing content and complicate mastering
> the content. Students miss content and language, couldn't concentrate on both."*

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Understanding this difficulty, my goal was to create functional grammar commentaries and grammar practice exercises for the course, which would (1) facilitate learning language and science content and (2) would provide a synergy between language and science content learning.

Literature support: When I referred to research literature for support, it turned out that the problem with which I was struggling was at the forefront of the research on grammar instruction. Researchers in several studies (Ellis, 2006; Hulstijn, 1993; Long, 1991; White, 1998) investigated strategies that would determine how to increase the learner's accuracy and/or suppliance of L 2 forms, all the while maintaining a focus on meaning. Results from studies suggest that a number of enhancement techniques (Doughty & Williams, 1998), both naturalistic and instructional, are possible, ranging from less intrusive to most obtrusive. These techniques include varying the font in written input, recast, raising grammar consciousness and explicit rule explanation.

Action Model: The diagram of second action is presented in Figure 14.2. The subject of the second action is the teacher/researcher. The object of the action is the grammar commentaries with L1 support complemented by practice exercises. The mediating tools are the *Longman Science* textbook ("language tips") and research literature. The community is represented by the ESOL Office, which presented the new course textbook, and by the teacher and students. Another mediating factor in this action is my research assistant, who activated the division of labor slot. The outcome is the first version of created functional grammar commentaries in Spanish with lingua-contextual exercises.

During the 2007/08 academic school year I continued to develop grammar commentaries with lingua-contextual exercises (modeling of the new solution) and, at the same time, to examine how the new solution was working in practice. Modeling and examining at the same time give an example of overlapping cycles in action research.

Action 2: Creating functional grammar commentaries with L1 support 2006/07

INSTRUMENTS: "Language Tips", research literature, critical trials

OBJECT: Grammar commentaries in Spanish

SUBJECT: Teacher/researcher

OUTCOME: Created grammar commentaries in Spanish

RULES:

COMMUNITY: Teacher, students, ESOL Office

DIVISION OF LABOR: Research assistant
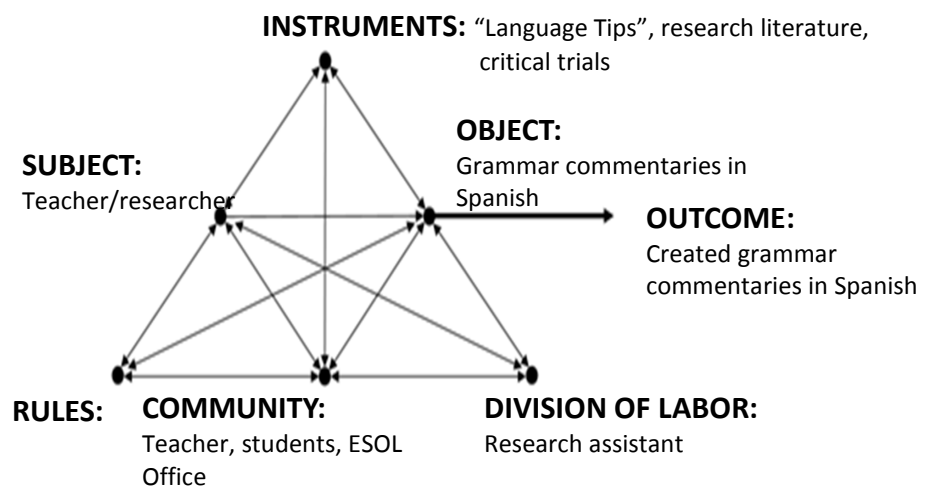
Action 3: Developing strategies for teaching grammar in a content-based class 2007/08

INSTRUMENTS: Grammar commentaries, grammar exercises

OBJECT: Students' knowledge of grammar

SUBJECT: Teacher/researcher

OUTCOME: Analysis of students' performance

RULES: Instructional strategies how to explain grammar

COMMUNITY: Teacher, students, ESOL colleagues

DIVISION OF LABOR: Research assistant
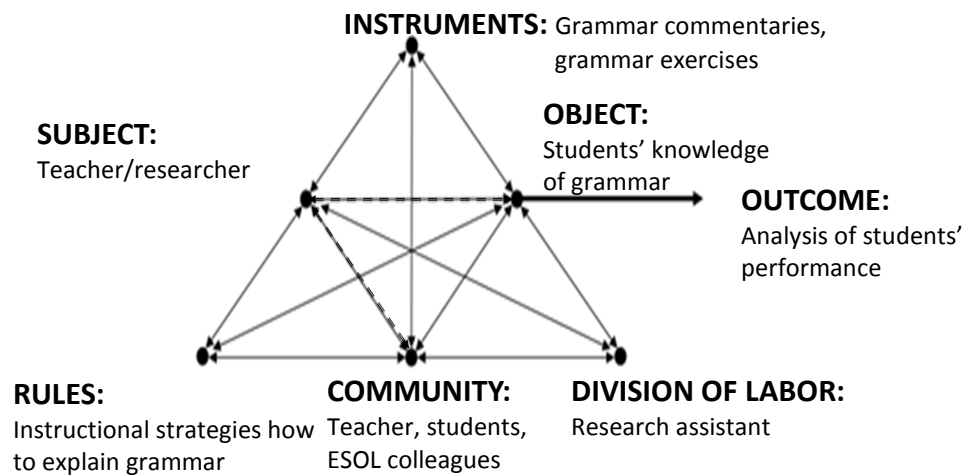
Figure 14.2. Learning actions of functional grammar activity.

.   **Action Model:** The diagram of Action 3 (see Figure 14.2) features the

mediational set-up of this action. The subject of the action is the teacher/researcher.

The object is students' knowledge of grammar. The mediating instruments are

grammar commentaries and grammar exercises. In this cycle I developed

instructional strategies (rules slot) for teaching grammar using functional grammar

commentaries in my science content class. In the following Diary Notes I

documented how I tried out the first solution.

>   ***Diary Notes dated August 28, 2007:*** *I wrote, "Today I added the verb 'to
> leave' to my grammar commentary. I revised it from what I had in a previous version.
> It becomes now with every day clearer how to incorporate grammar commentaries in
> Spanish into my lessons. I am doing English presentation and then provide a handout
> for Spanish-speaking students with clarifications in Spanish. Students read these
> commentaries on their own. I desperately need a Chinese handout. I wish I had one
> for Lin."*

I tried several formats observing the results of each trial and, finally, I opted

for the following strategy. First, I distributed the commentaries to Spanish-speaking

students and let the students read them for several minutes silently to familiarize

themselves with the grammar feature. Then, I delivered a mini-grammar lecture in

English explaining this grammar feature to the whole class, including non-Spanish

speakers (in the 2007/08 school year I had a Chinese student in one of my classes

who withdrew in November and two French-English speaking students). All students

were supposed to take notes. Afterwards, the students were supposed to do guided

grammar practice or individual grammar practice, using teacher-created

supplementary lingua-contextual exercises. During this cycle my bilingual assistant

helped me to edit grammar commentaries in Spanish. The outcome of the action was

the analysis of students' performance. Disturbances in this action occurred along the

subject-object pathway, because I, as a teacher, had some flaws and imperfections in my grammar instruction, which affected students' learning as objects of the teaching/learning activity and the subject-community pathway, because, overall, the grammar instruction was not implemented successfully in the ESOL language classes.

Below I provide an outline of how I was constructing my teaching-learning activity using critical trials as cycles of expansive learning.

Example of small cycles of innovative learning. *Conflicting situation:* In October of 2006 when I was preparing for my lesson, "The Five Steps of the Scientific Method," on the basis of the *Longman Science* textbook, I immediately realized that from the linguistic point of view the lesson would present a serious problem for beginning learners of English. The content of the lesson was based on the assumption that students know how to ask and answer questions. They were supposed to carry out the bean experiment keeping an experiment log, which included questioning and answering procedures. However, students who had been learning English for only two months were not prepared to do it. Constructing questions is one of the most difficult grammar topics, which even intermediate and advanced students usually have problems with. Besides, constructing questions in English presented additional problems for Spanish-speaking students, as there is a different pattern of writing questions in Spanish. For example, in Spanish one should put question marks at the beginning and at the end of the question and there are no auxiliary verbs at the beginning of the question. I have found negative language interference is very strong with this grammar topic, and for this reason it usually takes a lot of time and patience to teach students how to construct correct questions. This grammar topic, according to

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my professional experience, demanded special explanation and practice, which the *Longman Science* did not provide. The following field notes captured the emergence of the predicted problems.

Field Notes dated September 15, 2006: *I wrote, "(Period 1) It is good to give students a mini-grammar lecture on how to construct questions before they actually start reading 'Asking Questions' as a first step of the scientific method. (Period 2) Students did not know how to translate questions and how to ask questions in English. They start questions without auxiliary verbs. They ask questions like in Spanish, using only intonation. They need to know how to choose auxiliary verbs."*

Facing this conflicting situation in my teaching practice, I began to undertake my smaller cycles of innovative actions.

Questioning (2006/07 school year): How should I start with this grammar commentary? Students don't know question words and auxiliary verbs. Should I give them a list of question words in English and in Spanish? Should I give them examples of possible questions with different auxiliary verbs? Should I prepare a grammar mini-lecture, explaining how to construct questions in English?

Modeling the new situation (2006/07 school year): I prepare a mini-lecture in English using an overhead and a practice exercise to complement it.

Acting (2006/07 school year): I deliver a mini-lecture in English and afterwards have students do their individual practice to reinforce grammar material.

Examining the new solution (reflection and analysis) in 2006/07: I observe if, on the basis of my mini-lecture, students are able to do practice exercises.

Field Notes dated September, 15, 2006: *I wrote, "Grammar notes on questions were not successful. These grammar commentaries were not enough for*

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students. They were unable to do grammar practice. Or, maybe, the practice was too difficult?"

Self-reflective analysis: Observing and analyzing how students were responding to my questions during the grammar lecture and how they were doing their grammar practice, I realized that the lecture format in English for such a difficult grammar topic is counter productive. Additionally, I realized that I made an instructional mistake and gave students the practice exercise too quickly; it should have been done later in the course because they were not ready academically to perform it. My instructional mistake can be explained using Vygotsky's and Leontiev's teachings about students' cognitive readiness for certain language transformations (see Chapter II).

Modeling new solution (2006/07 school year): On the basis of my observation and analysis I start modeling the new situation. I start preparing grammar commentaries in Spanish and create two new grammar practice exercises.

Acting (2007/08 school year): This year, while teaching the same lesson, I act on the basis of the new solution. Instead of the mini-grammar lecture on questions in English for the whole class, I give Spanish-speaking students several minutes to read my teacher-created grammar commentaries in Spanish. Then, I deliver a mini-grammar lecture in English for the whole class. Afterwards, I ask students to do a new (revised from the previous year) practice exercise.

Examining the new solution (reflection and analysis) in 2007/08:

Field Notes dated September 26, 2007: I wrote, "Students read the commentaries attentively. It looked like they understand what they are reading about, but again I notice problems with grammar practice."

Field Notes dated September 26, 2007: I wrote, "Problems with questions again. How to teach students to use correct question words, auxiliary words? During my lunch it occurred to me that I need to use a substitution table to teach how to compose questions. I also need to make an erasable transparency for modeling how to construct the questions using this table."

Field Notes dated October 2, 2007: I wrote, "Practice with the substitution table went well during the first period, but it immediately revealed some drawbacks. Period 1 is my testing field. I need to do separately, maybe, in two tables, questions with the verb "to be" and questions with other action verbs because the structure of the questions is different."

Consolidating the new practice (2007/08): On the basis of my observations, reflections, and analysis of the same activity for two years, I created the final version of my grammar commentaries and grammar practice exercises in the science context, which I was planning to try out next school year, in 2008/09.

Self-reflecting analysis: Reflecting on my actions while developing the four instructional activities with L1 support, I reaffirmed for myself the cyclic nature of a teacher's practice in general and of action research in particular. I believe that if the teacher's practice has cycles of expansive learning, this practice is a living practice. If I just passively repeated what had been prescribed in the first draft course curriculum or followed the lesson planning guide of the Longman Science program, I would have been useless as a professional. The magic of teaching stems from the interaction between the teacher and the students in real classroom situations, which can be (and usually are) very different from what was thought about these situations by curriculum developers. If I, as a teacher, am not modifying curriculum materials to adjust them to the changing situation in class, then I am in stagnation, I am not

developing, I am not growing professionally. The art of teaching as a profession is lost. I understand development in the teaching practice as developing instructional materials and strategies to serve the needs of the students I am teaching in a given situation. This understanding of development differs from the understanding of development promoted at the professional development workshops, which usually provide teachers with snapshot activities taken out of the context of their concrete teaching situations and ask them to implement these activities in their practice. True development can be done only in a cycle mode, because it includes planning a new solution (or modeling a new situation), observing the new situation, reflecting on and analyzing what needs to be changed, again planning a new solution and incorporating into it the new changes as the result of reflection and analysis, and again observing the new situation in a new developmental cycle. If teachers are deprived of this creative component of their profession, then, I think, education as a developmental human activity per se stops performing its function.

The last stage of the learning cycle of the development of the functional grammar activity was the implementation stage of my study. My field notes on grammar commentaries during this stage and my recollections of class practice revealed that in class students used them only when I asked them to refer to a particular grammar topic, or when we were doing grammar exercises in a science context. Overall, the majority of students didn't memorize grammar rules that were discussed in the commentaries to the extent that would dramatically enhance their learning of English in a sheltered science content class and beyond it. For the majority of students, it was a hard learning experience which demanded them to

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spend more time outside of class mastering the grammar topics, because I did not have enough time for grammar explanation and practice in class (assuming that students are supposed to get complete language instruction in their language class). Often I felt frustrated about my efforts because I did not see the results which I would have hoped to see. However, it became evident that without grammar activities in a science context there would have been a vacuum in the instruction, because the course curriculum provided just a handful of worksheets, and the *Longman Science Workbook* activities filled less then ¼ of the instructional time.

Teaching language and content also made me realize how important team work is in ESOL teaching, which ideally should be aimed at coordinating efforts of teachers to balance the curriculum material appropriately among subjects that they teach. Unfortunately, my experience with such coordination during the implementation stage of my study was not always positive. While two teachers were attentive to my requests and agreed to encourage students to use bilingual dictionaries in their classes, one teacher was not cooperative at all and would not listen to my suggestions or requests. I should admit that the ESOL curriculum in my district does not provide opportunities for cross-disciplinary collaboration.

Translation Practice Activity as a Cycle of Expansive Learning

The decision to create the translation practice activity was the result of two rationales. The first rationale was connected to the situation in my classes when I started to teach the ESOL sheltered science content course in the 2005/06 school year using the *Pacemaker General Science* textbook. It became evident that even with this textbook, which had a Spanish study guide, students experienced difficulties in

understanding content. I realized that, in addition to bilingual dictionaries and bilingual vocabulary support provided in the Spanish supplement of the textbook, students needed examples of coherent texts in their mother tongue to help them construct meaning in a foreign language in a science content-based language class.

The second rationale stemmed from my strong belief, as a foreign language teacher, that the translation strategy, if used reasonably and creatively, could be one of the most efficient methods of teaching students how to construct meaning in content-based courses. I should admit that translation, as a teaching technique, has had many ups and downs throughout the history of teaching foreign languages. In different periods it has been accepted as a teaching device or rejected as a controversial subject depending on prevailing objectives and teaching preferences. For example, under the Direct Method which advocated habit formation and conditioning without the intervention of any intellectual effort, translation was abandoned for its mental burden on the learner (Bonyadi, 2003). On the contrary, in my teaching-learning model, which uses the combination of the Communicative Approach and the Cognitive Approach (Skehan, 1998), translation activity plays an important part as the activity which underscores the role of mind and makes learning meaningful and contextual.

Literature support: Recognizing the importance of translation strategy, Michael Lewis comments, "The two traditional ideas which rather fell out of favour while Communicative Approach began to dominate teacher training and classroom practice – translation and interference – turn out to be surprisingly fruitful when seen in the context of a lexical view of language" (Lewis, 1993 p. 60). He asserts that

translation is inevitable in a foreign language learning classroom, but he does not recommend it for its own sake; it should be tailored to students needs. He writes:

> Perhaps the oldest, and frequently most despised, methodology is grammar-translation, usually dismissed on teacher training courses in a few moments. The dismissal has always been a little too glib, but we certainly do not want to see a return to a methodology which takes long passages of supposedly 'good' but often turgid text into the classroom, to be laboriously translated, and later exploited grammatically and structurally. (Lewis, 1993, p. 60)

In his other comments Lewis compares translation to a "form of consciousness-raising" (Lewis, 1993, p. 65) which echoes with Vygotsky's and Leontiev's conscious approaches to learning a foreign language.

Bearing on other theoretical reading in the field (Chllapan, 1982; Darian, 2001; Duff, 1990; Hervy and Higgins, 1992; Larson, 1984), which helped me to conduct the historical analysis of the situation, and on my observation of students' performance in class, actual empirical analysis, I started to develop translation practice activity. In spite of its simplicity at first sight, it took me four school years to develop a final version of the translation practice handout and instructional strategies to complement it.

Action Model: The structure of the first learning action which took place in the 2005/06 school year is presented in Figure 15.1. During this year, in order to teach students how to comprehend the content, I asked them to copy small passages from the text into their notebook and afterwards to use a bilingual dictionary to translate them. The subject of the action is the teacher. The object of the action is the translation practice. The mediating instruments of the teacher are observation and textbook excerpts which are used for translation. My students mediate this action as

participants of the teaching-learning community. They use their own mediating

instruments in this action – bilingual dictionaries and textbooks. The rules of this

action are that students have to copy excerpts for translation from their textbooks. The

outcome of this action is the inability of some students to produce adequate

translation. This outcome was the result of disturbances I uncovered in this action and

then documented in my field notes. The disturbances occurred between the

community-instruments pathway and community-object pathway. I observed that

students who had low levels of Spanish literacy experienced difficulties in performing

written translation. It took them more time to do it, and their translation often was not

adequate enough.

Action 1: Translating excerpts copied from the textbook

2005/06
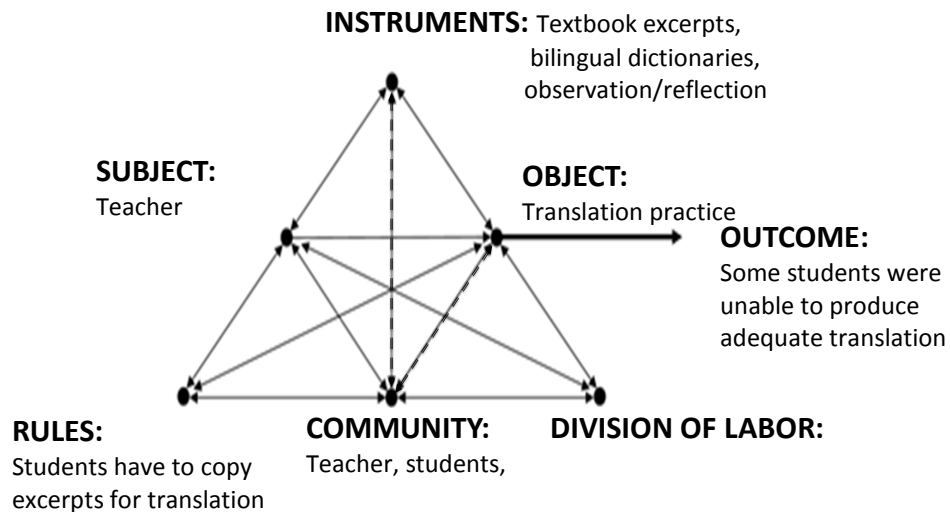
Figure 15.1. Learning actions of translation practice activity.

　　　Field Notes dated August 24, 2006: *I wrote, "Students who cannot write well in Spanish cannot translate."*

　　　Field Notes dated September 8, 2006: *I wrote, "Students did not do the translation as their homework (Period 1). They also did not want to translate the*

home assignment in class. I said that we are not moving ahead until the translation is done. (Period 3) Everybody did the translation, except Carlos. The class is very active."

Self-reflective analysis: The differences in translation abilities among students posed the following two questions for me: how could the needs of those students who had low levels of Spanish literacy be met, and was translation practice, as a learning strategy, beneficial for them at all? Reference to research literature helped me formulate the problem more clearly. Researchers (Brisk, 1998; Cummins, 1996, 2000) acknowledge the fact that the native language is the best medium for introducing all new concepts (for students who are at a very low level of L 2) and creating a base for learning English; however, they indicate that students with limited or no literacy in their native language face a dilemma. These students benefit from exposure to the native language, but they also feel the urgent need to develop English literacy (Brisk, 1998). I understood that I needed to develop this activity in such a way that students with special needs could benefit from it on equal terms with the rest of the class. I was looking for ways to solve the disturbance in this situation. The data from the following field notes displays my efforts to solve it.

Field Notes dated August 24, 2006: I wrote, "Think how to use Spanish text (translation) as "study guide", maybe, at the end of the lesson on cards. Think how to give the translation to students so that they can check it."

The use of the newly published *Longman Science* textbook in my classes in 2006/07 and the participation of my students with me in the process of joint construction of meaning in the teaching-learning activity helped me creatively extend the translation practice activity, adding a new instructional component, or mediating instrument, into it – the translation key.

Self-reflective analysis: The idea to use the translation key came as a result of my observation and self-reflection on how students were translating passages from the textbook. The format of texts in the *Longman Science* textbook, with small portions of content material on each page, were ideal for translation practice. While students were translating, I observed how students were cooperating with each other, giving better versions of Spanish text. Advanced students often read the whole sentences to less proficient students to show how it should sound in Spanish. At one of the lessons, observing how a group of students were cooperating and checking their translated sentences with each other, I had an insight that I should prepare a translation key, a Spanish text of the English excerpt that I assign for translation, so that all students would be able to check their translations; the advanced students could compare their translations to the exemplar native language version, while the low proficiency students could use it as a scaffolding instrument to improve their Spanish literacy and writing skills, and at the same time to develop English and science content mastery.

The modeling of the new situation took the whole academic school year of 2006/07. During this time I had to select mini-texts that were either important for translation from the content point of view, or presented difficulty for understanding and thus needed additional clarification by means of translation. The selection process was done on the basis of observation and reflection of how students were performing in class and of what passages had caused problems.

Literature support: During this cycle I also had to refer to research literature to support my extension. For example, Darian (2001) indicated that in order

to use translation as an effective tool, we need to take into account the difficulty of the texts. In the selection of the texts we also should pay attention to the degree of second language proficiency. Unfortunately, he concludes, there is no comprehensive view on determining the text difficulty; and teachers are liable to make their own decisions regarding the text difficulty. One practical way of handling this problem, he concludes, is the initial adaptation of authentic translation material. Larson (1984) suggested that students who are to work on translation should be given prior guidance on practical procedures before being engaged in the translation itself. They should be briefly informed of translation procedures like "preparation," "analysis," "initial draft," "rewording," "testing the translation," "polishing" and "final manuscript" (Larson, 1984).

Action 2: Deciding to use the translation key

2006/07
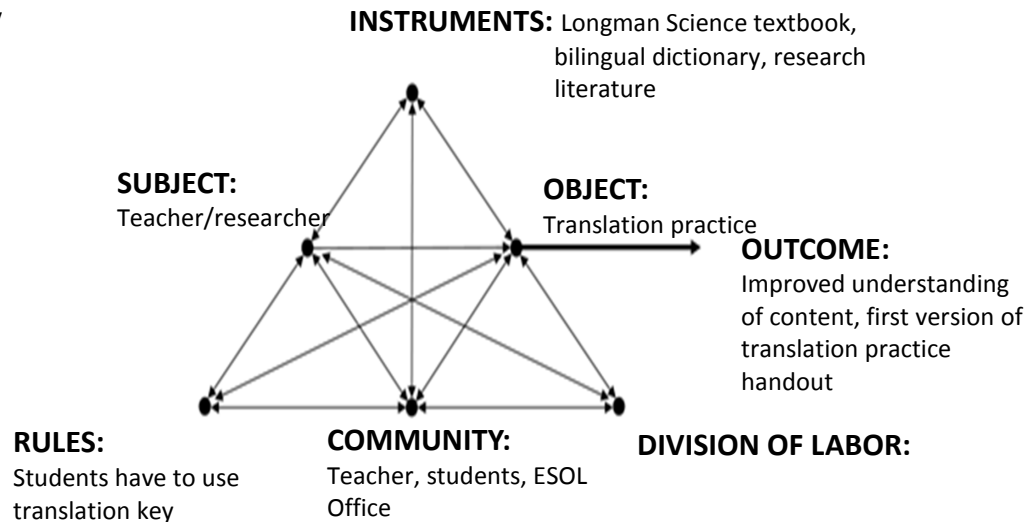
Figure 15.2. Learning actions of translation practice activity.

Action Model: The diagram of the second learning action of the translation practice activity is presented in Figure 15.2. The subject of the action is the teacher/researcher. The object of the action is the translation practice. The action is mediated by the researcher's observation and reference to research literature. Students, as participants of the teaching-learning community, mediate this action with the help of the translation key in order to construct better understanding of content. Another important mediating factor in this action is the ESOL Office, as the representative of the community, who introduced the new course textbook. My bilingual assistant activates the division of labor slot, helping to translate the excerpts. The immaterial outcome of the action is students' knowledge (constructed meaning) of content, and the material outcome is the teacher-created first version of the translation practice handout.

Self-reflective analysis: At this stage of my learning cycle I truly experienced expansive developmental transformation as a practitioner. My tacit knowledge that translation is very important as an instructional strategy for teaching a foreign language became my explicit knowledge, when I was able to develop the translation practice activity, use it and observe its effectiveness or ineffectiveness in my practice. In this cycle of expansive learning I once again learned that I have a vast amount of personal knowledge, value it and understand at the cognitive level how to use it for the benefit of my students. It also showed my constant striving to raise this tacit knowledge, which is deeply rooted in my value base, to an explicit surface level where I am able to live my values in my practice.

During the 2007/08 school year, I observed how students were performing translation practice activity using the created translation keys. I was conducting critical trials of the new solution. Concurrently, on the basis of my observations and reflections, I started to develop a new extension to this solution. I observed that I needed to prepare a separate handout (a single page) for each translation practice activity. This handout should have an English passage from the text to be translated and space below it for the translation by students. The reason to have the English text and its translation on the same page was to provide students with an opportunity to see the close correlation between two languages. By comparing languages and calling attention to the parallels in two languages, teachers can enhance students' conceptual and linguistic understanding (Martin-Beltran, 2009, 2010). "Most learners will not have thought closely about features of their mother-tongue." Lewis comments, "It is helpful therefore, to show learners ways in which their language and the language they are learning are lexically similar" (Lewis, 1993, p. 66).

It is interesting to point out how the students were helping me to create the final version of my translation handout. On the first version of the handout, I did not provide lines for written translation. I just left a blank space for translation. Then, during one of the lessons, I observed how a student was using a ruler to draw the lines for his translation on the handout, so that his written translation would look nice and neat. It struck me that he was teaching me a lesson about how I should complete my handout and correct my instructional glitch, as I recorded in the following Field Notes.

Field Notes dated September 24, 2007: I wrote, "At first I did not use lines on the translation handout. But I noticed today that Manual was using a ruler to help himself to write straight. I liked it. It helped me to finalize my handout."

In a different workplace situation, when I was checking students' work, the repeated mistakes in students' translations gave me the idea to highlight the problem-causing words and expressions in my handouts. Once again, my students, as participants of the study, helped me to improve my practice. The following data documented this fact.

Field Notes dated March 5, 2007: I wrote, "When I was examining students' translations, I noticed that they made the same mistakes with the same words. Reflecting on this I decided to highlight the words in the translation passages that always caused the problems for students, so that they would pay attention to these words while translating."

After these additions, I had a new insight that it would be useful to combine writing skills practice with the translation skills practice in this activity, even though the writing would be done in the students' mother-tongue. I discerned that this practice in Spanish would be a helpful activity for English acquisition, because research has shown that literacy skills transfer across languages (Cummins, 1996). Most of my students, while writing brief constructed responses (BCR), did not indent paragraphs. Therefore, I included a margin line in the writing part of the handout to call attention to indentations as they were writing and receiving teacher feedback. The diagram of the third learning action, which contributed to the development of the translation practice activity, is presented in Figure 15.3.

Action 3: Improving translation practice handout

2007/08

INSTRUMENTS: Critical trials, a ruler, fax machine

SUBJECT:
Teacher/researcher

OBJECT:
Translation practice handout

OUTCOME:
Completed, approved translation
practice handout

RULES:

COMMUNITY:
Student, publisher

DIVISION OF LABOR:
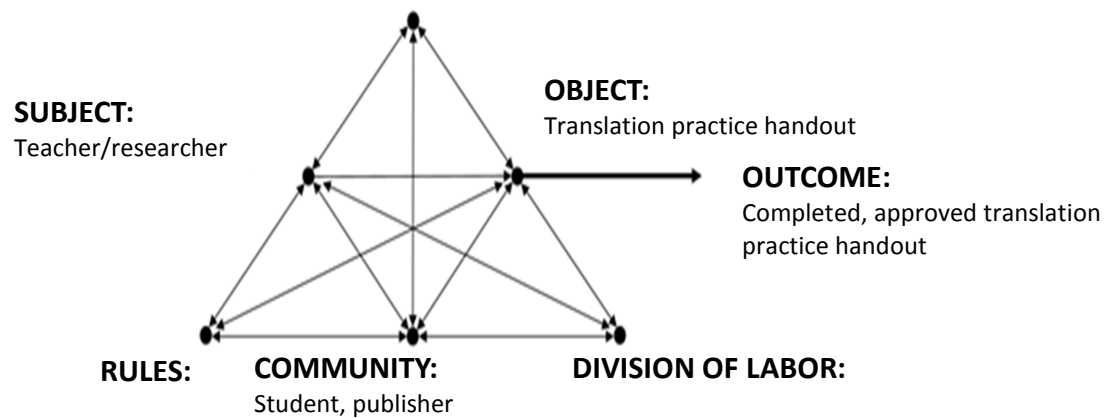
Figure 15.3. Learning actions of translation practice activity.

Action Model: The subject of the action is teacher/researcher. The object of

the action is the translation practice handout. The mediating instruments are

observation/reflection, the ruler and the fax machine for the communication with the

publisher. One of the students mediates this activity as the community member, when

I observe how he is using his ruler on the translation handout. Another important

community mediator in this action is the publisher. The outcome of this action is an

improved, completed and officially approved translation practice handout. In this

action I as a researcher extended my learning in the situation when I asked for an

official permission from the Longman publisher to let me use the excerpts from the

textbook for my handouts. Confident that I would obtain the permission fairly easily,

I started communicating with the designated representative from the copyright

department. It tuned out that it took me about two months to obtain the permission.

Two times I was rejected and I think it was only my persistence that made me succeed in this endeavor.

Self-reflective analysis: The analysis of my observations of the ways in which students performed the translation activity have revealed that students developed very positive attitudes towards this activity by the end of the course. I can even say that they liked it and waited for it. And we know that students (as all people) always like to do what they can do well. During this activity there was complete engagement of students. Often they cooperated actively to share each other's versions of the translations (if it was not a test translation). They also meticulously used self-editing skills to correct their mistakes I was constantly very satisfied watching students doing this activity. The success of this activity confirmed to me the idea that when a person (a student) realizes the benefit of bilingualism in his or her life, he or she acquires additional self-confidence and improves his/her self-esteem. I think that in translating paragraphs students imagined themselves as the future translators or interpreters, and that is why they really felt this practice to be significant. I also felt the importance of myself as a teacher who created helpful, developmental activity for the benefit of my students.

The implementation/evaluation stage of the development of the translation practice activity was done using the same pattern as the other three activities.

Conclusion

In this chapter I attempted to show how my formative experiment of researching my own practice (learning) can be described and interpreted. As Engeström (2000) points out, "Theories of organizing learning are typically weak in

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spelling out the specific processes of actions that make up the learning process"
(Engeström, 2000, p. 967). This is due to the fact that the three-dimensional practice
cannot be presented precisely in two-dimensional visual form. I experienced this
difficulty myself. I tried to reduce this constraint by using the models of human
activity system that helped me structure complex and multilayered configuration of
my actions while I was developing supplementary instructional activities with L1
support. The models helped visually display the idea that teaching practice consists of
multiple goal-directed actions and automatic operations that are relatively
independent but subordinate units of analysis, which can be described and interpreted
only against the background of my entire teaching and learning activity system, in
other words, my daily work. These models can also be viewed as steps or know-how
of creative teaching practice.

In this chapter I showed that my teaching-learning activity has a cyclic
nature. The cycles can be big or small. They are composed of internal and external
phases; they do not proceed in a straight trajectory but go back and forth and overlap
and evolve, expanding the developmental potential of the study participants, my
students and me (and my advisors as well)

I showed that my development and learning, as a professional, emerge from
the conflictual points in daily practice, which are also called disturbances or
contradictions. I highlighted that in order to be able to seek out these contradictions,
the teacher should possess certain personal properties and cultural values. I revealed
in myself those qualities that allowed me to be responsive to contradictions in my

practice and made me willing to resolve them. My active social position ultimately led me to improve practice in a way that benefited others.

In conclusion, the algorithm of the improvement of my practice can be summarized as follows (adapted from Dick, 1997). In each expansive learning cycle (1) I disconfirmed the emerging interpretation of my actions and actions of my students with the help of multiple critical trials (or small cycles); (2) I critiqued and refined my actions on the basis of observation and self-reflective analysis; (3) In each cycle, I included data collection (in the form of field notes) and interpretation, in order to test both data and interpretation in later cycles; (4) I sought out disturbances (contradictions) in my actions as they emerged, in order to challenge these pieces of data and their interpretation by other data from the study and research literature; (5) I deliberately sought disconfirming research literature, as my major source of possible disconfirmation, in order to allow me to make warrantable assertions; (6) I planned improvements in the development of my supplementary instructional activities derived from the data and the interpretation.

Chapter V: Analysis of Data Sources and Findings

Data transforms into evidence when actions
show that the criteria we have set ourselves are realized.
McNiff & Whitehead (2002, p. 100)

Preamble

In my study, I propose to distinguish two types of data analysis depending on the types of data sources, that is, a self-reflective data analysis and a student performance data analysis. I used the self-reflective data analysis to analyze myself and my practice in relation to others – my students, colleagues and the authorities. By means of this type of analysis I analyzed my feelings, thoughts, intentions and actions while I was constructing my model of teaching an learning activity. I used the student performance data analysis to explain and interpret empirical data on my students' learning during the implementation stage of my study with the aim of determining the effectiveness of the four activities with native language support.

Self-Reflective Data Analysis

My self-reflective data analysis is divided into two variations. I call the first variation the on-site-analysis. It was carried out in class during instructional time in real time format when I was mentally reflecting on my actions and the actions of my students during critical trials of supplementary instructional materials. This type of self-reflective analysis demanded immediate, on-site interpretation and explanation of my actions and the actions of my students in order for me to be able to make changes in my instructional materials and make them better. Examples of this analysis were provided in small cycles of innovative learning in Chapter IV.

The second variation of my self-reflective analysis, which I call the qualitative self-reflecting analysis, I used to explain and interpret sources of data collection such as my observation field notes, my diary notes and my recollections of classroom episodes and other situations in a wider school context, while I was creating my model of the teaching-learning activity. The purpose of this analysis was to interpret and explain what values, intentions and beliefs determined my actions and their outcomes in cycles of expansive learning. Examples of this self-reflective analysis make up a substantial part of Chapter IV of this dissertation. In Chapter V I summarize the findings of my self-reflection which helped me to better understand my practice and improve it and ultimately led me to answer my research questions.

In order to summarize my self-reflection, I performed the following procedures. First, I read carefully through all my notes which were taken during the four years of my self-study. Then, I sorted them out, assigning particular categories. Afterwards, applying creative thinking, intuition, recollection and insight, I reduced them to nine themes that guided my research. They are the following:

1. Constructive (dialectical) critique of the curriculum

2. Importance of personal values and beliefs in practice

3. Professional growth through readings of research literature in order to harmonize theory and practice

4. Mode of practice as cycles of expansive learning through self-reflection and resolution of contradictions

5. Creation as a mode of living practice

6. Dual objective (language and content) as the goal of lesson planning

7. Importance of team work

8. Acceptance of risk as an aspect of innovative practice

9. Unbiased evaluation of self-practice

The criteria which I have set for myself for selecting these themes were based on the following two premises: (1) frequency of the reference to the phenomena in my notes and (2) positive impact on teaching and learning.

These themes can be also interpreted through the lens of CHAT theory using its conceptual categories, such as subject, object, community, rules, instruments, and division of labor.

According to the analysis of coded data, the first theme, "constructive (dialectical) critique of the curriculum", emerged along the subject-object-community pathways. The data from my diary notes and observation field notes indicate that my intentions and actions primarily were directed at the critique of the curriculum, as the object of my teaching-learning activity system, which was the product of the community, the larger activity system (local school system).

The second theme, "importance of personal values and beliefs in practice", emerged along the subject-instruments pathway. The data indicate that I was constantly aware of my cultural and professional background (implicit knowledge) and was using it actively as instrument to bring about change on the external level, in my daily practice.

The third theme, "professional growth through readings of research literature in order to harmonize theory and practice", also emerged along the subject-instruments trajectory, but the utilizing of research literature as an instrument to better

understand and improve my practice performed a different function in this case. I used literature data to confirm and disconfirm my findings.

The fourth theme, "mode of practice as cycles of expansive learning through self-reflection and resolution of contradictions" developed along the subject-rules pathway. I was constantly aware that my actions in my teaching-learning activity system were subject to certain regular modes (rules) which had a repeated cyclic nature. I understood that my learning, development and improvement proceeded in cycles.

The fifth theme, "creation as a mode of living practice", was also developing along the subject-rules pathway, but the relationship between my actions and the rules of my teaching-learning activity system were different as compared to the previous theme. In the fourth theme I described in what way my actions proceeded. In this theme I describe the qualitative characteristic of my actions, that is, the actions should have a creative component. Or, in other words, the creative attitude is necessary in teaching profession in order to produce positive changes in curriculum and instruction.

The sixth theme, "dual objective (language and content) as the goal of lesson planning", emerged along the subject-object pathway. This theme emphasizes the importance of integrating language and content objectives in my daily instruction and how it was challenging to implement this goal.

The seventh theme, "importance of team work", underscored the necessity of close collaboration between ESOL team members on daily basis at school. This

theme developed along the subject-community pathway, because my colleagues and I were members of the same community.

The eighth theme, "acceptance of risk as an aspect of innovative practice", emerged along the subject-rules pathway. While analyzing and reflecting on my actions and thoughts, I understood, that, when I, as a teacher/researcher, embarked on the course of researching my own practice, I was committed to take risk and challenge myself. And I can say that I have witnessed that risk and have challenged myself. I accepted the rule.

And, finally, the ninth theme, "unbiased evaluation of self-practice", surfaced along subject-instruments pathway. The data from my diary and field notes indicate that I have spent a lot of time creating multiple evaluation research instruments, which could help me to implement triangulation, so that I would be able to validate my study. Parallel usage of qualitative and quantitative data helped me to achieve this goal.

In sum, the analysis of themes applying the CHAT categories showed that my learning and development in my self-reflective action research proceeded primarily along the subject-community, the subject-instruments, and the subject-rules trajectories. These directions displayed the major relationships between the elements of my teaching-learning activity system that affected my personal and professional growth and transformation. These particular trajectories can be explained by the fact that my skills as a researcher/practitioner were developed while I was functioning as a new member of a wider activity system, including school district and academic research community. This new experience demanded from me exploring new modes

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of behavior and practice as well as discovering new instrumentality and learning how to use it.

While reducing my categories to the major themes, I had to discard a number of interesting categories or topics, which were not directly related to answering my research questions but have come to the surface quite naturally as a result of my systematic observation and rational interpretation of my practice in a wider school context. These topics include problems with electives, effects of out-of-school situations on ESOL students' performance, e-mail communication pitfalls and others. These topics may be the objects of my future articles or conference presentations.

Student Performance Data Analysis

The student performance data analysis was done on the basis of (1) data collected from students in class during instructional time to evaluate student performance, (2) data collected from students during instructional time to evaluate teacher-created supplementary instructional materials and (3) data collected from the teacher/researcher and the students simultaneously in class during instructional time by the researcher's assistant, in order to provide a video display of how the proposed adjunct model of the teaching-learning activity was functioning in practice.

The analysis of data collected from students during instructional time to evaluate student performance was done on the basis of (1) pre and post tests, (2) scores of the vocabulary quizzes and (3) samples of student work. This analysis was done by comparing the results of pre and post tests and by comparing the grades of vocabulary quizzes and tests (see raw data on course tests and quizzes in Appendices O and P).

I used pre and post tests in three research situations; first, to assess students' literacy level in their native language; second, to assess students' general science knowledge in their native language; and third, to assess students' bilingual dictionary proficiency. I also used the LAS Links pre and post tests results to assess students' English proficiency levels before and after the study.

The analysis of students' literacy levels (see Appendix B) revealed that out of 29 students who participated in the study (one student withdrew from school in April), two students had limited literacy in Spanish and one student had very limited literacy in Spanish. Twenty-six students were competent in their native language, including two African students speaking World English and French. The analysis of the LAS Links pre test (see Appendix A) confirmed that all 29 students who initially participated in the study were at the beginning level of English proficiency.

The analysis of students' basic general science knowledge (see Appendix C) revealed that four Spanish-speaking students scored below 50 percent, thirteen students scored 60 percent, three students scored 70 percent, seven students scored 80 percent and one student scored above 90 percent. One African student did not answer a single question. The other African student scored 60 percent. Comparing the results of the pre-test with the results of final post-test revealed that the students who scored the highest on the pre-test scored the highest on the post-test. Two students scored higher on the post-test than on the pre-test; however, seven students could not reach the level of science knowledge tested in English compared to their science knowledge tested in Spanish. Students who had limited Spanish literacy scored the lowest on the final post-test. The African student who failed the pre-test failed the post-test as well,

because the student was unable to catch up with the rest of the class, having no previous science knowledge and low English proficiency. However, the other African student significantly improved her science knowledge, because the student was able to use her previous science knowledge and high English proficiency. Comparing the results of pre-test with the post-test (see Appendix A) revealed that students' knowledge of general science in English (62 percent) almost totaled the students' knowledge of general science in Spanish (63 percent). This means that they were able to acquire the necessary level of English competency, determined by the course curriculum, in order to function in mainstream science content-based classes.

The analysis of students' bilingual dictionary strategies on the basis of the timed pre-test (see Appendix D) revealed that out of 27 students, only two students had well-developed bilingual dictionary strategies; in other words, they were familiar with how to find the translation of an unknown word in the dictionary in a timely manner. [According to my observation, an average student needs about ten minutes to find the translation of 20 common words if the student knows how to work with the bilingual dictionary.] Other students either did not work with a bilingual dictionary at all or had minimal knowledge of how to use them. For example, during the pre-test I observed how students started looking English words in the Spanish-English section. This fact indicates that students did not know that the dictionary had two parts, Spanish-English and English-Spanish. Comparing the results of pre-test with post-test (see Appendix E) revealed that six students increased their time by 80 percent to find the translation of new words, five students increased their time by 70 percent, seven students increased their time by 60 percent, three students increased their time

by 50 percent, two students increased their time by 40 percent, and two students increased their time by 30 percent. Overall, all students made substantial progress (except for two students who already had well developed bilingual dictionary skills) in acquiring bilingual dictionary strategies. They learned how to use it as their accommodation tool to construct meaning in a science content class.

The analysis of the scores on the vocabulary quizzes was done by comparing students' responses in my observation charts during the Memory Time (MT) activity (when students worked in groups checking each other's knowledge of assigned vocabulary) with their scores on vocabulary quizzes. The analysis revealed (see Appendix F) that students who displayed the knowledge of vocabulary during the Memory Time and provided the maximum three (3) correct responses scored highest on Vocabulary Quizzes. The analysis also indicated that a significant number of students did not memorize vocabulary.

The analysis of correlation between the Final Vocabulary Quiz and Final Science Knowledge Test (see Appendix G) revealed that the highest scores on the Vocabulary Quiz correlate with the highest scores on the Science Knowledge Test. The lowest scores on the Vocabulary Quiz correlate with the lowest scores on the Science Knowledge Test, thus confirming the importance of developing vocabulary in content-based instruction, which is emphasized in the research literature (Nation, 1990, 2000; Schmitt, 2000). The data additionally displayed that students could be divided into three groups on the basis of their scores: students who always score above 70 percent, students whose scores fluctuate between 50 percent and 70 percent, and students who never score above 40 percent. The third group, based on the data

from my study, is composed of students who have apparent minor learning disabilities (although this is in the process of official assessment). According to my observations, it is the second group of students that needs extra support, as these students are capable of performing much better but are distracted by a number of reasons, most of which are connected to out-of-class situations. It is interesting to note that significant improvement was seen in the results of the Final Vocabulary Quiz. Many students scored 100 percent. Overall, students had an average performance of 68 percent on the Final Vocabulary Quiz (see Appendix, A). These results indicate that with the introduced enhancement treatment aimed at helping students to memorize vocabulary, students were able to demonstrate significant gains in learning vocabulary.

The analysis of the results on frequency of the use of bilingual dictionaries compared to the use of bilingual vocabulary lists (see Appendix H) revealed that all students (except one) referred to dictionaries more often than to vocabulary lists. The average ratio is 27 references to 12 references within the specified period of time. This result confirms the fact that the bilingual dictionary holds the first place among accommodation tools in second/foreign language instruction. However, I would argue that providing ESOL students with supplementary bilingual vocabulary is necessary and methodologically justified. The question is what the best form of presenting and compiling these lists is.

Below I cite some of students' comments from the rating scale that support the use of both accommodations.

Student (v6) "My comment is that I always use things, the dictionary and the vocabulary lists. Both things help me. I recommend the teacher to give more vocabularies to keep practicing."

Student (v14) "The vocabulary lists help me more and it's easier than the dictionary."

Student (v19) "I recommend the teacher to keep using the method of vocabulary lists. That is a good method, and the dictionary is also good, both are good."

Student (v3) "The vocabulary lists are good because they help us a lot. The vocabularies are easier to study. The dictionaries are also good because they help us with the words that we don't know. So, for me both of them are good, vocabularies and dictionaries."

Student (v8) "It is good to use the vocabularies and the dictionary, although sometimes we can't find some words in the dictionary. But they are good to learn English and like this become a bilingual person and get a good job."

The analysis of the results of the Final Translation Practice Test was done using the following criteria: how adequately students translated the assigned text passage (comparing to the translation key text in Spanish) and how well they applied self-editing skills to correct their translations if there were any mistakes. Students were supposed to finish their translation within 30 minutes. I assigned the 30 minutes interval on the basis of my observations of how long students took on average to perform the translation practice in class. The analysis (see Appendix I) revealed that 16 students adequately translated the text with minor mistakes, scoring 100 percent; four students scored 80 percent; four students scored 70 percent; and two students scored 60 percent. Four students finished the translation within 15 minutes, two students finished the translation within 17 minutes, and one student finished within 16 minutes. It means that 23 percent of students acquired significantly high speed of translation. They finished the translation almost twice as quickly as the assigned time displaying matured translation technique. As expected, students with limited Spanish literacy had most difficulty with this activity that required them to write in Spanish.

Three students, with limited Spanish literacy, did not produce adequate translation, scoring 60 percent, thus suggesting that low level of native language literacy also impacted their learning of a second language, including writing and content comprehension. Overall, all students improved their translation and self editing skills as a result of introduced interventions. They also showed a positive attitude towards this activity. The following students' comments illustrate this positive attitude.

> *Student (t6)* "*For me and my classmates the translation of paragraphs was a great help. It helped us to understand in Spanish what we read in English. I recommend my teacher to keep giving us paragraphs to translate because it is a great help for the ones who don't speak English.*"
> *Student (t9)* "*The translation of paragraphs from the book helps us to get more and more ability. While we practice more the translation, it helps us to understand English.*"
> *Student (t10)* "*To practice translating always helped me to correct the paragraphs that were not written correctly. The practice is very important and it helps to correct.*"
> *Student (t7)* "*I like this activity because it helped me to learn new words, new meanings and to learn about English. I think that is a good thing to learn more.*"
> *Student (t22)* "*I think these activities are good because like this we learn more English and Spanish. It is good to realize these activities because our minds develop more and like this we learn more English every day.*"

The analysis of data collected from students during the instructional time to evaluate teacher-crated materials was analyzed on the basis of (1) three rating scales and students' comments and (2) the checklist. The analysis of the rating scale that assessed the effectiveness of the use of bilingual vocabulary lists versus the use of bilingual dictionaries (see Appendix J) was done by counting students' responses, converting the responses into the percentage, and then comparing the results.

The answers revealed that nearly 100 percent of students responded that it is very helpful to use the bilingual dictionaries and vocabulary lists. Overall, students

preferred to use the bilingual dictionary more often (58 percent) than the vocabulary lists (45 percent) in class and at home. However, 62 percent of students said that they preferred to use both the bilingual dictionary and vocabulary lists in class.

The analysis of the rating scale that evaluated the effectiveness of the translation practice activity (see Appendix K) was done using the same procedure, first, by counting the students' responses, then, by converting the responses into percentage and, finally, by comparing the results.

The results indicate that 77 percent of students agreed that this activity is very helpful, 69 percent of students said that this activity helps them to understand science, and 61 percent said that this activity helps them to learn English. None of the students said that this activity is not helpful.

The analysis of the rating scale that evaluated the functional grammar commentaries (see Appendix L) was done using the same procedures as with the two previous research instruments.

The comparison of students' responses shows that 67 percent of students think grammar commentaries are helpful for them to understand English in a content-based class. However, only 41 percent of students said they always use grammar commentaries to prepare for other classes and 56 percent of students said they sometimes use commentaries to prepare for other classes; 82 percent of students think that grammar commentaries should be in both languages, in English and in the students' native language. Some of the students' comments are provided below.

Student (g6) *"It is good because there are rules in English and in Spanish that we don't know. We need to know these rules to improve our English, it helps us a lot."*

Student (g8) "The grammar commentaries help us to form a good sentence; it helps us in the writing of English."

Student (g17) "The grammar notes help a lot because sometimes you don't understand what you're reading in English. When you see it in your language it helps you a lot."

Student (g10) "For me the grammar should be translated in many languages. Like this we could understand and learn faster."

Student (g16) "It is very important to have your grammar notes. So we can learn the difference between the verbs, adjectives or other parts of speech that sometimes we don't understand. The grammar notes are practical, easy to understand and learn."

Students' comments that complemented the rating scales were translated into English from Spanish, examined and organized according to their responses. The analysis of the results revealed that out of 27 students who shared their comments, 20 students said that the use of both vocabulary lists and bilingual dictionaries is helpful and useful, three students said bilingual dictionaries are more helpful, four students said vocabulary lists are more helpful, and 26 students said grammar commentaries in Spanish are useful and helpful. One student said commentaries should be in English, 26 students said that the translation practice is a useful activity that helps students learn both English and science. One student said that translation practice is not helpful. The results of the analysis of students' comments show consistency with students' responses on the rating scales. The student who gave negative answers is, probably, an African student who speaks World English and who did not benefit from the supplementary materials that use native language support. This response could be attributed to the limitations of this study.

The analysis of the responses on the questions from the checklist (see Appendix, M) that evaluated the five most helpful activities used in the course was done by counting students' answers on all 16 activities (students were asked to place

a check mark next to the five activities they think were most helpful to understand science in English) and then selecting the top five activities that gained the most scores. The results revealed that out of 28 students who contributed their responses, 78 percent of students put on the first place "use a bilingual dictionary," 60 percent of students put on the second place "listen to CD recordings of textbook texts," 53 percent of students put on the third/fourth place "memorize vocabulary using the vocabulary lists," 53 percent of students put on the third/fourth place "do projects using a computer," and 35 percent of students put on the fifth place "do translation practice with the translation key." Students put "read grammar notes" activity on the eighth place and "do language exercises in science context" on the fifteenth place.

The checklist data was collected for the purpose of methodological triangulation. The analysis of the results revealed the consistency with the data obtained from the rating scales and observation field notes. It confirms the fact that students rate the use of the bilingual dictionary as the most helpful instructional intervention among the four activities with L1 support that were examined in the study. Two other supplementary instructional interventions with L1 support, which students rated among the most helpful activities in the course, were the use of vocabulary lists and translation practice. This provides evidence that students benefited from these activities. My explanation for why the students did not consider the grammar commentaries among the five most helpful activities in the course lies in the fact that they viewed reading grammar as the activity pertaining more to the ESOL English language course than to the science content-based course. The grammar commentaries helped them understand language and science per se, and

their comments confirm this fact. But when grammar commentaries were evaluated in comparison with other activities used in the science content class, such as doing projects using the computers, the explanation of science topics by the teacher, or listening to the CD, I think students very wisely and honestly did not give them the preference. My explanation for why students put the lingua-contextual exercises on the second-to-last place in the check list is the following. Students are not able to discern and assess professionally such subtle methodological issues as combining dual objectives, those of language and content, in the content-based class. For them, grammar was always the unwelcome but necessary activity to perform in my content-based language classes. I, quite frankly, can assume that it even has diverted their attention from mastering science to some extent. Putting myself into students' shoes, I can admit that it would probably have diverted my attention from learning science as well. For example, when I was writing this dissertation, I had to correlate two actions simultaneously: what to say in terms of research content and how to say it better in English, since I am a non-native English speaker. Grammar issues complicated my life to a great deal. But again, here arises the question, "How does one teach both language and content in a freshmen sheltered ESOL science content class without grammar?"

In the analysis of the student behavior protocols (see Appendix N), my attention was focused on the frequency of occurrence of pre-determined behaviors (or actions) of students, which I considered to be necessary for their successful performance in my class, and on any disturbances that prevented them from being successful. On the one hand, the student behavior protocol was the alternative way of

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student assessment; on the other hand, it was one more source of methodological triangulation to evaluate the effectiveness of proposed interventions. It helped me to track individual students' problems and negative trends and to relate them to students' difficulties in class performance. The analysis of behavior protocols revealed that inconsistencies and disturbances in students' behaviors are connected to out-of-class situations (such as the need to work instead of attending school to support their family and health issues), which are beyond my control as an ESOL teacher.

The analysis of the video data (see Appendices Q and R) confirmed that the proposed activities with L1 support could be well integrated into the course curriculum of the sheltered ESOL science content course at the beginning level of high school, promoting students' learning and enhancing engagement. The video displays how explicit grammar instruction could be delivered in a science content class followed by grammar practice activities. It shows how students use bilingual dictionaries and vocabulary lists on a daily basis during instructional time. It displays how the Memory Time activities could be used by a teacher during regular classroom instruction and how translation practice activity is implemented using self-editing strategies and the translation keys.

Below I provide a summary of the research questions with the corresponding data sources and types of data analysis.

Summary of the Research Questions with Corresponding Data Sources and Types of Data Analysis:

Research Question	Data Source	Analysis
1. How can I, as an ESOL teacher, effectively use native language support in a particular high school freshmen ESOL science content class in order to help students master both content and language?	1. Cycles of expansive learning	Activity as the unit of analysis, activity theory method (Engeström, 1987, 2000)
	2. Participant (teacher/researcher) self-reflecting field notes in classroom and after hours.	On-site reflective analysis of critical trails using activity theory method (Engeström, 1987, 2000)
	3. Personal self-critical reflection diary	Qualitative self-reflective analysis of field notes and personal diary (Bogdan & Biklen, 1982; Creswell, 1998; Maxwell, 1996)
	4. Participants (students) opinionnaries such as checklist and rating scales	Analysis based on triangulation of data from field notes, self-reflection, students' opinionnaries, behavior protocols (McKernan, 1991; MkNiff & Whitehead, 2002; Burns, 1999)
	5. Behavior protocol	
	6. Video data	
		Explanation and interpretation of evidence from all types of data
2. Which instructional activities could be useful to promote students' mastering content and language	1. Literature as data	Analysis based on comparing second/foreign language acquisition theories and empirical studies in order to harmonize theory and practice
	2. Critical trialing of the four activities with L 1 support	On-site analysis using activity theory method (Engeström, 1987, 2000)
	3. Observation charts	
	4. Self-reflective field notes	Analysis based on triangulation using self-reflective field notes,

	5. Self-reflective diary	self-reflective diary, observation charts, students' opinionnaries
	6. Students' opininnaries (checklist, rating scales)	
	7. Samples of teacher-created materials	Analysis of 'mark-up' copies of the trial materials with penciled in comments or suggestions for improvement (McKernan, 1991)
	8. Samples of students' work	
3. What measuring techniques could be applied to monitor students' progress?	9. Classroom episodes	Analysis of samples of students' work and tests to provide illuminative evaluation (McKernan, 1991)
	Quantitative data: 1. Pre-test (to evaluate knowledge of science) Post-test 2. Pre-test (to evaluate language proficiency) Post-test 3. Timed pre-test (to evaluate dictionary skills) Post-test 4. Timed final translation test 5. Course tests and quizzes 6. LAS Link scores	Analysis of linguistic features (confusion or understanding? What word or grammar construction caused the problem?) using episode analysis (McKernan, 1991)
	Qualitative data: 1. Rating scales 2. Check list 3. Samples of student work	Analysis based on constant comparative method (Glaser and Strauss, 1967)

On the basis of data analysis, I was able to answer my two supporting research questions. The questions and the answers are as follows.

Question 2: Which instructional activities could be useful to promote students' mastering of content and language?

Based on the results of my self-reflective analysis and student performance analysis, all four proposed activities with native language support, that is, (1)

bilingual dictionary proficiency activity, (2) vocabulary development activity, (3) functional grammar activity, and (4) translation practice activity, has been proven effective to improve English proficiency and provide extra support to help students understand science content. However, the degree of this effectiveness depends on students' prior knowledge, literacy levels, and the influence of out-of-class circumstances. Overall, students with prior and better educational background benefited most from the native language support than students with lower educational background in terms of grades. This corroborates prior research documented by Cummins (1996). However, native language support played a very positive role in the formation of study habits for the latter group of students. It assisted language transfer and promoted student confidence in the new cultural setting.

Question 3: What measuring techniques could be applied to monitor students' progress?

The effectiveness of the introduced interventions was measured using multiple sources of data collection, both quantitative and qualitative, applying methodological triangulation as a verification technique. Data sources included the LAS Links scores, researcher-created measuring instruments such as pre and post tests, three rating scales, the checklist, the behavior protocol, the observation charts and the video data.

The answers to the two supporting questions paved the way for answering the overarching research question.

Question 1: How can I, as an ESOL teacher, effectively use native language support in a particular high school freshmen ESOL science content class in order to help students master both content and language?

I have learned that in order to address this question, I have to be involved in ongoing and continuous inquiry. For example, I have to engage in action research self-study (or cycles of expansive learning), create supplementary curriculum materials with L1 support, evaluate the effectiveness of the materials and provide the evidence of improved practice and the ways in which others (my students) benefited from it. To be engaged in my action research self-study demanded from me constructive (dialectical) critique of the curriculum, reliance on personal values, constant reference to research literature to validate my experimental practice, and acceptance of risk as an inevitable aspect of creative practice.

I am not arguing that my answer is the only possible correct answer and that I am the model of good practice. What I am claiming, however, is that doing my action research self-study I have learned how to improve my practice. This learning has led to the development of new instructional materials (artifacts) and forms of teaching practice, which ultimately contributed to social benefit – better teaching minority students.

Conclusion

In conclusion, I claim that I presented my inquiry as a valid form of knowing. I claim that I have improved my practice (a) by providing evidence to show in what ways my practice has improved and I have learned as a teacher; (b) by presenting the criteria through which I am making the claim.

1. Overarching Research Question

How can I, as an ESOL teacher, effectively use native language support in a particular high school freshmen class in order to help students master both content and language?

2. Supporting Question
Which instructional activities could be useful to promote students' mastering content and language?

3. Supporting Question
What measuring techniques could be applied to monitor students' progress?

Actions to Be Taken by Teacher/Researcher
1. Critique curriculum constructively (dialectically)
2. Rely on personal values
3. Validate practice by means of literature support
4. Learn expansively through self-reflection
5. Create your own activities with L1 support
6. Implement dual objectives in lesson planning
7. Collaborate with colleagues
8. Accept risk as the aspect of innovative practice
9. Evaluate self-practice using triangulation

Algorithm of Improvement
1. Disconfirm the emerging interpretation of actions.
2. Critique and refine actions using self-reflection.
3. Test data collection and interpretation in later cycles.
4. Seek out disturbances in practice in order to challenge them by data and research literature.
5. Deliberately seek disconfirming literature in order to make warrantable assertions.
6. Plan improvements in materials derived from the data and interpretation

Created Instructional Activities with L1 support
1. Bilingual dictionary activity
2. Vocabulary development activity
3. Functional grammar activity
4. Translation practice activity

Figure 16. Teaching-learning activity model for improving my own practice.

(a) I explained how I was generating my own theory of practice as I was learning through practice. I showed that the process of theorizing can be looked at as an ongoing dialectical engagement (formative experiment) aimed at resolving contradictions (conflicts) in practice. I explained what I hoped to achieve and how I feel I have achieved it by providing illustrations from the data as evidence. I produced a written report of my study supplemented by explanatory video presentation.

(b) I critically reflected on my work. I tested data collection and interpretation in multiple cycles. I sought out disturbances in order to challenge them by data and research literature. I deliberately sought disconfirming literature in order to make warrantable assertions. I planned improvements in materials derived from the data and interpretation.

I claim that my self-reflected action research was done in such a way that the resulting assertions could be regarded as warrantable. I argue that within the givens of my research (work) situation, which is flexible and complex, any research methodology faces serious threats to validity. I would claim, however, that my action research design better meets those threats in my circumstances than conventional research.

In Figure 16, I provided my teaching-learning activity model for improving my own practice. It is a unique model created for a specific context by a particular investigator. However, it provides valuable practical experience structured in a visual format, which can be used as a tool or guidelines by teachers and researchers in various educational contexts for researching their own practices.

Chapter VI: Implications and Future Research

All practitioners are potentially knowledge workers, capable
of generating valid theory and having that theory recognized
as legitimate within all personal or professional forums.
McNiff & Whitehead (2002, p. 146)

The conducted study does not have analogies in educational research. It is an action research formative experiment on the basis of Russian cultural historical activity theory in which I attempted simultaneously to (1) develop instructional methods and materials for the ESOL science content course, (2) examine the process of their development by means of self-reflection, and (3) evaluate the benefits of these methods and materials for students' learning by means of qualitative and quantitative research instruments.

Unlike much of empirical academic research that may neglect educational and cultural contexts by focusing on one randomly selected group of learners and separate treatments, my study was conducted over a four-year period in an authentic ESOL classroom environment taking into consideration a real learning context.

Because of the multidimensional character of my study, the findings of the study led to a number of implications for (1) ESOL content-based instruction, (2) practitioner and academic research, (3) action research methodology, (4) development of curriculum materials for ESOL students, (5) ESOL professional development programs and ESOL teacher education programs, and (6) school administration.

1. Having revealed contradictions in the literature review between Krashen's theory of foreign/second language acquisition (currently one of the dominant theories informing second language teaching practices) and its practical implication in the

field of ESOL content-based instruction the study points to the need to introduce an adjunct ESOL model of content-based instruction with native language support based on conscious approach of mastering content and language. The native language support could be incorporated in the curriculum by means of supplementary language modules created for specific languages depending on the ELLs needs of a particular school or school district.

The study displayed that ESOL high school students should be systematically taught how to use a bilingual dictionary on a daily basis in order to acquire the necessary strategies to use it as their learning accommodation tool. The study displayed that a bilingual dictionary can and should be used in content-based instruction not only as a reference tool but also as a learning resource. The findings of the study point to the need to supply high schools with more bilingual dictionaries for beginning, intermediate and advanced levels. Also more studies are needed to determine how ESOL students use bilingual dictionaries and how their dictionary strategies influence their learning results.

The study underscores that it is necessary and legitimate to employ intentional memorization strategies in science content-based instruction at the initial stages of vocabulary learning. These strategies help to form vocabulary learning routines that most ELLs lack and assist them to build up their functional lexicon for a long term. However, further research is needed to determine what form of bilingual vocabulary presentation is optimal for content-based instruction.

Furthermore, the study displayed that vocabulary rehearsal strategies at the initial stages of vocabulary learning are useful and beneficial for ESOL high school

students and that these strategies can be well incorporated into content-based instruction at the high school level. The study opens the door for a discussion on what classroom learning environments should demand particular vocabulary learning strategies.

The majority of empirical research (Atkins, 1998; Nation, 2001; Schmitt, 2000) in recent years has centered on the initial learning rather than long-term development of vocabulary. Actual learning of a foreign language vocabulary and developing of a functional lexicon, as Nation (1982) explains, is an on-going process which takes more time and effort. The findings of the study display that more studies are needed to explore how ELLs retain vocabulary on a long-term basis and what intentional teaching and learning strategies could be applicable in ESOL content based instruction.

The findings of the study suggest that explicit grammar instruction in the form of mini-lectures in English, which are supplemented with functional grammar commentaries in the native language and followed up by practice activities, can be well integrated in a science content-based course and that students appreciated the value of grammar for their learning. However, further experimental studies are needed to compare effects of explicit and implicit grammar instruction on ESOL high school students.

The study revealed that the translation practice activity supplemented with the translation key had positive benefits for students' learning. It promoted interaction among students, engaged students in the learning process, helped ESOL students develop reading comprehension and improved self-editing skills. It was especially

beneficial for students with low Spanish literacy. Further experimental research is needed to compare the benefits of translation on ELLs' reading comprehension of specialized texts.

2. The findings of the study point to the fact that there is a great difference between doing academic research on samples of a selected student population, applying singled-out treatments within a short period of time, and doing prolonged practitioner action research in the ESOL classroom when complex, multilayered teaching practice is an everyday reality. For example, my self-study demonstrated that the use of comprehensible input strategies, which are advocated as the well-researched ("best practices") strategies for teaching content, were not effective in my authentic classroom setting. For example, I found that reliance on comprehensible input strategies, which favor an incubation period of listening prior to teaching students how to speak, and, consequently, the teaching of receptive skills prior to productive skills, is not effective and even detrimental for shaping students' positive attitude towards learning English and science. These strategies also don't promote the formation of study skills. After students were provided with conscious cognitive strategies of learning language and content, they realized the benefit of vocabulary memorization, explicit functional grammar instruction, and translation practice for their learning. However, more studies in authentic classroom settings are needed to contest recommended "best practices," to see how they work out in real learning contexts, if helping the ESOL learner is to be the final aim of research agendas.

3. The findings of the study suggest that applying CHAT as a theoretical framework for educational action research in general and action research self-study in

particular, provides a positive conceptual shift in traditional action research methodology, allowing researchers to use fundamental categories of the human activity system (such as subject, object, instruments, community, rules and division of labor) to examine teaching practice as a formative experiment comprised of multiple expansive learning cycles. The findings of the study demonstrated that relying on international theoretical fundamental heritage enriches educational research and provides opportunities for teachers/researchers to acquire different perspectives on teaching and learning, as well as on different possibilities (formats) for doing educational research.

The findings of the study demonstrated that teacher practitioners have a vast amount of personal practical knowledge which they can use for doing valid academic research.

4. The study demonstrated that practitioner-created supplementary curriculum instructional materials could be used on par with commercially published course materials and, in some aspects, could even outperform them. For example, in my study I found that native language support can be well integrated into curriculum materials in order to serve the special needs of my ESOL students. The study indicates that there is a need to substitute the stereotyped commercial textbook format (a student textbook plus a student workbook) with the new type of materials for ESOL content-based instruction which incorporate native language support modules.

The study also suggests that more balanced coordination (between content area and ESOL teachers) is needed for the designing of curriculum materials for ESOL high school students. For example, in my district the ESOL language

curriculum for beginning learners uses a purely communicative approach relying on comprehensive input strategies, while the content course curriculum demands from beginning learners extensive knowledge of specialized vocabulary, complex grammar structures and well developed reading and writing skills.

5. The findings of the study suggest that it is necessary to reconceptualize the preparation of future teachers for content-based instruction. The study suggests that a special ESOL content teachers program should be designed at colleges and universities where students are required to learn a foreign language in order to get an ESOL teaching license, in order to be able to begin to supplement their ESOL instruction with students' home languages. Based on my experience, the majority of immigrant students are Spanish speakers; for this reason, the preference should be given to learning Spanish. I also think that talented Latino/Latina bilingual students should be given more opportunities to enroll in the education college programs in order to work as teachers with dual-language expertise in schools.

The study also points to the need to design new formats of teacher professional development, where teachers could be instructed and trained how to develop innovative curriculum instructional materials in order to meet the needs of ESOL students in particular school and school districts, because commercially published programs are too generalized (stereotyped) and do not take into consideration specifics of ESOL student populations.

6. The findings of the study suggest that ESOL students should be more accurately assessed at entry levels, allowing for subsequent corrections during the first semester. This practice could have helped the teacher to identify students'

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learning disabilities in due time and apply the necessary teaching strategies to help students to progress. Because my study also found that many ESOL students were lacking strong literacy skills in their first language (Spanish), schools need to consider supporting L1 literacy skills in a remedial Spanish literacy course (as an elective) during students' first year in high school. This course would help students to improve their low Spanish literacy and promote language transfer in ESOL classes.

The findings of the study are consistent with the findings of McKernan (1991, p. 45) that the main obstacles preventing teachers from conducting practitioner research is the lack of time, the lack of resources, and the difficulty of obtaining consent to conduct research from district officials. The least constraint, according to McKernan (1991), which corroborates my study, is to obtain consent from the students. All my students were interested in participating in the study (the incentive was community service hours), and I thank my school administration for providing support to conduct the study.

I also recommend that state and federal school officials consider more possibilities for teachers/researchers to conduct their action research studies both individually and collaboratively. One such possibility can be to provide teachers/researchers with paid leave time as it is done in other countries (such Australia and Russia) to write their findings but allow data collection activities to be conducted in their own time. Another possibility may be to provide more opportunities for teachers to participate in exchange programs designed to promote collaborative inquiries and research projects that test different instructional models. I also think it would be beneficial to establish international weeks under the aegis of

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professional workshops, where teachers with experience teaching abroad could exchange information about instructional materials, strategies, and curriculum planning utilized in other countries.

Creating my adjunct model of content-based instruction I demonstrated that a foreign-born ESOL teacher, who has different values-and-beliefs system, theoretical and professional background can suggest alternative approaches to teaching ESOL courses which might present an interest for the American TESOL community.

In conclusion, I call on my fellow American practitioners and academic researchers to more enthusiastically explore international theories, methods and practices of teaching a foreign/second language in secondary education. With the advance of computer technology, access to these resources has become available to all. In my study, I used data from research conducted in the United States, Russia, Finland, Canada, Great Britain, Ireland, Australia, China, Germany, Italy, Hong Kong and some other countries. Let's make our learning, and not only the economy, globalized. The learning outcome will be beneficial for all.

Appendix A
Cumulative Performance Data

S-s #	Date of Entrance	Spanish Literacy Pre	Science Knowledge Pre	LAS Links Pre	LAS Links Post	Vocabulary Quiz Final	Science Knowledge Post
1.	February	Competent	12 - 80%	1A	1B	0 - 0%	8 - 53%
2.	October	Competent	11 - 73%	1A	1A	withdrew	withdrew
3.	January	Competent	9 - 60%	1A	1B	8 - 80%	9 - 60%
4.	January	Competent	12 - 80%	1A	1B	10- 100%	12- 80%
5.	August	Competent	6 - 60%	1A	1A	10 - 100%	12 - 80%
6.	October	French /Eng	0 - 0%	1A	1A	6 - 60%	5 - 33%
7.	August	Competent	9 - 60%	1A	1B	10 - 100%	10 - 66%
8.	November	Competent	12- 80%	1A	1B	10 - 100%	13 - 87%
9.	August	Competent	9 - 60%	1A	1B	5 - 50%	8 - 53%
10.	September	Competent	10 - 66%	1A	2A	10 - 100%	10 - 66%
11.	August	Competent	11 - 73%	1A	1B	10 - 100%	11 - 73%
12.	August	Competent	12 - 80%	1A	2A	8 - 80%	12 - 80%
13.	September	English	9 - 60%	1A	1B	10 - 100%	11 - 73%
14.	August	Competent	7 - 46%	1A	1B	6 - 60%	8 - 53%
15.	August	Competent	10 - 66%	1A	1B	7 - 70%	11 - 73%
16.	October	Competent	11 - 73%	1A	1B	10 - 100%	12 - 80%
17.	August	Competent	10 - 66%	1A	1B	8 - 80%	7 - 46%
18.	August	Very limited	8 - 53%	1A	1B	1 - 10%	3 - 20%
19.	October	Competent	10 - 66%	1A	1B	10 - 100%	12 - 80%
20.	August	Competent	14 - 93%	1A	2A	10 - 100%	13 - 87%
21.	September	Competent	12 - 80%	1A	1B	4 - 40%	6 - 40%
22.	August	Competent	4 - 27%	1A	1B	3 - 30%	4 - 27%
23.	September	Limited	10 - 66%	1A	1A	4 - 40%	3 - 20%
24.	August	Limited	10 - 66%	1A	1B	2 - 20%	4 - 27%
25.	August	Competent	9 - 60%	1A	1B	5 - 50%	8 - 53%
26.	February	Competent	8 - 53%	1A	1B	10 - 100%	13 - 87%
27.	February	Competent	13 - 87%	1A	2A	5 - 50%	9 - 60%
28.	September	Competent	9 - 60%	1A	1B	7 - 70%	12 - 80%
29.	September	Competent	12 - 80%	1A	2A	10 - 100%	15 -100%

Students have an average performance of 63 % on Science Knowledge Pre-Test (in Spanish)
Students have an average performance of 62 % on Science Knowledge Post-Test (in English)
Students have an average performance of 68 % on Final Vocabulary Quiz

Appendix B
Students' Spanish Literacy Levels

N = 27*

Literacy levels	Very limited literacy	Limited literacy	Competent
Number of students	2	1	24

* Two students among 29 students who participated in the study spoke World English

Appendix C
Comparison of Science Knowledge Pre-Test and Post-Test

N = 28*

Science Knowledge	Number of students scored 60% or below	Number of students scored above 60%	Number of students scored above 70%	Number of students scored above 80%	Number of students scored 90 % or more
Pre-Test (in Spanish)	4	13	3	7	1
Post-Test (in English)	11	4	3	9	1
Pre-Test (in English)	1	1			
Post-Test (in English)	1		1		

* Student #2, who participated in pre-test but withdrew from school in April, is not indicated in the total number of students.

Appendix D
Results on the Dictionary Strategies Pre-Test vs. Dictionary Strategies Post-Test

N=27

Student number	Pre-Test Time in min.	Post-Test Time in min.	Difference in Minutes	Increase in %
1.	30	9	21	70%
2.	60	10	50	83%
3.	60	7	43	71%
4.	**5**	7	-2	-40%
5.	40	8	32	80%
6.	60	40	20	33% French
7.	60	9	51	85%
8.	**5**	5	0	0%
9.	25	7	18	60%
10.	25	8	17	68%
11.	35	8	27	77%
12.	15	8	7	43%
13.	-	-	-	Engl. speaker
14.	25	7	18	72%
15.	15	7	8	53%
16.	30	12	18	60%
17.	12	10	2	18%
18.	60	10	50	83%
19.	18	6	12	66%
20.	20	7	13	65%
21.	30	8	22	73%
22.	60	22	38	63%
23.	60	14	46	80%
24.	20	9	11	55%
25.	60	10	50	83%
26.	15	10	5	33%
27.	15	8	7	47%
28.	22	9	13	58%
29.	20	8	12	60%

Appendix E
Comparison of the results on the Dictionary Strategies Pre-Test vs. Dictionary Strategies Post-Test

N=27

Number of students	Increase in %	Decrease in %	No gain
6	80 %		
5	70 %		
6	60 %		
3	50 %		
3	40 %		
2	30 %		
1		40 %	
1			0 %

Appendix F
Correlation between Memory Time Responses and Vocabulary Quizzes Results
(for the period from February 25 through May 10)

Quiz #	Fail Quiz (0) MT	Fail Quiz (1) MT	Fail Quiz (2) MT	Pass Quiz (0-1) MT	Pass Quiz (2) MT	Pass Quiz (3) MT
Quiz 8 **N = 27**	14 %	33 %	14 %	7 %	7 %	22 %
Quiz 9 **N = 28**	10 %	10 %	7 %	7 %	21 %	42 %
Quiz 10 **N = 27**	18 %	18 %	14 %	7 %	14 %	17 %
Quiz 11 **N = 26**	7 %	15 %	11 %	3 %	30 %	30 %

Appendix G
Correlation between Final Vocabulary Quiz and Final Science Knowledge Test

HH: high score on Final Vocabulary Quiz and high score on Final Test

HL: high score on Final Vocabulary Quiz and low score on Final Test

LL: low score on Final Vocabulary Quiz and low score on Final Test

LN: low score on Final Vocabulary Quiz and "no pass" on Final Test

NL: "no pass" on Final Vocabulary Quiz and low score on Final Test

HN: high score on Final Vocabulary Quiz and "no pass" on Final Test

NN: "no pass" on Final Vocabulary Quiz and "no pass" on Final Test

N = 28

Correlation	HH	HL	LL	LN	NL	HN	NN
Percent of students	46 %	11 %	3,5 %	7 %	3,5 %	3,5 %	25 %

Appendix H
Results on Frequency of the Use of Dictionaries vs. the Use of Vocabulary Lists
(for the period from February 25 through May 10)

N=29

Student number	Use of dictionaries	Use of vocabulary lists
1.	33	9
2.	23	9
3.	37	10
4.	38	8
5.	29	21
6.	21	9
7.	32	16
8.	27	7
9.	32	16
10.	32	9
11.	32	20
12.	32	8
13.	18	14
14.	36	17
15.	20	9
16.	12	2
17.	28	18
18.	28	13
19.	42	11
20.	18	15
21.	32	11
22.	32	13
23.	14	12
24.	32	11
25.	33	10
26.	34	18
27.	27	12
28.	**7**	**10**
29.	18	12

Average use of dictionaries - 27

Average use of vocabulary lists -12

Appendix I
Results on Translation Practice Final Test

N=29

Student number	Grade for Adequate Meaning	Time In minutes	Self-editing Skills
1.	A	35	average
2.	Absent	Absent	Absent
3.	A	30	good
4.	A	27	good
5.	C	30	good
6.	French/English	-	-
7.	B	35	good
8.	A	15	good
9.	B	23	good
10.	A	28	good
11.	A	16	good
12.	A	26	good
13.	English speaker	-	-
14.	B	27	good
15.	A	30	good
16.	A	30	good
17.	A	15	good
18.	D-	15	good
19.	B	20	good
20.	A	17	good
21.	A	25	good
22.	C	35	bad
23.	D	30	average
24.	C-	30	good
25.	C	22	average
26.	A	21	good
27.	A	15	good
28.	A	23	good
29.	A	17	good
30.	E	35	average

Rating of the Use of Bilingual Vocabulary Lists vs. the Use of Bilingual Dictionaries

N = 26 (1, 6, 7) N = 27 (2, 3, 5)		Number of students responded	Percentage of students responded
1. Using vocabulary lists in class is	always helpful	16	62 %
	sometimes helpful	10	38 %
	never helpful	0	0 %
2. I use vocabulary lists in class	always	12	44 %
	sometimes	13	48 %
	never use	2	7 %
3. I use vocabulary lists at home	always	9	33 %
	sometimes	13	48 %
	never use	5	19 %
4. Using a bilingual dictionary in class is	always helpful	15	58 %
	sometimes helpful	10	38 %
	never helpful	1	4 %
5. Using a bilingual dictionary at home is	always helpful	10	37 %
	sometimes helpful	11	41 %
	never helpful	6	22 %
6. I prefer to use	bilingual dictionary in class	5	19 %
	vocabulary lists in class	5	19 %
	both	16	62 %
7. I prefer to use	bilingual dictionary at home	14	53 %
	vocabulary lists at home	3	12 %
	both	9	35 %

N = 26		Number of students responded	Percentage of students responded
1. Translating paragraphs from the course book	always helps	18	69 %
	sometimes helps	6	23 %
	helps a little	2	8 %
	never helps	0	0 %
me to understand science in class.			
2. Translating paragraphs from the course book	always helps	16	61 %
	sometimes helps	9	35 %
	helps a little	1	4 %
	never helps	0	0 %
me learn English in class.			
3. Translating paragraphs from the course book	always helps	16	61 %
	sometimes helps	8	31 %
	helps a little	1	4 %
	never helps	1	4 %
me memorize vocabulary.			
4. I think this activity is	very helpful	20	77 %
	sometimes helpful	5	19 %
	not very helpful	1	4 %
	not helpful	0	0 %
for students who learn English.			

Rating of the Functional Grammar Commentaries

N = 27		Number of students responded	Percentage of students responded
1. Grammar commentary in Spanish	always helps	18	67 %
	sometimes helps	9	33 %
	never helps	0	0 %
me to understand English in science class.			
2. I always use	grammar commentaries in Spanish (English)	11	41 %
sometimes use		15	56 %
never use		1	3 %
	to prepare for other classes.		
3. I always	read grammar notes to prepare for other classes	9	33 %
sometimes		16	59 %
never		2	7 %
4. I think grammar commentaries should be	only in English	2	7 %
	in other languages	3	11 %
	in other languages and in English	22	81 %

5. I think grammar commentaries should be only in English.

	I agree	7	26 %
	I don't agree	16	59 %
	I don't know	4	15 %

What activities helped you understand science in English?

N = 28

Title of the Activity	Number of students who chose it	Percentage of students who chose it
1. Use a bilingual dictionary	**22**	**78 %**
2. Listen to the recorded texts from the textbook on CD	**17**	**60 %**
3. Memorize vocabulary using vocabulary lists	**15**	**53 %**
4. Do projects using a computer	**15**	**53 %**
5. Do the translation practice with the translation key	**10**	**35 %**
6. Listen to the explanation of the teacher	8	28 %
7. Keep organized notebook (with dividers)	8	28 %
8. Read grammar notes	7	25 %
9. Participate in class discussions	7	25 %
10. Take tests	7	25 %
11. Write answers to questions	7	25 %
12. Use diagrams and charts	6	21 %
13. Do homework	4	14 %
14. Read the textbook silently in class, answering questions	3	10 %
15. Do language exercises in science context	3	10 %
16. Do book reviews during reading sessions	2	7 %

Behavior Protocol on Individual Student

Course: Title
Student: Name

_____

Behavior (action data)	always	frequently	occasionally	never
1. Uses vocabulary lists for reference			+	
2. Uses bilingual dictionary		+		
3. Refers to grammar notes				+
4. Is active during "memory time"		+		
5. Is active during "translation practice"	+			
6. Asks teacher clarification questions				
7. Asks peers clarification questions				
8. Stays engaged in class				
9. Pays attention				
10. Performs as instructed				
11. Does homework				
12. Keeps organized a notebook				
13. Respectful				
14 Attends the class				

_____

Appendix O
Raw Data on Quizzes and Tests for the First Semester

Quarter 1   Quarter 2
10 points for Quiz   10 points for Quiz
20 points for Test   15 points for Test

#	Q1	T1	Q2	T2	Total Q1	Q3	T3	Q4	T4	Q5	T5	Total Q2
1.	-	-	-	-	-	-	-	-	-	-	-	-
2.	-	-	-	-	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-	-	-	-	-
4.	-	-	-	-	**-**	-	-	-	-	-	-	-
5.	6		4	12	**10 - 12**	2	7	9	7	7	11	**28 - 37**
6.	-	-	-	-	**-**	-	-	-	-	-	-	**-**
7.	10		6	11	**16 - 11**	5	9	6	8	5	8	**32 - 36**
8.	-	-	-	-	**-**	-	-	-	-	10	13	**10 - 13**
9.	6		4	15	**10 - 15**	3	6	-	-	-	-	**13 - 21**
10.	-	-	2	10	**2 - 10**	3	8	5	4	4	6	**14 - 28**
11.	6		8	14	**14 - 14**	10	12	8	12	8	11	**40 - 49**
12.	9		8	13	**17 - 13**	8	11	10	11	10	9	**45 - 44**
13.	-		8	17	**8 - 17**	10	11	10	11	10	10	**38 - 49**
14.	7		3	16	**10 - 16**	3	9	4	6	6	9	**33 - 40**
15.	10		6	16	**16 - 16**	10	13	10	11	7	13	**43 - 53**
16.	-	-	5	14	**5 - 14**	6	12	7	10	4	10	**22 - 46**
17.	10		7	16	**17 - 16**	10	13	10	13	10	13	**47 - 55**
18.	4		2	10	**6 - 10**	1	3	1	5	0	10	**8 - 28**
19.	-	-	-	-	**-**	4	9	8	12	10	10	**22 - 31**
20.	-	-	-	-	**-**	-	-	-	-	-	-	**-**
21.	-	-	1	7	**1 - 7**	3	9	3	4	0	6	**7 - 26**
22.	3		0	10	**3 - 10**	0	1	0	2	3	2	**6 - 15**
23.	-	-	0	9	**0 - 9**	4	6	2	1	1	4	**8 - 20**
24.	3		2	8	**5 - 8**	1	4	2	4	2	6	**10 - 22**
25.	1		3	8	**4 - 8**	6	6	6	6	1	6	**17 - 26**
26.	-	-	-	-	**-**	-	-	-	-	-	-	**-**
27.	-	-	-	-	**-**	-	-	-	-	-	-	**-**
28.	-	-	8	13	**8 - 13**	5	7	8	10	10	11	**31 - 41**
29.	-	-	10	17	**10 - 17**	10	13	8	12	10	14	**38 - 56**

Appendix P
Raw Data on Quizzes and Tests for the Second Semester

10 points for Quiz   30 points quarterly
15 points for Test   45 points quarterly

Student #	Q 6	T 6	Q 7	T 7	Q 8	T 8	Total Q 3	Q 9	T 9	Q 10	T 10	Q 11	T 11	Total Q4
1.	-	-	2	8	2	8	**4 - 16**	2	9	5	9	0	8	**7 - 26**
2.	1	10	3	9	0	8	**4 - 27**	-	-	-	-	-	-	**-**
3.	-	-	2	6	5	8	**7 - 14**	4	8	8	9	-	-	**12 - 17**
4.	7	10	10	11	10	10	**27 - 39**	10	12	6	9	10	12	**26 - 33**
5.	7	12	6	8	5	6	**18 - 26**	10	7	5	9	10	12	**25 - 28**
6.	4	6	2	8	2	4	**8 - 18**	3	0	4	8	6	5	**13 - 13**
7.	7	10	8	9	5	10	**20 - 29**	10	12	2	7	10	10	**22 - 29**
8.	10	14	10	12	8	9	**28 - 37**	10	15	8	13	10	13	**28 - 41**
9.	7	10	6	5	5	8	**18 - 23**	7	10	2	11	5	8	**14 - 29**
10.	5	11	10	11	4	7	**19 - 29**	10	14	6	12	10	10	**26 - 36**
11.	10	15	6	8	4	12	**20 - 35**	8	15	10	13	10	11	**28 - 39**
12.	10	14	7	13	10	11	**27 - 38**	10	11	4	10	8	12	**22 - 33**
13.	10	12	10	12	8	12	**28 - 36**	10	15	8	14	10	11	**18 - 40**
14.	10	10	7	6	2	5	**19 - 21**	10	12	7	9	6	8	**23 - 29**
15.	7	14	2	7	7	8	**16 - 29**	7	11	-	-	-	-	**7 - 11**
16.	6	10	4	3	6	8	**16 - 21**	10	13	3	8	10	12	**23 - 33**
17.	10	11	8	8	7	8	**25 - 27**	8	11	5	9	8	7	**21 - 27**
18.	2	8	7	5	1	3	**10 - 16**	1	7	2	5	1	3	**4 - 15**
19.	10	13	10	9	8	6	**28 - 29**	10	13	5	11	10	12	**25 - 36**
20.	10	11	10	12	-	-	**20 - 22**	10	15	10	12	10	13	**30 - 40**
21.	2	5	2	6	2	5	**6 - 16**	5	6	2	8	4	6	**11 - 20**
22.	4	4	1	4	2	4	**7 - 16**	1	1	2	7	3	4	**6 - 12**
23.	3	7	5	6	-	-	**8 - 13**	6	6	3	9	4	3	**13 - 18**
24.	2	6	2	5	5	2	**9 - 13**	0	7	4	6	2	4	**6 - 17**
25.	1	10	4	9	0	5	**5 - 24**	3	8	5	6	5	8	**13 - 22**
26.	-	-	5	7	6	10	**11 - 17**	10	11	6	10	5	9	**21 - 30**
27.	-	-	8	6	2	7	**10 - 13**	10	12	8	12	10	13	**28 - 37**
28.	10	10	10	8	3	9	**23 - 27**	8	12	5	8	7	12	**20 - 27**
29.	10	11	10	9	10	5	**30 - 25**	10	13	8	12	10	15	**28 - 40**

Appendix Q
Video Data Distribution
(How video clips and lesson activities were distributed throughout March 10 – March 26)

March 10	March 16	March 20
Objective: Students will take a test	**Objective**: Students will (1) memorize new vocabulary in order to read and comprehend texts in lesson 2; (2) answer questions in order to explain in writing how weathering and erosion change rocks	**Objective:** Students will (1) review Cause and Effect in order to understand the relationship between events; (2) identify singular and plural nouns in a science context in order to correctly write their singular and plural forms
	Activities used: Vocabulary lists 24, 25 # 26 Vocabulary practice # 27 Workbook, p. 55 # 28 Reading, pp. 114-117 Questions p. 115 # 29 HW Questions p. 117	**Activities used:** Grammar notes 15 Grammar practice # 32 HW check Memory Time (individual practice with vocabulary) # 33 Reading, pp.120-121, questions p. 121
Interventions observed: 1. Use of dictionaries 2. Translation Practice	**Interventions observed:** Use of dictionaries Use of vocabulary lists (Introduction)	**Interventions observed:** Use of dictionaries Use of grammar notes Use of LCE Use of vocabulary lists (Individual Memory Time)
Period 2 Video clips: 1-8	**Period 2** Video clips: 1 (on file dated March 11)	**Period 2** Video clips: 52; 53; 54
Period 3 Video clips: 9-16	**Period 3** Video clips: 25; 26; 2 (2); 3; 4 (on file dated March 11)	**Period 3** Video clips: 33-41; 53.1
Period 4 Video clips: 17; 18; 19; 20		**Period 4** Video clips: 42-51; 54.1

March 24	March 26
Objective: Students will (1) present project "An Animal;" (2) identify the root and the suffix in a word in order to identify the meaning of a scientific term; (3) work in pairs in order to memorize vocabulary of the lesson	**Objective:** Students will (1) listen to the CD in order to practice pronunciation; (2) translate two paragraphs about volcanoes in order to check comprehension of a science text
Activities used: Grammar notes 16 # 34 Vocabulary and content practice (lingua-contextual exercises with L1 support) # 33 Reading, 12 questions # 35 Workbook, pp. 59-60 Memory Time (group work)	**Activities used:** # 35 HW check # 36 Class translation Vocabulary lists 24, 25 # 37 Listening to CD
Interventions observed: Use of grammar notes Use of LCE Use of dictionaries Use of vocabulary lists (group work)	**Interventions observed:** Use of translation practice Use of dictionaries Use of vocabulary lists
Period 2 Video clips: 55; 56; 57; 58; 59	**Period 2**
Period 3 Video clips: 60	**Period 3** Video clips: 60; 61; 62; 63; 64; 65; 66; 67
Period 4 Video clips: (on file dated March 20) 55.1; 56.1; 57.1; 58.1; 59.1; 60.1	**Period 4** Video clips: 68; 69; 70; 71; 72; 73; 74; 75; 76

(37 minute clip composed from the five-hour video data recorded from March 16 to March 26)

Day 1 Getting Started (recorded on March 16, stored on file dated March 11)

Clip #	Selected Start and End Time	Description of the Activity
# 2(2) Per. 3	00:00-00:18 00:50-1:00 1:30-1:35 2:35-2:59 2:59-3:07 3:29-3:42 5:30-6:08 4:45-4:60	Students enter the classroom Objective Assignments Warm-up question I give lesson overview Students copy assignments
# 3 Per. 3	6:45-7:48 8:00-10:04	I distribute vocabulary lists Students repeat key vocabulary words after me I distribute vocabulary practice
# 4 Per. 3	00:00-00:15 00:36-1:00 1:00-1:12 2:36-2:42 3:47-4:20 5:07-5:35 6:57-7:06 8:50-8:58	Students do vocabulary practice using dictionaries and vocabulary lists student (26) student (26) (optional) student (27) student (22) student (9)

Day 2 Memorizing Vocabulary (recorded on March 20)

# 35 Per. 3	6:22-7:35 8:23-9-:25 10:37-10:50	Open your vocabulary lists and find the word "crack" Instructions on how to do individual "Memory Time" activity
# 36 Per. 3	1:09-2:23	Examples on how students do individual "Memory Time"

Day 2 Doing Grammar (recorded on March 20)

# 37 Per. 3	00:11-1:20	I distribute grammar notes Students read grammar notes.
	2:36-5:12	I explain grammar using overhead projector
	5:12-6:10	Examples of how students do grammar practice
	6:30-7:38	Student (9) uses vocabulary lists
	8:06-8:20	Student (22) reads Spanish support
	8:45-11:15 11:40-12:21	Checking grammar practice

Day 3 Memorizing Vocabulary in Groups (recorded on March 24)

# 59.1 Per. 4 (on file dated March 20)	00:00-00:20	Instructions on how to separate into groups
	3:00-4:10	Pair work starts
	4:40-5:05	Examples of how students work in groups
	5:40-6:16	Student (6) sits alone
# 62 Per.4	00:00-00:30 2:14-2:44	Examples of how students work in groups
	00:38-1:30	I check responses from students (12), (4)
# 63 Per. 4	00:00-00:42	(2), (24), (1) student group
# 64 Per. 4	00:00-00:30	(10), (3), (21) student group
# 65 Per. 4	00:00-00:15	(6) student alone
	00:23-1:15	(8), (16) student group

Day 4 Translation Practice (recorded on March 26)

# 69 Per. 4	7:26-11:05	Overhead displays the "Volcano Diagram"
	11:34-11:39	Translation practice starts
		Examples of how students do translation practice
# 70 Per. 4	00:45-1:10	(6) student
	2:20-2:34	(24) student
	2:40-3:14	(19) student
	4:06-4:25	Examples of how students use vocabulary lists
	4:30-5:05	

The Scoring Rubric for Spanish Literacy in Writing
(The rubric is designed by the researcher on the basis of the state Language Arts
standards in writing in English)

Score 1   **Very Limited Literacy in Spanish**

- writing is barely intelligible
- inadequately addresses the topic
- contains few complete thoughts
- uses vocabulary and syntax that are unacceptable for student's grade level
- demonstrates significant weakness in capitalization, punctuation and word spelling

Score 2   **Limited Literacy in Spanish**

- writing is mostly intelligible
- addresses the topic in general
- expresses some complete thoughts
- makes sense even though disorganization of ideas may be evident
- uses vocabulary and syntax that are partially appropriate for grade-level standards
- uses capitalization, punctuation, and word spelling that partially meet grade-level
standards

Score 3   **Competent in Spanish**

- writing is intelligible
- expresses complete thoughts
- the organization of idea is logical
- uses vocabulary and syntax that are appropriate for student's grade level
- uses capitalization, punctuation and spelling that are appropriate for student's grade
level
- almost no errors are made

Samples of Versions of Teacher-Created Materials during Critical Trials

Version 1

Grammar and Content Practice

Directions: Find in the text "**What are Rocks and Minerals?"** examples of nouns, adjectives and verbs. Write down your examples in three columns. Find translations of the words you don't know in the dictionary.

Noun	Adjective	Verb
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Version 2 (page 1)

Grammar and Content Practice

Directions: Find in the text **"What are Rocks and Minerals?"** examples of nouns, adjectives, and verbs. Write down your examples in three columns. Find translations of the words you don't know in the dictionary.

Noun	Adjective	Verb
Example: *mineral*	Example: *large*	Example: *to cover*
1. _____	_____	_____
2. _____	_____	_____
3._____	_____	_____
4._____	_____	_____
5._____	_____	_____
6._____	_____	_____
7. _____	_____	_____
8. _____	_____	_____
9. _____	_____	_____
10. _____	_____	_____

Samples of Versions of Teacher-Created Materials during Critical Trials

Version 2 (page 2)

Grammar and Content Practice

Directions: (1) Find in the text **"What are Rocks and Minerals?"** examples of nouns, adjectives, and verbs. Write down your examples in three columns in the table. (2) Find translations of the words you don't know in the dictionary. (3) Then underline nouns, adjectives and verbs in the supplementary sentences. Use a single line for a noun, two lines for a verb, and a wavy line for an adjective.

For example: Each <u>mineral</u> has different <u>properties.</u>

1. The crust is made of cool solid rock.

2. Streams are good places to find rocks of different sizes.

3. Diamonds are the hardest minerals.

4. Scientists distinguish two kinds of igneous rock: extrusive and intrusive.

5. Marble and slate are metamorphic rocks.

6. All reptiles have lungs.

7. Animals use their bodies and sounds to communicate.

8. People and animals are different groups of mammals.

Appendix U
Catalogue of Supplementary Instructional Materials with L1 Support

Vocabulary lists (Glossaries)

Thirty-five vocabulary lists for each lesson of the course book with translations in Spanish, Chinese and French. Total number of vocabulary words and phrases in each glossary equals 750 lexical units.

Mini -Translation Practice

Twenty mini-translation practice activities for each lesson of the course book with "translation keys" in Spanish, Chinese and French.

Lingua -Contextual Exercises (LCE)

Fifty lingua-contextual exercises (LCE) for each lesson of the course book, which are meant to align language and content standards.

Grammar Commentaries

Twenty-five grammar commentaries that explain grammar features in science context for each lesson of the course book in English and in Spanish. The topics include:

Articles
Parts of speech
Verb "to be"
Verb "to have"
Construction "There is/are"
Pronoun "It"
Simple Present Tense
Negative sentences
Questions
Simple Past Tense
Regular and irregular verbs
Plural nouns
Demonstrative adjectives and pronouns
Constructions with a modal verb "can" in science texts
Passive constructions in science texts
Compound nouns as science terms
Suffixes and prefixes in science terms
Countable and uncountable nouns in science texts
Comparative adjectives
Superlative adjectives
Contractions
Common and proper nouns in science texts
Meanings of the root
Organization of a bilingual dictionary
Homographs in science texts

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