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Computer access, social interaction and learning in a bilingual/multicultural setting.

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COMPUTER ACCESS, SOCIAL INTERACTION AND LEARNING IN A BILINGUAL/MULTICULTURAL SETTING

A Dissertation Presented

by

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DEDICATION

To life,
that has shown me so much,
"maestra vida cámara
que da y que quita,
que quita y que da."

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ABSTRACT

COMPUTER ACCESS, SOCIAL INTERACTION AND LEARNING
IN A BILINGUAL/MULTICULTURAL SETTING

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This study examined the nature of social interactions taking place between students working with computers in three inner-city school classrooms. Its main objective is to present a descriptive analysis of the impact of computers on the social relations between students in a bilingual/multicultural setting.

The social interactions between students in the classroom are assumed to be an important dimension of their learning experience, especially for students from subordinate cultures. It is further assumed that student-student interactions take place within the context established by the teacher and the school, and within the general context of the society. The micro context (student-student interactions) can not be analyzed in isolation from the macro context (the society).

Student interactions were defined as a verbal or non-verbal transaction between two students. These interactions were analyzed by using three major categories of interaction: 1) type of interaction, 2) form of

interaction, and 3) mode or expressive style. Classroom sessions were videotaped for a period of 4 weeks near the end of the school year. In addition, fieldnotes were taken to complement the videotaped material. A crosstabulation analysis was conducted to examine the relationship between the categories of interaction and the demographic characteristics of the students initiating or receiving those interactions. Data on the students' demographic characteristics, such as ethnicity, socioeconomic status, sex, and ability level, were gathered through the use of a questionaire.

It was found that all of the determinants of access to the computers and learning tended to favor Anglo students and did not facilitate the success of Hispanic and other minority students. On the other hand, Anglos usually assumed the dominant role in the interactions with Hispanic students. In general, the social interactions between students was determined by a combination of factors, including socioeconomic status, ethnicity, ability level, and sex. These factors played an important role in determining the type, form and mode of social interaction between students, but they should not be seen in isolation from each other. The powerless status of Hispanics in the school and the city, and the generalized presence of Anglos in positions of authority are additional factors that contribute to explain this phenomenon.

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CHAPTER 1

INTRODUCTION TO THE STUDY

This study examined the nature of social interactions between students working in computer classrooms in two inner-city schools. The focus of this study on student interactions was an idea that emerged out of this researcher's previous experience teaching in similar classrooms. During the two years prior to the initiation of this study, this researcher had been working as computer resource teacher for the public school district, and participated in the development and implementation of the computer education program, and became familiar with the different issues that learning in the computer environment entailed.

The emphasis of the computer program was on the development of children's problem solving and higher order thinking skills. Computers were used as an incentive for students to work in problem solving activities. Students were encouraged to explore freely and to work in problem solving activities at their own pace. They were encouraged to help each other and to share their findings with their peers. However, many times students, both Anglos and Hispanics, failed to engage in meaningful exploratory activities on the computer. They tended to limit their explorations to trial and error entries on the computer, with little planning or reflection on their part, or to

testing the limits of the microcomputer by "crashing" the system or causing it to malfunction. For example, they would start hitting all keys on the computer at random filling the screen with letters and numbers. Although this type of activity was a natural part of the children's exploration of the microcomputer environment (Turkle, 1984) and was not completely discouraged, it served to interfere with other higher learning activities.

This researcher found that some children could obtain a product independently with little teacher input, while others needed a structure provided by the teacher to facilitate their work with problem solving activites. Some students could move on to higher levels of conceptualization through work on activities presented to them, while others, who needed to move on, would use more time to explore a particular concept or skill.

Students were allowed to choose a partner for work on the computer and to move freely in the classroom. In almost all occasions, with a few exceptions, they would pair by sex, ability level, and/or ethnic group. Given that there were more students than computers available, many students had to share a computer. It presented the problem of students getting equal access to the computers. Some students were more aggressive than others and would monopolize the computer. Situations of conflict arose when students could not come to an agreement

on the use of the computer, requiring the teacher's intervention.

Some administrators and teachers in the school district expressed to the researcher in personal conversation, that they did not believe that bilingual children have the basic skills and mental abilities for the type of activities involved in the computer program. They would not encourage their work in problem solving activities and wanted to simplify their tasks. These attitudes and expressions reflect the low expectations and consequential differential treatment provided by many teachers and administrators to bilingual children. These attitudes have been well documented by other research studies (Rosenthal & Jacobson, 1968; Maldonado-Guzman, 1984).

The researcher's concern, as a teacher committed to the education and empowerment of bilingual children, was on how to contribute to change this practice. He observed that this pattern of socialization was reproduced every day in the classrooms by the children themselves. His observations in the classrooms led him to conclude that wider forces within the school and the society had an impact in the everyday social dynamics of the classroom. Who children chose to sit or work with, and who assumed the role of the expert, seemed to be related to their social status. Student performance did not seem to be only determined by ethnicity, but by a combination of

several factors, including gender, socioeconomic status and ability level.

He became convinced of the need to examine more carefully the behavior and social interactions exhibited by students in the classroom, while taking into consideration the students' gender, ethnicity, socioeconomic status, and ability level. With this study he hopes to make a contribution to the education of minority children by revealing the underlying processes of classroom dynamics and by considering their implications to educational theory and practice.

1.1 Context of the Study

The focus of this study is on interactions between students. At the same time, it tries to avoid presenting an isolated, static view of those interactions. In order to present student interactions in their dynamic dimension linkages will be established between the personal relationships of the students and the larger structural forces of the classroom, the school, and the society in general.

Students' interactions in the classroom are not only affected by the type of activities and ambience created by the teacher in the classroom, but also by the quantity and quality of their relationships with peers and other school personnel within the general context of the school, and by

their relationships (or lack of it) with significant others in the community where they live.

1.1.1 The City

The city is situated in the western part of Massachusetts. It has a population of about 44,000, consisting mostly of Anglos. Dominant among them are the Irish, a considerable number of French Canadians, and some Poles and Italians. The city has experienced a new and fast growing Hispanic population (15 to 25%), particularly of Puerto Rican descent, and a smaller population of Afro-americans and Asians.

The Puerto Rican population began establishing itself in the city more than 20 years ago. It has been growing at a fast pace since then, while the Anglo population has been decreasing during the same period of years. This change in population has been due to three factors: 1) exodus of Anglos from the city, 2) differences in median age of both populations and in the corresponding reproductive capacity (the average Puerto Rican is between 15 to 23 years old, while the average Anglo is around 30 years of age), and 3) family size, there are 5 members in the typical Puerto Rican family, while in the typical Anglo family there are only 3 (U.S.Census, 1980).

Puerto Ricans face the most disadvantaged socio-economic conditions earning an average weekly salary of $157 (U.S.Census, 1980), the lowest educational level (7.7 years of school), the highest unemployment rate (20%),

and living in the most deteriorated buildings (Massachusetts Commission on Hispanic Affairs, 1986). They are also blamed for the high incidence of criminality and drug abuse affecting the city. In the past year alone, there were 4 fires affecting life and property of Puerto Ricans and other poor families.

Like in many other cities in the United States, the Puerto Rican community is isolated from other ethnic communities in the city and is constantly moving to and from the island. Probably this high rate of migration, together with the isolationist and racist attitudes encountered, and other factors that are beyond the scope of this study, account for the low level of political participation of the community in city politics. A Puerto Rican woman was elected to the local School Committee in 1985 and constituted the only Hispanic elected official in the city.

1.1.2 The Schools

Puerto Ricans comprise 50% of the elementary school student population, Anglos 45%, Afro-americans 4%, Asians and others 1% (Ingraham Planning Associates, 1987). The Puerto Rican student population is composed of a mixture of those children born in Puerto Rico and raised some part of their lives in the United States and those children born and raised in the United States. English is not the main language for the vast majority of these children, they speak mostly Spanish at home.

The school district has four elementary school buildings and their principals are Anglos. Two of the schools, with total student populations of about 600 each, have the highest concentration of Puerto Rican students. Both of these schools are located in Hispanic neighborhoods. Another school has about 400 students and is located in a more socially and racially mixed neighborhood. These schools have transitional bilingual programs. A fourth school is located in a predominantly Anglo neighborhood and has about 150 students and no bilingual programs.

This study was conducted in three classrooms, one of the classrooms was located in one of the larger elementary schools, and the other two classrooms were located at the medium sized school. Both the regular homeroom teacher and the computer education teacher of each classroom were Anglos. The larger elementary school had a Puerto Rican woman for assistant principal, who had just been named to the position. The first Puerto Rican in such a position. The other school did not have an assistant principal position.

1.1.3 The Computer Classrooms

Through federal and state grants, the school district has built microcomputer laboratories at each of its four upper elementary schools (4th to 6th grades) and hired four computer education teachers, one for each elementary school. Each of these laboratories consisted of a network

of 16 TRS-80 Color Computers connected to a central computer located on the teacher's desk and two Apple IIe microcomputers. Through this network the teacher could send files or special programs to one or more students, and could save each student's computer work. Students from each classroom are scheduled for at least 45 minutes a week of computer education classes.

The computer education curriculum emphasizes the development of problem solving skills and the teaching of computer literacy. Programming skills are viewed as by-products of the process and not as the main goal of the program. The Logo computer language is used for most of the activities in the classrooms. Logo is a programming language that was developed by Seymour Papert and his colleagues at the artificial intelligence laboratory of the Massachusetts Institute of Technology (MIT). It was created to provide children with an environment to discover and explore concepts in mathematics. Papert believes that he is providing children with a biased free environment. He claims that Logo is to mathematics as clay is to art (Papert, 1984). He also assumes that computers are neutral artifacts.

However, contrary to Papert's view, computers did not show to be neutral artifacts that every student could use with ease. The students' level of success in the program seemed to be highly related to their previous experience with computers. Not only was the social environment

important but also the students familiarity with the learning materials. The Logo environment was abstract and confusing and made the drawing of geometric shapes more complicated than drawing with a ruler, transporter or compass.

Problem solving skills were taught through the use of the Polya model of problem solving. This model of problem solving, developed by G. Polya (1973), formulates four basic steps to guide heuristic reasoning: 1) define the problem, 2) make a plan, 3) carry out the plan, and 4) look back. Although these are usefull strategies for solving problems, the assumption behind their use was that children lacked the necessary thinking skills. In addition, they were applied to the solution of trivial problems, which consisted in the reproduction of graphic designs developed by the teachers. The problem solving activities were more like traditional worksheets to be filled out by the students.

1.2 Statement of the Problem

Most studies of computer related programs have been conducted in suburban schools with mostly Anglo upper and middle-class students. These studies have been conducted with groups of four to eight students at a time, and many of them in experimental or controlled situations, out of the regular classrooms. However, as computers become increasingly available, beyond the wealthy suburbs, to

poorer inner-city school districts, more computer programs are being developed to serve large groups of students. On the other hand, the inner-city school districts have a more diversified student population than the affluent suburbs. A larger proportion of students from different ethnic, linguistic, and socioeconomic backgrounds reside in them. These urban multicultural settings will require consideration of different criteria than those already established for the suburban middle class. In implementing and evaluating these programs we must take into account the students' level of proficiency in the English language and their diverse socioeconomic, cultural, and linguistic background.

While some studies of computer related programs have been concerned with the interaction of students of different sex and/or ability level, none has dealt with the interaction of students from different ethnic backgrounds. A few studies have shown that some computer environments serve to promote collaboration between students (Hawkins, Sheingold, Gearhart, & Berger (1982); Fire Dog, 1985; Clements and Nastasi, 1985), but we can not assume that it will automatically apply to students in all settings.

Giroux (1983) indicates that schools reproduce the relations of power and resistance between dominant and subordinate groups that exist in the larger society. He adds that:

> the imprint of the dominant society and culture is inscribed in a whole range of school practices, i.e.,

the official language, school rules, classroom social relations, the selection and presentation of school knowledge, the exclusion of specific cultural capital, etc. (p.66).

This study will explore the impact of computers on the social relations in the classroom in a bilingual and multicultural setting. It will attempt to show how the relations of domination and resistance are manifested in the classroom as a new element (the computer) is introduced.

1.3 Definition of Terms

Afro-American: a North American of African descent, also referred to as black.

Anglo: an English speaking caucasian of European descent, also referred to as white.

Bilingual: refers to children and adults who can speak two languages at different levels of proficiency. For example, many Puerto Rican children in the United States can speak two languages, Spanish and English. Some are more dominant in Spanish (native language) and others are more dominant in English.

Hispanic: a person who was born and raised in a Spanish-speaking country or whose ancestors were born and raised in a Spanish-speaking country, particularly in Puerto Rico or other Latin American country.

Language Proficiency: refers to a student's ability to speak and comprehend a particular language, in everyday

social situations as well as in more cognitive demanding academic situations.

Minority: term used to classify non-Anglo groups in the United States, i.e., Afro-americans, Hispanics, Cape Verdians, and Asians.

Multicultural Setting: refers to a classroom setting with children from different cultural backgrounds, e.g. Irish, Polish, French-Canadian, Puerto Rican, etc.

Social Interaction: it is used to refer to all interactions between children for academic or non-academic purposes. It is also used in a more narrow sense to refer to non-academic interactions between children in the classroom. It is expressly indicated in the text when it is used in this more narrow sense.

1.4 Significance of the Study

Since there is a scarcity of research on the impact of computers in bilingual and multicultural settings, this study will shed some light on the particular considerations educators must take when introducing this technology into those settings. The findings of this study could provide a better understanding of the problems confronted by students from subordinate groups and could contribute to identify possible strategies to overcome these problems.

If students' social relations in the classroom and other school practices are permeated by relations of cultural and social conflict, then it will be worthwhile

to examine how these relations and practices are manifested as a new element, the computer, is introduced. By carefully studying how the mechanisms of domination and resistance operate in schools, we can better understand why students from different groups fail or succeed in certain school experiences. A critical examination and analysis of these everyday school practices and experiences could serve to point to strategies for change and social action.

1.5 Limitations of the Study

This study was carried out during a period of two months. The short duration of the study limits the scope of the findings.

Student interactions via the computer were observed to a limited extent. Notes were taken about the projects the students were working on their computers, and about the problems they were confronting with their projects in general. More extended observations of student interactions via the computer would have entailed narrowing the focus of this study, sacrificing the wider context of the classroom.

Students' ability level was determined based on teachers' perceptions. This was done with the purpose of analyzing the relationship between teacher's expectations, student's characteristics, and student's performance in the classroom. Based on previous research (Rosenthal &

Jacobson, 1968; Cohen & Anthony, 1982), it was assumed that students' performance was largely determined by the teachers' perceptions and expectations of their level of ability.

Another limitation is that students were not involved in the final categorization and analysis of the events. This researcher interpreted and categorized the events by using the data from the field notes and the videotapes. The analysis is subject to error in certain situations where the students' personal views were not available.

In addition, student interactions were observed only in the computer classroom. No observations were made of social interactions between students during the period prior to the computer classroom session or while students were involved in other activities. It limits the understanding of events in the classroom that might have been initiated somewhere else.

1.6 Organization of the Study

This document is organized in a way to facilitate the reader's understanding of the rationale and procedure followed in the research. The first chapter discusses the objectives of this research and provides some background information on the study and the setting where it was conducted. The second chapter presents a review of previous research on the factors affecting learning of students from subordinate cultures. It also presents a

review of studies on computer education programs. The third chapter describes the theoretical framework and assumptions used, and explains the research process and methodology used. The fourth chapter presents the findings of this study, together with an analysis and interpretation of those findings. The last chapter indicates the most important conclusions reached in this study, and discusses its implications for teaching and future research.

C H A P T E R 2

REVIEW OF THE LITERATURE

This chapter presents the literature related to learning in three areas of relevance to the study. In sections 2.1 thru 2.3 previous studies in the area of social interaction are presented. Section 2.4 discusses several factors affecting learning of bilingual students from subordinate cultures. In sections 2.5 thru 2.7 a critical evaluation is made of the uses of computers in schools, and several studies of computer related programs are discussed. Finally, in section 2.8 a summary of the discussion is presented followed by some concluding remarks.

2.1 Social Interaction and School Learning

The consciousness of individuals is constituted in the social practice in which they participate (Freire, 1985). According to Freire, the act of knowing involves two related dimensions: the relationship between the learners and the educator, and the social reality in which they exist. Freire's notion of pedagogy is based on a relationship of dialogue between learners and educators where the social reality is critically analyzed. He criticizes traditional education, where discipline is emphasized, teachers control all activities, and students become passive recipients of information (Freire, 1976).

It limits students' responses to what the teacher wants them to say or how to best please the teacher. In confirmation of Freire's critique, Goodlad (1984) found that teachers in the typical classrooms throughout the United States, spend most of their time "standing or sitting in front of a class imparting knowledge to a group of students" (p. 105). He observed that most children were involved in passive learning activities and independent work on identical tasks.

The role social interaction plays in learning has been explored by various research traditions. Developmental psychology has theorized that social interaction and the coordination of actions are essential factors in cognitive development (Piaget, 1981). Piaget states that "social life affects intelligence through the three media of language (signs), the content of interaction (intellectual values), and rules imposed on thought (collective logical or pre-logical norms)" (p. 156). According to Piaget, the interactions of the individual with the social environment (inter-individual transactions) are subject to the same developmental stages as his/her interactions with the physical world (intra-individual transactions).

Based on Piaget's theories, a group of researchers have been studying the role social interaction plays in cognitive development (Perret-Clermont, 1980; Bearison, 1982). These researchers have taken a different perspective than traditional developmental psychologists.

Instead of looking exclusively at the individuals and their mental capacities, they have focused their attention on the social context in which knowledge is developed. However, they have utilized in their studies an experimental design which limits the subjects' interactions to the conditions established within the experiment. The varied characteristics of individuals and the complexity of situations under which knowledge can be developed is not addressed by these studies. They are mainly concerned with how subjects respond to pre-defined task conditions, and fail to take full consideration of cultural and socioeconomic factors in social cognition. Other researchers have questioned whether the findings of these type of studies could be sustained in a natural environment (Bronfenbrenner, 1976). Finally, researchers of cognitive development fail to acknowledge the fact that the tasks and other measures they utilize to determine cognitive competencies may be biased towards certain social, cultural, and gender specific values and practices (Giroux, 1983).

On the other hand, the ethnographic research tradition is characterized by its use of naturalistic techniques of study. It gathers its data for analysis through the use of field observations, participant observations, interviewing and questioning of informants, videotape, audiotape, and film. Ethnography is the analytic description and reconstruction of cultural behavior which delineate the

shared beliefs, practices, and knowledge of a group of people (Spradley and McCurdy, 1972).

Educational ethnographers have been studying different aspects of social relations in schools and its relationship to student performance. One strand of ethnographic research has been devoted to the study of differences between home and community cultures and the culture of the school and its effect on classroom interactions between teachers and students. These studies have focused mainly on patterns of conversational turn-taking (Shultz, Florio, and Erickson, 1982) and interactional styles (Philips, 1972) that are appropriate at home and community, yet are judged inappropriate at school. They have demonstrated how cultural factors play an important role in conflicts of interaction between teachers and students. Based on their findings, these researchers have questioned the validity of the clinical labels that are often applied to students from "culturally different backgrounds".

Another strand of ethnographic research has been examining classroom interactions and school practices and their implications for different social classes. Jean Anyon (1980) analyzed teachers' pedagogical styles, curriculum content, and methods of student evaluation of elementary schools in communities of different social classes. She concluded that the student's school experience differed qualitatively by social class. Students in the higher social classes were presented

activities that required higher cognitive and analytical abilities, and were expected to show greater capacity for independent and creative work than students in the lower social classes. Working class students were presented less exciting activities that involved mechanical and rote work, and discipline and control was highly emphasized in their schools.

On the other hand, a study in an inner-city public elementary school conducted by R. Timothy Sieber (1982) found that middle class students received a better education and special privileges that were not offered to working class and Puerto Rican students within the same school. Sieber's research goes beyond the level of the social interactions in the classroom to the wider level of the school and the community. He describes how middle class parents actively fought to bring about changes in the school to benefit their children. With the multilevel approach of his ethnographic study, he demonstrates how classroom events are affected and determined by political struggles within the larger community.

Other ethnographic research, conducted in bilingual classrooms, have examined teacher-student interactions and their effect on social stratification (Maldonado-Guzman, 1984) and on student learning (Moll, 1982). Maldonado-Guzman found that teachers provide differential treatment to students based on the student's ethnicity, ability level, gender, personal appearance, and social class. He

utilized a "multi-dimensional framework" in his ethnographic study. This framework, developed by Maldonado-Guzman (1980) for the study of interactions in the classroom, combines the use of inductive and deductive methods of analysis. Maldonado-Guzman seeks to explain classroom events by describing their constituent elements and analyzing their internal dynamics, and by examining how external factors influence the events that take place in the classroom. He states that children's actions in the classroom are influenced by the inmediate context as well as by what they learn and do at home or in the community where they live.

Luis Moll (1982) contrasted the learning activities provided to high ability bilingual students in Spanish and English classrooms. He found that the same group of children were provided advanced reading comprehension and writing activities in the Spanish classroom, but were provided low level activities of decoding and recalling information in the English classroom. Moll indicates that the differences in levels of the activities could not be attributed to a lack of proficiency in the English language because the students were fluent in English. Both, Moll and Maldonado-Guzman, utilized videotape recordings as sources of data for analyzing classroom interactions. They indicate that through videotaped recordings they were able to reexamine classrooms events and to reinterpret them as

new information and knowledge was obtained at a later point in time.

The above mentioned studies on social interaction in schools have focused their attention on school practices and/or teacher-student relationships. They describe the internal dynamics of the school and show how it contributes to reproduce the dominant culture and to provide an inferior education to students from subordinate classes and cultures. However, the underlying assumption of these studies is that the process of domination is one-sided. They do not take into account the actions of students or their parents to accomodate or resist these practices (Giroux, 1983).

How students reproduce the relations of domination and resistance between themselves by reproducing and internalizing the attitudes and beliefs prevailing in their environment is another aspect not addressed by these studies. Attitudes and beliefs about different ethnic groups, or associated with sex roles, social class and ability level are transmitted by teachers, the student's home environment, and society in general. These attitudes are reflected in the interactions betweeen students in the classroom and influence their relationships with other students.

2.2 Student-Student Interactions and Learning

Most studies have been carried under the assumption that student-student interactions are not an important element in the learning process. Student interactions are usually considered as deviations from the learning activities in the classroom. This is especially true in traditional classrooms, where most of the learning activities are centered on the teacher and require individualized seatwork.

A study conducted by Steven Bossert (1979) examined the influence of classroom task structures on social relationships in the classroom. As part of his study, Bossert examined peer interactions in two third grade and two fourth grade classrooms. He did not find a strong influence of race and neighborhood in the establishment of social or play interactions between students. However, his study was conducted in a private "upper-middle-class" school with a student population of similar socioeconomic status. He found that student interactions in academic work were highly influenced by ability level (as determined by the teacher) in those classrooms where recitation was emphasized and special privileges were granted based on task performance. He observed that students of high ability tended to group together and engage in relations of competition with their peers. In addition, Bossert observed that students usually grouped together by sex in both play and academic work situations.

It is also important to recognize that not all student interactions are based on socially or culturally transmitted attitudes and beliefs, some of these interactions can be attributed to the dynamics of child development. Rubin (1980) reports that as children approach the age of 12 group belonging becomes more important and that "sex segregation of these groups is almost total." He also indicates that groups exert strong pressure on children to behave according to their expectations and standards.

2.3 Cooperative Learning and Social Interaction

The literature on cooperative learning has also shown that students' classroom performance is affected by many factors. Cooperative learning consists of students working in small groups in the classroom. Students with different academic abilities, different sex, and different levels of English proficiency are integrated into each group. A different role is assigned to each student and the students take turns in assuming each role. This is done with the purpose of making group work more efficient and to foster the participation of all students and to avoid status differences among students (De Avila, 1985). Each group is monitored carefully, especially at the beginning, to prevent "high self-concept" students from turning cooperative situations into competitive ones, to give

encouragement to "low self-concept" students, and to provide support as needed (DeVoe, 1977).

There are two variations of cooperative learning. One has a developmental approach, and believes that students learn through task-oriented interactions (Johnson, Johnson, Holubec, & Roy, 1984). The other variation of cooperative learning follows a behavioristic, motivational model. It believes that students learn more when group rewards are provided based on individual learning (Slavin, 1985).

When cooperative learning is compared to individualized instruction, it shows to be more effective in increasing the student's capacity "to take the affective perspective of others, more altruism, more positive attitudes towards classroom life, and higher achievement" (Johnson, Johnson, Johnson, and Anderson, 1976). Affective perspective taking, in turn, is opposed to egocentrism and stimulates cognitive and moral development (Kohlberg, 1968; Piaget, 1981). Cooperative learning methods have been found to have very positive effects on self-concept, friendliness, race relationships, and attitudes towards handicapped students (Slavin, 1983; Johnson, Johnson, Scott, and Ramolae, 1985). The process of discussion and interaction in cooperative learning groups promotes the use of higher-order and critical thinking skills (Johnson and Johnson, 1983), and provides the opportunity for developing English language skills (Ornstein-Galicia and Penfield, 1981; Wong-Fillmore, 1985).

2.4 Subordinate Status, Bilingualism and Learning

The following research studies and reports indicate that many complex and interrelated factors account for the level of academic achievement of children from subordinate cultures. Studies of different minority groups conducted at an international scale (Ogbu, 1978; Cummins, 1984) have noted that the school performance of minority students is related to their "status and power" relationship to the majority group. Ogbu makes a distinction between "castelike" or dominated and "autonomous" minority groups and indicates that students from dominated groups are the minority students that overwhelmingly tend to fail in school. He considers Afro-Americans, Mexican-Americans, Native-Americans, and Puerto Ricans to be "castelike" minorities because "they share the experience of being brought into United States society against their will and then relegated to subordinate status" (p. 225). Ogbu states that the persistent school failure of these minority groups can be attributed to three factors: 1) the cumulative effect of the inferior education they have traditionally received; 2) the subtle mechanisms used to differentiate their education from the one provided to Anglos, i.e. testing, ability grouping, and classroom dynamics; and 3) the "job ceiling" or virtual exclusion of minorities from prestigious and highly remunerated occupations. According to Ogbu, these factors "have the consequence of stunting their development of linguistic, cognitive, motivational, and

other skills that promote the type of school success enjoyed by the dominant group" (p. 29).

Cummins points out that school programs reflect the language, values, and learning styles of the dominant group and tend to discriminate indirectly, and flagrantly at times, against minority children. He indicates that IQ and other standardized tests used to determine students' cognitive abilities or intelligence are also based on the assumption that all students are from a culturally homogeneous population. This overemphasis in the Anglo "dominant group values in the assessment and pedagogical process has served to perpetuate the educational (and societal) 'status quo' in which cultural and socio-economic differences are frequently transformed into academic deficits." (p. 93). Thus, by failing to incorporate the learning experiences of minority children, the educational system contributes to create the conditions for their failure. Cummins adds that schools are focusing on minority children's mental abilities as the source of their academic failure, instead of looking at the inadequacy of the educational program offered to these children.

On the other hand, recent studies in bilingual and multicultural classrooms in the United States have focussed on the effects of language proficiency and social status on academic achievement and classroom interactions of linguistic minority students (De Avila, 1984, 1985; Hakuta and Diaz, 1985; Cohen, 1986; Cohen and Anthony, 1982). De

Avila (1984) presents research evidence which indicates that students differences in intellectual development and cognitive style can not be attributed to bilingualism. Studies that characterize Hispanic students as being more "field dependent" (Ramirez and Castaneda, 1974) or having "lower achievement motivation" (Gaudry and Spielberger, 1971) than Anglos, fail to establish a distinction between degree of language proficiency, socioeconomic status, and ethnicity. These studies assume that Hispanics are a homogeneous group, that all Hispanics come from the same socioeconomic background, and have the same level of proficiency in both English and Spanish. These characterizations only serve to reinforce stereotyped attitudes towards Hispanic students. In order to better assess the effects of bilingualism, De Avila says, consideration must be given to the students linguistic proficiency in each language.

Language proficiency and intellectual development have not shown to be sufficient predictors of academic success of linguistic minorities (De Avila, 1985). It could be attributed to the fact that traditional bilingual education programs have followed a policy of compensatory education, based on the assumption that linguistic minority children have "deficiencies" that need to be corrected. Without altering the school's basic structure, special programs have been created that separate "deficient" or "disadvantaged" children from "non-deficient" or "regular" children. In

this way many minority language children are identified as "special" or "disadvantaged" by their peers, and by teachers and other school personnel, placing the burden of a label or stigma upon them. The former is not intended as an argument against bilingual education programs per se but against the "deficiency" model they have followed.

De Avila (1985) has established three factors that affect minority language students' level of academic success: 1) the level of interest elicited by the learning activities and the motivational aspects involved; 2) the degree to which the learning activities facilitate the formation of concepts and the acquisition of intellectual strategies or repertoire; and 3) the extent to which students are able to participate or have access to collaborative group work and verbal interchange with teacher and peers.

Several studies have pointed out that the academic performance of minority language students is significantly affected by the expectations of non-minority teachers and students (Cohen, 1974; Cohen and Anthony, 1982). Cohen (1974) found that teachers and Anglo class peers expect less from all linguistic minority students, no matter what their intellectual abilities are, thus producing a "self-fulfilling prophecy for failure". In a related study, Cohen and Anthony (1982) found that students of higher social status are more active and influential when there is interaction in a classroom task. Since students who talked

and worked more together showed increased academic and conceptual learning, these patterns of interaction served to prevent the access to learning of "low status" students. Cummins (1984) presents other studies that show that teachers tend to give more opportunities for interaction and to have more positive transactions with students perceived as high achievers as compared with students they perceive as low achievers. Given the tendencies to classify linguistic minority students as "deficient," "disadvantaged," or as having "low achievement motivation," we could also expect them to have less interactions and more negative transactions with their teachers and schoolmates than Anglos.

A study conducted in Canada by Elizabeth Peal and Wallace Lambert (cited in Hakuta and Diaz, 1985) found that true or "balanced bilinguals" perform better than "pseudo bilinguals" or monolinguals on both verbal and non-verbal measures of cognitive ability. The Canadian researchers demonstrated that truly bilingual children outperform monolinguals especially in tasks requiring symbolic or mental flexibility. However, as Joshua Fishman has pointed out, the issue is not whether there is a relationship between bilingualism and intelligence, but of under what circumstances are particular kinds of relationships, positive or negative, obtained (cited in Hakuta, 1986).

In a recent article, Cummins (1986) concludes that the educational experience of minority students must be

transformed to one of empowerment in order for minority students to be able to succeed academically. He establishes four important elements of an empowering school environment: 1) the incorporation into the school program of the minority language and culture; 2) the participation in the educational process of the minority community; 3) the establishment of an educational approach that encourages reciprocal interaction between teachers and students, and allows students to "become active generators" of their learning; and 4) the change of the role of professional educators to become advocates of minority students.

2.5 Uses of Computers in Schools

Schools throughout the United States are acquiring computers at an accelerated rate. According to a national survey conducted by the Center for Social Organization of Schools (1986), by the Spring of 1985, 92% of all high schools, 85% of all middle/junior high schools, and 57% of all elementary schools were utilizing 5 or more computers as part of their regular instructional programs.

The Center for Social Organization of Schools also found that, at the elementary school level, computers are most commonly being used for Computer Assisted Instruction or CAI (i.e., programs of drill-and-practice and tutoring,) and that other uses of computers such as: discovery learning, problem solving, programming, and word processing were becoming more widespread (44% of all computer use).

However, an article in the Christian Science Monitor (cited in Benderson, 1983) reported that a gap exists between the poor and the more affluent school districts in per pupil expenditures on microcomputer and other instructional materials, and in the way in which the computers are used. The Christian Science Monitor indicated that wealthier school districts tend to use computers to teach programming and other advanced skills, while innercity and rural school districts use them more to drill and practice students in the basic skills.

On another hand, findings by Schubert (1984) indicate that teachers, and even students themselves, seldom encourage - and sometimes actively discourage - computer use by female and "minority" students. Schubert reported that while there may be a high level of participation of females and "minorities" in elementary computer programs, student enrollment in advanced computer classes is mostly Anglo and male. She also found that many schools assign academic prerequisites that tend to limit computer access to "brighter" students.

In addition, several surveys conducted among teachers show that computer use in all classrooms is very small, and that many teachers are not positive about using computers extensively in their classrooms (Stevens, 1984). Teachers are confronted with the more practical problem of fitting the computer into their already loaded teaching schedules. Furthermore, computers are new to education

and most teachers lack the necessary training and skills in computer use.

These descriptions of computer use in schools seem to indicate that the introduction of computers has not brought forth a revolution in education as had been predicted by some. Various educators had indicated that the introduction of computers will revolutionize teaching and learning (Deken, 1981), will provide more relevancy and motivation to education (Doerr, 1979), and will allow teachers to give more emphasis to higher cognitive skills in the classroom (Papert, 1980; Bork, 1980). These views attribute to technological innovation alone the capacity to bring about educational reform. They ignore the role economic, social, political, and cultural factors play in the reproduction of the actual educational system.

The fact that computers are mostly used for drill and practice in the elementary school level does not indicate a break from traditional forms of instruction. Schools rather seem to be incorporating computers into their traditional programs of instruction. For these purposes, several computers are being placed at one or two locations of schools, usually in a laboratory or in a room of common use like the library (Center for Social Organization of Schools, 1986). In this way, computers are used to provide students a pre-packaged instructional program (geared to the provision of basic academic skills). This laboratory setting allows computer education activities to be carried

out with the same teacher directed approach and with the same emphasis in discipline and control provided in the traditional classroom.

The different quality of computer education provided to upper and middle class students vis-a-vis students from subordinate cultures, poor, and female students is a reflection of what Bowles and Gintis (1976) have identified as the role of the schools in the reproduction of the existing economic order. Bowles and Gintis studied the patterns of class, race, and gender distinctions fostered by the educational system and found that this was accomplished, in part, through a process of differential selection and training of students.

Another important aspect of the presence of computers in schools is their impact on the social relations between teacher and students and between the students themselves. This is an area that has been studied to a limited extent and deserves further study.

2.6 Computers and Social Interaction

Given the evidence presented above on how existent school practices serve to discriminate against students from subordinate cultures and low social class, it is important to consider how the introduction of computers affect the social relations of the classroom.

Some researchers have been examining the social and psychological effects of computer environments (Turkle,

1984; Clements, 1986), comparing the collaborative work of students in on-computer and off-computer situations (Hawkins, et al., 1982; Clements & Nastasi, 1985, 1986), and studying how different computer programs serve to enhance or hinder social interaction and collaboration among students (Clements & Nastasi, 1985). However, none of these studies have analyzed the patterns of interaction of students by ethnic or socioeconomic status, nor have they analyzed how the computer program relates to existing school practices.

Hawkins and her co-researchers (1982) reported increased task-related interactions and more instances of verbal and non-verbal collaboration between students using the Logo computer language, as opposed to students working in other "non-teacher-directed" activities in the classroom. They attribute these beneficial effects of Logo to three possible occurrences. Student's work on the computer is much more visible and public than most other activities in the classroom. Secondly, the Logo language makes more explicit the student's instructions to the computer and the output of those instructions, allowing for more involvement of other students. Thirdly, the novelty of the computer could have produced a reactive effect on the students.

Although this study included some children from different ethnic and socioeconomic backgrounds, the researchers indicate that it was conducted in a private

school in Manhattan and many of the children "were above national norms in school achievement and came from upper-middle-class and professional backgrounds" (p. 363). The patterns of interactions of the students by gender, ethnic, or socioeconomic group was not analyzed.

Clements and Nastasi (1985) observed children working in pairs in on-computer and off-computer activities and compared the respective effects of these situations on 20 measures of social competence. They did not find evidence that students working on computers initiated and maintained more interactions with their social environment. However, they found that students in the computer situation engaged in more academically related cooperative work, while at the same time exhibited more conflict and more resolution of those conflicts without adult intervention. Clements and Nastasi conclude that the lack of significant difference between the on-computer and the off-computer situations, in the amount of social interaction observed, may be due to the big amount of cooperative work taking place between the pairs. A continuous level of involvement between each pair of students prevented the initiation of other social interactions, and may have generated more conflicts. The participants in this study were all Anglo, middle-class children.

2.7 Computers and Bilingual Education

Studies evaluating the effects of computer use in bilingual settings are very scarce. Saracho (1982) investigated the effects of a computer assisted instruction (CAI) program on the academic achievement and attitudes of Spanish-speaking migrant children attending schools in the South-western United States. This study involved 256 children from third to sixth grade. The results show that students in the CAI program had greater achievement than students in a control group. However, the study showed that students who did not participate in the CAI program had more favorable attitudes toward CAI than those students in the CAI program.

An article in Electronic Learning magazine reported that there are "10 major computer-based bilingual education projects" in cities throughout the United States (Swett, 1986). These experimental and demonstration projects involve students from various ethnic and linguistic groups: Puerto Ricans, Chicanos, Cubans, Sioux Indians, Samoans, and Indochinese. In general, the purpose of these projects is to "speed up English language acquisition and proficiency in ESL classrooms" (p. 49). Most of the projects use computers to teach basic English grammar skills through programs of "drill-and-practice" and "tutorials". Only two of the projects were reported to use the computer as a tool to teach the process of writing.

One of these projects also integrated the teaching of science to the teaching of English language skills.

On the other hand, there is a tendency to limit access to computers to linguistic minority students and low-ability students (DuBois & Schubert, 1986). In the case of linguistic minority students it is argued that they should not be introduced to computer programs like Logo because of their limited English skills. Furthermore, it has often been held that linguistic minority students lack the necessary thinking skills to cope with this kind of computer programs, as if thinking was related exclusively to the English language. Low-ability students are often kept from experiencing computer programs because of their limited reading, spelling and/or mathematics skills. It is precisely for the improvement of those skills that many computer programs have been developed.

2.8 Summary and Conclusions

Recent research in cognitive development and academic achievement of students from subordinate cultures point to the need to radically transform the academic experience of these students. Schools must take into account all factors contributing to their academic success. Paulo Freire's theory of dialogical education can provide a theoretical framework for this new educational practice.

The introduction of computers into the schools does not necessarily represent an improvement in the educational

conditions of all students. Old patterns of discrimination based on class, race, and sex could be exacerbated if appropriate policies are not maintained for computer use in the classrooms. In the development of computer education programs we must not emphasize discipline and control and the provision of skills to get a job. Instead, computers should be used as tools for collaboration and social and cultural interaction. The educational program should not be centered on the development of higher-order thinking skills, but on the application of those skills to meaningful life situations. Our goal should be to prepare students for meaningful jobs and a conscientious participation in society.

The next chapter describes how Freire's theoretical framework and Giroux's notion of domination and resistance are utilized for the study of social interactions between students in computer classrooms.

C H A P T E R 3

METHODOLOGY

This chapter presents the assumptions, theoretical framework, and questions guiding the study. The data gathering and field procedures used are also presented. The last section describes the categories used in data analysis, the process of coding observations, and other sources of data.

3.1 Assumptions and Theoretical Framework

This study is based on the assumption that education is essentially a political act (Freire, 1976). According to Freire, education is not a neutral activity. The unequal relations between dominant and subordinate groups are recreated everyday in the context of the school. Ideology, power, and culture are important elements for understanding the dynamics within the school and between the school and the wider society (Giroux, 1983). Relations of domination and resistance are expressed through the medium of ideology, power, and culture. In accordance with this theory, it can be expected that social interactions in the classroom are an important dimension of the student's learning experience, especially for students from subordinate cultures. These interactions can take place between a teacher and a student or between students.

The emphasis of this study is on the interactions between students themselves.

The theoretical framework developed by Maldonado-Guzman (1984) for the study of teacher-student interactions was utilized, with some modifications, to study student-student interactions in the classroom. In this framework, it is assumed that student-student interactions take place within the context established by the teacher and the school, and, moreover, within the general context of the society. You can not look at the micro context (student-student interactions) in isolation from the macro context (the society). The method of multi-dimensional ethnography developed by Maldonado- Guzman considers the macro and micro levels as "relative ends of a continuum," starting from the "inner sources of behavior" and extending to the structural forces of society as manifested in the classroom, school, family, community, social class, and culture.

> This means for example, that some classroom behavior may respond directly and immediately to a family situation, but not to the immediate classroom structure or dynamics. This also means that not everything that happens in the classroom has to be determined by the immediate context. Actually many times children may not be immersed in the immediate context and could be thinking about something else, or behaving in response to drives that are rooted somewhere beyond the classroom (Maldonado-Guzman, 1984, p. 358)

An important assumption of this framework is that classroom interactions are "continuously dynamic," that is, they embody students' lived experiences at different

times, and in diverse settings and contexts. In this sense, Maldonado-Guzman's method of multi-dimensional ethnography differentiates itself from other ethnographic studies, which have approached classroom interactions in their static dimension. According to Maldonado-Guzman, the ethnographic research tradition represented by the work of H.Mehan and R.McDermott, among others, has studied classroom interaction at the micro-social level without taking into account the larger social context and its historical dimension.

Computer classrooms were chosen for this study because of the researcher's previous experience and knowledge of such learning environments, and because of the nature of the learning activities in that environment. Activities in the computer classroom are not centered on the teacher, and students are encouraged to collaborate and to freely choose where to seat.

3.2 Research Questions

This study sought answers to the following research questions:

1. How did students gain access to learning while working with computers?
2. What was the nature of the social interactions between students while working with computers?
3. How did the nature of the social interactions between students, while working with computers, vary according to:

a. the students' ethnic background,

b. the students' socioeconomic status,

c. the students' level of ability, and

d. the student's sex?

4. What was the interrelantionship between all the variables?

3.3 Data Gathering Procedures

This study took place in three upper elementary school classrooms in a public school district in western Massachusetts. Permission for this research was obtained from the Assistant Superintendent of the school district (see Appendix A), and from the Principals of the schools. The classrooms were chosen based on the following criteria:

1) teachers willingness to cooperate with the study,

2) classroom composition of students from different sex, ethnic groups, and ability levels.

All students in these classrooms were asked to obtain parental permission to participate in the study. Students and their legal guardians were asked to sign a written consent form (see Appendix B) for their participation in this study.

Ability level was determined based on the classroom teacher's opinion. Teachers were asked to classify each student in their classroom into one of three ability levels: high, medium, or low. In addition, students and their parents were asked to complete a Socio-economic

Questionnaire (see Appendix C). The purpose of this questionnaire is to gather data about the student's age, previous experience with computers and Logo, family income, and ethnic background.

Students in the three classrooms have received some instruction on Logo programming and on the Polya model of problem solving during the previous year as part of the regular computer education curriculum of the school district. Students are instructed in an unstructured approach, where they can choose to do problem solving in pairs or individually (with the limitation that there are about 15 computers for about 18 students, and not all the students will be able to work individually on a computer). They are also able to choose their partners and to move around the room freely. The role of the teacher consists of introducing students to concepts in the Logo language through group presentations, providing information on an ongoing basis, answering students' questions, and checking for task compliance.

Each classroom meets once a week in instructional sessions lasting 45 minutes. As part of the computer education curriculum, students are asked to develop projects consisting of graphic pictures or designs in the Logo computer language. Each student is provided with a set of worksheets for planning and developing their Logo projects (see Appendix D). They are asked to develop their projects

individually or in pairs and to complete individual worksheets.

Classroom A meets on Mondays from 9:30 to 10:15 A.M. and was taught by an Anglo female. It is located in one of the larger schools in a Hispanic neighborhood. The room is small and narrow and there are two long tables in the middle with 16 Radio Shack computer stations. There is not much space between the two tables and the students have to sit very close to one another. One Apple computer is on a wheeled cart placed at one corner of the room, and the other Apple computer is on a separate table in another corner of the room. When students come in to the classroom they are expected to get their notebooks from a shelf and to take a sit. They are not allowed to turn the computers on until instructed by the teacher.

Although all Radio Shack computers in classroom A are connected to a central computer network on the teacher's desk, the teacher was not observed using the network to send files or special programs to students, nor to save students' work. Students had to keep record of their work in their notebooks and to retype it into the computer at the beginning of every session.

Classrooms B and C are located at the medium sized school in a socially and racially mixed neighborhood. These two classrooms are taught by the same teacher, a male Anglo. They met on Fridays, one from 9:30 to 10:15 and the other from 10:30 to 11:15. The room is large and there

are four tables and four computers per table, with two computer stations on each side of the table. There is adequate space between all students working on a table. When students come in to the room they are expected to get their notebooks from the shelf and to take a sit. However, this computer teacher allows them to turn their computers on at any time. The teacher also used the computer network in every session to save students' computer work in a file. At the beginning of each session the teacher would sit at his desk and ask each student if they wanted to continue working with their previously saved file, then he would proceed to send them their files.

Both teachers are teaching computer education for the first time this year, however they are certified teachers and have previous experience teaching in other classrooms. The female teacher is a former science teacher at the secondary level and the male teacher is a former teacher of special education at the elementary level.

3.4 Field Procedures

Each classroom session was videotaped for a period of 4 weeks near the end of the school year, for a total of about 8 hours of video recording. To reduce possible reaction effects to the presence of the observer and the video equipment, several practice recording sessions were held prior to data collection. Students and teachers were informed about the purpose and objectives of the study,

and were asked to ignore the equipment and to continue their regular classroom activities. No constraints was placed on the teacher or the students during the observations. They were free to move around.

A stationary video camera on a tripod, which was discretely moved to two different positions, was used to assure unobstrusiveness in the recording. The video camera, with a zoom lens, was placed at an angle in order to record a whole section of the classroom. The recording by sections of the classroom permitted the capture of student interactions at several adjacent computer stations at the same time. It also allowed the capture of possible interactions between students at different computer stations. During the filming, the researcher made an effort to film most of the interactions taking place between students of different ethnicity and/or sex. In addition, the researcher was careful to avoid being influenced by the students' actions in deciding what to film or observe.

Detailed notes were made to complement the videotaped material. In particular, the observer took fieldnotes of what each child was doing on the computer, and of other events in the classroom not appropriately recorded through the videotaping.

3.5 Data Analysis

After preliminary observations of the classrooms the following elements emerged as important to this study. The computer education period can be subdivided into three constituent parts: 1) opening time, when students take their seating places, notebooks and other classroom materials, and turn their computers on; 2) computer work time, when students work on their academic tasks; and 3) closing time, when students save their work, turn their computers off, and put away their notebooks and classroom materials.

Student interactions in the computer classroom can take place within two contexts: 1) the context of the computer station, where a group of students (usually a pair) work on a single computer; 2) the context of inter-computer stations, where a student working in one computer station interacts with a student at another computer station. Interactions within the context of inter-computer stations involved transactions between a student and a pair of students, or between two pairs of students. This study addressed both contexts. When more than two students were involved in the interactions, each transaction was isolated and analyzed as a separate event.

3.5.1 Definition of Interaction

For the purpose of this study, a student interaction is defined as a verbal and/or non-verbal transaction between

two students. Student interactions were analyzed in terms of their type, form, and mode or expressive style.

Three types of interactions have been identified: 1) academic, 2) procedural, and 3) social. An academic interaction is defined as a transaction between students that is directly related to the activities and materials of the computer education curriculum. They are interactions where students give or obtain information, and decide how to proceed and what to do next in completing their academic task.

A procedural interaction is a transaction between two or more students that is related to the order, discipline, and rules established in the classroom. Procedural student interactions involve making judgement of what constitutes appropriate behavior in the classroom, and deciding where to sit and how to handle or operate the computers.

Social interactions are defined as interactions not directly related to the academic tasks. Students engage in social interactions when they converse or write notes on personal or other non-task related topics, and when they play games, or engage in other non-task related activities.

The focus of this study is on the quality of the interactions themselves. The contexts and types of interactions provide the background descriptions for the student interactions. In order to consider the quality of the interactions it is necessary to go beyond the

background descriptions and look into the forms and modes or styles of those interactions.

Three forms of interactions have been identified: 1) instructional, 2) collaborative, and 3) divergent. An interaction of instruction occurs when a student assumes the role of the teacher and the other of a student. A collaboration is when the two students dialogue or share equally in their interaction. A divergent interaction occurs when students discontinue or interrupt interaction.

The final and most fundamental level of analysis was the mode of interactions. It refers to the mode or expressive style of gestures and speech utilized by the students. Maldonado-Guzman (1984) utilized the category of expressive style to analyze teachers' differential treatment of students in the classroom. He cites studies that indicate that expressive style reflects the rational and subjective states, and unconscious attitudes of one person about others (Giles, Scherer, and Taylor, 1979; Brown and Frazer, 1979). It was used in the present study to analyze the mode of interactions that take place between students in the computer classroom as concrete manifestations of social relations of domination and resistance (Giroux, 1983). Student's mode of interaction were classified into five categories: 1) accomodation, 2) resistance, 3) domination, 4) rejection, and 5) reciprocity. An interaction of accomodation occurs when a student accedes to behave in a particular way to fulfill

expectations or to avoid confrontation. Students interacted in a mode of resistance when they opposed another student's actions or intentions to control their behavior. An interaction of domination occurs when a student assumes control over the actions or attempts to control the behavior of another student. Interactions of rejection ocurr when a student observes another with detachment, refusing to respond when addressed by another student. Two students interact with reciprocity when they dialogue cordially, complementing each other in their behavior or actions.

Another important indicator, given the bilingual setting, was the language used by the students in their interaction. Although English is the official language of the classroom, there were several cases of Hispanic students communicating in Spanish with their Hispanic peers, and a few cases of Anglo students utilizing Spanish in their interactions. Several instances of codeswitching, i.e., the alternate use of two languages, was also observed among various Hispanic children. The use of language matching can be regarded as another indicator of students' attitudes towards each other.

Finally, it was important to look at who was the initiator and who the recipient of those interactions. Students were identified according to their personal characteristics, i.e., gender, ethnicity, ability level, and socio-economic status.

3.5.2 Coding System

All observations were initially recorded on videotapes and fieldnotes, and later classified into the different categories of analysis through the use of a coding sheet (see Appendix F). The process of coding the data from the videotapes and the fieldnotes was carried in two stages. The first stage consisted of writing a narrative description of the videotaped data and integrating it with the fieldnotes (see Appendix E). Many hours of viewing and reviewing the videotapes was required in order to construct a narrative description of the events within their varied dimensions and contexts. This narrative description included a map of the classroom showing where each of the students was seated, and comments and speculations from the observer (included within parentheses).

The second stage consisted of sorting the data into the defined categories of interaction through the use of the coding sheet. This sorting of the data facilitated measuring frequencies of those interactions, and making comparisons and establishing relationships between the students' personal characteristics and the different categories of interaction. This stage provided the raw data that was later used for computer analysis.

The Statistical Package for the Social Sciences (SPSS) at the University of Massachusetts Cyber computer system was used to create the program for computer analysis (see Appendix H). A crosstabulation or contingency table

analysis was conducted, given the nature of the variables involved (a list of all the variables is included in Appendix G). Most of the variables were discrete and represented nominal values. For example, the form of student interactions was either instructional, collaborative, or divergent. There was no implied order or distance between these values.

Additionally, alphanumeric symbols, consisting of letters or numbers, were used to code the values of all the variables. In alphanumeric coding, numbers are used as symbols and not as real numbers to be used in mathematical operations. These characteristics of the variables examined excluded the possibility of other levels of measurement.

Crosstabulation analysis was used to examine the frequency distribution of cases for each of the variables and the relationship between them. The differences in percentages between the variables was used to determine the degree of relationship between them. Two-dimensional tables were used to determine basic relationships, and three-dimensional tables were used to introduce control variables.

3.5.3 The Use of Other Sources of Data

Documents on the computer education curriculum of the school district provided information about the objectives and structure of the learning activities. Informal

interviews with the teachers were important to assess their particular implementation of the curriculum and the rationale behind their activities in the classroom. This information complemented the videotapes and fieldnotes in the analysis of the process whereby access to learning was determined in the computer classrooms.

A socioeconomic questionaire was used to obtain essential demographic data about the students and their families (see Appendix C). The questionaire consisted of two parts: one part was filled by students in the classroom, and the other part was filled by their parents or guardians at home. Some of the questionaires were not returned by the students and the researcher had to call by telephone or visit students' home to complete them.

The questionaire was designed so that students and their parents provided information about their place of origin or birth, and the sources of income or occupation of members of their household. This information was used to determine the student's ethnicity and socioeconomic status. As was mentioned before, the ability level of the students was based on the teachers' opinions.

CHAPTER 4

RESULTS AND ANALYSIS OF DATA

In this chapter, the demographic characteristics of participants in the study are described. Classroom activities and student interactions are analyzed to reveal how students' access to learning was determined in the computer classrooms. The nature of the social interactions taking place between students are described. As previously indicated, social interactions are described in terms of their type, form, and mode.

An analysis is made of how student interactions varied according to the students's demographic characteristis. Crosstabulations indicating frequency distributions and percentages are used for this analysis. In addition, control variables are utilized for examining the interrelationship between the variables.

4.1 Participants

This study involved a total of 47 students in three different classrooms. Data was gathered for 20 students in classroom A, 18 students in classroom B, and 9 students in classroom C. See Appendix G for a complete listing of students participating in the study. Table 1 (next page) shows a breakdown of the ethnic composition of students observed by classroom.

Table 1: Ethnicity by Classroom of Students Observed

Ethnic	Classroom A	Classroom B	Classroom C	Total
Black	1 (5%)	3 (17%)	0 (0%)	4 (9%)
Hispanic	6 (30%)	9 (50%)	3 (33%)	18 (38%)
White	13 (65%)	6 (33%)	6 (67%)	25 (53%)
Total	20 (100%)	18 (100%)	9 (100%)	47 (100%)

When asked to classify students according to their ability level, teachers found most white (Anglo) students (52%) and few Hispanic (11%) or Black (Afro-American) (25%) students to be of high ability. In the average ability level were classified 50% of Afro-Americans, 50% of Hispanics, and 28% of Anglos. Teachers believed that 25% of Afro-Americans, 39% of Hispanics, and 20% of Anglos were in the low ability level (see table 2, next page).

All of the Hispanics in the high ability level and an overwhelming majority of the Hispanics in the average ability level (89%) were females, while a vast majority of the Hispanics in the low ability level (71%) were males. Which shows a tendency among teachers to place more Hispanic males than females in low ability levels. All Hispanic girls in classroom A were classified of average ability. However, they did not seem to be at the same ability level. Den, for example, seemed to be of higher ability than Ive. Den was shy, while Ive was more of the

Table 2: Ethnicity by Ability Level by Classroom of Students Observed

Ethnic / Ability	Classroom A	Classroom B	Classroom C	Total
Black	1 (5%)	3 (17%)	0 (0%)	4 (9%)
High	0 (0%)	1 (33%)	0 (0%)	1 (25%)
Average	0 (0%)	2 (67%)	0 (0%)	2 (50%)
Low	1 (100%)	0 (0%)	0 (0%)	1 (25%)
Hispanic	6 (30%)	9 (50%)	3 (33%)	18 (38%)
High	0 (0%)	2 (22%)	0 (0%)	2 (11%)
Average	4 (67%)	4 (44%)	1 (33%)	9 (50%)
Low	2 (33%)	3 (33%)	2 (67%)	7 (39%)
White	13 (65%)	6 (33%)	6 (67%)	25 (53%)
High	7 (54%)	1 (17%)	5 (83%)	13 (52%)
Average	4 (31%)	3 (50%)	0 (0%)	7 (28%)
Low	2 (15%)	2 (33%)	1 (17%)	5 (20%)
Total	20 (100%)	18 (100%)	9 (100%)	47 (100%)

extroverted and strong type. When they paired for work on the computer, Ive controled most of the work while Den did not contribute much to their work. However, when Den worked on her own she got more work accomplished on her assigned project.

On the other hand, there was not a significant difference in the percentage of Anglo females and Anglo males classified in the high ability level (54% and 46% respectively). However, a vast majority of the Anglos in the low ability level were males (80%), and in the middle ability level the vast majority of Anglos were female (71%). These figures show a tendency among teachers to classify Anglo males at the extremes, in high or low ability levels. On the other hand, Anglo females were

grouped in the high and average ability levels. All of the Afro-American students were males (see table 3, below).

Table 3: Sex by Ability Level by Ethnicity of Students Observed

Sex / Ability	Ethnicity: Hispanic	Whites	Blacks	Total
Females	12 (67%)	13 (52%)	0 (0%)	25 (53%)
High	2 (17%)	7 (54%)	0 (0%)	9 (36%)
Average	8 (67%)	5 (39%)	0 (0%)	13 (52%)
Low	2 (17%)	1 (8%)	0 (0%)	3 (12%)
Males	6 (33%)	12 (48%)	4 (100%)	22 (47%)
High	0 (0%)	6 (50%)	1 (25%)	7 (32%)
Average	1 (17%)	2 (17%)	2 (50%)	5 (23%)
Low	5 (83%)	4 (33%)	1 (25%)	10 (46%)
Total	18 (100%)	25 (100%)	4 (100%)	47 (100%)

When compared by socioeconomic status (SES), a vast majority of Afro-American (75%) and most Hispanic (62.5%) students were of low SES, while most Anglo students (69.6%) were of middle SES. (see table 4, next page).

Of the three classrooms observed, classroom A had the highest proportion of students from low SES (42.1% of the students), classroom B had the highest proportion of middle SES students (56.3%), and classroom C had the highest proportion of high SES students (25%).

The students tended to group by sex and ethnicity. Not only did Hispanics tended to pair with other Hispanics for computer work, they also tended to sit at adjacent

Table 4: Ethnicity by SES by Classroom of Students Observed

Ethnic SES	Classroom A	Classroom B	Classroom C	Total
Black	1 (5%)	3 (19%)	0 (0%)	4 (9%)
High	0 (0%)	1 (33%)	0 (0%)	1 (25%)
Middle	0 (0%)	0 (0%)	0 (0%)	0 (0)
Low	1 (100%)	2 (67%)	0 (0%)	3 (75%)
Hispanic	6 (32%)	7 (44%)	3 (33%)	16 (37%)
High	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Middle	1 (17%)	5 (71%)	0 (0%)	6 (37%)
Low	5 (83%)	2 (29%)	3 (100%)	10 (63%)
White	12 (63%)	6 (38%)	5 (67%)	23 (54%)
High	1 (8%)	0 (0%)	2 (83%)	3 (13%)
Middle	9 (75%)	4 (67%)	3 (0%)	16 (70%)
Low	2 (17%)	2 (33%)	0 (17%)	4 (17%)
Total	19 (100%)	16 (100%)	8 (100%)	43 (100%)

places in the computer classroom. The same pattern of seating was found by gender: girls will sit together with other girls, and boys with other boys.

4.2 Computer Access and Learning

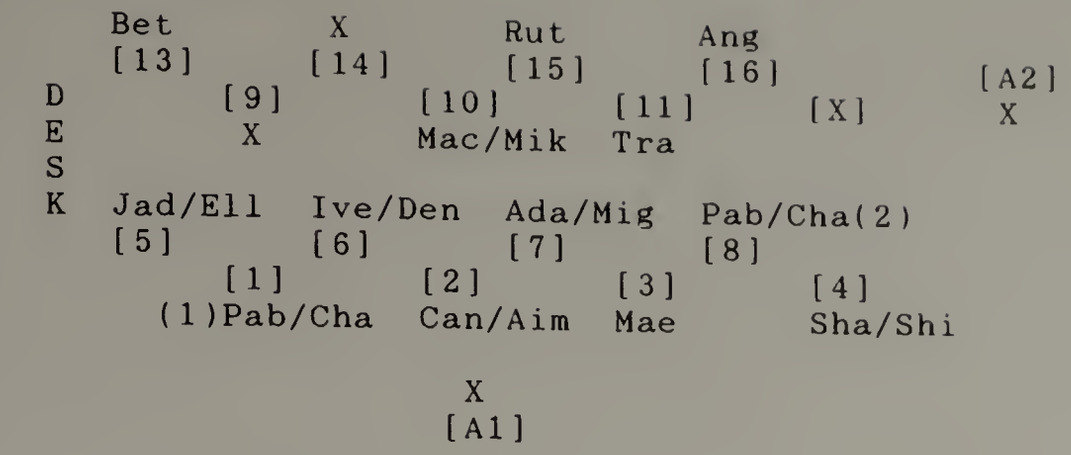
Access to the computers was determined in three different ways. On one hand, it was constrained by the ratio children per computer. For example, in classroom A there were a total of 23 students and 15 Radio Shack computers in operation, consequently 8 students had to share a computer with another student. There were 19 students in classroom B and 20 students in classroom C. Both of these classrooms utilized the same computer laboratory with 15 computers in operation, and 4 or 5

students had to share a computer (for an illustration of the computer lab facilities, see Figure 1, next page). However, a considerable number of students would choose to pair to the point that usually one or two computers were left unused. Once students started working in pairs they tended to continue as a pair even when additional computers were available due to absences of other students. Only a few instances were observed when a student would discontinue working in a pair to work alone. They would rather change partners than work alone.

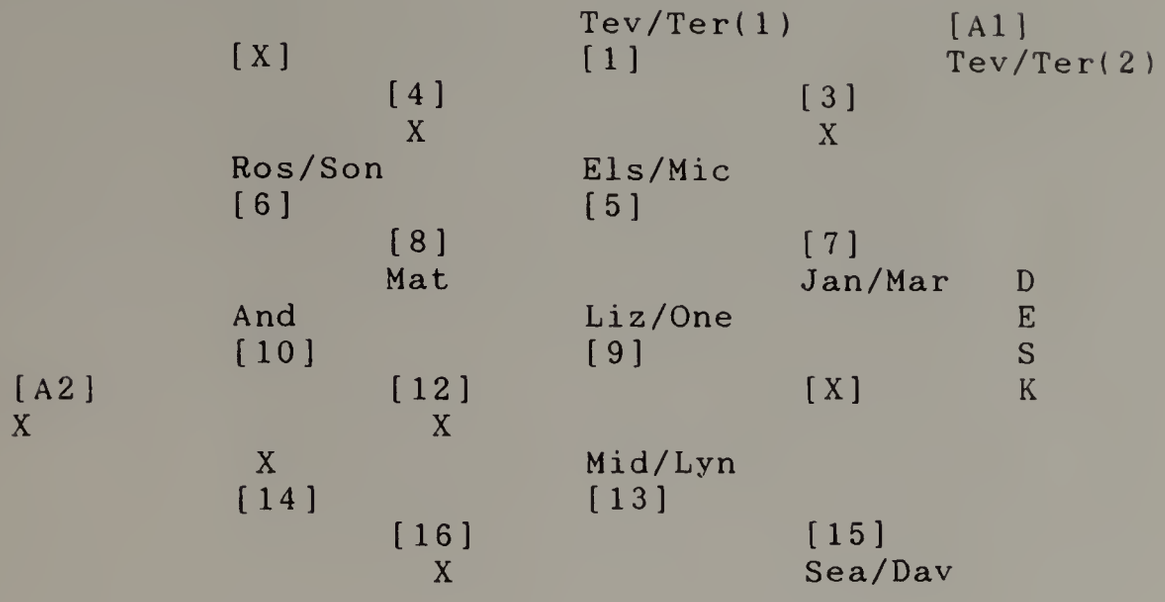
The particular relationship that students established as they paired for work on the computer was another determinant of the level of access they had to the computer. Access to the computer was shared when students established reciprocal relationships of collaboration. Relations of reciprocity ocurred when students took turns or alternated in their use of the computer, and when students collaborated in academic tasks by making joint decisions and contributions in their computer work. Access to the computers was impaired when a student assumed control over the computer and dominated another student's involvement in academic work.

For their computer work students were provided with worksheets with graphic designs that they were supposed to reproduce (see Appendix D). Each worksheet contained some instructions on how to accomplish the task. Students were expected to complete three of these worksheets before they

Map of Classroom A:



Map of Classroom B:



Legend:

[5] = Computer station #5 (Radio Shack)
[X] = Computer missing or out-of-order
[A1] = Apple computer station #1
Ros/Son = Identification codes of students
Tev/Ter(1) = First place where Tev & Ter sat
X = no one was sitting in that place

Figure 1: Map of Computer Classrooms

were allowed to work on their own project. All of this work was done on the Radio Shack computers. Once students had finished their first project they were allowed to retype it into one of the Apple computers, where it could be printed out on paper. All the finished projects were displayed on a bulletin board in the classroom.

During the period of these observations most of the students in classrooms A and B had not been able to complete the worksheets. In classroom A only Anglos were working on their own projects. In classroom B only Anglos and Afro-Americans were observed to be working on their own projects. No Hispanic student was observed working on their own project in these two classrooms. In classroom C there were only 3 Hispanic boys and no Afro-Americans, and all of the students were working on their individual projects except two of the Hispanic boys. All of the projects displayed on the classroom bulletin board were done by Anglo students, except for one that was done by a Hispanic together with an Anglo.

Apple computers were mostly utilized by Anglo students, mainly girls. When the Apple computers were utilized by Afro-American and Puerto Rican students, they were working together with an Anglo student and worked for a short period of time not extending for more than one class session. Although it could be argued that this fostered inter-ethnic relations, in two of the occasions observed (Tev/Ter and Mik/Mac) the Afro-American boys used

the computer for very little time. They were mainly observers of the Anglo boys' work. On the other occasion (Ive/Jen), the two girls worked for a small period of time and could not accomplish anything on the computer, receiving very little assistance from the teacher. There was only one occasion in which an Afro-American student (Ter) got to use an Apple computer by himself and only because his Anglo partner was absent. Instead of allowing the Afro-American student to continue working in the project he was doing with the Anglo student, the teacher provided the Afro-American student with an educational game. This further corroborates my contention that the Afro-American student was a mere observer of the other student's work. However, it is important to point out that Ter was a new student and had only one year of previous experience with Logo. Ste, his partner, had two years of previous experience with Logo.

A small proportion of the students (19%) had a computer at home. Anglo students were more likely to have more previous experience with computers and to have a computer at home. All of the students that had a computer in their homes were Anglo, except for one, who was Afro-American and of high socioeconomic status.

4.3 Student-Student Interactions

A total of 316 events were classified into the previously defined categories of interaction. Observations

were made of interactions between students working at one computer station (computer context) and between students working at different computer stations (inter-computer context). Fifty five percent of the interactions observed took place in the context of inter-computer stations, and the remaining 45% took place in the context of one computer station (see Table 6, p. 69). It shows that more interactions took place between students working at different computers than between students working at the same computer.

The emphasis of this study was on the interactions between students of different ethnic groups. The majority of the recorded events (60%) were between Hispanic and Anglo students, which were the predominant ethnic groups in the student population. A limited amount of the recorded events involved Afro-American students, given the smaller proportion of Afro-Americans in the student population. Most of the interactions of Afro-Americans were with Anglo students (13%), while interactions between Afro-American and Hispanic students were found to be minimal (2%).

Some of the interactions took place between students of the same ethnic group. These interactions were found to be as follows: interactions between Hispanic students themselves (18%), between Afro-American students (3%), and between Anglo students (4%).

Interactions between students by ability level were as follows:

33% between average & high ability students
22% between average ability students
15% between low ability students
15% between low & high ability students
14% between average & low ability students
1% between high ability students

Student interactions by gender consisted of:

36% between females only
34% between males only
30% between males & females

Interactions between students by SES were:

56% between middle & low SES students
18% between high & low SES students
14% between low SES students
11% between middle SES students
1% between high & middle SES students
0% between high SES students

4.4 Interactions by Type

The predominant type of interaction between all students was academic (48% of total interactions) which seems to indicate that the computer classroom environment, with its emphasis on problem solving activities that were not centered around the teacher, did not result in a considerable reduction of student involvement in academic tasks. Students were more frequently involved in their tasks and for long periods of time.

Procedural interactions accounted for 24% of the interactions, and social interactions accounted for 28% of the interactions (see Table 5, next page). Procedural

Table 5: Ethnicity of Initiator (ETHINI) by Ethnicity of Recipient (ETHREC) of Interaction by Type of Interaction

ETHINI Type	ETHREC Black	ETHREC Hispanic	ETHREC White	Total
Black	11 (31%)	4 (2%)	18 (16%)	33 (10%)
Academic	10 (91%)	0 (0%)	4 (22%)	14 (43%)
Procedur	1 (9%)	1 (25%)	6 (33%)	8 (24%)
Social	0 (0%)	3 (75%)	8 (45%)	11 (33%)
Hispanic	3 (8%)	58 (35%)	82 (73%)	143 (73%)
Academic	0 (0%)	33 (57%)	41 (50%)	74 (52%)
Procedur	0 (0%)	13 (22%)	18 (22%)	31 (22%)
Social	3 (100%)	12 (21%)	23 (28%)	38 (26%)
White	22 (61%)	106 (63%)	12 (11%)	140 (44%)
Academic	7 (32%)	51 (48%)	7 (58%)	65 (46%)
Procedur	9 (41%)	24 (23%)	3 (25%)	36 (26%)
Social	6 (27%)	31 (29%)	2 (17%)	39 (28%)
Total	36 (100%)	168 (100%)	112 (100%)	316 (100%)
Academic	17 (47%)	84 (50%)	52 (46%)	153 (48%)
Procedur	10 (28%)	38 (23%)	27 (24%)	75 (24%)
Social	9 (25%)	46 (27%)	33 (30%)	88 (28%)

interactions involved inevitable communication between people that work in the same space.

As shown in Table 6 (next page), most of the interactions in the context of a computer station were academic (75%), while in the context of inter-computer stations most of the interactions were social (44%).

4.4.1 Between-group interactions

When the ethnicity of the students was considered, it was found that most of the interactions initiated by Hispanic students towards Anglo students (50%) were academic, while 22% of these interactions were procedural and 28% were social. There were slightly less academic

Table 6: Student Interactions by Context and Type of Interaction

Context	Type			
	Academ	Proced	Social	Total
Computer	106	25	11	142
Row Pct	75%	18%	8%	45%
Col Pct	69%	33%	13%	
Inter-Co	47	50	77	174
Row Pct	27%	29%	44%	55%
Col Pct	31%	67%	88%	
Total	153	75	88	316
	48%	24%	28%	100%

interactions initiated by Anglos towards Hispanic students (48%), while procedural and social interactions increased by one percent, 23% and 29% respectively.

There were only 4 interactions initiated by Afro-American students towards Hispanics, 3 of these interactions were social and 1 was procedural. All of the interactions initiated by Hispanic students towards Afro-Americans (3) were social. There were no academic interactions between Afro-American and Hispanic students. This pattern of interactions between Afro-Americans and Hispanics may show that they saw each other more as friends and less as intellectual patterns.

The interactions initiated by Anglos towards Afro-American students were 41% procedural, 32% academic, and 27% social. It may show that Anglos tended to have more instrumental interactions with Afro-American peers, as compared with Hispanics. On the other hand, the

interactions initiated by Afro-Americans towards Anglos were predominantly social (44%) and less procedural (33%) and academic (22%) than the ones initiated by Anglos. This mismatch in the type of interactions initiated by these two groups may have underlying racial connotations.

When the ability level of the students was considered, it was found that 33% of the academic interactions were initiated between average and high ability students, 15% between average and lows, and 11% between lows and highs (see Table 7, below). This shows a tendency of students to interact academically more with students at proximal levels of ability.

Table 7: Ability Level of Initiator (ABILINI) by Ability Level of Recipient (ABILREC) of Interaction by Type of Interaction

ABILINI Type	ABILREC High	ABILREC Average	ABILREC Low	Total
High	4 (5%)	49 (36%)	31 (30%)	84 (27%)
Academic	0 (0%)	24 (49%)	11 (35%)	35 (42%)
Procedur	4 (100%)	13 (27%)	10 (32%)	27 (32%)
Social	0 (0%)	12 (24%)	10 (32%)	22 (26%)
Average	56 (74%)	68 (49%)	23 (23%)	147 (46%)
Academic	27 (48%)	40 (59%)	12 (52%)	79 (54%)
Procedur	11 (20%)	9 (13%)	4 (17%)	24 (16%)
Social	18 (32%)	19 (28%)	7 (31%)	44 (30%)
Low	16 (21%)	21 (15%)	48 (47%)	85 (27%)
Academic	5 (31%)	11 (52%)	23 (48%)	39 (46%)
Procedur	6 (38%)	4 (19%)	14 (29%)	24 (28%)
Social	5 (31%)	6 (29%)	11 (23%)	22 (26%)
Total	76 (100%)	138 (100%)	102 (100%)	316 (100%)
Academic	32 (42%)	75 (54%)	46 (45%)	153 (48%)
Procedur	21 (28%)	26 (19%)	28 (27%)	75 (24%)
Social	23 (30%)	37 (27%)	28 (27%)	88 (28%)

Socioeconomic status (SES) was another variable correlated to students' type of interaction. It was found that most of the academic interactions (62%) took place between middle and low SES students, followed by high and low SES students with only 19% of the academic interactions (see Table 8, below). There were no academic interactions observed between high and middle SES students. When the interactions between these groups of students were further analyzed it was found that an additional 40% of the interactions between high and low SES students were social,

Table 8: Socioeconomic Status of Initiator (SESINI) by SES of Recipient (SESREC) of Interaction by Type of Interaction

SESINI Type	SESREC High	SESREC Middle	SESREC Low	Total
High	0 (0%)	1 (1%)	27 (17%)	28 (9%)
Academic	0 (0%)	0 (0%)	14 (52%)	14 (50%)
Procedur	0 (0%)	1 (100%)	2 (7%)	3 (11%)
Social	0 (0%)	0 (0%)	11 (41%)	11 (39%)
Middle	3 (10%)	33 (30%)	90 (56%)	126 (42%)
Academic	0 (0%)	11 (33%)	50 (56%)	61 (49%)
Procedur	1 (33%)	14 (43%)	27 (30%)	42 (33%)
Social	2 (67%)	8 (24%)	13 (14%)	23 (18%)
Low	26 (90%)	77 (69%)	43 (27%)	146 (49%)
Academic	13 (50%)	39 (51%)	17 (39%)	69 (47%)
Procedur	3 (12%)	20 (26%)	5 (12%)	28 (19%)
Social	10 (38%)	18 (23%)	21 (49%)	49 (34%)
Total	29 (100%)	111 (100%)	160 (100%)	300 (100%)
Academic	13 (45%)	50 (45%)	81 (51%)	144 (48%)
Procedur	4 (14%)	35 (32%)	34 (21%)	73 (24%)
Social	12 (41%)	26 (23%)	45 (28%)	83 (28%)

while only 19% of the interactions between middle and low SES students were social.

Most of the interactions between males and females were social (49%) (see Table 9, below). It showed a tendency of boys and girls not to engage in intellectual interactions between themselves.

4.4.2 Within-group interactions

The majority of the interactions between Hispanics themselves (57%) were academic, 22% of the interactions were procedural and 21% social (refer back to Table 5). The interactions that Anglos initiated between themselves

Table 9: Sex of Initiator (SEXINI) by Sex of Recipient (SEXREC) of Interaction by Type of Interaction

SEXINI Type	SEXREC Male	SEXREC Female	Total
Male	106 (68%)	48 (30%)	154 (49%)
Academic	55 (52%)	13 (27%)	68 (44%)
Procedur	35 (33%)	12 (25%)	47 (31%)
Social	16 (15%)	23 (48%)	39 (25%)
Female	49 (32%)	113 (70%)	162 (51%)
Academic	18 (37%)	67 (59%)	85 (53%)
Procedur	7 (14%)	21 (19%)	28 (17%)
Social	24 (49%)	25 (22%)	49 (30%)
Total	155 (100%)	161 (100%)	316 (100%)
Academic	73 (47%)	80 (50%)	153 (48%)
Procedur	42 (27%)	33 (20%)	75 (24%)
Social	40 (26%)	48 (30%)	88 (28%)

were 58% academic, 25% procedural, and 17% social. Almost all of the interactions between Afro-Americans (91%) were academic and only 9% of their interactions were procedural.

hey did not initiate social interactions between themselves. As can be seen from the figures presented above, the predominant pattern of within-group interactions for all ethnic groups was academic, with Afro-Americans having the highest proportion of academic interactions between themselves.

When the interactions of students of the same ability level were analyzed, it was found that interactions between average ability students were 59% academic, 28% social, and 13% procedural (refer back to Table 7). Interactions between low ability students were 48% academic, 29% procedural, and 23% social. High ability students had only procedural and no academic or social interactions between themselves. In conclusion, both average and low ability students interacted more academically between themselves, but average ability students had more social interactions between themselves than low ability students.

Interactions between students of middle SES were predominantly procedural (42% of their interactions), between low SES students they were mostly social (49%), and between high SES students there were no interactions observed (refer back to Table 8).

When the students' sex was considered, it was found that both males and females maintained mostly academic interactions between themselves (51% and 59% respectively) (refer back to Table 9). On the other hand, females had

more social interactions (22%) between themselves than males (15%).

4.5 Interactions by Form

All academic and procedural interactions were analyzed by form. Three forms of interaction had been identified: instructional, collaborative, and divergent. As shown in Table 10 below, a vast majority of the interactions between students working at the same computer station (computer context) were collaborative (70% of the interactions). Instructional interactions were preponderant between students working at different computer stations (inter-computer context) with a 69% of the interactions.

Table 10: Student Interactions by Context and Form of Interaction

	Form			
Context	Instru	Collab	Diverg	Total
Computer	28	92	11	131
Row Pct	21%	70%	9%	57%
Col Pct	29%	81%	58%	
Inter-Co	67	22	8	97
Row Pct	69%	23%	8%	43%
Col Pct	71%	19%	42%	
Total	95	114	19	228
	42%	50%	8%	100%

It was found that the predominant form of interaction between all students was of collaboration (50% of all academic or procedural interactions), which indicates that

more students chose to work with a partner rather than work alone (see Table 11, below). This can be attributed to the unavailability of computers for everyone to work alone on a computer, even if he or she wanted to do so. However, it was observed that on many occasions students paired together leaving two or more computers unused.

Table 11: Ethnicity of Initiator (ETHINI) by Ethnicity of Recipient (ETHREC) of Interaction by Form of Interaction

ETHINI Form	ETHREC Black	ETHREC Hispanic	ETHREC White	Total
Black	11 (41%)	1 (1%)	11 (14%)	23 (10%)
Instruct	3 (27%)	0 (0%)	5 (46%)	8 (35%)
Collabor	8 (73%)	1 (100%)	4 (36%)	13 (56%)
Divergen	0 (0%)	0 (0%)	2 (18%)	2 (9%)
Hispanic	0 (0%)	46 (38%)	59 (74%)	105 (46%)
Instruct	0 (0%)	8 (17%)	23 (39%)	31 (29%)
Collabor	0 (0%)	35 (76%)	31 (53%)	66 (63%)
Divergen	0 (0%)	3 (7%)	5 (8%)	8 (8%)
White	16 (59%)	74 (61%)	10 (12%)	100 (44%)
Instruct	10 (63%)	41 (55%)	5 (50%)	56 (56%)
Collabor	4 (25%)	27 (37%)	4 (40%)	35 (35%)
Divergen	2 (12%)	6 (8%)	1 (10%)	9 (9%)
Total	27 (100%)	121 (100%)	80 (100%)	228 (100%)
Instruct	13 (48%)	49 (41%)	33 (41%)	95 (42%)
Collabor	12 (44%)	63 (52%)	39 (49%)	114 (50%)
Divergen	2 (8%)	9 (7%)	8 (10%)	19 (8%)

It can also be attributed to the fact that collaboration was encouraged by both teachers.

The fact that two students were working on the same computer did not necessarily mean that true collaboration was taking place. There were many instances in which two

students were apparently collaborating without any conflict, but in reality one of the students of the pair did all the work, while the partner passively observed. This was probably due to two circumstances: in some situations, one of the kids assumed control over the computer work and did not allow the other student to use the computer. In other cases, one of the students was not interested or did not know what to do in the computer work.

To further explore this point, collaborative interactions were analyzed to determine the proportion of those interactions that involved conflict vs. those that involved no conflict. The situations where two students were working on the same computer with no conflict,

Table 12: Ethnicity of Initiator (ETHINI) by Ethnicity of Recipient (ETHREC) of Interaction by Collaborative Form

ETHINI Collabor	ETHREC Black	ETHREC Hispanic	ETHREC White	Total
Black	8 (67%)	1 (2%)	4 (10%)	13 (11%)
Conflict	2 (25%)	0 (0%)	0 (0%)	2 (15%)
Non-Confl	6 (75%)	1 (100%)	4 (100%)	11 (85%)
Hispanic	0 (0%)	35 (55%)	31 (80%)	66 (58%)
Conflict	0 (0%)	14 (40%)	10 (32%)	24 (36%)
Non-Confl	0 (0%)	21 (60%)	21 (68%)	42 (64%)
White	4 (33%)	27 (43%)	4 (10%)	35 (31%)
Conflict	3 (75%)	11 (41%)	0 (0%)	14 (40%)
Non-Confl	1 (25%)	16 (59%)	4 (100%)	21 (60%)
Total	12 (100%)	63 (100%)	39 (100%)	114 (100%)
Conflict	5 (42%)	25 (40%)	10 (26%)	40 (35%)
Non-Confl	7 (58%)	38 (60%)	29 (74%)	74 (65%)

constituted the vast majority of the cases (65%), while situations of conflict were found in 35% of the cases (see Table 12, previous page).

Hispanics initiated more non-conflictive interactions of collaboration than students from the other ethnic groups (57% of total non-conflictive interactions). Half of these interactions were initiated towards Anglo students and the other half were initiated towards other Hispanics. Anglos initiated only 28% and Afro-Americans 15% of the non-conflictive interactions. This may reflect a tendency among some Hispanics to submit rather than confront in relations of collaboration.

Most of the interactions of collaboration with conflict took place between Hispanic and Anglo students, 28% of them were initiated by Anglo students and 25% were initiated by Hispanics. An additional 35% of the conflictive interactions of collaboration took place between Hispanic partners. It shows that Hispanics tended to initiate more conflictive interactions between themselves than with Anglo students.

Afro-Americans received 8% of the conflictive interactions from Anglos and initiated 5% between themselves. They initiated only one conflictive interaction towards Anglos and none towards Hispanics.

When the students' ability level was considered, it was found that most of the collaborative interactions (39%) took place between students of average and students of high

Table 13: Ability Level of Initiator (ABILINI) by Ability Level of Recipient (ABILREC) of Interaction by Form of Interaction

ABILINI Form	ABILREC High	Average	Low	Total
High	4 (7%)	37 (37%)	21 (28%)	62 (27%)
Instruct	3 (75%)	14 (38%)	16 (76%)	33 (53%)
Collabor	1 (25%)	19 (51%)	5 (24%)	25 (40%)
Divergen	0 (0%)	4 (11%)	0 (0%)	4 (7%)
Average	38 (72%)	48 (48%)	16 (21%)	102 (45%)
Instruct	13 (34%)	15 (31%)	10 (63%)	38 (37%)
Collabor	25 (66%)	30 (63%)	5 (31%)	60 (59%)
Divergen	0 (0%)	3 (6%)	1 (6%)	4 (4%)
Low	11 (21%)	15 (15%)	38 (51%)	64 (28%)
Instruct	6 (55%)	6 (40%)	12 (32%)	24 (38%)
Collabor	5 (45%)	3 (20%)	21 (55%)	29 (45%)
Divergen	0 (0%)	6 (40%)	5 (13%)	11 (17%)
Total	53 (100%)	100 (100%)	75 (100%)	228 (100%)
Instruct	22 (42%)	35 (35%)	38 (51%)	95 (42%)
Collabor	31 (58%)	52 (52%)	31 (41%)	114 (50%)
Divergen	0 (0%)	13 (13%)	6 (8%)	19 (8%)

Table 14: Ability Level of Initiator (ABILINI) by Ability Level of Recipient (ABILREC) of Interaction by Collaborative Form

ABILINI Collabor	ABILREC High	Average	Low	Total
High	1 (3%)	19 (37%)	5 (16%)	25 (22%)
Conflict	0 (0%)	8 (42%)	3 (60%)	11 (44%)
Non-Confl	1 (100%)	11 (58%)	2 (40%)	14 (56%)
Average	25 (81%)	30 (58%)	5 (16%)	60 (53%)
Conflict	7 (28%)	13 (43%)	1 (20%)	21 (35%)
Non-Confl	18 (72%)	17 (57%)	4 (80%)	39 (65%)
Low	5 (16%)	3 (5%)	21 (68%)	29 (25%)
Conflict	1 (20%)	0 (0%)	7 (33%)	8 (28%)
Non-Confl	4 (80%)	3 (100%)	14 (67%)	21 (72%)
Total	31 (100%)	52 (100%)	31 (100%)	114 (100%)
Conflict	8 (26%)	21 (40%)	11 (35%)	40 (35%)
Non-Conf	23 (74%)	31 (60%)	20 (65%)	74 (65%)

ability (see Table 13, previous page). High ability students initiated most of the conflictive interactions (37%), while average ability students initiated most of the non-conflictive interactions (39%) (see Table 14, previous page). It shows that average ability students tended to be less confrontative in their collaboration than high ability students.

As Table 15 indicates, most of the few interactions initiated by boys towards girls were conflictive (67%). At the same time, girls initiated a similar amount of conflictive interactions towards boys (60%). It may indicate that collaborative interactions between boys and girls were permeated with conflict and may involve true collaboration.

Table 15: Sex of Initiator (SEXINI) by Sex of Recipient (SEXREC) of Interaction by Collaborative Form

SEXINI Collabor	SEXREC Male	SEXREC Female	Total
Male	43 (90%)	6 (9%)	49 (43%)
Conflict	13 (30%)	4 (67%)	17 (35%)
Non-Confl	30 (70%)	2 (33%)	32 (65%)
Female	5 (10%)	60 (91%)	65 (57%)
Conflict	3 (60%)	20 (33%)	23 (35%)
Non-Confl	2 (40%)	40 (67%)	42 (65%)
Total	48 (100%)	66 (100%)	114 (100%)
Conflict	16 (33%)	24 (36%)	40 (35%)
Non-Confl	32 (67%)	42 (64%)	74 (65%)

When interactions of collaboration were correlated with the student's socioeconomic status (SES), it was found that low and middle SES students were collaborating

Table 16: Socioeconomic Status of Initiator (SESINI) by SES of Recipient (SESREC) of Interaction by Form of Interaction

SESINI Form	SESREC High	SESREC Middle	SESREC Low	Total
High	0 (0%)	1 (1%)	16 (14%)	17 (8%)
Instruct	0 (0%)	1 (100%)	7 (44%)	8 (47%)
Collabor	0 (0%)	0 (0%)	7 (44%)	7 (41%)
Divergen	0 (0%)	0 (0%)	2 (12%)	2 (12%)
Middle	1 (6%)	24 (29%)	77 (66%)	102 (47%)
Instruct	1 (100%)	17 (71%)	37 (48%)	55 (54%)
Collabor	0 (0%)	6 (25%)	33 (43%)	39 (38%)
Divergen	0 (0%)	1 (4%)	7 (9%)	8 (8%)
Low	16 (94%)	59 (70%)	23 (20%)	98 (45%)
Instruct	6 (38%)	18 (31%)	3 (13%)	27 (28%)
Collabor	10 (62%)	35 (59%)	19 (83%)	64 (65%)
Divergen	0 (0%)	6 (10%)	1 (4%)	7 (7%)
Total	17 (100%)	84 (100%)	116 (100%)	217 (100%)
Instruct	7 (41%)	36 (43%)	47 (41%)	90 (42%)
Collabor	10 (59%)	41 (49%)	59 (51%)	110 (50%)
Divergen	0 (0%)	7 (8%)	10 (8%)	17 (8%)

more frequently than students from any other SES group (68% of all collaborations) (see Table 16, above). As shown in Table 17 (next page), both low and middle SES students tended to initiate mainly non-conflictive interactions between themselves (77% and 64% respectively). This may indicate a high level of reciprocity between the two groups.

Table 17: Socioeconomic Status of Initiator (SESINI) by SES of Recipient (SESREC) of Interaction by Collaborative Form

SESINI Collabor	SESREC High	SESREC Middle	SESREC Low	Total
High	0 (0%)	0 (0%)	7 (12%)	7 (6%)
Conflict	0 (0%)	0 (0%)	4 (57%)	4 (57%)
Non-Confl	0 (0%)	0 (0%)	3 (43%)	3 (43%)
Middle	0 (0%)	6 (15%)	33 (56%)	39 (35%)
Conflict	0 (0%)	0 (0%)	12 (36%)	12 (31%)
Non-Confl	0 (0%)	6 (100%)	21 (64%)	27 (69%)
Low	10 (100%)	35 (85%)	19 (32%)	64 (59%)
Conflict	5 (50%)	8 (23%)	11 (58%)	24 (38%)
Non-Confl	5 (50%)	27 (77%)	8 (42%)	40 (62%)
Total	10 (100%)	41 (100%)	59 (100%)	110 (100%)
Conflict	5 (50%)	8 (20%)	27 (46%)	40 (36%)
Non-Confl	5 (50%)	33 (80%)	32 (54%)	70 (64%)

Another way for students to interact between themselves was in instructional form. Instructional interactions represented 42% of the interactions (refer back to Table 16), and consisted of an answer, question, or statement. It was found that in 59% of the cases instructional interactions involved a student making a statement about the task, 21% involved answering a question about the task, and 20% of the interactions involved a student asking a question about the task (see Table 18, next page).

All instructional forms of interaction involved an uneven relation between two students, where one of them assumed the role of knower or expert (dominant role) and the other of ignorant or learner (subordinate role). In

Table 18: Ethnicity of Initiator (ETHINI) by Ethnicity of Recipient (ETHREC) of Interaction by Instructional Form

ETHINI Instruc	ETHREC Black	Hispanic	White	Total
Black	3 (23%)	0 (0%)	5 (15%)	8 (8%)
Answer	0 (0%)	0 (0%)	2 (40%)	2 (25%)
Question	0 (0%)	0 (0%)	2 (40%)	2 (25%)
Statemen	3 (100%)	0 (0%)	1 (20%)	4 (50%)
Hispanic	0 (0%)	8 (16%)	23 (70%)	31 (33%)
Answer	0 (0%)	0 (0%)	3 (13%)	3 (10%)
Question	0 (0%)	2 (25%)	12 (52%)	14 (45%)
Statemen	0 (0%)	6 (75%)	8 (35%)	14 (45%)
White	10 (77%)	41 (84%)	5 (15%)	56 (59%)
Answer	1 (10%)	13 (32%)	1 (20%)	15 (27%)
Question	0 (0%)	2 (5%)	1 (20%)	3 (5%)
Statemen	9 (90%)	26 (63%)	3 (60%)	38 (68%)
Total	13 (100%)	49 (100%)	33 (100%)	95 (100%)
Answer	1 (8%)	13 (27%)	6 (18%)	20 (21%)
Question	0 (0%)	4 (8%)	15 (46%)	19 (20%)
Statemen	12 (92%)	32 (65%)	12 (36%)	56 (59%)

the analysis of this form of interaction it was crucial to determine who was the initiator and who the recipient of the interaction. Initiators of instructional statements and answers usually assumed a dominant role of expert, while recipients of these forms of interaction assumed a subordinate role of learner. On the other hand, initiators of instructional questions were usually assuming a subordinate role.

As shown in Table 18, anglo students initiated 68% of the instructional statements, 75% of the instructional answers, and only 16% of the instructional questions. Most of these interactions were towards Hispanics and some

towards Afro-Americans. In contrast, Hispanics initiated only 25% of the instructional statements, 15% of the instructional answers, and 74% of the instructional questions.

Table 19: Ability Level of Initiator (ABILINI) by Ability Level of Recipient (ABILREC) of Interaction by Instructional Form

ABILINI Instruct	ABILREC High	ABILREC Average	ABILREC Low	Total
High	3 (14%)	14 (40%)	16 (42%)	33 (35%)
Answer	1 (33%)	4 (29%)	3 (19%)	8 (24%)
Question	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Statemen	2 (67%)	10 (71%)	13 (81%)	25 (76%)
Average	13 (59%)	15 (43%)	10 (26%)	38 (40%)
Answer	1 (8%)	1 (7%)	5 (50%)	7 (18%)
Question	6 (46%)	2 (13%)	1 (10%)	9 (24%)
Statemen	6 (46%)	12 (80%)	4 (40%)	22 (58%)
Low	6 (27%)	6 (17%)	12 (32%)	24 (25%)
Answer	1 (17%)	1 (17%)	3 (25%)	5 (21%)
Question	3 (50%)	5 (83%)	2 (17%)	10 (42%)
Statemen	2 (33%)	0 (0%)	7 (58%)	9 (37%)
Total	22 (100%)	35 (100%)	38 (100%)	95 (100%)
Answer	3 (14%)	6 (17%)	11 (29%)	20 (21%)
Question	9 (41%)	7 (20%)	3 (8%)	19 (20%)
Statemen	10 (45%)	22 (63%)	24 (63%)	56 (59%)

Similar forms of interaction were initiated by students of high ability towards students of low and average ability, and by middle SES children towards low SES children (see table 19, above). This pattern of interactions illustrate the dominant role assumed by Anglo, high ability and middle SES students towards Hispanics,

Table 20: Sex of Initiator (SEXINI) by Sex of Recipient (SEXREC) of Interaction by Instructional Form

SEXINI Instruc	SEXREC Male	SEXREC Female	Total
Male	38 (69%)	17 (43%)	55 (58%)
Answer	9 (24%)	0 (0%)	9 (16%)
Question	6 (16%)	8 (47%)	14 (26%)
Statemen	23 (60%)	9 (53%)	32 (58%)
Female	17 (31%)	23 (57%)	40 (42%)
Answer	7 (41%)	4 (17%)	11 (28%)
Question	0 (0%)	5 (22%)	5 (12%)
Statemen	10 (59%)	14 (61%)	24 (60%)
Total	55 (100%)	40 (100%)	95 (100%)
Answer	16 (29%)	4 (10%)	20 (21%)
Question	6 (11%)	13 (33%)	19 (20%)
Statemen	33 (60%)	23 (57%)	56 (59%)

Afro-Americans, lower ability, and low SES students in the computer classrooms observed.

Almost all of the inter-gender instructional interactions observed were between a high-ability high-SES Anglo girl and an average-ability low-SES Hispanic boy. The Anglo girl assumed the dominant role, initiating 59% of her interactions in instructional statements and another 41% in instructional answers (see Table 20, above). The Hispanic boy initiated 53% of his interactions in instructional statements and 47% in instructional questions, assuming the learner role in most of his interactions, for example:

Ant: This thing doesn't work! (looking at Ste).

Ste goes to Ant's computer and types on it.

Ant: I don't like it there, that's not the right place.

Ste: So, where do you want it?

Ant: Over here.

Ste: You need to put a bigger number.

Ant: Then it is going to go...(pointing with his finger).

Ste gesticulates with her hand and walks away (as if saying do whatever you want).

Ant: I'm only kidding (asking her to continue helping him).

Following is an example of a procedural interaction in the form of an instructional statement between two Anglo boys, a middle-SES high-ability student to a low-SES low-ability student:

Mik: Write this down on your paper (with a nagging sound).

Jos: I don't have a pencil

Mik: Here (giving him a pencil).

An interaction was classified as divergent when a student discontinued or interrupted an instruction or collaboration with another student. Divergent interactions represented only 8% of all forms of interaction (refer back to Table 11). Most of the divergent interactions were initiated by Anglos towards Hispanic students (32% of all divergent interactions). Hispanics initiated 26% of the divergent interactions towards Anglos.

On the other hand, low ability students initiated 32% of the divergent interactions towards average ability students (refer back to Table 13). For example, two low ability students (Pab and Liz) were observed to withdraw from the task. They did not seem to know what to do to accomplish the task and were easily distracted. In another case, a average ability student (Ive) got frustrated because she could not put together a part of her project, withdrawing from the collaborative work. It was also observed that strong differences in opinions was another factor for student divergence from the task.

No significant differences were found in the divergent interactions between male and female students, nor between middle and low SES children.

There were situations of mismatch in the type of interaction. In one situation, one student was initiating an academic collaboration and the other student responded with a procedural conflict. Their conflict was not academic, of correctedness or incorrectedness of an input, but procedural, of who should do what now. In the other situation, one student was trying to give an academic instruction, while the other student refused the instruction, not because it was incorrect but because they differed about what should be done.

4.6 Interactions by Mode

Five modes of interactions had been identified: reciprocity, domination, resistance, accomodation, and rejection. Interactions were considered of reciprocity when two students dialogued cordially, complementing each other in their interaction. They were of domination when a student attempted to control another student's actions or behavior verbally or physically.

Interactions assumed a mode of resistance when a student firmly opposed another student's intention of controlling his/her actions or behavior. Interactions of accomodation occurred when a student acceded to act or behave in a particular way to fulfill expectations or avoid confrontation. Rejection was another mode of interaction observed. It consisted of interactions where a student observed another with detachment or did not respond when addressed by the other student.

The mode of interaction between all students tended to gravitate between two extremes: reciprocity and domination. In one third of the cases children were found to be interacting in a reciprocal mode (see Table 21, next poge). Relations of reciprocity between students were more likely to be of collaboration on academic tasks or, to a lesser degree, of cordial socialization (see Table 22, p. 89; and Table 23, p.90). On the other hand, over one fourth of the cases involved relations of domination. In the typical

Table 21: Ethnicity of Initiator (ETHINI) by Ethnicity of Recipient (ETHREC) of Interaction by Mode of Interaction

SESINI Mode	SESREC Black	Hispanic	White	Total
Black	11 (31%)	4 (2%)	18 (16%)	33 (10%)
Accomoda	0 (0%)	0 (0%)	7 (39%)	7 (21%)
Rejectio	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dominati	4 (36%)	0 (0%)	4 (22%)	8 (24%)
Resistan	1 (9%)	0 (0%)	5 (28%)	6 (18%)
Reciproc	6 (55%)	4 (100%)	2 (11%)	12 (37%)
Hispanic	3 (8%)	59 (35%)	83 (73%)	145 (46%)
Accomoda	0 (0%)	5 (8%)	43 (52%)	48 (33%)
Rejectio	0 (0%)	2 (4%)	1 (1%)	3 (2%)
Dominati	0 (0%)	9 (15%)	2 (2%)	11 (7%)
Resistan	0 (0%)	5 (8%)	19 (23%)	24 (17%)
Reciproc	3 (100%)	38 (65%)	18 (22%)	59 (41%)
White	22 (61%)	105 (63%)	13 (11%)	140 (44%)
Accomoda	0 (0%)	1 (1%)	2 (15%)	3 (2%)
Rejectio	2 (9%)	17 (16%)	1 (9%)	20 (14%)
Dominati	15 (68%)	55 (52%)	2 (15%)	72 (52%)
Resistan	2 (9%)	4 (4%)	2 (15%)	8 (6%)
Reciproc	3 (14%)	28 (27%)	6 (46%)	37 (26%)
Total	36 (100%)	168 (100%)	114 (100%)	318 (100%)
Accomoda	0 (0%)	6 (4%)	52 (45%)	58 (18%)
Rejectio	2 (6%)	19 (11%)	2 (2%)	23 (7%)
Dominati	19 (53%)	64 (38%)	8 (7%)	91 (29%)
Resistan	3 (8%)	9 (5%)	26 (23%)	38 (12%)
Reciproc	12 (33%)	70 (42%)	26 (23%)	108 (34%)

relations of domination, one student gave instructions to another student or maintained control over the computer work.

Accomodation and resistance were usually the modes initiated by students in response to an interaction of domination. Interactions of accomodation were also initiated by students who had assumed or internalized a subordinate role. Students interacted in an accomodative

Table 22: Mode of Interaction by Type of All Interactions Observed

Mode	Type: Academic	Procedur	Social	Total
Accomoda	32	13	13	58
Row Pct	55%	22%	22%	18%
Col Pct	21%	17%	15%	
Rejectio	5	7	11	23
Row Pct	22%	30%	48%	7%
Col Pct	3%	9%	12%	
Dominati	52	25	14	91
Row Pct	57%	28%	15%	29%
Col Pct	34%	33%	16%	
Resistan	16	13	9	38
Row Pct	42%	34%	24%	12%
Col Pct	10%	17%	10%	
Reciproc	49	18	41	108
Row Pct	45%	17%	38%	34%
Col Pct	32%	24%	47%	
Total	154	76	88	318
	48%	24%	28%	100%

mode in 18% of the cases and in a mode of resistance in 12% of the cases (refer back to Table 21). Students in the typical interaction of accomodation did not contradict or create any conflict in their collaborative work, letting their partner to control or dominate their computer work. They were also more likely to be asking questions about the task.

Rejection was an alternative mode of interaction of students who refused to reciprocate or maintain interaction with another student. Interactions of rejection

Table 23: Mode of Interaction by Form of All Interactions Observed

Mode	Form			Collabor	
	Instru	Collab	Diverg	Confli	Non-Co
Accomoda	20	21	4	3	18
Row Pct	35%	36%	7%	14%	86%
Col Pct	21%	18%	21%	7%	24%
Rejectio	5	1	5	1	0
Row Pct	22%	4%	22%	100%	0%
Col Pct	5%	1%	26%	2%	0%
Dominati	43	31	3	21	10
Row Pct	47%	34%	3%	68%	32%
Col Pct	45%	27%	16%	51%	14%
Resistan	7	16	7	15	1
Row Pct	18%	42%	18%	94%	6%
Col Pct	7%	14%	37%	37%	1%
Reciproc	21	46	0	1	45
Row Pct	19%	43%	0%	2%	98%
Col Pct	22%	40%	0%	2%	61%
Total	96	115	19	41	74
	30%	36%	6%	36%	64%

represented 7% of total interactions and were predominantly social.

Most of the interactions of reciprocity took place between Anglos and Hispanics, 26% of them were initiated by Anglos and 17% by Hispanics (refer back to Table 21). Another 35% of the reciprocal interactions took place between Hispanics themselves.

Jen and Jad are working on their project.

Jen: Just write TINY, for tiny toes.

Jad types, watches the screen, then claps and smiles.

Jad: Now we have to do the legs...

Els and Mic are working together on their project.

Els: Mira lo que hiciste, viste. Ahora tienes que borrar todo eso.

Mic: Tu eres mas loca chica.

Els: Mira lo que hiciste. Estate quieta ya!

Mic: Mira, vete!

Els: Mira trata sixty.

Mic types on the computer.

Els: No! Look what you are doing, Mic... Ay Dios mio!

Three out of every four interactions of domination were initiated by Anglos towards minority children, 60% towards Hispanics and 17% towards Afro-Americans (refer back to Table 21). The few interactions of domination initiated by minority students took place between girls and boys and can be attributed to the normal culture of boys and girls of their age and not necessarily to racial or ethnic factors (see Table 24, next page). In one of the cases it involved social play of sex roles between an Afro-American boy and an Anglo girl. In the other case it was a Hispanic girl giving instructions to a low ability Anglo boy. According to Rubin (1980), children between the ages of 9 to 12 are more likely to

Table 24: Sex of Initiator (SEXINI) by
Sex of Recipient (SEXREC) of Interaction
by Mode of Interaction

SEXINI Mode	SEXREC Male	SEXREC Female	Total
Male	107 (69%)	48 (30%)	155 (49%)
Accomoda	26 (24%)	11 (23%)	37 (24%)
Rejectio	9 (8%)	3 (6%)	12 (8%)
Dominati	40 (37%)	11 (23%)	51 (33%)
Resistan	8 (8%)	8 (17%)	16 (10%)
Reciproc	24 (23%)	15 (31%)	39 (25%)
Female	49 (31%)	114 (70%)	163 (51%)
Accomoda	3 (6%)	18 (16%)	21 (13%)
Rejectio	4 (8%)	7 (6%)	11 (7%)
Dominati	14 (29%)	26 (23%)	40 (25%)
Resistan	8 (16%)	14 (12%)	22 (13%)
Reciproc	20 (41%)	49 (43%)	69 (42%)
Total	156 (100%)	162 (100%)	318 (100%)
Accomoda	29 (19%)	29 (18%)	58 (18%)
Rejectio	13 (8%)	10 (6%)	23 (7%)
Dominati	54 (35%)	37 (23%)	91 (29%)
Resistan	16 (10%)	22 (14%)	38 (12%)
Reciproc	44 (28%)	64 (39%)	108 (34%)

express hostility towards the opposite sex, especially the boys towards the girls.

There were two incidents observed that illustrate the mechanisms of domination used by students in the classroom. One of the incidents involved two girls (Tra and Bet), an Anglo and a Hispanic. The two girls were fooling around and making fun of each other. Then, the Anglo girl complained about the other girl's behavior to the teacher, who punishes the Hispanic girl.

> Tra is making faces and sticking her tongue out at Bet.
>
> Ive: Bet no le tengas miedo que te de en la

cara. Mira, te esta sacando la lengua.

Tra: She is scared.

Bet moves towards Tra, but Tra stands up and walks away. She goes to the teacher to complain about Bet.

Ive: Rutie, Betzaida, Betzaida! (warning her).

The teacher observes Bet and calls her.

Bet: I'm doing nothing, I'm sitting down.

Tra: I was just joking.

Mic: See, that was her own joke (looking at the camera)

Bet is an exuberant, vivacious Hispanic girl. She has been very active, moving around the room and expressing herself loudly in the classroom, mainly in Spanish. Tra, on the other hand, is more the quiet type. She has been more discrete in her moves. Although the two girls (Tra and Bet) were observed to be behaving improperly in the computer classroom, only the Hispanic girl was punished. Bet was later suspended from computer class for another incident. Nobody ever complained about the Anglo girl's behavior.

The other incident was between three boys, two Anglo and a Hispanic (Kev, Ton and Joe). Two boys (Kev and Joe) were arguing over the use of the computer and another Anglo boy intervenes in favor of the other Anglo boy, hitting the Hispanic boy (Joe). This incident did not involve any punishment or reprimand from the teacher to

any of the boys involved. However, the Hispanic boy was effectively threatened by the Anglo boys and did not attempt to use the computer again after this incident.

An overwhelming majority of the interactions of accomodation (86%) were initiated by minority students toward Anglos, 74% of the interactions were initiated by Hispanics and 12% by Afro-Americans (refer back to Table 21). It does not necessarily mean that these students voluntarily assumed the subordinate role. In most of the circumstances minority students did not have previous experiences with computers and did not receive any support from the teacher. They had to rely on the Anglo students who did have the experience or support from the teacher to complete their work. For example, Jos and Kev are working on a project of a word search of heavy metal rock bands. Kev brought a magazine of rock music and is looking at it while Jos observes.

Kev: Get the notebooks to copy the names of some of the bands.

Jos walks to closet, gets the notebook, sharpens the pencil, and goes back to his seat.

Kev: Here is Motley Crue, copy that one, and Metallica.

Jos: Where is it?

Kev: Here, and AC/DC.

Jos: What?

Kev: That's the name of the band (laughing).

More interactions of resistance were initiated by Hispanics than by students of any other ethnic group: 50% of the interactions where initiated by Hispanics towards Anglos and 13% were initiated toward other Hispanics. Afro-Americans initiated another 13% toward Anglos. In one of the interactions of resistance observed, a Hispanic student refused to continue following the instructions given by her partner (an Anglo):

Ive is typing on the computer and Ell interrupts.

Ell: No! (she types something).

Ive: What in the heck do you think you're doing! (looking seriously at Ell).

Ell: Ok, let me do this, ok (in a low tone).

After Ell is finished, Ive types on the computer again.

Ive: TO SPIDER, right?

Ell nods: Ok we have to make a leg. Ok, RT 20 RLEG.

Many interactions of rejection were observed, where students ignored the other's presence or refused to reciprocate meaningful interaction. Anglos initiated the vast majority of these interactions, 74% towards Hispanics and 9% towards Afro-Americans (refer back to Table 21).

These interactions of rejection could be attributed to racial prejudice. Contrary to the commonly held belief that children are not aware of skin color, research evidence has shown that children become increasingly

conscious of race and color differences, starting at the age of 3 (cited in Thomas, 1984). Other researchers (see Rubin, 1980) have found an universal tendency among children to base group membership on similarity of traits, such as appearance, race, sex, skills, and temperament.

4.7 Summary of Findings

Most Anglo students were considered of high ability, while a vast majority of Afro-Americans and an overwhelming amount of Hispanics were considered to be of medium or low ability, according to the teachers' opinions. When the socioeconomic status (SES) of students participating in this study was considered, it was found that a vast majority of Afro-American and most Hispanic students were of low SES, while most of the Anglo students were of middle SES.

Students would group together by sex and ethnicity. The tendency of Hispanics to sit together could be attributed to several factors. In the first place, Hispanics and Anglos live in mostly segregated communities. Classroom A was located in a predominantly Hispanic community, and almost all of the Anglos came from other neighborhoods in the city. Classrooms B and C were located in a predominantly white neighborhood. Hispanic students came from two subsidized housing projects surrounding the school and from another community that was almost exclusively Hispanic.

Secondly, the Hispanic and Anglo communities differed in their socioeconomic composition. An overwhelming amount of Hispanic students in classroom A and all Hispanic students in classroom C were from low SES families. The vast majority of Anglo students in classroom A were from families of middle SES. In classroom B, most Hispanics and Anglos students were of middle SES. In classroom C an overwhelming amount of Anglo students were from high SES. In third place, existing cultural differences between Hispanics and Anglos could be influencing students decisions of where to sit.

The tendency of students to sit together by sex could be attributed to socially and culturally transmitted attitudes and beliefs. It could also be attributed to the dynamics of child development. As was indicated in chapter 2, at about the age of 10 to 12, children become more concerned with group membership and sex identification is a particularly important criteria. Rubin (1980) observed an universal tendency of children to children at this age to segregate by sex.

Access to the computers and the learning activities involved was determined by three factors: 1) the ratio of children per computer, 2) the structure and content of the learning activities provided by the teacher, and 3) the relationship established between students during their computer work. It was found that many students had to pair for work on the computer because there were not

enough computers for each to work alone. In addition, once students started working in pairs they tended to continue working together, even when all computer were not being used.

Most of the students in the classrooms observed were not able to complete the problem solving worksheets. However, Anglo students were more succesful than students from other ethnic groups in completing the learning activities, while no Hispanic student was able to complete them. This could be attributed to the fact that Anglos had more previous experience with computers and with the concepts involved in the learning activities.

The majority of the interactions observed took place between Anglo and Hispanic students. Usually these interactions occurred between average and high ability students and between students from middle and low socioeconomic status. As was indicated before, the typical Hispanic was of average ability and low SES, while the typical Anglo was of middle SES and high ability level. The interactions between these students were predominantly of collaboration with no conflict. However, when these interactions were further analyzed, it was found that they tended to assume one of two modes: reciprocity and domination. Interactions of reciprocity involved true collaboration and they represented 34% of all student interactions. Interactions of domination represented 29% of the student interactions and, in these

relationships, one of the students (usually an Anglo) assumed control over the activities on the computer, while the other student (usually a Hispanic) followed instructions or observed passively.

C H A P T E R 5

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a summarized discussion of all the variables examined in the study, which contribute to understanding the nature of social interactions taking place between students in a bilingual/multicultural setting. It describes how access to computers and learning was mediated in the classroom, and establishes correlationships between students' demographic data and the type, form, and mode of interactions taking place between them.

Finally, some recommendations based on the findings of the study are made to the school district and to other researchers.

5.1 Conclusions

Following are some concluding remarks regarding the questions guiding the study.

Question #1: How did students gain access to learning while working with computers?

Access to the computers was constrained first of all by the number of computers available for use. Given that there were more students than computers available, some students had to share the computer with another student. However, only some of the students were able to equally

share the computer. In most of the cases one of the students would control the operation of the computer while the other merely observed or was limited to a secondary role. This aspect will be addressed more fully in subsequent questions.

Another important dimension influencing students' access to computers and learning were the content and structure of the learning activities provided by the teacher. The learning activities assumed that computers are neutral artifacts that all students could use with ease. However, students with previous experience with computers, specially those that had computers at home were more successful in completing the learning activities. Logo, the computer language utilized in the program, is abstract. For students to use it succesfully they had to understand various mathematical concepts, such as angles, degrees, rotation, estimation of distance, etc. In addition, problem solving skills were applied to the solution of abstract and trivial problems. The problem solving activities consisted of worksheets with missing information to be filled out by students. Students who were not familiar with the concepts involved and did not have much previous experience with computers required more guidance and support to complete the learning activities.

Classroom activities were structured in hierarchical levels. At the first level students had to complete three problem solving worksheets provided by the teacher. In

the second level, students had to develop their own project. Once students had completed their project, they were instructed to transfer it to the Apple computer, where it was printed out on paper. During the period of the study, most of the students in classrooms A and B had not completed their assigned worksheets, and no Hispanic student had reached the level of working on their own project. In classroom C, all of the Anglo students and only one Hispanic student were working in their individual projects. All of the projects displayed on the classrooms' bulletin boards were done by Anglo students, except for one project done by a Hispanic together with an Anglo. In conclusion, all of the determinants of access to computers and learning tended to favor Anglo students and did not facilitate the success of Hispanic and other minority students.

Question #2: What was the nature of the social interactions between students while working with computers?

Close to one-half of the interactions between the students were academic, about 30% of them were social, and almost one-fourth were procedural. There were more students working with a partner than working alone. However, the fact that two students were working on the same computer did not necessarily entail a relationship of collaboration. It was found that in 60% of those interactions one of the students dominated or assumed

control over the computer, and 40% of the interactions involved true collaboration.

Instructional interaction was the other predominant form of relationship between students. In a majority of the cases, a student was giving instructions to another student about the academic task. One student in this form of interaction assumed the dominant role of expert and the other student assumed the subordinate role of learner.

In summary, student interactions tended to fall between two extremes: domination and reciprocity. If interactions of domination are combined with other interactions initiated by students in response to them, i.e. interactions of accomodation and resistance, they represented a vast majority of all interactions held between students. Interactions of reciprocity represented one third of all interactions, including academic, social, and procedural interactions.

Question #3a: How did the nature of social interactions between students, while working with computers, vary according to the student's ethnic background?

Most of the interactions between Anglo and Hispanic students were for academic purposes. However, Anglos usually assumed the dominant role in those interactions. A vast majority of the interactions between Afro-American and Hispanic students were social, which shows that they viewed each other more as friends than as intellectual

patterns. The interactions initiated by Anglos towards Afro-Americans were mostly procedural, while the interactions initiated by Afro-Americans towards Anglos were predominantly social. This mismatch in the type of interaction between these two groups may have underlying racial connotations. A smaller proportion of the cases, involved interactions of reciprocity between Anglo and Hispanic and Afro-American students.

Hispanics initiated more interactions of collaboration with no conflict than students from other ethnic groups. Half of these interactions were initiated towards Anglos and the other half towards Hispanic peers. In addition, Hispanics initiated more conflictive interactions of collaboration between themselves than with Anglos. This pattern of interactions may reflect a tendency among Hispanics to submit rather than confront in relations of collaboration with Anglos. It does not necessarily mean that Hispanics voluntarily assumed a subordinate role.

The powerless status of Hispanics in the school and the city, and the generalized presence of Anglos in positions of authority may be key factors contributing to this phenomenon. In addition, most of them did not have much previous experience with computers or with the concepts involved in the computer program and had to rely on the support of the teacher or the Anglo students to complete their work. Notwithstanding, more interactions

of resistance were initiated by Hispanics than by students of any other ethnic group.

Question #3b: How did the nature of social interactions between students, while working with computers, vary according to the students' socioeconomic status?

Most academic interactions took place between middle and low SES students, and a smaller amount took place between high and low SES students. It shows a tendency of students of different ability level to work together. Low and middle SES students were found to have mostly interactions of collaboration without conflict between themselves. This could be attributed to a tendency of low SES students to accommodate themselves into relations of collaboration where middle SES students control the activities on the computer. A smaller proportion of these non conflictive interactions between low and middle SES students could be attributed to true relations of reciprocity taking place between them.

Question #3c: How did the nature of social interactions between students, while working with computers, vary according to the students' level of ability?

Students would interact academically more with peers at proximal levels of ability, that is, more collaborations were initiated between average and high ability students and between average and low ability students than between

any other ability groups. High ability students tended to be more conflictive in their interactions of collaboration than average ability students. It may reflect a higher tendency of high ability students to maintain control in their relations of collaboration.

Question #3d: How did the nature of social interaction between students, while working with computers, vary according to the students' sex?

Most of the interactions between males and females were social, which shows a tendency of boys and girls not to engage in intellectual work. In addition, a vast majority of these social interactions were permeated with conflict, which confirms findings of other studies that children of this age are more likely to have a hostile attitude towards the opposite sex. On the other hand, most of the interactions between students of the same sex were academic, but females had more social interactions between themselves than did males.

Question #4: What was the interrelationship between all the variables?

The nature of the social interactions between students was determined by a combination of factors, including socioeconomic status, ethnicity, ability level, and sex. Each of these factors played an important role in determining the form and mode of social interaction between

students, but they cannot be seen in isolation from each other. In effect, Hispanic students of low ability or low SES had less access to learning activities in the computer than Hispanic students of higher SES or ability levels.

In addition, these factors are linked to conditions that go beyond the classroom to the level of society in general. Classroom dynamics reflect the social and political reality where students live. Educators who seek to change the existing patterns of interactions between students in the classroom will face the constraints imposed by this social and political reality. The aim of educators should be to raise students consciousness of this reality and the need to act to transform it.

5.2 Recommendations for the school district

1. Computers are being used as "entertainers" of students while the homeroom teacher is on planning time. As computers loose their attractiveness as a novelty, it would be more difficult for this arrangement to be maintained, and teachers will need to rely more on discipline to manage students. All computer related activities should be integrated into the classroom curriculum. Computer resource teachers could work together with classroom teachers to plan these integrated activities. An alternative mechanism should be implemented for providing teacher planning time.

2. The computer program should provide one computer per child in the classroom. In this way the issue of who controls the computer is eliminated and students can concentrate on completing their task and collaborating as equals with other students in the classroom.

3. The computer program should include content and meanings relevant to the culture of the students (i.e. Puerto Rican culture). For example, instead of the turtle in Logo a "coqui" could be utilized (the "coqui" is a little frog autochthonous of Puerto Rico). In addition, worksheet exercises could consist of drawing coconut palm trees, the Puerto Rican flag, etc.

4. Computers could be used to foster the development of writing skills and self expression.

5. The school district should consider alternative approaches for influencing student interactions in the classroom and for reversion of established roles. Cooperative learning methods could be an appropriate alternative, given its effectiveness in promoting desegregation and its emphasis on mixed ability groups.

5.3 Recommendations for further research

1. The use of videotape equipment for recording classroom interaction is very appropriate, however additional equipment could help improve the quality of the data. For example, the use of two video cameras and remote microphones would facilitate the simultaneous recording of

face to face interactions and general classroom dynamics.

2. In order to make the research study more meaningful and to incorporate participants' views more fully, participants should be involved in the analysis of the events.

3. Student interactions should be observed in different contexts: in their homerooms, while working in academic tasks in different subject areas, in free and unstructured activities, during recess. It would help differentiate between students' personality traits and social factors affecting student interactions. It would also help to illustrate how social interactions are influenced by the context.

APPENDICES

APPENDIX A

Letter of Approval

CITY OF

MASSACHUSETTS
ZIP CODE

Asst. Superintendent

February 10, 1987

PUBLIC SCHOOLS
Street
Tel.

Mr. Miguel Drouyn
C-8 North Village
Amherst, Massachusetts 01002

Dear Mr. Drouyn:

The purpose of this letter is to approve your request to do dissertation research in two classrooms in the Public Schools elementary computer education program. You may begin your data collection following February vacation and continue for twelve (12) weeks thereafter.

My understanding is that your research on the POLYA model for problem solving may be of benefit in developing more effective strategies to improve learning in the computer education classroom, especially for bilingual education program students. I look forward to receiving your observations and suggestions in this area once you have completed your research.

Mr. , the Computer Education Director, has given his approval for your research. Please contact him to make final arrangements for your visit. Best of luck in this undertaking.

Yours sincerely,

Assistant Superintendent

APPENDIX B

Written Consent Form

Written Consent Form

COLLABORATIVE PROBLEM SOLVING ON COMPUTERS
IN A BILINGUAL/MULTICULTURAL SETTING:
AN ETHNOGRAPHIC STUDY

To: _____
Fifth Grade Student
_ Elementary School
., Mass.

My name is Miguel A. Drouyn and I am a computer education teacher at Public Schools. Presently on leave from my teaching position, I am in the process of completing the requirements for a doctoral degree in Education at the University of Massachusetts in Amherst. My dissertation will be a study on the collaborative process of elementary school students working on problem solving tasks on computers. Specifically, I am interested in studying the effects of students' work on microcomputers on cross-sex and ethnic relations, and on the quantity and quality of problem solving success.

Your class is one of three elementary school classrooms that have been chosen to participate in the study. As part of this study, I will be videotaping your computer education classes with Mrs. You will continue your work in the computer laboratory for the remainder of the semester, and Mrs. will continue to be your teacher. I will be in the class in the role of an observer as you are working on your problem solving exercises and projects in the Logo language.

If you agree to take part in this study, you and your parents will be asked to complete a questionaire about your previous computer experience, family income, and other information about your family. In addition, I will need to examine the work you produce in the computer laboratory and to make copies of some of your worksheets for future reference. I will also make notes about your work in class and may ask an occasional question for clarification purposes.

Each videotaped session will be transcribed by me or by a typist (who will be committed, as I am, to confidentiality). My goal is to analyze the material gathered in the study for presentation in my doctoral dissertation. I may also use the information in journal articles, workshops for teachers, and possibly a book. However, in all written materials and oral presentations in which I might use materials from the study, I will use neither your name, names of people close to you, nor the name of your school or city. Transcripts will be typed with initials for names, and in the final form the narrative material will use pseudonyms.

Although I want you to participate in the study, I want you to

understand that you are under no obligation to do so. You will not be placed at a disadvantage now or in the future if you elect not to participate. Furthermore, if you agree now to participate in the study but later change your mind, you may withdraw at any time without prejudice.

In order to take part in the study, you must have the written consent of your parent or legal guardian. In signing the form below, you and your parent or guardian are agreeing to your taking part in the study under the conditions set forth above. You are also assuring me that you will make no financial claim on me now or in the future for your participation.

If your parent or guardian has any questions or would like further information about the study, please ask him or her to call me at my home phone, 536-8932. Thank you for considering being part of my research.

_____
Miguel A. Drouyn

Participant's Consent: I, _____, have read the statement above and agree to participate in the study under the conditions stated therein.

_____ _____
Signature of Participant Date

Parent or Guardian's Consent: I, _____, have read the statement above and agree to my son or daughter's participation in the study under the conditions stated therein.

_____ _____
Signature of Parent or Guardian Date

Al Padre o Encargado(a)

de _____
Estudiante de Quinto Grado
Elementary School
, Massachusetts

Mi nombre es Miguel A. Drouyn y soy maestro de computadoras en las escuelas públicas de . Al presente estoy en licencia sin sueldo de mi trabajo como maestro para poder completar los requerimientos del grado doctoral de la Universidad de Massachusetts en Amherst. Mi disertación será un estudio sobre el proceso de colaboración de estudiantes de escuela elemental trabajando en la resolución de problemas en computadoras. Específicamente, me interesa estudiar los efectos del trabajo en computadoras en las relaciones entre niños y niñas de diferentes sexos, grupos étnicos, y abilidades. Me interesa también estudiar la cantidad y calidad de éxito que cada uno de estos niños y niñas logra en la resolución de problemas en computadoras.

El salón de su hijo(a) es uno de tres salones de clase que han sido seleccionados para participar en este estudio. Como parte de este estudio, yo estaré grabando en video la clase de computadoras de Mrs. . Además, si usted accede a la participación de su hijo(a) en este estudio, le vamos a pedir que llene el cuestionario adjunto sobre el ingreso y otra información de su familia.

Cada video será transcrito por mi o por una secretaria (quien, al igual que yo, guardará confidencialidad absoluta). Mi objetivo es analizar el material recopilado en el estudio para presentarlo en mi disertación doctoral. También es posible que yo utilice el material en artículos de revistas profesionales, talleres para maestros, y, a lo mejor, en un libro. Sin embargo, en cualquier material escrito o presentación oral que yo haga, no usaré el nombre de su hijo(a), o de personas relacionadas, ni el nombre de la escuela o ciudad. Las transcripciones serán hechas usando las iniciales del nombre, y en la versión final se usarán seudónimos.

Aunque quiero que participen en mi estudio, quiero que sepan que no están obligados a hacerlo. Su hijo(a) no será puesto en una posición de desventaja si es que decidiera no participar. Aún más, si usted accediera a su participación ahora y luego cambiara de opinión, podría terminar su participación en cualquier momento sin ningún perjuicio.

Al firmar al otro lado de esta hoja, usted está accediendo a la participación de su hijo(a) en el estudio bajo las condiciones aquí establecidas. Usted está también asegurándome que no hará ninguna reclamación financiera a mi persona ahora o en el futuro por esta participación.

Si tiene alguna pregunta o quiere alguna información adicional sobre el estudio, me puede llamar a mi casa al teléfono: 536-8932. Gracias por considerar ser parte de mi investigación.

_____
Miguel A. Drouyn

Consentimiento del Padre o Encargado(a)

Yo, _____, he leído lo indicado arriba y accedo a la participación de mi hijo o hija en el estudio bajo las condiciones aquí establecidas.

_____ _____
Firma del Padre o Encargado(a) Fecha

Cuestionario Socio-económico

	Padre	Madre
1. Lugar de Origen	_____	_____
2. Ocupación	_____	_____
3. Educación:		
a. menos de 12 años	_____	_____
b. Escuela Superior (12 años)	_____	_____
c. Universidad (1 a 3 años)	_____	_____
d. Universidad (4 años o mas)	_____	_____

4. Vivienda ____propia ____alquilada Pago Mensual _____

5. Número de personas en la familia _____

6. Ingreso familiar _____ Semanal/Mensual (Escoja uno)

APPENDIX C

Socioeconomic Questionaire

Socio-economic Questionaire

1. Date _____

2. Student's Name _____

3. Address _____

4. Age _____ 5. Sex ____ 6. Place of Birth _____

7. Years living in the U.S.A _____ 8. Years in Holyoke _____

9. Do you have a computer at home? ____ Yes ____ No

10. For how many years have you had the computer? _____

11. Years of previous experience with Logo:

_____ 1 or less _____ 2 _____ 3 or more

To be filled by parent or guardian

	Father	Mother
12. Place of Origin	_____	_____
13. Occupation	_____	_____
14. Education:		
a. less than 12 years	_____	_____
b. High School (12 years)	_____	_____
c. College (1 to 3 years)	_____	_____
d. College (4 years or more)	_____	_____

15. Housing ____owned ____rented Monthly Payment _____

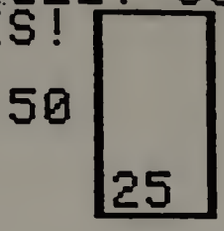
16. Family size _____

17. Family income _____ Weekly/Monthly (Please circle one)

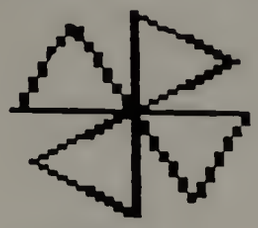
APPENDIX D

Problem Solving Worksheets

WRITE PROCEDURES FOR THE TRIANGLE AND RECTANGLE. USE THEM TO DRAW THESE FIGURES!



REC

1. 

FOUR

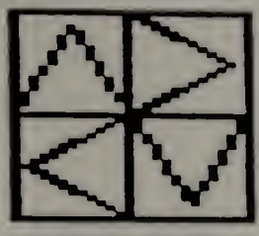
NAME:

DATE:

TRI

2. 

WINDOW

3. 

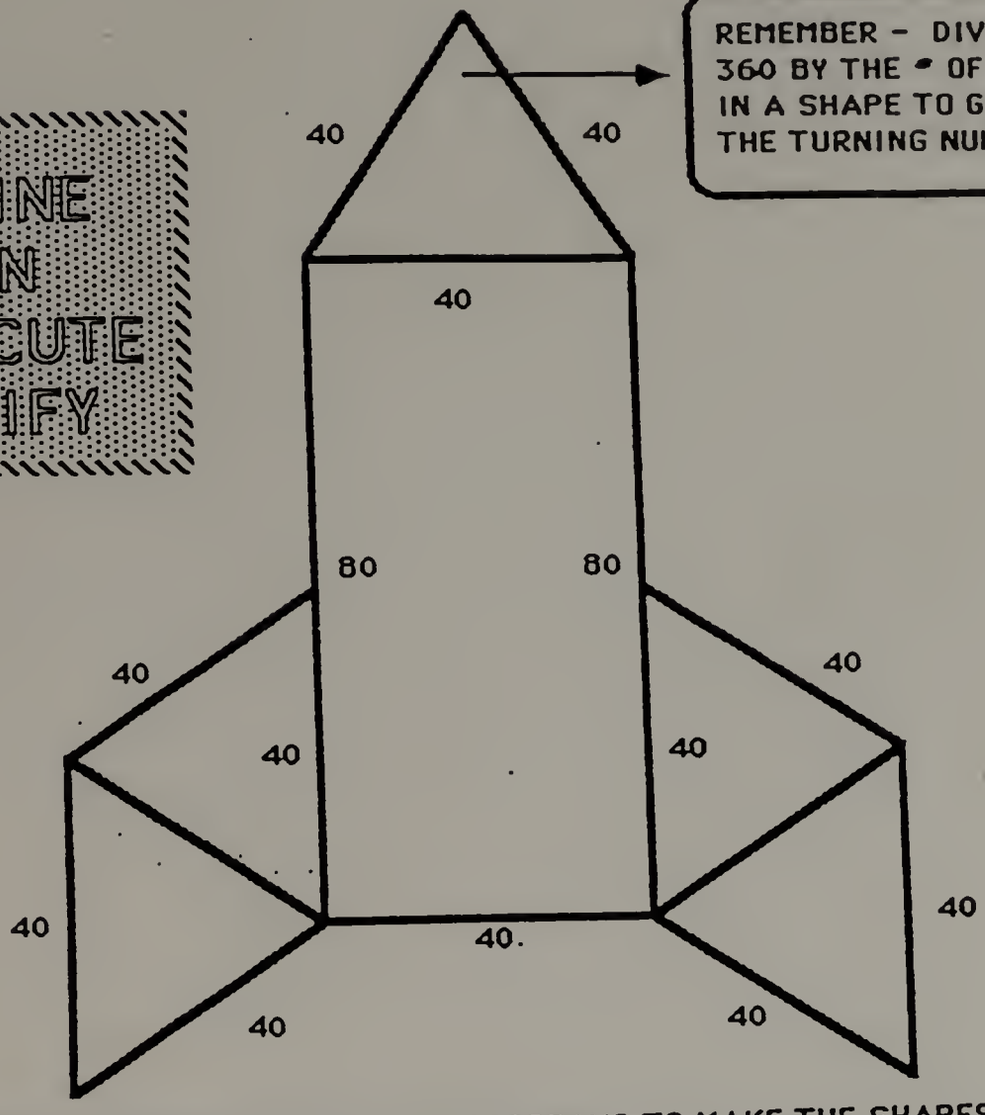
DESIGN

WRITE YOUR PROCEDURES BELOW!

THE LOGO SPACESHIP

DEFINE
PLAN
EXECUTE
VERIFY

REMEMBER - DIVIDE 360 BY THE # OF SIDES IN A SHAPE TO GET THE TURNING NUMBER



DIRECTIONS: YOU MUST WRITE TWO PROGRAMS TO MAKE THE SHAPES FOR THIS SPACESHIP: A RECTANGLE (BODY) AND AN EQUILATERAL TRIANGLE (NOSE AND FINS). AFTER YOU HAVE DONE THIS, ALL YOU HAVE TO DO IS PUT THEM TOGETHER IN ONE PROGRAM. YOU CAN PRINT SOMETHING ON THE BODY OF THE SHIP IF YOU LIKE. GOOD LUCK!

2. PLAN – **A.** NAME THE SHAPES THAT MAKE UP EACH PART OR SECTION OF YOUR PROJECT.

B. DESCRIBE METHOD OF SOLUTION: **PARTS** OR **PATTERN**, **ANALOGY** (IS IT LIKE OTHER PROBLEMS?), OR **SENT TO A LIMIT** (HOW FAR CAN YOU GO WITH THIS IDEA?)

A. NAME OF PART/SHAPE	B. METHOD OF SOLUTION
1. NOSE (TRIANGLE)	PART
2. BODY (RECTANGLE)	PART
3. FIN (TWO TRIANGLES)	PARTS and PATTERN
4.	
5.	
6.	
7.	
8.	

3. EXECUTE - A. WRITE AND RECORD A PROGRAM FOR EACH PART OF YOUR PROJECT.

B. WRITE AND RECORD A PROGRAM FOR THE STEPS NEEDED TO CONNECT ALL THE PARTS.

```
TO NOSE
REPEAT 3 (FD 40 RT 120)
END

TO BODY
REPEAT 2 (FD 80 RT 90
FD 40 RT 90)
END

TO FIN
NOSE
RT 60
NOSE
END

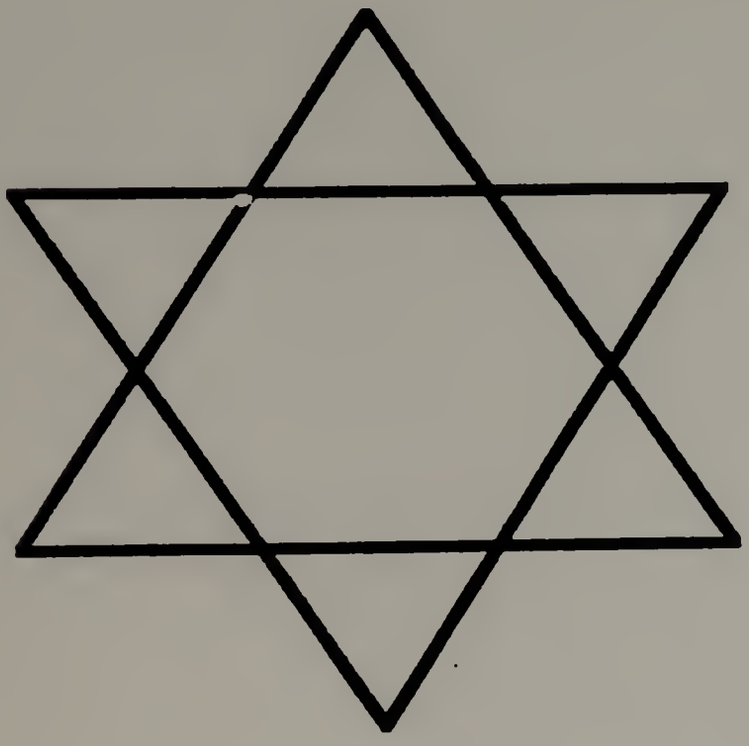
TO _____
END

TO _____
END
```

LOGO PROBLEM SOLVING SHEET

NAME _____ CLASS _____

1. DEFINE – DESCRIBE YOUR PROJECT [AN EXACT PICTURE HELPS.]
GIVE THE PICTURE A NAME.



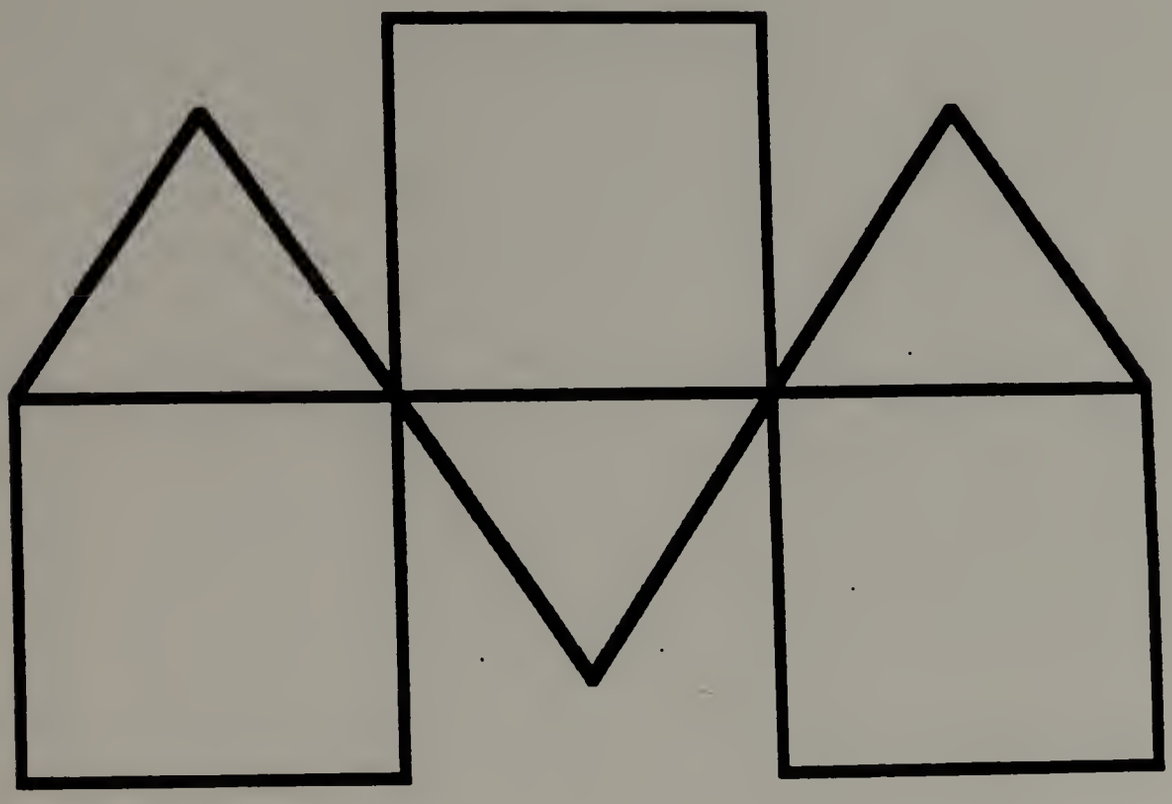
CAN YOU MAKE THIS DESIGN WITH JUST TWO TRIANGLES?

PROJECT NAME: _____

LOGO PROBLEM SOLVING SHEET

NAME _____ CLASS _____

1. DEFINE – DESCRIBE YOUR PROJECT [AN EXACT PICTURE HELPS.] GIVE THE PICTURE A NAME.



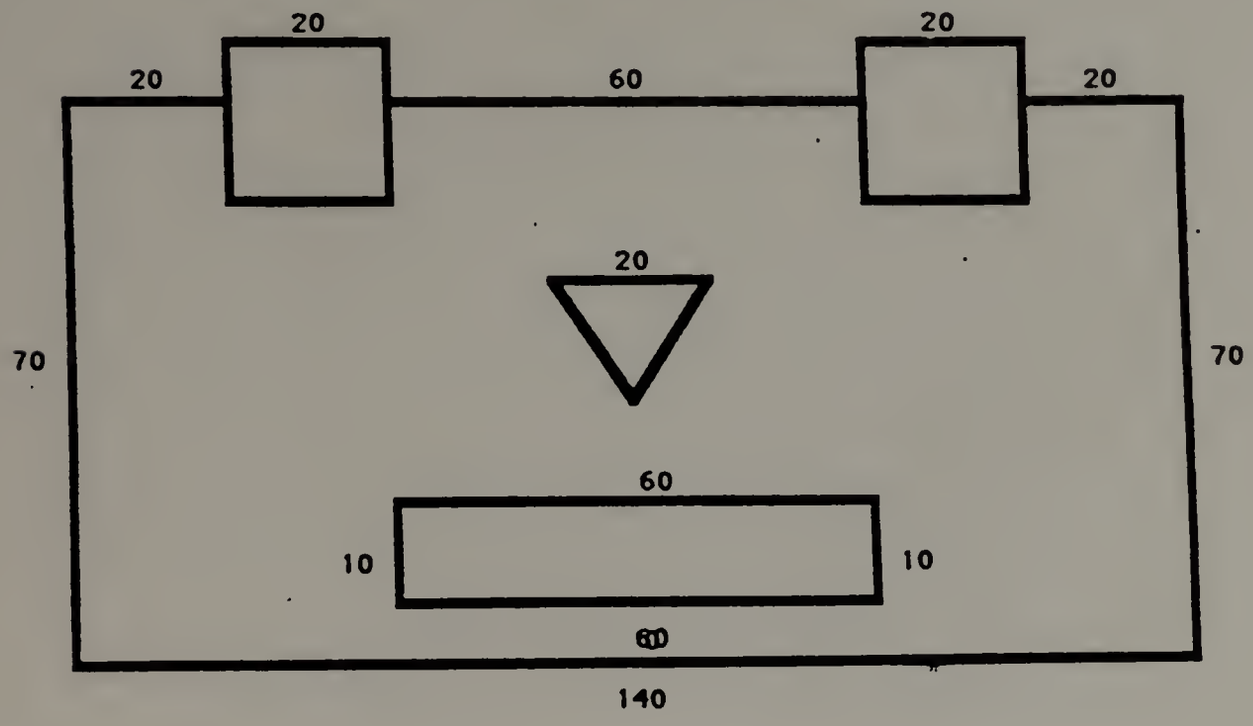
ALL LINES IN THIS DESIGN ARE 50 TURTLE STEPS LONG. TURNING NUMBERS INCLUDE 30, 60, 90 AND 120.

PROJECT NAME: _____

LOGO PROBLEM SOLVING SHEET

NAME _____ CLASS _____

1. DEFINE – DESCRIBE YOUR PROJECT [AN EXACT PICTURE HELPS.] GIVE THE PICTURE A NAME.



PROJECT NAME: _____

LOGO LAB
PROBLEM SOLVING SHEET

NAME_____ DATE_____

1.DEFINE(Draw a rough picture of your project.Give it a name.)

Project Name_DRAGON_____

2.PLAN(Name all the parts of your project.)

A.BODY_____ E.SPINE_____

B.LEGS_____ F._____

C.HEAD_____ G._____

D.EYE_____ H._____

Name the shapes that make up each part.

A.RECTANGLE_____ E.ROW OF TRIANGLES

B.SQUARE1_____ F._____

C.SQUARE2_____ G._____

D.SQUARE3_____ H._____

RECTANGLE=40X80 SQUARE3=15
SQUARE1=20 TRIANGLE=16
SQUARE2=40

3.EXECUTE(Work on your computer to write the procedures for each shape.Check for bugs.)

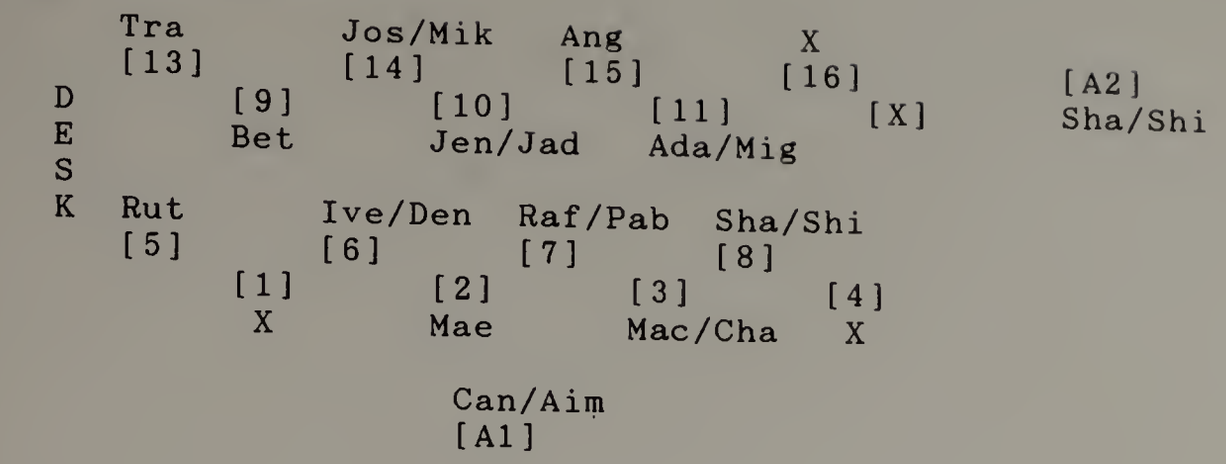
4.SOLVE(Write a super procedure that puts all of your shapes together to make your original picture or design. Use the name from step one.Review and check.)

APPENDIX E

Narrative Description

CLASSROOM A : 4 MAY 87

Map of Classroom A:



The teacher (MH) is helping the two girls (Can/Aim) in one of the Apple IIe computers [A1].

{00:01} Rut, Ive, Bet, & Den are talking (social).

{00:16} Cha is pulling Mac by the arm and the head. Mac had turned away from the computer and was facing to the side. Cha is trying to make Mac turn around towards the computer again.

{00:20} Bet to Rut: "You get it?" Rut nods (social).
{00:59} Bet to Ive: "Do you get it?"
{01:05} Ive: "Yes...(uninteligible)"
{1:13} Bet stands up and says loudly: "Pa'l carajo, me voy pa' alla" (she seems to be bothered by something which I don't know what it is. She might be acting for the camera).
Den: Cono
Bet walks away and tells Den: "Cono no se dice se hace."
Ive: "Uuuh!" She laughs.
Bet: "A mi que se joda!" She pats Raf on the head (playing).
MH seems to have ignored the whole situation. The rest of the children seem to be busy working on their computers. I move the camera to another location (Tra's table).
{1:47} Bet leans over the table to look at Tra's screen. She makes a noise with her mouth and moves her body as if dancing and looks at the camera (she might be acting for the camera again).
{1:54}

{2:01} Jen is sitting in front of the computer and Jad is on the side. They both are involved in their

computer work. Jad is typing on the computer from the side.
{2:27}
{2:18} Bet screams again: "A mi que se joda!"

MH moves to the other Apple IIe [A2] to help two other girls (Sha/Shi). Now she is helping Mac/Cha, then she talks to Pab/Raf. Then MH talks to Ive/Den briefly and walks away.
{2:37} Ive: "Adriana esta mas buena."
Bet: "Tu la ves."
Ive: "Sometimes." They are talking about a Spanish soap opera.
{2:48} Tra calls Bet and says something (inaudible).
Bet: "Me, I don't care."
{3:05} Bet starts talking to the camera: "What's up man. That's a fresh camera." I leave the camera on Bet for a little while to see if she stops acting out, then I move the camera to the other location (Tra's table).
{03:38} Mik is working on the computer while Jos sits not to close on the side. He looks at the camera and smiles.
Mik: "Write this down on your paper." (with a nagging sound).
Jos: "I don't have a pencil."
Mik: "Here" (He gives Jos his pencil).
{04:05} Jos starts writing on the paper. (I move the camera again to location near Ive's table.)

Sha comes to talk to MH and she goes to [A2] to help them (Sha/Shi).
{04:27} Raf works on the computer while Pab looks around the room and at the camera.
{06:23} (I am trying to keep the camera away from Bet to see if she stops acting out. I try to film only those students who are on task to discourage Bet's behavior.)
{04:53} Ive: "Partele la cara ahi mismo Betzaida." Tra is bothering Bet, she is making faces and sticking her tongue out at Bet.

Mac acts for the camera. Aim walks to MH at [A2].

Ive: "Betzaida no le tengas miedo que te de en la cara. Mira te esta sacando la lengua."
{05:45} Tra: "She is scared."

{05:52} Ive: "Rutie, Betzaida, Betzaida (with an English accent). She stands up next to Rut. Write TO BIG BOX (Ive is trying to explain Rut how to do something on the computer.
Ive: "What are you doing?"
Rut: "It's not the same, we are doing this."

Ive: "Que tu estas haciendo? You are supposed to write TO BIG BOX then TO SMALL BOX. That's how we got it."
{06:12} Rut: "That's not the shape we are supposed to do."
Ive goes back to her seat.

{06:15} Den to Ive: "Let me see something." She tries to write something on the computer.
Ive does not let her type: "Ok, let me see something" (Ive replies taking control of the computer).
{06:18} Ive: "Que tu estas copiando?" (to Rut). Rut is working on a procedure called TO CROSS.

{06:24} Ive is dictating some commandds to Den, who is typing on the computer.

{06:02} Tra walks to [A2] and complains to MH about Bet. MH observes Bet for a few seconds and calls her.
Bet: "I'm doing nothing. I'm sitting down."
Tra: "I was just joking." She talks with Jos.
Mik: "See, that was her own joke."
{06:17}

Bet is sitting on a table in a corner of the room (probably MH asked her to seat there). After a few minutes, she is gone from the corner.

The girls in A1 (Can/Aim) show MH a design on their screen. MH exclaims: "OOOOOh!" (praising) and she talks to them.

Tra plays with a toy (a miniature pinball machine). She shows it to the camera and smiles.

{10:43} Jad and Jen have switched places. They are working on their computer. Jad is typing on the computer while Jen is holding the worksheet and observing from the side.
Jen: "Just write TINY, TINY TOES" Jad types watches the screen, claps, and smiles.
Jad: "Now we have to do..."
{11:40}

Rut types "SQUARE" on the computer and obtains only a line on the screen.

MH is doing something on [A2] while Sha/Shi are sitting at another computer [8].

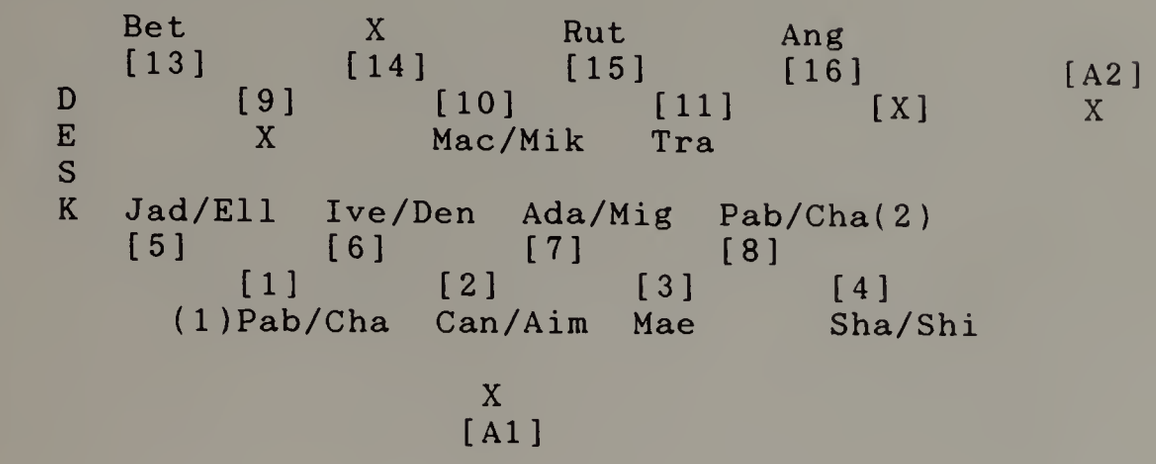
{12:07} Closing time. MH: "Ok people we need to get ready. Ok people please put the worksheets in your folder. Line up by the door." MH to Pab: "Please pick

up the notebooks for me."
{13:05} Raf is still working on the computer.
{13:58}

Girls on A1 and A2 keep working on their computers while the rest of the class gets on line and leave the room. They are the last to leave the room.
{14:39}

CLASSROOM A : 11 MAY 87

Map of Classroom A:



{55:14} Opening time.
{55:19} MH helps Pab/Cha.
MH: "I'm coming around, make sure you are filling out these sheets as you go." She walks away towards the other table.
{55:27} Can and Aim are working together. Can types from the side and Aim sits in front of the computer. Aim points at the screen and talks to Can.

Ada and Mig work together. Ada is typing on the computer and Mig is on the side taking notes on a paper.

{55:34} Ive works on the computer and Den observes. Ive is holding her folder in front of her with one hand and with the other hand types. Den is writing on the table.

{56:50} Now Aim types and Can observes. They take turns in typing. They stop and call the teacher.

Pab is sitting on the side and Cha is working on the computer. Cha and Pab talk about their task.

{57:22} Sha has the papers on her hands while Shi types

on the computer. They talk about their project. Shi has been doing all the typing.
{59:32}

{57:56} Den takes the papers away from Ive. She is talking to Ive about the task.

MH: "I don't like your mouth let's get busy." (to Bet).

{58:51} Cha calls the girls on [5]: "look it, look it." He starts pushing all the keys and buttons on the computer and says, "fresh!"
{59:08}

{59:32} Ive talks to the girls on [2] about their projects: "you're doing flowers? Oh! Ah, ah we are doing this," she shows them her worksheet.
{1:00:01}

{1:00:51} Cha looks at the teacher, who is helping the girls on [2], and says, "look it's frozen." Pab says "it doesn't work." Cha turns the computer off and him and Pab stand up and walk away.
{1:01:00}

{1:00:44} Mac brings his folder to Ell for her to copy one of her procedures on it. Ell writes on Mac's folder.

Ive, Rut, & Bet are gathered around Bet's computer. Mac also joins them.

MH: "Mik you stay still or go away." She tells the other students to sit down: "in your chairs please." Mac tells MH that Bet is watching TV.

MH to Bet: "turn it off and just stare at the screen."

{1:01:25} Ive returns to her place and snatches a paper from Den's hands and pushes her away from the computer. Ive types and Den writes on the table.

Ell does not want to give the folder back to Mac. She gets up and gives it to Mik, Mack's partner.
{1:02:18}

{1:02:38} Ive makes a comment to Can, who had turned her face towards her. Can turns her face around again with indifference and talks to her partner (Aim).
{1:02:45}

Pab & Cha have moved from computer [1] to [8]. Chat then tries to sit at computer [9] by himself, next to Bet. Him and Mac look at Bet's screen, she is smiling. MH tells Cha to go back to [1], but later settles in

having him sit with Pab at [8].

{1:03:32} Mig continues to observe while Ada types.

{1:03:42} Can types. Aim tries to type and Can pushes her hand away.

MH is helping Mik. Mac is sitting on the side looking at some papers. Now MH helps Rut. Nobody is using the Apple computers. MH is now helping Sha/Shi, then she moves to help Mae. Aim comes to MH and talks to her.

{1:03:54} Ive is copying from her folder again on to the computer, while Den observes from the side. Den gives her some papers but she puts them aside and does not use them.
{1:06:56}

{1:05:38} Bet is standing on back of Mac/Mik's computer. She says something to Mac and hits him on the head. MH indicates Bet to go back to her seat.
{1:06:54}

MH helps Ive/Den, and observes Bet. Then MH speaks to Can/Aim.

{1:08:10} Den starts typing from the side. Ive observes and hits Den. Den runs her procedure and it works.
Ive: "Mira!"
Den: "Allright."
Ive hits Den and starts typing again.

{1:08:46} Aim types again. They are both involved in the computer work, although Can does must of the typing.
{1:09:54} Den tells Ive she is doing something wrong and Ive hits her again.
{1:10:07} Ell gets up and indicates something to Ive/Den about their work. Den and Ell talk about the task, then Ell goes back to her place.
{1:10:56} Den tries to type something and Ive hits her hand.

MH helps Cha/Pab. She sits in between Cha & Pab and converses with them.

Jad/Ell seem very involved in their work. Jad is typing while Ell observes from the side. Ell tells Jad that she is doing something wrong but Jad does not let her touch the computer by placing her left arm around the keyboard. Jad keeps typing without paying attention to Ell. Jad runs her procedure and looks at the screen smiling with satisfaction. Ell smiles with embarassment.

{1:12:40}
{1:13:54} Pab looks, observes, stands up, while Cha works on the computer.
{1:16:22}
Mik asks MH for help. Tra leans over the table to see what Ang on [16] is doing. MH asks her to sit down in a mild reprimand.

MH stands on back of Jad/Ell and exclaims: "AAAh, very nice!" and gives some observations about how to continue their work. MH then leans towards Bet and tells her something while Bet looks at her seriously.

{1:15:03} Den calls MH and asks a question about her work. MH responds and Den tells Ive: "see I told you." After MH leaves, Ive hits Den on the head. Ive raises her hand again to hit Den, but MH reprimands: "Girls!"
{1:16:04}
MH is helping Ada/Mig. Mik talks to MH, she looks at him but continues working with Ada/Mig.

{1:16:24} Cha talks to Pab and they work together without conflict.
{1:17:15}
{1:16:26} Ive seems to be frustrated or bothered for not being able to get something done, she shakes her head to both sides. Ell calls MH (apparently they did something that affected their graphic design), MH smiles and says, "fix it up."

{1:17:20} MH reprimands Bet: "Shhh...put your feet down." Ive asks for MH's help by raising her hand, then exclaims: "Sea la madre que me pario" (she seems to be bothered for not being able to do something on the computer). The teacher continues talking to Mik. Ive raises her hand and shakes it insistently. MH looks at her and moves her hand as if telling Ive to continue working on her own. Ive shows her something on her screen. Rut raises her hand calling for MH's help. MH to Ive: "Ok, think how you are going to change it."

{1:18:02} Ive talks to Den about what they are doing on the computer, while MH walks away.

{1:18:24} Jad/Ell seem to be sharing the computer, both talk about their work and use the computer.
{1:18:37}
Rut raises her hand again and leaves it up for some time. MH walks around the room and stands on back of Rut. Rut talks to MH and she responds. Cha interrupts and asks MH a question out loud. MH to Ada/Mig: "Gentlemen, please." They were playing fighting each other. Mik raises his hand, MH leans toward their

computer. Bet is looking at a paper, she doesn't seem to be doing anything on her computer. MH walks around the room and sits on the table next to Mae and asks her, "what are you trying to do, nothing?"

{1:19:54} Pab doesn't seem to be very involved in the work Cha is doing on the computer. He is observing Cha and looking to Ada/Mig sitting next to him.

{1:21:07} Cha shows MH some drawing on his folder, "do you think we can print this?"
MH: "Did you get it?"
Cha: "Almost"
MH: "Ok, you are close, keep at it."
MH observes the work of Sha/Shi: "Very, good. Very, very good, now what?"

{1:21:17} Cha and Pab work together again.
{1:21:54} Cha pushes Pab's hand away and Pab withdraws again. The teacher walks to Pab/Cha:
MH: "Are you working Pab or just watching."

{1:21:47} Ive and Den are talking and pointing at their work on the computer.
{1:22:00}
MH looks at Ada/Mig's computer and says: "Oh, Ada nice, Mig good work." She talks to them then says to Ada: "You know how to make a curve." Ada says, "I know." MH walks around the room towards Rut. Pab continues to observe the work of Cha.

{1:24:48} Cha asks Pab how much he should go forward. He says that he needs to go a little bit. Pab responds "twenty."
{1:25:00}
Den raises her hand. Ada/Mig raise their hands also, and call MH out loud. Den raises her hand again and Ive too. Ada says, "What do we do now?" MH responds, "I don't know, I didn't see your first procedure. Try it."

Ive raises her hand again and shakes it insistently and turns her head toward MH, who is standing next to Rut. MH leans towards Rut's computer. Den begins to write on the computer, Ive observes, makes some comment and writes something also. Ive raises her hand again. Ive and Den smile. Den puts her hands on her face, looking at the screen.

{1:25:25} Pab looks at the camera, he then moves his hand and turns the vertical control knob on the back of [3] and then looks to the side as if he had done nothing. Mae walks to MH and tells her about the problem with her TV (she didn't seem to notice what Pab

did). The teacher walks and stands on back of Ang on [16] and talks to her. Ada/Mig raise their hands and MH talks to them and gives them some instructions, then asks Mig, "What's wrong with it?"
{1:27:14}
Pab moves the vertical control knob of [3] again. Cha watches Pab and asks Mae if it is fixed now. Pab looks at the screen (it is still out of control), then looks at MH and tells her that there is something wrong with [3].
{1:27:51} Closing time.

MH: "Ok people make sure everything is written down on your paper... Rut please pick up the folders on that side."

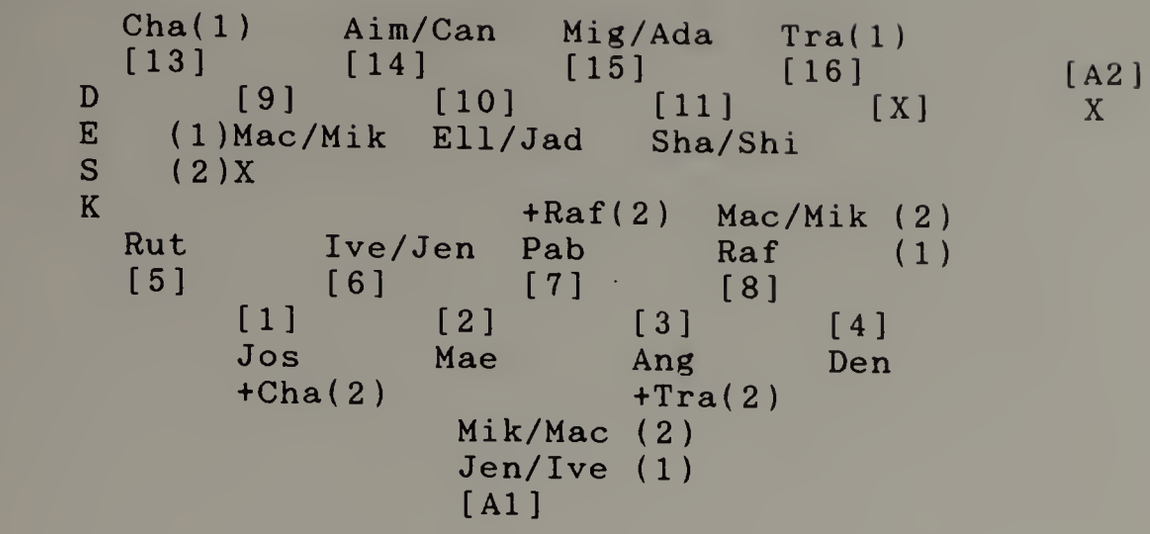
Pab: "Do I put it right here?"

MH: "Collect folders on the other side please (to Pab). Let's go, get ready to leave."

Can and Aim continue to work on their computer while the other children line up at the door. Ive and Den push each other.
{1:29:50} Bet stands in front of VC and starts hitting Mac. Tra plays with a ball in her way out. Can, Aim and Pab are the last ones to leave.
{1:31:37}

CLASSROOM A : 18 MAY 1987

Map of Classroom A:



Opening time. Bet was held back in her room and will not be coming to computers today.

{51:35} Can and Aim work together. They talk cordially about their project with no conflict.

Mac and Mik work together again. Jen is sitting with Ive. Den is working by herself at the other extreme of the table. Rut is also working by herself on a computer next to Ive.

Raf is sitting on [8] by himself, MH asks him to work with Pab to try to finish their work. He moves and sits next to Pab on computer [7].

Tra asks for permission to work with Ang but CV tells her to wait until Ang is finished with the project she is doing and then they can work together on another one.

{51:50} Ive talks to Rut (social).
{52:11} Jen pats Ive on the shoulder to call her attention.

Mac/Mik complain about having problems with their computer, MH tells them to move to another computer.

Rut raises her hand and MH goes to her place.
Rut: "Mine doesn't write"
MH: "What do you suggest you might try?"
Rut: "I don't know." MH turns Rut's computer off and back on.

{52:29} Ell and Jad work together. They discuss their task cordially with no conflict.

{52:50} Mac asks Cha if a pencil on the table is his and walks away (procedural).
{52:56} Mac & Mik moved to [8], where Raf was sitting before.

{53:07} Jen and Ive work on the computer together they talk about their task. They talk cordially without conflict.

{53:16} Sha and Shi work together with no conflict.

{55:00} Ive calls Rut and points at her screen and smiles.
{55:22} Jen tells the teacher that they are finished (It seems that Jen had done the task already, and she just copied the procedures from her notebook. This is the first time they worked together since I started observing the classroom). The teacher looks at their work and lets them move to computer [A1].

{56:07} Ada and Mig argue about their work. Ada pushes Mig away from the computer and types.
{56:51} Mig tries to type again and Ada doesn't let him.

{57:44} MH gives instructions to both Ive and Jen at computer [A1]. They talk cordially.

{57:44} Pab asks Ang about the task and she shows him something on her computer and gives him some instructions.
{58:06} Pab touches Den's computer and she pushes his hand away.
{58:11} He also bothers Tra.
{58:15} Finally, he sits in his place.
{58:20} Ang shows Pab something on a paper and gives him further instructions.
{58:27} She tells him something again, but this time she looks upset (hostile).
{58:30}
{58:49} Raf and Pab work together without conflict and talk about their task. Raf is doing the typing.

{59:00} Ang talks to Mae and shows her what she did.
{59:20} Ang gets up and walks to the other table to Tra's place.

{59:21} Ive talks to Jen and fixes Jen's hair with her hand. Jen moves her head backwards and combs it with her hands. Ive looks happy and smiles with Jen and MH.

{59:30} Mik and Mac are talking about their task. Mik does the typing and Mac observes.
{1:01:08} Mik and Mac talk about their hands comparing their sizes (social).
{1:01:20} They continue working together.
{1:02:24} Mac leans over the other table to see what Tra is doing.
{1:02:59} Mac sits again next to Mig.

{1:00:30} MH leaves and Ive types on the computer, Jen has the notebook on her hands and reads the commands to Ive. Jen also types and points or points at the keys with her pencil.
{1:01:59} They have problems with their work on the computer and call MH.
{1:02:37} They try again to fix their work on the computer. Ive does the typing and does not let Jen touch the keyboard. She can not fix the problem, Jen laughs.
{1:03:51} MH goes to [A1] and helps Jen/Ive.

{1:01:05} Pab and Raf disagree on what to do on the computer. They look at the screen of Jen/Ive's computer and copy their commands.
{1:01:19} Now Raf is working on the computer, while Pab is looking away.
{1:01:40} They resume working together. Now they look at Sha/Shi's screen but still argue about what to do.

{1:02:38} Jos looks to the side. Mae, who is working on the computer next to him, places her notebook on the side of the screen to block Jos's view of her screen (thinking that he is trying to copy from her).
{1:02:52} Jos continues working on his computer as if nothing had happened (he did not seem to be trying to copy from Mae's computer).

{1:05:32} Ive is holding the notebook now, while Jen is working on the computer. They have problems again with their work. They are waiting for MH.
{1:05:41}
Tra moved to a sit in between computers [2] & [3] in front of Pab/Raf. She has some papers on her hand.
{1:05:43} She talks to Pab and he gestures with his hand for her to go away (hostile). She gestures back with her notebook.
{1:05:48}
{1:06:21} Tra took some papers away from Raf and Pab. Raf is trying to get the papers back from her. Raf is upset and he moves his body towards Tra as if he is going to hit or push her. Tra moves away but still stays seated in front of him. Raf takes a paper away from her.
{1:06:49} Pab and Raf turn around towards MH. MH is

busy helping Sha/Shi and doesn't notice them.

MH is helping Raf/Pab, she also gives some instructions to Ive/Jen.

{1:07:17} Tra is now typing on Ang's computer. She struggles with Ang over the control of the computer.
{1:08:12} MH calls her attention and she sits back up straight.
{1:09:42} Tra talks to Jen cordially.
{1:09:47} Tra makes faces and talks to Ive.
{1:09:51} Ive turns her face away from her. She is upset and points her finger at Tra and responds back to her.
{1:10:07} Tra tries to type again on Ang's computer. Ang pushes her hand away.
{1:10:19} MH intervenes and calls Tra's attention. Tra sits straight and lowers her face.

{1:10:46} Den calls Mac and he gets up and looks at her screen. They talk about her project and then he goes back to his sit.
{1:11:30}

{1:11:16} Pab leans over the table and looks at Ang's screen. Tra is holding a pencil on her hand and reaches toward Ang's computer. Ang pushes her hand away.
Tra now hits Pab with the pencil. Pab pushes her hand away and wrestles with her a little.
{1:11:59}

Jen and Ive move back to the table to [6].

{1:12:03} Tra points at a poster on the wall and talks to Ang. They get up and look at the poster and converse.
{1:12:38} Tra sits down again and rocks her chair.
{1:13:02} Ang goes to Mae's place and talks to her. Mae shows her work on the computer
{1:13:56} Ang returns to her place.

Mac talks to MH and she gives him and Mik permission to work on computer [A1]. Mac sits on front of the computer and Mik stands on the side with a notebook on his hands.

{1:14:28} Ang pushes Tra away from her computer with hostility.
{1:14:42} MH calls Tra's attention again and she stays seated next to Ang for a little while and then returns to her place at [16].

{1:15:02} Ive talks to Raf (social).

{1:15:45} Ive talks to Rut (social).
{1:16:01} Jen pats Ive on the shoulder to get her attention. They work together on the task with no conflict.

{1:16:11} Cha moves to Jos's computer and sits on his side. They talk about how they got some scratches on their arms (social).

Mik is now sitting on front of the computer and Mac is standing on the side with the notebook.

{1:17:13} Mae looks to the side where Jos is sitting and he places his notebook on the side of his screen to block Mae's view of his screen (It did not seem to me that Mae was trying to copy from his computer).
{1:17:37} Cha leans towards Rut's computer. Rut says she is finished and Cha argues with her about whose turn it is to go to the Apple computer (procedural).

{1:17:47} Ell and Jad talk to Raf and explain something (instruction). Jad does something on Raf's computer and moves back to her seat.
{1:18:31}

{1:18:10} Mac stands next to Rut's computer, looks at her screen and agrees that it is Rut's turn.
{1:18:13} Rut looks at Cha and sticks her tongue out at him, Cha throws something at her.
{1:18:29} Rut raises her hand. MH is helping Sha/Shi. Mac, Jos and Cha go back to their places. Rut is smiling.

{1:18:53} Jad pushes Ell on the head, they argue over their work.
{1:18:57}
{1:18:59} Ive observes Rut while Jen continues to work on the computer. Rut has finished her work and is calling the teacher. Rut is happy and excited. MH is now helping Jad/Ell. Ive looks at Rut's computer and nods approvingly.

{1:19:24} Aim and Can raise their hands calling the teacher. MH looks at them and gives them some papers to place on the shelf.

{1:19:45} Rut talks to Ive. They talk and smile (social). Rut raises her hand again and leaves it up.
{1:20:17} Ive complains about the lack of attention from MH: "Solo a los gringos les hace caso."

MH leans towards Aim/Can's computer and helps them. Then she turns her back to Rut (who is raising her hand) and calls the attention of somebody on the other

side of the room.

{1:20:48} Ada and Mig argue about their work.
{1:20:58}
Ive turns towards MH and tells her that Rut is calling her. MH continues to look at somebody on the other side of the room.
{1:21:04} Rut talks to Ive, who points to the clock (indicating that time is running out) and when Rut is getting up to leave, MH turns around towards her.

MH looks at Rut's screen and shakes her head (as if approving, but with indifference). MH doesn't show any excitement about Rut's work. Rut shows her screen and smiles. MH indicates something briefly and then moves away.

{1:21:29} Rut stands up looking towards Ive, tells her something about her work. Ive looks at Rut and talks to her and Jen and smiles.
{1:22:53}
MH stands next to Sha/Shi and speaks to them. She then goes to Den who shows her work on the computer. MH stays with Den for a while.

{1:22:57} Raf talks with Pab (social).
{1:23:58} Ell chats with Raf. She gives him some instructions.
{1:24:35}
{1:24:13} Ive stands on back of Rut and observes her work. Ive touches Rut's hair and blouse. Rut continues working and ignores Ive.
{1:24:58} Jos calls Ive and she leans over the table to look at Jos/Cha's screen. MH comes to Jos/Cha's place and indicates something. Ive sits down and looks at MH with the corner of her eyes.

{1:24:54} Raf asks Ell about the task. Ell gives more instructions.
{1:25:38} Raf observes Jad working on the computer. She continues working without looking at him.
{1:27:12}

Rut raises her hand insistently and MH walks away from her. Several other students raise their hands on the other table. MH says it is going to be time to go soon, but Sha insists and talks with the teacher. MH then goes to help Ada/Mig.

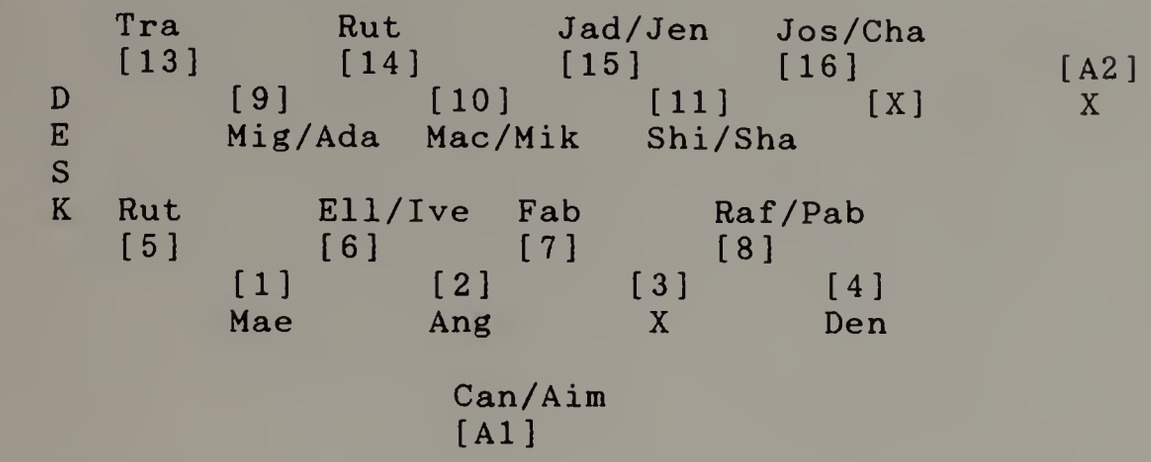
{1:27:19} Mik and Mac return to computer [8]. Mik asks Pab to move to the side.
{1:27:39} Mac stands on the side of She and shakes his hand but she continues working indifferently.
{1:27:48} Mac talks with Mik about the computer

(procedural).
{1:28:58} Pab moves closer to Mac and he pushes Pab away from the computer.

Closing time.
{1:29:03} Pab and Raf push each other and play fighting.
{1:29:19} Raf hits Mik and Mik hits him back.
{1:29:24} Raf hits Ive and she responds verbally and moves away from him.
Pab picks up the folders. MH helps Ada/Mig till the end of the period.
{1:30:26}
All children walk out of the room.
{1:31:37}

CLASSROOM A : 1 JUN 1987

Map of Classroom A:



{00:01} Opening time.
Ive and Ell are working together, Ive is sitting on front of the computer and Ell on the side. They work on their project with no conflict.
{02:20}
Ive is typing on the computer and Ell interrupts:
Ell: "No!" She types something on the computer.
Ive: "What in the heck do you think you're doing!"
{02:35}
Ell: Cordially, "ok, let me do this, ok."
Ive smiles. Ell types on the computer and Ive observes. After Ell is finished, Ive types on the computer.
{03:48}
Ive: "TO SPIDER, right?" (She is referring to the procedure in Logo). Asking for her approval.
Ell nods:"Ok we have to make a leg. Ok, RT 20, RLEG."
Ive: "What, RLEG?"
Ell is dictating the commands from a paper and Ive

types them on the computer without conflict. They run the procedure and look at the screen. Their facial expression shows that something is wrong with the design drawn.

Ell checks the commands on the computer and says, "Ok, Ok," and types something. Ive runs it again, they look at each other and smile (It seems it worked better this time.)

Ell: "Ok, TO SPIN. I have the spin procedure in here somewhere, I know that. I have one for square." She starts dictating commands to Ive: " To Spin, Repeat 12. Twenty? Twelve!" (it seems that Ive typed 20 instead of 12 and Ell is correcting her).

Ell: "Ok, you know this (she points with her fingers trying to indicate parenthesis) shift, SQUARE, RT 30, shift, type END, now type SPIN." Ell types on the computer (to run the procedure).

Ive: "What is it doing?"

Ell: "It stopped? ...I got it!" She starts looking through her papers, as if looking for something that is missing.

{11:01} Ive: "Look!" Pointing at another computer on back of them. Both look at the computer on back of them [9]. Mig/Ada have drawn a truck on their screen on a red background color. The truck is drawn and redrawn many times, as if it was moving.

{11:36} Ive stands up and looks at Rut's screen leaning over her TV set. She talks to her and types on Rut's computer
{12:22} Pab and Raf look at the camera and make faces.
{13:05} Den talks to Pab/Raf about their work.
{13:24}
{14:06} Rut talks with Jen (procedural).
Jen asks Mac if he is mad at her and he looks at her seriously and does not respond.
{14:46} Ive: " Que?"

Rut: " Que ustedes van a hacer Lissie?" Ive turns around and looks at Rut but does not respond.
Ive talks to Mig.
{14:54}
Ive and Ell talk about their project without conflict.

Den calls the teacher, she raises her hand.
{15:28} Cha sits next to her and looks at her screen.
Den points to something on her screen and talks with Cha about her project.
{15:36}
Cha then turns towards Pab/Raf's computer and looks at their screen, but they don't talk. MH talks to Cha and he goes back to sit next to Jos.

Pab & Raf exchange places.
{16:29}
Ive: "What happened to you there, what happened?" (pointing at Ell's forehead).
Ell: "I don't know, beats me." She types something on the computer.
Ive to Ell: "You are always going (she moves her head to both sides)." Ell does not respond and continues working.
{17:13}
Ive sticks her tongue out to the camera. She then turns around and applauds at the students on the computer on back of her (Mig/Ada). She then pats Ada on the head, and pounds on the back of his chair with her hand and talks to him. He responds and they laugh.
{17:41} Ive continues working with Ell.
{18:02} Ive calls Tra and makes some noises with her mouth and laughs (social, fooling around).
{18:09}
Rut is not working on her computer, she is observing others around her, then she stands up and looks out the window (she stretches her body, as if she was tired of sitting down).
{18:46}
Rut leans over the table and looks at Mac/Mik's computer and smiles at them. She talks to them, mostly to Mik, about their work.
{19:07}
Ell is working on the computer while Ive observes and looks to the side. Ive then types something and Ell gives her instructions and corrects what she did. Ell continues to type while Ive observes.
{21:50} Ive starts hitting several keys and says she is bored. She and Ell argue about what to do.
{22:06} Ell looks in the notebook for the procedure to type on the computer while Ive observes on the side. Ell starts typing and Ive is still observing and getting restless.

{20:13} Mik calls Rut to watch what he did. Rut leans over the table again observes and talks to Mik and Mac.
{20:46} Jen to Rut: "Uf, Rutie (fanning her hands, indicating it stinks). She then smiles and tells Rut that she is just kidding.
{21:57} Rut is now sitting on the table and talking to Jen (looks like it is non-academic, social talk). Tra is sitting on the other side.

{22:20} Tra talks to Rut: "It is nice out." She is standing up and looking out the window. Now she goes back to her place.
{22:32}

{23:32} Ive: "Let's stop the computer." She turns off the monitor.
Ell: "Nooo!"
Ive: "I'm tired, aren't you?"
Ell: "What an idiot...
Ive: "Let's go..."

{24:05} They stand up and then sit down again.

{25:00} Ell types again on the computer while Ive sits on the side.

{26:21} Ada & Mig are working on the computer and singing the ABC in English. Ive and Rut join them in the singing.
{26:47}
{27:12} Ive hits Ell on the shoulder. Ell says "ouch" (she is burnt from a suntan). Ive talks to Mik about Ell's sunburn and Ell turns around and speaks to Mik also (social).

{27:54}
Ell hits Ive and tells her to read the notes and turns back to work on the computer. Ive observes from the side while Ell types.

Jen and Ada are talking about the background color in their design.

{33:16} MH observes Ell's work. Ive observes, then stands up and goes away. Ell continues to work on the computer alone.

{33:50} Closing time. MH: "Ladies and gentlemen time to go." The children start lining up at the door.
Jad says she is sweating and talks to Ive.

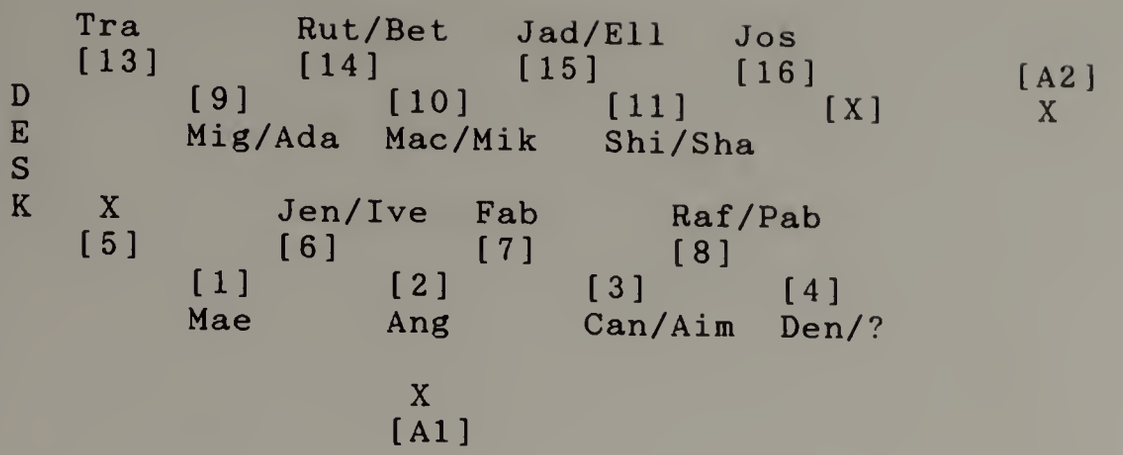
{34:46} Ang says she peed in her pants and Jad is mad and pushes her away.
{34:53}

{35:44} Rut asks Aim about their work on the computer and she replies briefly.

{35:49}
They walk out of the room.
{36:25}

CLASSROOM A : 8 JUN 1987

Map of Classroom A:



{52:23} Opening time.
Rut is giving out folders to students. MH presents on the board a graphic design and some procedures in Logo and asks the students how to use the procedures to do the design. MH presents several questions. She calls Ell to answer, then calls Shi, Can, Ada, Sha.

Mac is looking at Rut, who just sat down in front of him and tells her something.

MH: "Mac, pay attention please. How are you going from these two procedures to this picture? Any ideas? Ive, any ideas?" Ive shakes her head indicating no. Mik gives an answer. Ada adds something else.

MH: "Very interesting! Did you hear what he said. Say it again, Ada."
Jen is called to answer the next question.

{58:50} Work time. The teacher finishes her introduction of the new procedures and asks students to copy the procedures in their notebook and then enter the codes into their computers.

{58:40} Ive and Jen talk about the design they are going to work on. Ive does not agree with Jen on the design and starts writing on her notebook. Jen asks her: "What are you doing?" and writes in her notebook too.

{59:09} Mik is writing on the notebook while Mac looks around. Mac tries to turn the computer on and Mik does not let him (procedural conflict).
{59:24}

{59:54} Mac talks to Bet (procedural).

{1:00:16} MH calls his attention and he sits next to Mik.
{1:00:50} Mik asks Mac if he wants to copy what he wrote and Mac pushes his notebook away.

{1:01:08} Mik starts typing while Mac observes.
{1:01:30} Mac talks with Bet (social).
{1:03:30}

{59:27} Ive shows Jen what she wrote. Jen looks but continues writing on her notebook. Ive smiles at Jen. Jen continues writing. Ive withdraws and seems to be thinking.

{1:00:05} Ive asks Jen: "What are you doing?" Jen does not respond and continues writing on her notebook. Ive looks at Jen's notebook and copies to her notebook. Jen seems to be thinking or planning something. She moves her pencil, as if planning her design.

{1:01:58} Ive turns the computer on and talks with Jen (procedural). Jen writes on the computer while Ive observes.

{1:03:08} Jen tells Ive to type and moves back. Ive writes on the computer while Jen dictates the commands. Ive is going to press a key and Jen says, "no" and types on the computer.

{1:04:14} Ive withdraws, looks to the side and writes on her notebook.

{1:04:08} Mik asks Mac to type and tells him which commands to type.

{1:04:38} Mik and Mac talk about their task.
{1:05:18} Mik gives Mac instructions about the commands to type.
{1:06:38}

{1:04:52} Ive hits the space bar and looks at Jen, but she continues typing with no interaction.
{1:05:18} Ive talks to Ang (procedural).
{1:05:31}

{1:08:48} Ive tries to type and Jen says: "no, not yet" and pushes her hand away. Jen continues typing while Ive observes and looks around.
{1:08:53}
{1:09:54} Jen is smiling and shows MH what she has on the screen. MH says, "you are very close." Jen types and Ive observes.

{1:10:53} Mik tells Mac what to type on the computer.
Mik: "Ok, write FD 90... No! 50." Mik pushes Mac's hand and types on the computer. Mac just sits there and observes.

{1:11:16} Jad stands on back of Mik and gives him instructions about his work.
Jad: "You don't need TO SQUARE... You go FORWARD 18, that's not enough."
Mik: "No, let us do it our way."
Jad: "Fine, fine then don't do it."
Mac: "Yeah, Jad." Jad walks away.

{1:11:58} Bet is writing on the computer and Rut gives instructions from the side.
Rut: "Borra eso. No, eso no. Type Shift 9."

{1:12:02} Mik to Mac: "Write FD...50." Mac types it on the computer. Then Mik continues writing on the computer while Mac sits on the side looking around.

{1:12:26} Jad stands on back of Rut and asks them: "What are you doing?" She observes their work.
Jad: "You don't need square, erase it. We already got ours. Go up." She writes on their computer.

{1:13:31} Mik calls Jad: "We got it. How come we got it!" Jad leans over the table and looks while Mik and Mac exclaim: "Aha, hah" and smile.

Raf and Pab do not seem to be working on the task. They are talking and fooling around.
{1:13:47} Pab observes Den, who is working together with a new girl. Raf joins in.

{1:15:46} Raf sits in his place and types. Pab sits on the side and observes. Pab tries to type and Raf pushes his hand to the side.

{1:18:31} Pab is playing with the girl sitting in front (new girl) and Raf turns the computer off and goes with Pab to watch Den working.

{1:19:24} Raf and Pab sit again in their place and work on their task.

{1:20:10} Raf and Pab stop working and are just looking around.

{1:13:56} Jad continues giving instructions to Bet while Rut observes.

{1:15:34} Rut argues with Mac.
{1:16:00} Jad calls MH and says that Rut/Bet's computer is frozen.

{1:16:35} Mik tells Mac to copy the procedures into his notebook. Mac asks Mik to copy the procedures for him and Mik agrees to copy the procedure for the triangle and that Mac will copy the rest.

{1:17:03} Mac observes the girls in front of him while Mik writes.

{1:17:36} Mik gives Mac his notebook back and tells Mac to copy the rest from his notebook. Mac starts writing.

{1:17:55}
Den calls the teacher. MH comes to her and gives her some explanations and writes something on her computer.

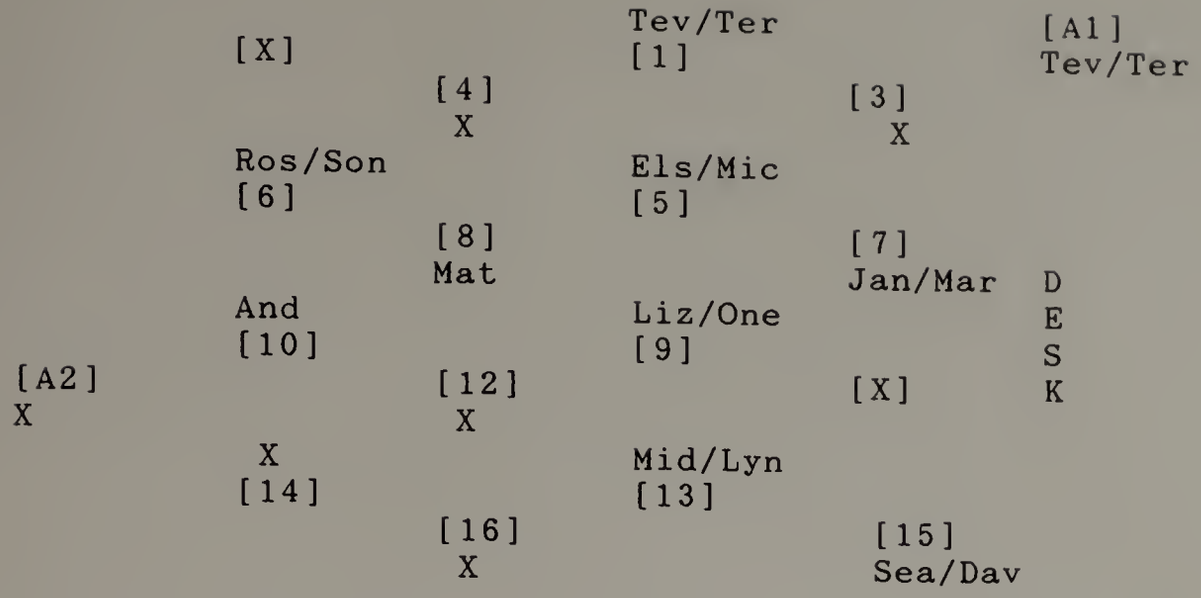
MH looks at Fab's computer and exclaims, "oh, Fab that is great!"

Can and Aim stand up to look at Fab's work. Aim exclaims "doiiiii" (making fun of Fab). Raf and Pab, are observing from the side.

{1:24:23} Closing time.
MH: "Raf and Pab please take your folders."
All the children line up by the door.
{1:25:30}

CLASSROOM B : 8 MAY 87

Map of Classroom B:



{14:45} Mat is asking the teacher permission to go to the bathroom. He walks out of the room.

Lyn is using the computer and Mid sits on the side. Sea is sitting on front of the computer and Dav is on the side. One is on the computer and Liz is on the side. Mic and Els sit equidistantly to the computer, they alternately type on the computer.

The teacher (CV) speaks to Jan/Mar. He is asking some questions to help them with their work on the computer. Mar is working on the computer and Jan sits on the side. Tev calls CV. He moves to Tev/Ter's place and talks to them.

Lyn and Mid have switched places, Mid is on front of the computer and Lyn is on the side.

And raises his hand (calling the teacher). He turns around toward the teacher but the teacher does not seem to notice him. Mat walks into the room.
{17:15} And asks Mat a question. Mat nods (with indifference). And turns around again and continues working on the computer.
{17:20}
{15:54} Ros is typing on the computer while Son observes on the side. Son comments on something Ros did, she points to the screen. Ros replies something (inaudible). Son is now looking around at other students in the room while Ros continues typing. They talk again about their work (in Spanish).
{20:52}

{17:25} Tev is writing on the computer while Ter observes on the side (They are not really collaborating in their work. Tev controls the work on the computer). Ter is not using the computer and Tev is doing all the work. Tev seems to have finished his project. Both him and Ter exclaim: "Yes!" and tell the teacher that they are done. Jan exclaims: "Apple time!"
{18:23}
{18:29} Ter tries to type on the computer and Tev pushes him away. Tev calls the teacher (he is trying to get the teacher to see what he has done). Ter tries to type on the computer again and Tev pushes his hand away.
{18:39}
{18:49} Liz talks to Mat he replies briefly, turns around and continues his computer work.
{18:59}
CV looks at Tev/Ter's computer and approves their work.
{19:08} Tev calls Sea to show him what he has done. Sea walks to their place, look at the screen, and walks away.
{19:28} CV goes to his desk and asks Tev/Ter to send their file to the main computer for saving and printing. CV tells them that they will now transfer their procedures to the Apple [A1] in order to print their graphic design. CV turns on the Apple computer and gives them a printed copy of their procedures.

{20:57} Sea and Dav have switched places, now Dav sits in front of the computer and Sea is on the side (he looks at the camera). Sea is taking notes on the paper. Dav points to the screen and talks about what he is doing.

{20:57} Mid and Lyn continue to work in their project. Mid is typing on the computer and Lyn writes on the notebook. Both point at the screen and comment about their work.
{22:34}
{22:45} Liz observes while One works on the computer. Jan talks to Liz. Liz takes off her left shoe and puts it back on. Then she does the same thing with her other shoe.
{24:30}
{22:52} Mar had been standing next to Tev/Ter observing their work, and now she walks back to her seat. And calls Mar and asks her a question about his work on the computer. Mar explains something (inaudible) and leaves.
{23:12}
{23:23} Els to Mic: "Mira lo que hiciste, viste, viste. Ahora tienes que borrar todo eso."
Mic: "Tu eres mas loca, chica."
Els: "Mira lo que hiciste" (she puts her hands on

top of her head). "Estate quieta ya!" Els starts typing on the computer.
{23:50}
{23:38} Mar talks to Ter who is at the teacher's desk getting a print out from the teacher. Mar calls the teacher and shows CV where she is having problems. CV asks a couple of questions to help her solve the problem.

{24:24} Mic and Els talk about their work. Mic starts typing again.
Mic: "Mira, vete!" She pushes Els away from the computer. They smile and talk again about their work.

{24:38} Ros and Son have a problem with the procedure for the NOSE of their spaceship project. Ros is frustrated and gesticulates with her hand.
Son: "Mira, trata sixty."
Ros replies something (inaudible).
Son types something and exclaims, "carajo." She looks up at the microphone and says, "se me safo" (excusing herself). They comment about their work, and as the teacher walks past their table, both call CV at the same time.
{25:44}
{25:16} Els: "No! Look what you're doing. Mic...! Ay Dios mio!" Mic smiles and says something (inaudible) and continue typing. Els smiles.

{25:40} Tev and Ter are working on the Apple computer [A1]. Tev is doing the typing and Ter is on the side holding the print out of the procedures.
{27:55}
{25:46} CV comes to And's place to help him. Liz gets closer to One and talks to her (as if reacting to the teacher's presence). Liz has some papers on her hands and is playing with them while she observes One.

{26:19} One talks to Mar. Mic talks to Els, Mar, Jan, One, and Liz in Spanish.

{27:02} Son calls CV: "Our NOSE won't come out." CV walks to their place.
Mat: "You're nose is on your face" (trying to be funny). Son looks at him but he does not make I contact.

{27:09}
Ros explains what she did. The teacher seems to have found the problem and tells them to check what they typed for the 'o' in nose.

{27:54} CV moves to help Liz/One. Els calls CV. Mar raises her hand and exclaims, "Yeees!" Els calls One

and talks to her.

{28:01} Ros takes a paper and writes on it while Son types on the computer from the side. Son claps her hands and she and Ros smile with joy looking at the screen (they finally got their procedure to work). {28:50}
{28:53} Ros and Son talk and plan what they are going to do next. They use their bodies to check whether they want the turtle to move right or left. Son continues to type on the computer while Ros writes on the paper.

{29:12} Lyn and Mid have switched places again. Now Lyn is in front of the computer and is typing on it.

Sea and Dav are working together on the computer. Dav contines to be in front of the computer. Mid speaks to Sea and smiles.

{30:42} Now Ros is typing while Son observes.
Son: "Ahora pa' aca. It is supposed to be LT 90 and NOSE."

Els calls the teacher. Mic types something on the computer and calls CV also.

{31:15} Mar calls the teacher and CV looks at her screen and exclaims: "Hey, a completion! Is it all done in the Edit Mode?" CV checks their work and congratulates them openly for having finished. CV goes to the shelf and picks up another worksheet: "Here is your next challenge, read the directions, see if you can figure it out...and...and make it."

And is standing close to Liz looking at Mar's computer. Liz turns around and looks at him seriously (probably she is bothered because he is too close to her.)

{32:30} One moves to the side and Liz gets in front of the computer and types something.
Liz: "Hazlo tu." She moves back to the side where she was before.

Tev and Ter are working on A1 (not very visible).

{33:04} Neither Liz nor One are using the computer. Liz is looking to the side and One is writing on a paper.

{33:30} One gets back in front of the computer and types.
Els calls CV: "We need help."
CV: "No you don't." Els calls the teacher again

and CV goes to their place.

CV to Els: "You have the program that works, you have to put it in the right place. What happened?"

Els: "I don't know."

CV: "I don't know what it is... It is your program, I don't know what you did. You put it in there, you design the whole thing yourself. Show me the main picture you've got..." CV gives them some directions and walks back to his desk.

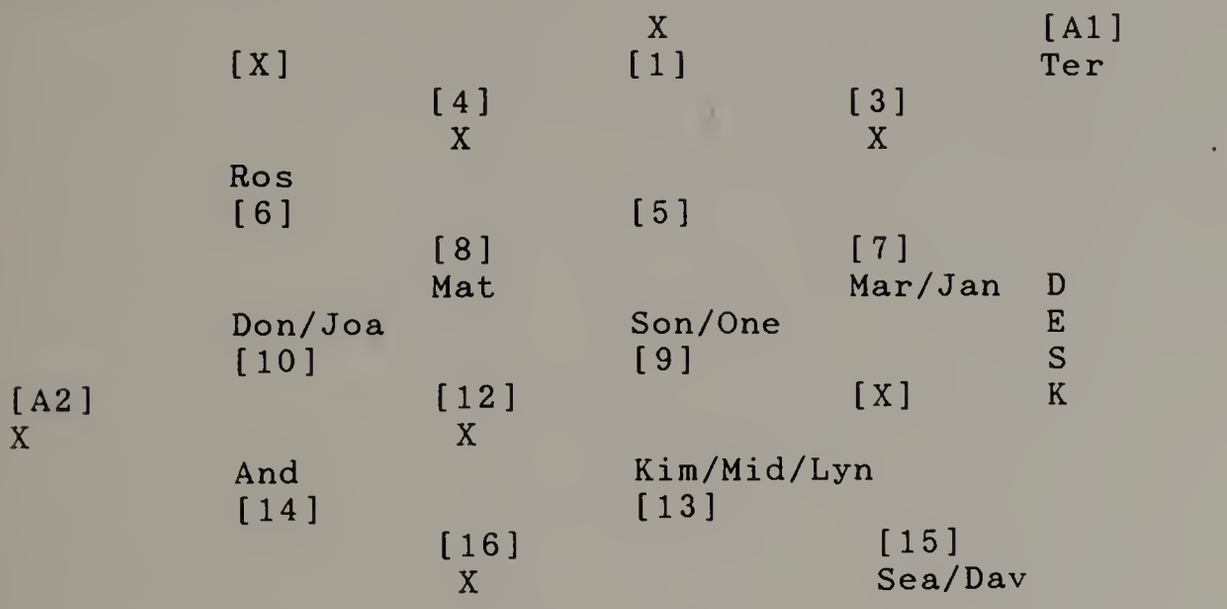
CV announces there are only 3 minutes left. Sea asks the teacher for help, CV tells him that there are only 2 minutes left and he can not help him right now.

{34:55} Closing time. CV starts saving students' files: Sea/Dav, Lyn/Mid, And, One, Mat, Els, Ros/Son.

{35:58} Liz and Mat fight (playing).
{36:29} Sea and Dav go to [A1] and Dav touches Tev on the back. Then Dav tries to type something and Tev pushes his hand away.
{36:33}
All the children leave except Tev and Ter. CV goes to [A1] and saves their work on a disk and they leave the room.
{39:09}

CLASSROOM B : 15 MAY 87

Map of Classroom B:



{7:23} Opening time. CV tells me that students have to do three projects before they can have a turn on the Apple computers.

CV downloads files as follows: Dav, Lyn, And, One, Mat, Ros, Mar.

Son decided to sit with One, and Ros will work alone. Mar and Jan work together again. Sea and Dav sit together also. Kim joins Mid and Lyn to work with them. And is sitting by himself. Ter sits at the Apple computer[A1].

{8:32} Sea tells Lyn to turn off her volume and leans over her monitor and turns it off himself.
{8:41}

{9:50} Sea, Lyn and Dav talk about dating.
Sea: "You are trying to go out with him" (to Lyn).
Lyn: "He wished" (with hostility).
Sea responds (inaudible) and laughs (mocking).
{10:35} Sea types and Dav observes. They talk about their work.
{13:29} Sea, Dav and Lyn talk about their friends, who they go out with or visit, and who they hang out with.

{11:00} Jan and Mid talk. They talk to the teacher then go back to their places.

{10:48} Joa calls And and he goes to his place and talks to him and Don (procedural).
{11:40} And instructs Joa/Don, who are sitting on the table behind him. CV asked And to instruct them on how to do their project. Joa and Don are special need students and And is low ability.
{15:20} And goes back to his place.

{10:54} Ros calls Son. She looks at their screen and asks them to show her what they have. Son and One go to Ros's place to look at her screen. One goes back to her sit while Son gives her instructions from Ros's computer. Then Son goes back to sit with One and Ros continues to give instructions. They are talking in Spanish and English, must of the English words are Logo commands thou.
{13:50} One and Son work together on their computer.
{15:30} Ros calls One they talk and Ros gets up and gets a paper for her and gives one to One.

{15:58} Don is typing and Joa is holding the worksheet, Joa tries to type also and Don holds his hand and does not let him type.
{16:47} Joa types now and Don observes.
{17:04} And goes to Joa/Don's place, observes their work but does not intervene and goes back to his place.
{17:15} Don types now again.

{16:27} Mat talks to One and they converse. They are talking about bad words in Spanish. Mat says "hombre... carajo".
{17:32}
Sea argues with Lyn and Kim. Son interrupts and asks Sea if he knows the word "puneta".
Sean: "What does that mean?"
Lyn and Mid ask Mar: "Mar.., is puneta a bad word. What does it mean." Dav walks to where Mar is and asks her. Mar says something inaudible. CV calls Sean's attention.
{19:44}
{22:06} One goes to Ros' and they talk (social), Son comes and joins them in the conversation. They are gathered around Ros's computer. They look at the camera and converse about the filming and smile.
{23:30} They talk about the task. One leaves and Son sits next to Ros and types on the computer.

{22:57} Mar talks to Mat (social).
{23:49}
CV is giving instructions to Lyn, Mid and Kim about their task. Mid and Lyn are working on their own project. It is called "beach" and it consists of a sun, an umbrella, and sand.
CV: "It would be a lot easier to do it by parts than trying to do it as one long strand. You've got three brains over here, right."
Lyn: "Only two, one is not working."
CV: "What is wrong with the third one?
Lyn: "I don't know."
CV: "I won't ask whose brain is not working... Well, what do you think you're going to do."

{25:11} One goes back to Ros' and converses again with Son and Ros (social). They laugh. The teacher comes to their table to help Mat. Mat is working on a project of a castle. One stays talking to Ros, while Son goes back to her sit.
{26:55}
{22:11} Joa walks to And's place and ask him for help. He talks to And about his work. And goes to Don/Joa' computer and talks to them.
{26:42} And goes back to his place.
{27:55} And gives instructions to Don. He tries to type on their computer and Don pushes his hand away.
{29:21} And goes back to his place.

{29:54} Kim talks to Lyn about the task.
Lyn: "Do you want to do this?"
Kim: "No"
{30:26} Sea talks to Dav, Mid, Lyn and Kim (fooling around).
{31:05}

{30:55} Son and One are talking and working on their computer. Mar and Jan also converse and work on theirs. Mar and Jan have already finished their first project and are working on another project provided by the teacher. Most of the students are working on the spaceship project.

{32:48} Sean and Dav are working on their own project. They are trying to draw a radio boom box. Sean is typing and Dav takes notes.

Lyn, Mid and Kim also work on their project. Mid is typing and Lyn is giving the commands.

{36:12} Dav hits on the table with his pencil in a hostile attitude towards Lyn (???). Lyn looks at him seriously.

Dav gets up and walks to [A1]. Ter is using "The Factory" (an educational software provided by the teacher) on the Apple [A1] (Tev is absent and the teacher did not let Ter continue transferring the procedures of their project).

{37:37} Sea goes to One/Son and talks to them (social) and they smile.
{37:53} Son talks to Mat (social).
{38:07}
{38:17} Dav talks to Mar and Jan (social). One of the girls at [13] (Lyn, Mid, Kim) talks to Mat (social).
{38:38} Sea and Dav return to their place.

{38:22} And gives instructions to Joa and Don.
He goes back and forth from his place to Joa/Don's place.

{38:55} Sea is working on his project with the help of the teacher. {39:18} Dav now talks to Lyn about fighting.
{40:06} Lyn to Ros: "Have you ever fought?"
{40:40} Lyn and Dav argue.
{42:46} They get up and walk away.

{41:06} Mat talks to Son (social).
{41:13}
{43:30} Lyn returns to her place and Dav sits next to Sea and talks about the task.
{44:04} CV helps And with his work.
Lyn talks to Sea. Dav, Sea and Lyn continue arguing and making fun of each other.

{45:49} After CV leaves And calls Joa: "Come here, I got it now." Joa comes over, And shows him his work and smiles."

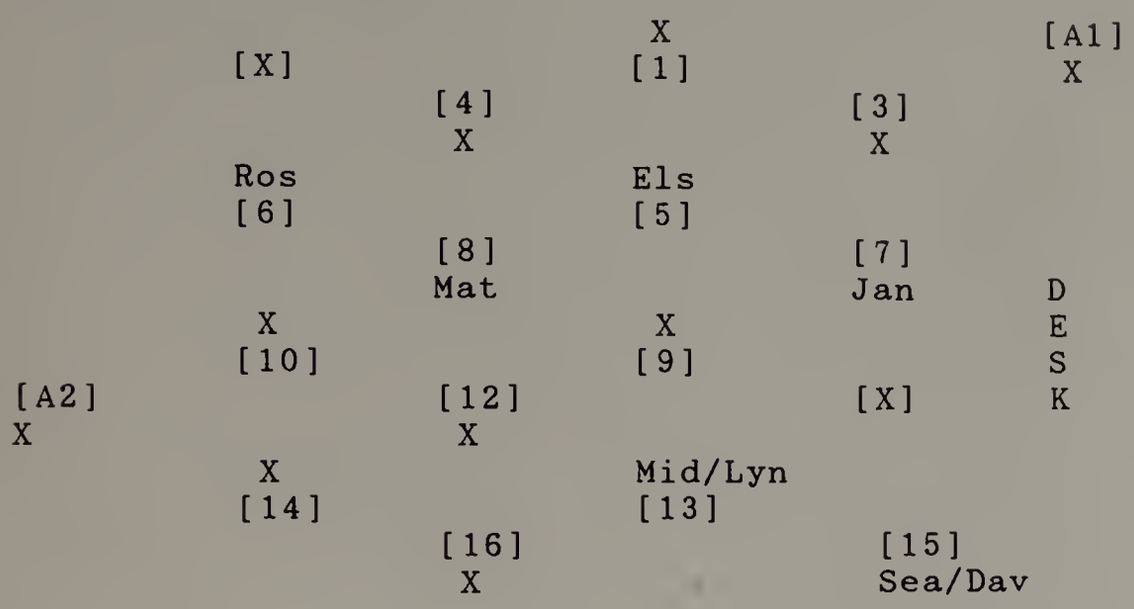
{48:26} Joa gets up to leave and And moves toward Joa as if he was going to fight with him. Joa does not pay attention to him and continues walking away. And looks at me and smiles.

{47:30} Mat is talking to Mar (social). They fight over a paper.
{50:01}

{50:19} Closing time. CV save files: Sea, Lyn, And...
{51:35} Recording is interrupted.

CLASSROOM B : 22 MAY 1988

Map of Classroom B:



{1:31:40}
Today there is a special activity and all of the children in the band (music) are not present.

Ros, Els, Jan, and Mat are all working at the same table each on a separate computer.

{1:32:24} Dav is typing and Sea is observing him.
Sea: "What are you doing?"
Mid and Lyn look at Sea/Dav's papers.
Lyn: "That's hard!"
Sea: "It's his if he is not fooling around."
Sea hits Dav in the arm. Sea and Dav are fighting (playing) and they hit each other.
{1:33:00} Lyn talks with Mid.
Lyn: "We can make a line here" (to Mid).
{1:33:35} Lyn goes to CV, who is sitting at his desk and talks to him . CV goes to her place and explains

again how to do their project using the method of shapes and parts (used as part of the curriculum). CV walks away.

{1:34:10} Dav is typing and Sea is telling him what to type, but it seems that Dav is not doing what Sea says. They are arguing about what to do.

{1:37:29} Lyn and Mid work together without conflict.

{1:37:43} Sea and Dav fight again.
{1:37:47} CV calls their attention and goes to their place to observe their work. They are working on the drawing of a portable radio (boom box).
Sea and Dav continue to argue about their work. CV tells Sea that he can try to work on their project by himself on another computer.
{1:39:34} Sea moves to another computer next to them [16].

Mid: "...you are not working together?" (to Sea). He does not respond and continues getting ready to use the computer.
{1:40:09} Sea asks Dav about their project, Dav pushes the papers away towards Sea. Sea looks at them and throws some papers back at Sea.
{1:40:34}
Lyn calls CV and he goes to her place.

Ros has finished a part of her project. CV walks to her place and gives her some instructions on what is needed to complete the project.
{1:41:29} Els and Jan converse about their projects (procedural in Spanish).
{1:41:57}
{1:42:51} Jan and Els converse again in Spanish about their projects (procedural).
{1:44:15}
CV helps Jan, who is working on a project provided by the teacher. {1:45:13} Ros to Els: "Ya termine" (I am finished).

Els to Ros: "Ya terminaste, deja verlo" (You are finished? Let me see) "ayudame con el mio" (help me with mine).
{1:45:35} Els looks at Ros's screen and tells CV that Ros is finished. (Ros finished the project of the rocket or spaceship, which is her first project).

CV walks to Ros's computer to check and says, "There it is! Congratulations. Now you get to move to the next one!" He gives her a paper and some verbal instructions for her next project, the drawing that looks like a mask.

{1:46:08} Jan calls Els and talks about her project

(procedural). Jan is complaining because she does not have the worksheet for the right project, the project she was working with Mar, who is playing with the band today. It is the second project that consists of squares and triangles, and looks like a mask. Els tells her to tell the teacher (in Spanish).
{1:46:53}
Ros, Els, Mat, and Jan work in their respective projects. No interaction is taken place between them.
{1:54:20}
CV goes to help Mid/Lyn.

Sea is sitting next to Dav and they are working together in their project. He gives Dav some instructions and goes back to his place.
{1:54:50}
Mat calls CV for help with his work. CV goes to Mat's place and gives him some instructions.

Mid and Lyn work together with no conflict. They are having problems in getting a part done.

Lyn: "No, what are you doing?"

Mid: "Erasing that, we need to make a circle."

Lyn: "No, we don't."

Mid keeps typing, then exclaims "yeah" (she got the part done). She walks away to call CV.
{1:58:10}

{1:55:41} Sea gets up again and stands next to Dav. He gives instructions again.
{1:56:17}
{1:56:55} Sea sits next to Dav once more. They talk about the project.

Sea: "You have to draw another rectangle over here."

Dav: "I know what to do, look."

{1:58:09} Lyn, who is wearing a short sweater, raises her hands, stretching her body. Sea, who is sitting in front of her exclaims: "look" (pointing at her belly that is showing).

Lyn: "Shut up."

Sea: "Good lord!" He looks at Dav and laughs. Lyn turns her face to the other side seriously.
{1:58:25}
Lyn asks Mat: "What are you making?"

Mat: "A castle."

{1:58:48} Lyn and Mid continue working on their project. Sea and Dav also work on theirs together without conflict.

CV is now giving instructions to Els. Els is working on a project consisting on a face of a robot.

Mat tells CV he needs help.

{2:02:10} Lyn argues with Mid about their project.

Sea and Dav continue working without conflict. They are excited for having finished a part of their project. Sea goes back to his place and continues talking to Dav.

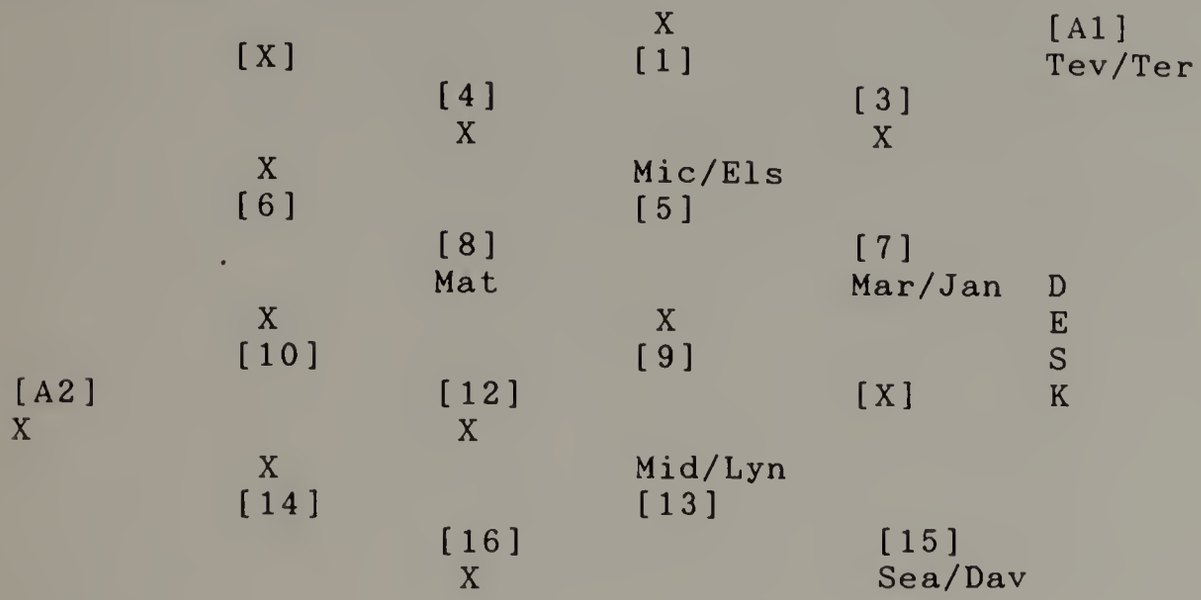
<< TAPE #3 >>

(I had to place a new videocassette in the VCR to continue recording this last part of the class session. A part of the action was lost in the process. The closing time section is therefore incomplete.)

{00:01} Closing time. CV starts the process of saving files: Lyn/Mid and Sea (Sea insisted that the teacher save his work and not Dav's, that his was more complete. CV loads Sea's work to main computer and double checks with Dav if that was the file to be saved. Dav assented. All students walk out of the room.
{02:10}

CLASSROOM B : 5 JUN 1988

Map of Classroom B:



{36:37}
There are several students missing. Also the computer class period will be shorter today due to a special school activity.

Mat hits Jan on the head and goes away (playing). It seems that Mat has his castle almost finished. He has

the wall and two towers.

CV is talking to Els/Mic.

Els: "See, I told you."

CV: "You did it in the Run Mode, right? You got to do a little bit at a time in the Edit Mode. I can't do anything in terms of printing it out unless you do it in the Edit Mode."

Els: "We did it! Can't you mark on us our project done."

CV: "You did it temporarily, now it is gone. You have to fix it so that it works. I'm not going to sit down and do it for you, that's not what I'm going to do. If I were you I would get rid of all this and start one at a time."

{41:42}

Tev and Ter are working on the Apple computer. They are using an educational game.

{44:03}

Els: Mr. CV, we got it.

CV: "Ok, what comes next. You have 3, 4, 5, 6 out of 8 that are working. Seven out of 8 that are working. Ok, everything works. Do it again type it exactly.

{46:43}

Jan is doing a braid on Mar's hair. Mar is working on the computer. She is not working on her project. She seems to be exploring with a design.

CV writes something on Els/Mic's computer and goes away.

{49:16}

Els: "It works!"

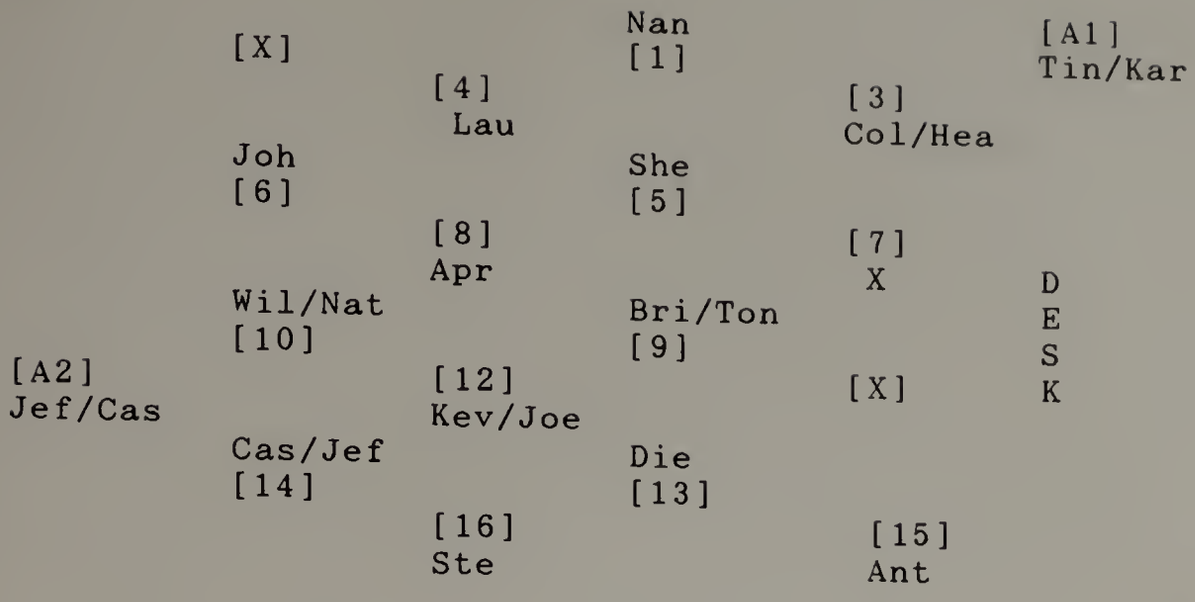
Mic: Looking at the camera, "we worked on this for weeks and weeks. We never thought we could finish. We had to, we needed a computer teacher, an expert."

Closing time. CV saves files.

{52:03}

CLASSROOM C : 8 MAY 87

Map of Classroom C:



{39:10} Opening time. Ant asks the teacher to use one of the Apple computers to print the project he finished. The teacher tells him that he has to do one more project before he gets to use the Apple. Ant walks away with his face down (looking to the ground).

There are various children around the teacher's desk trying to talk to the teacher: Nat, Cas, Jef.
Cas and Jef walk back to their table and stop in the way to talk to Hea about their projects.

CV starts sending files to students: Ste, Tin/Kar (he helps them get started at [A1]), Ton, Kev, Nan.
CV: "Anybody else?"

{41:10} Kev was sitting in front of the computer and now switches places with Joe. CV takes the disk from Tin/Kar's computer and uses it to set up the other Apple [A2]. He then calls Cas and Jef and helps them get started at [A2].

Ton is sitting in front of the computer and Bri is on the side. Wil is sitting in front while Nat is asking CV for some papers. After obtaining the paper, Nat goes to his table and sits next to Wil, on the side.

The teacher calls Joe and Die but does not send them files. Joe is working with Kev, and Die is working by himself on a computer close to Joe and Ant.

{42:39} Ant is talking to Ste. She is working on her computer while she talks with Ant.

{42:57}

{44:07} Ant continues to be seated next to Ste talking to her. He is asking about her project. She answers and explains in a cordial tone.

{44:45} CV is walking past his desk when he remembers something (moves his hand). He calls Ant to give him his worksheet. Ant stands up and walks to the teacher's desk. CV gets some papers from his file cabinet and shows them to Ant. He asks him to choose one. Ant picks a worksheet and walks back to his place. CV tells him to follow the instructions in it.

Bri and Ton say that they are finished with their project. CV goes to Bri/Ton's place and looks at their work. He then goes to his desk and asks Ton to send his file to the main computer ("press S, T & Enter"). CV then goes to Ant's place and helps him get started with his project. CV goes back to his desk and prints out Bri/Ton's file.

{44:56} Joe is working on the computer while Kev is looking at the papers.
{45:55}

{46:10} Kev stands up and tries to push Joe out of his seat. They argue about who gets to sit in front of the computer. Joe pulls Kev's chair closer to the computer and asks him to sit there.

{46:50} Kev goes back to his seat but moves his chair away from the computer and crosses his arms on front in a show of dissatisfaction.

{46:57} Kev finally moves his chair closer to the computer and starts typing on the computer from the side.
{47:05}

{47:18} Joe sits in front of the computer and observes while Kev types. Joe is waiting seriously. He rests his head on his arm lying against the table.
{47:58}

{48:50} Joe and Kev talk about their project. Joe now types on the computer and smiles.
{49:56}

{49:39} The principal announces on the loudspeaker that all classrooms should come to the gym in a few minutes.

{50:00} Kev starts typing again.
{53:20}

{50:22} Ste shows Ant what she did and Ant smiles. Ant talks about his project and Ste smiles (inaudible). Ste has turned around on her chair facing Ant and is talking to him while he types.

{50:20} CV: "Ok, I need to save your projects."

Closing time. He starts saving files: She, Hea, Joh, Apr, Ste. Joe and then Kev raise their hands to have the teacher save their files.

CV: "On whose name is it, under Kev? Anybody else?" To Kar/Tin: "just leave it on and I'll save it." Bri and Ton raise their hands.

CV: "Don't save it, I already saved yours." He saves Nan's file. "Anybody else saving, last call. Ok, turn off your machines. Ant just a minute, go S, T and Enter."
{55:14}

CLASSROOM C : 15 MAY 87

Map of Classroom C:

		Joh		[A1]
	[X]	[1]		Tin/Kar
	[4]		[3]	
	She		Hea	
	Lau/Cas	Col		
	[6]	[5]		
	[8]		[7]	
	Apr		X	D
	Nat/Wil	Bri/Ton		E
	[10]	[9]		S
[A2]	[12]		[X]	K
Apr	Joe/Kev			
	X	Die		
	[14]	[13]		
	[16]		[15]	
	Ste		Ant	

{1:31:38} Opening time. CV sends files to students. Die and Ste are talking.
{1:31:49} Ant walks in, he talks to Ste and Die looks at them and listens.
{1:33:13} Ant and Ste continue to talk. Die now is working on his computer. CV sends Ste her file.

Kev sits in front of the computer and Joe sits on the side, they are waiting for the teacher to send their file.

Nat sits in front of computer and Wil on the side. Nat is copying some procedurs from his notebook while Wil observes. Bri sits on computer and Ton on the side.

CV asks Nat if he wants a file sent.
{1:33:47} Ton asks Nat also and he doesn't respond. CV and Ton ask him again louder and he finally responds "no."

CV sends Ant his file from the main computer.
{1:34:11} Ste talks to Ant. His replies are brief. She tries to intervene in his computer work, but Ant remains indifferent and does not pay much attention to what she is saying.
{1:34:49}

Die looks to the teacher and observes Ant and Ste. Die is working on project provided by the teacher.

{1:34:34} CV sends Kev his file: "On the way whatever it is. What is it?" Kev responds (inaudible). Joe nods and says, "a word search."

Work time.
{1:35:29} Ant is talking (to himself or to the computer) about his computer work. He plans and gesticulates with his hands and with his body (Ant is working on a project provided by the teacher called "The Logo Spaceship").
{1:35:36} Ant talks to Ste: "I'm going to beat the computer up." Then he comments about Ste's project. Their conversation is cordial, but Ant's tone seems to be more between indifferent and hostile.

Ste asks: "What?"

Ant: "What, ah, ah..." (making fun of Ste).
{1:36:19}

Ste: "I'm so wonderful."

Joe: "How humble!" Ste smiles.

Ste: "Ant, I did it."

Ant: "You see I told you..." Ste points at Ant's worksheet and talks to him. Ant gets mad and takes his paper away. She looks at the camera and smiles.
{1:37:14}

{1:36:36} Kev types and Joe observes. They point at the screen and talk about their work. Joe writes on the notebook. They are working on a project called Heavy Metal. It is a word search. In their folder they have an unfinished project resource sheet for the drawing of a truck.

{1:38:28} Ant goes to Ste's computer and talks to her about what she is doing on the computer. Ste is working on her own project. She is drawing a t-shirt

with a design in it. Ant says something about her project and Ste replies and pushes him away.
{1:39:49}

CV goes to Ant's table (he had his hand raised several times before). He shows CV a problem he is having with his work on the computer.

Ant: "This thing doesn't work."

CV: "You know why it doesn't work? (to Ste).

Ant: "No, she don't know." Ste makes some comments about what is wrong with Ant's work. Ste gets up and shows him what is wrong on his computer.

CV: "Yes" (to Ste). He asks Ant and explains why it was wrong.

Ant: "You got a lucky guess" (to Ste). Ste laughs.
{1:41:02}
{1:42:41} Ant asks Ste to help him. She goes to Ant's computer and types on it. Ant: "I don't like it there that is not the right place."

Ste: "So where do you want it."

Ant: "Over here."

Ste: "You need to put a bigger number."

Ant: "Then it is going to go..." Ste gesticulates with her hand and walks away (as if saying do whatever you want).

Ant: "I'm only kidding."
{1:44:47}
{1:47:26} Ant shows Ste something on his screen and asks her to help him. Ste looks at his screen and says, "I don't know" and goes back to her seat. Ant calls the teacher.

CV: "Help him" (to Ste)

Ste: "I don't know how"

Ant: "She doesn't know"

CV: "Ask somebody else." Ste asks Cas, who was passing by, to help him. {1:48:18} Cas stands on back of Ant. Ste talks to Cas and then Cas smiles and walks away.
{1:48:33} Ste goes back and sits next to Ant and talks to him and writes on his computer.
{1:51:57} Ste: "I did it, I fixed it" and goes back to her seat. Die looks at her and smiles.

Ant: "At last after 25 years."

Ste: "So, you would have taken a lifetime."
{1:52:10}

Ant: "She did it" smiling (to CV).

Ste: "I did it."

CV: "You figured it out.

Ste: "Yes"

CV: "Great!"

Ant: "At last after 25 years." Ste replies something (inaudible).
{1:52:54}

{1:53:15} Ant types again and complains that there is something wrong with his program.

Ste: "Shut up... I didn't touch anything." They argue about what is wrong with the program.

{1:54:15} Ste: "Hey, I did it" (pointing at her screen and looking at Ant).

Ant: "You never make mistakes." He pretends he is crying."

Ste gets up and looks at Ant's computer, then goes back to her chair.

Ant: "I am gonna call a better expert than you. You said you'll fix the program and you just ruined it up more."

Ste: "You wanted me to fix it and I fixed it."

Ant: "Fix it!" She keeps working on her computer and doesn't move. They continue talking (inaudible).

Ant: "You know what a ... is? No? You are dumb. (I am standing by the bulletin board looking at the students' projects that are displayed. Ant has on the board a project he did with Bri, dated 12/15/86).

{1:58:58} Ant gets up and looks at the programs on the bulletin board. Ste says that that is cheating. Joe and Kev look at Ste and she tells them that he has all the answers on the paper. Joe smiles.

Ant returns to his seat. He is getting frustrated for not being able to fix his problem. He pretends he is crying again and Ste gets up and hits him on the head with her pencil. They smile.

Joe did not take a turn nor typed on the computer during the whole period.

Tin and Kar work on computer [A1] and Apr on [A2].

<<Tape #2>>

{00:10} Closing time. CV: "Ok it's time for me to save your work."

Files saved: She, Joh, Cas, Ste, Wil, Ton, Col, Ant, Kev

CV to Die: "Do you want to save that, no, good." Also didn't save Hea's.

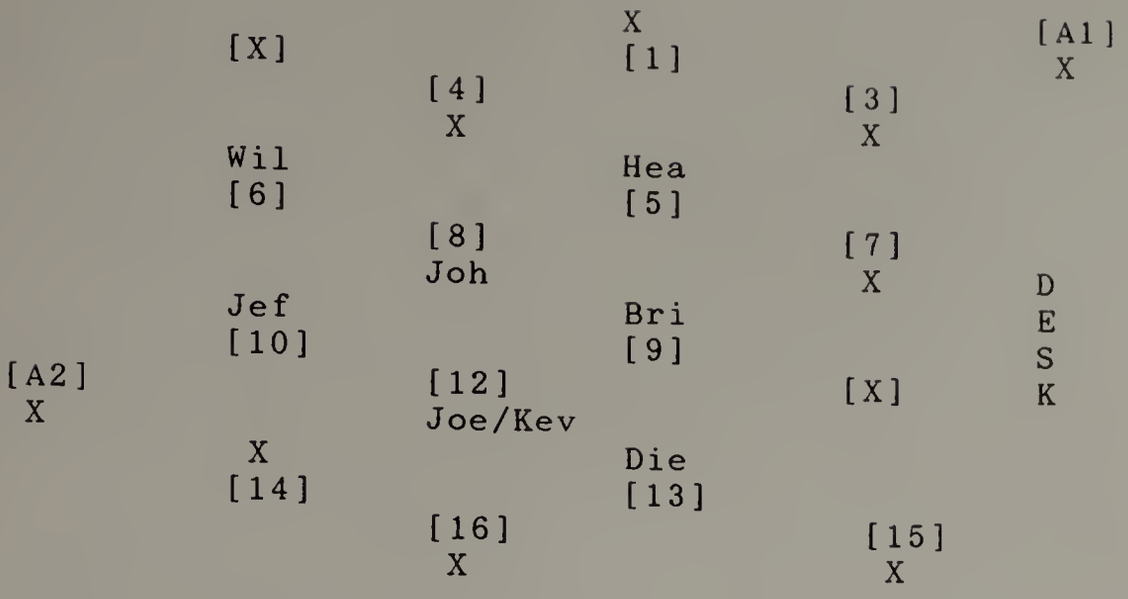
Joe is talking to Ton and Nat (out of camera) then he holds his thigh with his hands and shows an expression of pain. He gets up and runs after Nat. Ton makes fun of Joe. The homeroom teacher walks in and everybody goes back to their seats and calm down. All children walk out of the room.

{5:34}

Kar and Apr stay back in the computer room. Apr makes a printout. CV helps them save their work {7:22}.

CLASSROOM C : 22 MAY 87

Map of Classroom C:



{2:35} Opening time.
BO (homeroom teacher) walks into the computer classroom and the children start coming in one at a time. BO is counting children as they go in.

BO: "...if you are silly, you are seven..." (Joe and Kev are walking in at that moment, one after the other. Joe was six and Kev seven).

CV: "I think I can handle it."

BO: "...the others will be back at 10:30 and maybe not until 11:00" (some students are missing).

CV sends files to students: Hea, Jon, Bri.

{03:12} Kev brought a magazine and is looking at it and Joe is also looking from the side. Joe takes the magazine and looks at it while Kev types on the computer. CV sends Kev their file.

CV asks Jef is she is going to be working in something new. She says yes, and CV does not send her a file. CV, "is everybody all set?" Die who has not looked at the teacher all this time, nods without looking at the teacher, however CV was looking at him.

{05:07} Kev talks to Joe about their work and asks Joe to get the notebook. Joe gets up and gets their notebook and sharpens the pencil.
{05:54}
{05:20} Bri and Joh are talking (procedural).
{05:48} Jef and Bri go to the teacher's desk. Bri gets a print out from the teacher.

{06:43} Joe writes on the notebook. They talk about their work and Joe takes notes while Kev types, without any conflict (Joe has looked at the camera two times. He did not smile, he just turned around and continued working). Kev takes the magazine and looks at it. Kev reads from the magazine and Joe takes notes. They are copying some names of "heavy metal" bands from the magazine for their "word search".

CV is standing and observing Kev/Joe, then he walks towards his desk. I talk to CV at his desk.

{15:29} Die is smiling and showing something on his screen, he calls Kev. Kev takes a quick look and continues to work on his computer. Joe has not looked at or spoke to Die during all this time.
{15:37}
Die looks at CV (I am talking to CV) then turns back to his computer. Die looks back at Kev/Joe but they do not notice him.

{17:58} Bri talks to Kev (procedural).
{18:02}
{19:44} Die turns around toward Joe and smiles showing his screen. Joe looks briefly and continues working with Kev.
{19:49}
Die raises his hand (calling the teacher).

{20:30} Bri walks to Kev/Joe's computer and talks to Kev about their project.
{20:38}
Jef leans over the table and makes some indications about their project to both Kev and Joe, then goes back to her place.
{21:25}
CV is seated next to Die, who is showing his work and talking about it.
{21:51} Bri returns to his place but continues talking to Kev about their project.
{22:15} Joh looks at Bri's screen and talks to him about his project.
{23:40}
{22:39} Die, who is alone now (CV is gone), is smiling and calls Kev/Joe to show them his work. Both Joe and Kev look and talk to him.
{23:02} Die raises his hand again to call CV.

{23:13} Joe takes Bri's print out and reads it. Kev reads it also. Bri leans over Kev/Joe's monitor and talks to them, mostly Kev (he does not make eye contact

with Joe).
{24:18}
CV is sitting next to Die again. Wil walks around the table and is standing next to CV observing him work with Die. CV is typing something on Die's computer.

{24:59} Kev/Joe are looking at the magazine again and talking (social).
{25:56} Kev gets up and walks away and Joe leans over the table to look at Jef's computer and talks to her about her project. She is doing a "word search" also.

Bri sits at Kev/Joe's computer and types something on it. Joe is sitting on the table and looking at Jef's computer. Joe looks at Bri and they smile.
{26:28}
{26:37} Bri talks to Joe and looks at their project.
{27:02} Kev is touching some cables on the back of Jef's computer. Joe and Bri observe and smile (social).
{27:36} Joe continues sitting on the table and looking at Jef's computer. Jef talks with Joe about their projects. They laugh (social).

{28:24} Kev goes back to his place and kneels down on the chair and types something on the computer. Joe says, "still don't work" (it seems that the computer is frozen). Joe is observing Kev while still sitting on the table with one foot on his chair.
Kev tells Joe, "press this button."
Joe presses the on/off switch on the back.
Kev: "now it's gone."
They look at each other.
Kev: "thanks"
Joe: "You did it." They argue about what happened.
{30:47}

{31:29} Joe is looking at the magazine. Kev, Joh, and Jef join him. They talk about it (social).
{33:42}
Two girls (white anglos from another classroom) walk in the room and are looking for the teacher, they come to me (I am sitting at CV's desk) and I direct them towards CV, who is sitting with Die. CV tells the girls to sit at the Apple computer [A1] and to get started. The girls tell him that they have not used the program (Milliken Word Processor) before and CV goes to their place and gives them verbal instructions.

Joe looks at Die's screen and talks to him, Kev also. Die is happy and smiling.

{34:04} Kev talks to Joh and Bri (social).
{34:39}
Joe continues to look at the magazine. He makes an open remark about the magazine, not addressed to anybody in particular. Jef looks at the magazine and talks to Joe.
{35:49} I talk to Jef, interrupting. Wil, who has been following CV for some time now, talks to CV. CV gives Wil a paper from his desk and Wil walks away.

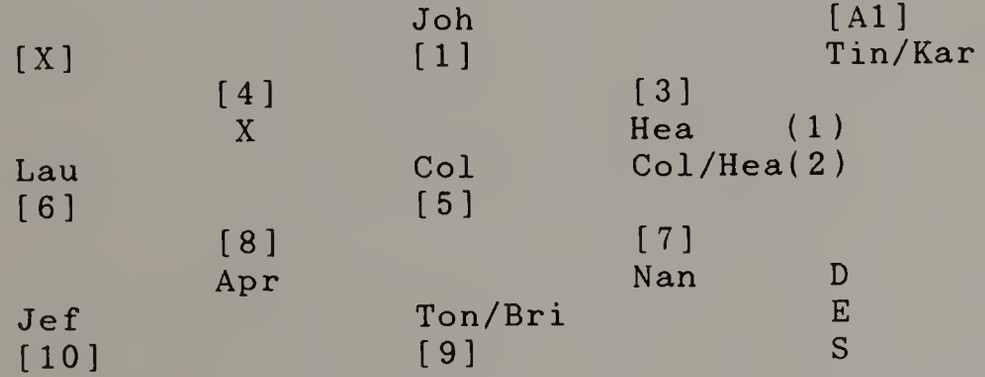
{35:58} Joe and Kev are arguing because Joe pressed the on/off switch.

Joe: "I did it because you told me to do it."
Kev: "You pressed the button."
Joe: "You are a liar, I did it because you told me to do it."

{36:27} Kev tells Joh and Jef about it.
{36:32}
{38:00} Closing time. Jef says she is finished and CV saves her file.
{38:14} Kev and Joe switch places (they do not have any work to save and Kev lets Joe face the teacher, a set up for getting in trouble with the teacher). Joe hits the reset button again and Kev says outloud: "Why did you just reset it." CV looks at him but continues saving files: Hea, Die.
{38:33} Joe talks outloud to Bri about what happened, blaming Kev for it.
{38:43} Joe and Kev argue again.
{39:53} CV loads Joe/Kev file and notices they do not have anything written. "Good that I didn't save it," he says. Then he saves Wil's file. CV asks Joh but he says he does not have anything to save. Students leave the room, the two white girls stay on [A1].
{43:35}

CLASSROOM C : 29 MAY 87

Map of Classroom C:



[A2]
X

[12]
Joe/Kev

[X]

K

Nat/Wil
[14]

Die
[13]

[16]
Ste

[15]
Ant

{43:37} Opening Time.
{43:56} Ste talks to Ant (procedural).
{45:05}
CV sends files to Kev, Die, Apr, Joh, & Hea.
{45:07} Work time.
Kevin is sitting on front of the computer, also has the notebook and is writing on it. Joe points to the screen and indicates something to Kev. They work without conflict on their word search "Heavy Metal". Kev says hello at the camera.
{46:30} Joe takes the notebook and pencil, but Kev takes it back. They argue about their work.
{46:42}
Ton and Bri, who are working on a story (wordprocesing) on a computer in front of them, observe. Ton looks at Kev and makes some funny expressions and sounds (making fun of Joe?)
{46:48}
{46:59} Kev gives the notebook back to Joe, then leans over the table and talks to Ton.

Joe writes on the notebook, erases something, checks notes, and starts writing on the computer. Kev continues to talk with Ton & Bri. They talk in a low voice and Kev whispers something to Ton.

{48:14} Kev goes back to his seat and looks at what Joe is doing on the computer. Joe points at the screen and talks to Kev.
{48:50}
Ton talks to Kev, Kev talks with Ton & Bri, Bri talks to Kev.
{49:32} Kev asks Joe about what he is doing and he explains to Kev.
{50:26} Kev talks to Ton/Bri again, he leans on the table, while Joe continues to work on the computer. He then leans on the table on the other side of the computer and talks to Bri. Ton, Bri, & Kev write on a notebook. (They are acting out a lot today, they look at the camera and laugh).
{54:08}
Tin is talking to Ste. CV is helping Ant do his spaceship project.
CV: "What are your first two commands." He types

TO ROCKET and other commands on Ant's computer. Ste is watching CV and Ant, also Nat is watching on back of Ant. Now Nat talks to CV and he goes with Nat to his desk. Nat leaves and CV goes back to work with Ant.

Die is working on his computer and looks back to Joe. Die types TRUCK and a picture of a Coca-cola truck is drawn on his computer (CV had helped him do this project). Jef is just erasing letters with the spacebar.

{1:02:27} Kev is sitting in front of the computer typing and Joe is on the side. They talk about the project. Ton is watching on the side and talks to Kev. Kev, Ton, and Joe look at the camera and laugh. They are fooling around again.

{1:03:01} Jef calls Joe and he looks at her screen and asks her what is it she has done.
{1:03:17} CV to Ton/Bri & Kev/Joe: "Ok guys, are you ready?"
Ton: "No."
Joe: "We are." Joe and Kev are finished with their project.
CV: "Ok"
Kev goes back to sit next to Joe.
{1:03:39} The teacher asks them to put their name on the project in order to print it. They talk and type on the computer.
{1:04:44} CV: "Press S T and Enter.
Ton (standing in front of Joe) to Nat: "Nate, what are you doing?"
Joe (looking at Ton): "A spaceshuttle"
Ton (without looking at Joe): "Yeah"
Nat does not respond.
Joe: "A spaceshuttle, gumby."
Kev: "A spaceshuttle"
Ton to Joe: "Ask him"
Joe turns around and taps Nat on the back: "Joe"
Ton: "Nate are you doing a spaceshuttle?"
Nat: "Yes"
Joe: "Yes, go!"
{1:05:11}
Kev turns around towards Die and talks to him, Joe also. Die looks back and continues his work while he talks with them. Die is exploring with the procedures of his truck project.
{1:05:43} Now Joe/Kev are looking at Nat/Wil and talk to them (social). Joe and Kev have not done anything more on their computer.
{1:06:32}
Ton whispers something to Kev. Kev leans over the

table on Bri's side. Bri is just typing letters on his screen. Joe leans over the computer and looks at Ton/Bri's screen.
{1:06:50}
Joe to Ton: "What are you doing?"
Ton says something (inaudible).
{1:07:20}
CV gives Kev a print out of their work, and ask them to include the list of words to be found in the word search.
Ton is making faces towards the camera (?)
{1:08:24}
Joe to Ton: "Is that true about the ...
Ton: "No"
{1:08:37}
{1:09:12} Ant asks Ste for help and she gives him some instructions. Then Ant talks to Ste (social).
{1:10:45} Ste stands up and looks at Die's screen.
{1:10:32}Joe talks to Die. Kev also looks at Die's screen.
{1:10:57} Ste talks to Kev (hostile).
CV is explaining something to Ant about his work.
{1:13:57} Ant talks to Ste.
{1:14:20}
{1:14:56} Ant: "I'm done, I'm done!"

Die is looking around. He is not doing anything on his computer. Now he starts working again.

Joh is working on his project. Nan has been working on her project of a face.

{1:17:30} Ant talks to Ste, then he moves to a sit closer to Ste (social).

{1:18:37} Closing time.
CV: "Our time is up, we have to save quickly."
{1:19:40} Nat tells Ste something and she hits him with her hand.
{1:20:10}
{1:20:24} Ant talks to Ste. Ste is explaining what she is doing on her computer.
Ant: "Ah, I know that."
Ste gives him the papers she has on her hands.
{1:21:30}
Saving files: Apr, Hea, Joh, Ste, Wil, Ant, Col, & Nan.
Die didn't even bother waiting to save anything.
{1:24:08}

APPENDIX F

Data Coding Sheet

Data Coding Sheet

Classroom:

Recording Date:

Time:

Tape Num:

Coding Date:

Time:

Event Number	Duration of Event			Student Characteristics Initiator					Student Characteristics Recipient					Content Computer			Content Inter-Comp			Type of Interaction			Form of Interaction			Mode of Interaction					Language Used			
tcddmnum	Start	Stop	Time	Id	Se	Et	Ab	So	Id	Se	Et	Ab	So	Op	Wo	Cl	Op	Wo	Cl	Ac	Pr	So	Is	Cl	Di	Ac	Rj	Do	Rs	Rc	En	Sp	Cd	Nv

Coding System:

1. Student Characteristics
   - Se = Sex
     - m = male
     - f = female
   - Et = Ethnicity
     - h = hispanic
     - w = white anglo
     - b = black
   - Ab = Ability level
     - l = low ability
     - a = average ability
     - h = high ability
   - So = SES status
     - l = low
     - m = middle
     - h = high
2. Content of Interaction
   Computer station or Inter-Computer Station
   - Op = Opening time
   - Wo = Work time
   - Cl = Closing time
3. Type of Interaction
   - Ac = Academic
   - Pr = Procedural
   - So = Social
4. Form of Interaction
   - Is = Instructional
     - q = question
     - a = answer
     - s = statement
   - Cl = Collaborative
     - c = conflict
     - n = no-conflict
   - Di = Divergent
5. Mode of Interaction
   - Ac = Accomodation
   - Rj = Rejection
   - Do = Domination
   - Rs = Resistance
   - Rc = Reciprocity
6. Language Used
   - En = English
   - Sp = Spanish
   - Cd = Codeswitch
   - Nv = Non-verbal

APPENDIX G

Participants and Variables

File: subjects
Report: characteristics

Id	Sex	Ethnic	Ability	Socioec	Classr	Grade	Own computer
Ada	m	w	h	m	A	5	n
Aim	f	w	h	m	A	5	n
Ang	f	w	h		A	5	
Bet	f	h	m	l	A	5	n
Can	f	w	h	h	A	5	n
Cha	m	w	m	m	A	5	n
Den	f	h	m	l	A	5	n
Ell	f	w	m	m	A	5	y
Ive	f	h	m	l	A	5	n
Jad	f	w	m	m	A	5	n
Jen	f	w	h	m	A	5	n
Jos	m	w	l	l	A	5	n
Mac	m	b	l	l	A	5	n
Mae	f	w	m	m	A	5	y
Mik	m	w	h	m	A	5	n
Pab	m	h	l	l	A	5	n
Raf	m	h	l	l	A	5	n
Rut	f	h	m	m	A	5	n
Shi	f	w	h	m	A	5	y
Tra	f	w	l	l	A	5	n
And	m	w	l	m	B	6	n
Dav	m	b	m	l	B	6	n
Don	m	w	l	l	B	6	n
Els	f	h	h	m	B	6	n
Jan	f	h	m	m	B	6	n
Joa	m	h	l	m	B	6	n
Liz	f	h	l		B	6	
Lyn	f	w	m	l	B	6	y
Mar	f	h	m	m	B	6	n
Mat	m	w	m	m	B	6	y
Mic	f	h	l	l	B	6	n
Mid	f	w	m	m	B	6	n
One	f	h	m		B	6	
Ros	f	h	h	l	B	6	n
Sea	m	b	h	h	B	6	y
Son	f	h	m	m	B	6	n
Tev	m	w	h	m	B	6	n
Ter	m	b	m	l	B	6	n
Ton	m	w	h	m	C	6	y
Ant	m	h	m	l	C	6	n
Bri	m	w	h	m	C	6	n
Die	m	h	l	l	C	6	n
Jef	f	w	h		C	6	
Joe	m	h	l	l	C	6	n
Kev	m	w	l	m	C	6	n
Nat	m	w	h	h	C	6	y
Ste	f	w	h	h	C	6	y

VARIABLES

NO.	TYPE	COLUMNS	NAMES	VALUES
ID	N	1-4	Tape/Event No.	
1	N	6	Classroom	1=A, 2=B, 3=C
2	N	8-10	Day/Month	
3	N	12-13	Time	
4	A	15-17	Initiator-Id	
5	A	19	Initiator-Sex	m = male f = female
6	A	21	Initiator-Ethnicity	h = Hispanic b = Black w = White
7	A	23	Initiator-Ability	h = high ability m = average ability l = low ability
8	A	25	Initiator-SES	h = high class m = middle class l = low class
9	A	27-29	Recipient-Id	
10	A	31	Recipient-Sex	m = male f = female
11	A	33	Recipient-Ethnicity	h = Hispanic b = Black w = White
12	A	35	Recipient-Ability	h = high ability m = average ability l = low ability
13	A	37	Recipient-SES	h = high class m = middle class l = low class
14	N	39	Context	1 = Computer 2 = Inter-Computer
15	N	41	Type of Interaction	1 = Academic 2 = Procedural 3 = Social

16	N	43	Form of Interaction	1 = Instructional 2 = Coliaborative 3 = Divergent
17	A	45	Form of Instruction	s = statement q = question a = answer
18	A	47	Form of Collaboration	c = conflict n = no conflict
19	N	49	Mode of Interaction	1 = Accomodation 2 = Rejection 3 = Domination 4 = Resistance 5 = Reciprocity
20	N	51	Language Used	1 = English 2 = Spanish 3 = Codeswitch 4 = Non-Verbal

Variable Types:
A = Alphanumeric
N = Numeric (Integer)

APPENDIX H

SPSS Program

```
 INPUT
?
 EDIT
?? p*
RUN NAME          COMPUTERS & SOCIAL INTERACTION IN MULTICULTURAL SETTING
FILE NAME         DATOS
DATA LIST         FIXED/1 ID 1-4 ROOM 6 DATE 8-10 TIME 12-13
                  INITIAT 15-17 (A) SEXINI 19 (A) ETHINI 21 (A)
                  ABILINI 23 (A) CLASSINI 25 (A) RECIPIEN 27-29 (A)
                  SEXREC 31 (A) ETHREC 33 (A) ABILREC 35 (A)
                  CLASSREC 37 (A) CONTEXT 39 TYPE 41 FORMINTE 43
                  FORMINST 45 (A) FORMCOLL 47 (A) MODE 49 LANGUAGE 51
MISSING VALUES    ALL (' ')
VALUE LABELS      ROOM (1) A (2) B (3) C/ SEXINI ('M') MALE ('F') FEMALE/
                  ETHINI ('H') HISPANIC ('B') BLACK ('W') WHITE/
                  ABILINI ('H') HIGH ('M') MEDIUM ('L') LOW/
                  CLASSINI ('H')HIGH ('M')MIDDLE ('L')LOW/
                  SEXREC ('M')MALE ('F')FEMALE / ETHREC ('H')HISPANIC
                  ('B') BLACK ('W') WHITE/ ABILREC ('H') HIGH
                  ('M') MEDIUM ('L') LOW/ CLASSREC ('H') HIGH
                  ('M')MIDDLE ('L')LOW / CONTEXT (1)COMPUTER WORK
                  (2)INTERCOM WORK (3)CLOSING TIME/
                  TYPE (1)ACADEMIC (2)PROCEDUR (3)SOCIAL/
                  FORMINTE (1)INSTRUCT (2)COLLABOR (3)INDIVIDU
                  (4)WITHDRAW / FORMINST ('S')STATEMEN ('Q')QUESTION
                  ('A')ANSWER / FORMCOLL ('C')CONFLICT ('N')NONCONFL/
                  MODE (1)CORDIAL (2)INDIFFER (3)HOSTILE
                  (4)ASSERTIV / LANGUAGE (1)ENGLISH (2)SPANISH
                  (3)CODESWIT (4)NONVERBA
PRINT FORMATS     INITIAT TO CLASSREC (A)/FORMINST,FORMCOLL (A)
CROSSTABS         ETHINI BY ETHREC BY TYPE/
                  FORMINTE BY ETHINI,ETHREC/

FINISH
OF FILE
?? e
CFILE    IS A LOCAL FILE
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