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**How A Group of Elementary Deaf Students Interact with LEGO LOGO Activities:
A Case Study**

A Dissertation
Presented for the
Doctor of Philosophy Degree
The University of Tennessee, Knoxville

Amy Rebecca McDaniel
August 2004

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DEDICATION

This dissertation is dedicated to
my thoughtful devoted parents,
James Marvin McDaniel and Mary Rebecca Whetstone McDaniel
and
to an extraordinary person
who was instrumental at the beginning of my graduate studies journey
Dr. Donald J. Dessart.

*As you walk through the valley of the unknown,
you will find the footprints of Jesus both in front of you and beside you.*

~ Charles Stanley ~

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Only through experience of trial and suffering can
the soul be strengthened, ambition inspired, and success achieved.*
~Helen Keller~

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It is only in the giving of oneself to others that we truly live.*
~ Ethel Percy Andrus ~

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I cannot do everything, but still I can do something;
I will not refuse to do something I can do.*
~Helen Keller~

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~ Dr. Leo Troy ~
(Never say "opps" in the conference room.
~the future Dr. Amy~)*

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The condition of an enlightened mind is a surrendered heart.

~ Alan Redpath ~

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Motivation is what gets you started. Habit is what keeps you going.

~ Jim Ryun ~

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We were born to succeed, not to fail.
~ Henry David Thoreau ~

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ABSTRACT

The purpose of this case study was to discover how deaf students used problem solving skills as a group and to discern language expression they used during sessions with LEGO LOGO activities. This case study was conducted at Missouri School for the Deaf, a residential school in Fulton, Missouri with five deaf students from grades four and five.

Five sessions of LEGO LOGO activities with the students were conducted and videotaped. During the sessions, the participants completed the activities with LOGO commands, LEGO constructions, LEGO LOGO, and related paper assignments. Transcriptions of selected segments of the videotapes were made and review of all data were conducted for analysis of the group work and language used. In the analysis several themes emerged: group work skills, language, time management, and gender issues. They were presented, described, and discussed.

Multiple suggestions were offered for changes in classroom instruction so that the students could gain skills necessary for improvement in academic skills. Changes for a repeat study were offered, as well as implications for future research.

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CHAPTER I

INTRODUCTION TO THE STUDY

INTRODUCTION

In terms of cognitive, logical, creative thinking, and decision-making skills, deaf/hard of hearing (d/hoh) students are at risk for underachievement. Lane (1992), a proponent for change in education of deaf students, has stated that the education of deaf students, usually based on methods intended for the education of hearing students, has failed for decades. When compared to their hearing peers, d/hoh students lag behind. Lane reports that the average 16-year-old deaf student reads at the same level of an eight-year-old hearing student. In math, the average 16-year-old student is four grades behind. Allen (1994) concurs with Lane on reading achievement levels of d/hoh students. He reports that over half of the d/hoh students leaving special education programs read below the fourth grade level.

Even after completing secondary school, d/hoh students have difficulty meeting academic standards for higher education. Albertini, Bochner, and Dowaliby (1997) conducted a study to assess the concurrent and predictive validity of the National Technical Institute for the Deaf Writing Test. They reported that most deaf students on the college campus studied developmental English courses prior to enrolling in Freshman composition. Even with the developmental courses, some students failed to meet admission criteria to the school.

As a student and as a teacher, I have experienced and observed pedagogy for d/hoh students based on pedagogy for hearing students and have thus concluded that the

education of d/hoh students relies heavily on rote memory instructional techniques. However, different approaches to learning in the classroom, such as collaborative or cooperative learning, may offer beneficial opportunities for d/hoh students. Such activities may promote social skills in group encounters while enhancing learning with the development of logical, creative thinking, and decision-making skills. Though a reasonable alternative, a paucity of literature exists on the topic of collaborative or cooperative learning with d/hoh students.

Even less literature is available on d/hoh students learning with LEGO LOGO, a combination of LEGO manipulatives and the programming of LOGO with communication between LEGO and LOGO through an interface card in the computer. Yet, the use of LEGO LOGO activities offers the opportunity for d/hoh students to interact within the group structure to solve problems and learn together.

Slavin (1995) reports cooperative learning to be a great success. Its use has been researched in all subject areas and at all grade levels with the results confirming that cooperative learning does indeed enhance student achievement. Cooperative learning has been found to engage and motivate students and aid teambuilding. This case study, which examined how a group of elementary deaf students interacted with LEGO LOGO activities, was conducted to learn how these students might benefit from group tasks.

Group interaction and the language used by the students during the interactions were the foci of this case study rather than the LEGO LOGO activities. LEGO LOGO activities were selected since they offer an opportunity for attaining construction goals in a nonverbal environment. A number of years ago, I undertook a study to examine how an 11 year old Deaf student, Eve, learned the computer language, LOGO (McDaniel, 1990). Eve

conceptualized a figure such as a square and manipulated the cursor or, as it was known in LOGO, the Turtle movements in order to produce the square on the computer screen. In previous teaching encounters with Eve, I had observed many verbal classroom interactions among other children. However, Eve and her classmates were unable to share their thinking or explain how to complete tasks though it appeared that they had ideas and/or information. After questioning Eve and her classmates, I concluded they lacked the language to share. I wanted to find some pedagogical approach to facilitate the acquisition of thinking and language skills. Therefore, a case study was conducted using a LOGO-based program that provided a nonverbal environment while using logical thinking to design the figures. I surmised that since learning through LOGO-based activities and constructions had already been demonstrated by the student, language for thinking and for the designs could also be taught.

Without having the language to explain how the figure would be produced, Eve used a trial-and-error technique to construct the figures. As her figures became more complex, Eve used skills acquired in designing simpler figures and additional trial-and-error efforts to produce the more complex figures. Throughout this process of skill development, Eve used whatever language she possessed to think and to determine how she would construct a figure. When she discussed the completed figure, I supplied the appropriate language, and she practiced in context as she improved her language skills. In my observations of Eve, it appeared that she was learning and motivated to seek more information. Giving her appropriate language for what she was doing provided new useful language for her to apply to other situations and language with which to ask questions about her continuing work.

In the interim, between studies, while teaching deaf children for ten years, I continued to keep abreast of advancements in LOGO, the emergence of LEGO LOGO, and the connection between LEGO LOGO-based instruction and the development of language and thinking skills. In addition, I became interested in learning strategies, in particular cooperative learning, since they appear to facilitate learning in a more appropriate manner: engaging students so that they are “actively involved in constructing their understanding of the world” (Zorfass, 1999, p. 206). The learner’s grasp of knowledge is brought “into being through a transaction between the learners and the environment” (p. 206). I believe this emphasis on the active involvement of learners with their environment results in better cognitive, language, and thinking skill development as learners acquire knowledge. Cooperative learning, which Johnson and Johnson (1975) report to be underutilized, but most important, engages students in active participation while learning.

THE PROBLEM

Much is yet to be learned about improving skills of d/hoh students so they may achieve at higher levels. Building thinking, cognitive, language, and academic skills to a level commensurate with their hearing peers is essential. Increasing knowledge about critical periods and uses of language as well as positive findings on how children can be engaged in learning necessitates exploration of effective learning activities. Thus, the problem of this study has been to examine how deaf students, as a group, approach LEGO LOGO activities and to examine the language they use while engaged in the activities.

THE PURPOSE

One purpose of this study was to observe and analyze the behavior of deaf elementary students as they completed LEGO LOGO activities. This study was based on the conceptual framework that the learning process of a group of deaf students could be analyzed if the group were required to complete problem-solving activities using a combination of technology and manipulatives. A second purpose of this study was to scrutinize the display of language during interactive behavior in the learning process while the students were involved motorically and mentally in selected activities. These purposes were the basis for the research questions.

QUESTIONS

This study was designed to answer two research questions.

1. How does a group of deaf students solve problems based on a specific assigned task utilizing LEGO LOGO?
2. What types of language expression (a combination of PSE, ASL, English, facial expression, and nonverbal language) do deaf students use to solve problems during LEGO LOGO activities?

DEFINITIONS OF TERMS

ASL: American Sign Language, language expressed in manual signs that has its own syntax and grammar, used primarily by deaf people

deaf: persons who have hearing losses greater than 90 decibels (dB), may have been born with the loss or acquired it after birth, loss is sensory neural in nature, may use

American Sign Language and/or spoken English with lipreading for communication, may attend day or residential schools, may or may not use amplification, are unable to acquire spoken language through audition alone, even with the help of a hearing aid

Facial expressions: facial changes with brows or other areas of the face to add emphasis or to ask questions

hard of hearing: persons who have hearing losses between 25 decibels (dB) and 89 dB, may have been present at birth or may have occurred after birth, may or may not use amplification, may or may not require special educational techniques for learning

LEGO: small, primary colored manipulatives consisting of plastic blocks, programmable blocks, cubes, gears, motors, pulleys, sensors, lights, and other assorted pieces, used by children to build creatively or by pictured instructions

LEGO LOGO: combination of LEGO manipulatives and the programming of LOGO with communication between LEGO and LOGO through an interface card, constructions of LEGO manipulatives connected to the computer and operated by program written to control some aspect of model, examples: a LEGO car with a created computer program to move it in various directions or a lamp post with an operating light controlled by the computer program, new commands such as on, off, and sensor were added to LOGO to accommodate the new constructions with LEGO

LOGO: computer language developed by Papert (1993a) to help children use logical thought to build and explore the creation of figures from simple to complex, designed to be easy for children to use, turtle geometry is usually a first step for children, the cursor on the computer screen resembles a small turtle, commands are given to the turtle to have it draw as directed by commands typed on the keyboard, commands that include such terms

as FORWARD, BACK, LEFT, RIGHT, PEN UP, PEN DOWN, and REPEAT, an example: REPEAT 4 FORWARD 20 LEFT 90 END will create a square, 90 used after the direction LEFT is for number of degrees the turtle should turn, children can use degrees without fully understanding the concept, children use trial and error as they master the programming language to have trial and success, additional commands are used as the student gains skills, program grounded in constructivist educational philosophy

Nonverbal language: gestures and body movements used as meaningful components of expressive language

PSE: Pidgin Sign Language, a manual language that combines elements of ASL and manual English, changes depending on the skills of the signers

Types of language expression: language used to give and receive information including PSE, ASL, English, nonverbal, and facial expressions

DESIGN OF STUDY

This study was organized to observe a group of five deaf students during five sessions as they completed LEGO LOGO activities. Five students, in grades four and five, participated voluntarily after informed parental permission was granted. Interviews were conducted prior to the sessions and immediately at the completion of the sessions. Group work with LEGO LOGO activities was chosen for this study since such activities permit deaf students to succeed in activities that otherwise their language might prohibit them from accomplishing in a traditional lecture/discussion approach.

Methods and procedures of this study are summarized later in this report, along with objectives which were met during the sessions. Session I objectives were to introduce LOGO commands, to practice the LOGO commands by using the floor exercise and the computer, and to write a journal of the day's session. Detailed descriptions of additional sessions are contained in Chapter III.

All data, videotapes, journals, pre- and post-interviews and field notes were reviewed literally, interpretively, and reflexively numerous times. A discussion of the findings comprises Chapter IV.

NEED FOR STUDY

The current level of academic achievement of deaf students necessitates changes in educational practices. Learning in a group offers an approach that permits all deaf students to be actively engaged in their learning and benefit from the knowledge of their peers. Learning how deaf students work in groups and the language they use while doing so is a first step toward designing pedagogical practices that will embrace and improve the education of deaf students.

ASSUMPTIONS

1. Because of my prior study, comparisons, and observations of how deaf students learn, I am competent to facilitate exploration and learning with LEGO LOGO activities.
2. The students selected from the research are capable of purposefully using manipulatives and the computer for the LEGO LOGO activities in the study.

3. Uncontrolled variables such as intellectual ability, socio-economic status, motivation, and other handicapping conditions may influence learning.
4. The learning process, behavior, and language of a group of deaf students can be analyzed as the group completes problem-solving activities with LEGO LOGO.

LIMITATIONS OF THE STUDY

1. The population available for the study was limited to those attending the Missouri School for the Deaf, a residential school.
2. The study was limited in that all ethnicities are not represented at Missouri School for the Deaf in the same proportion as in the general population in the United States.

DELIMITATIONS OF THE STUDY

1. The deaf students of the study volunteered to participate and had the required parental approval.
2. The deaf elementary students who participated in this study were delimited to five students in grades four and five.
3. The school population from which students volunteered for this study was delimited to deaf students attending Missouri School for the Deaf.
4. Observations were delimited to five sessions.
5. The activities in this study were delimited to activities based on LEGO LOGO group work.

ORGANIZATION OF THE STUDY

Chapter I of this dissertation includes an introduction that presents the performance status of d/hoh students, my background and previous studies, and important considerations for future education of d/hoh students. Next, the problem of skill level for deaf students, the definitions of terms, the design of the study to examine group work and language, and the need to examine an instructional structure which may improve skills are presented. The assumptions were presented followed by limitations and delimitations. Then, this section on the organization of the study concludes the chapter.

Chapter II is organized into three sections that present pertinent research in the three areas relevant to this study: cooperative learning, language, and LEGO LOGO. Chapter II ends with a summary of the research.

Chapter III on methodology commences with an introduction that presents the choice of tradition for the study followed by a description of the students who participated in this study. Next a description of the setting of the study is presented followed by a description of materials used, the activities conducted, and the data collection. The chapter concludes with statements on the reliability, validity, and objectivity of this study.

Chapter IV, presenting the results of the study, begins with an introduction followed by an analysis of the data and responses to the research questions. Next, the four emergent themes derived from observations are discussed.

Chapter V, entitled Summary, Conclusions, and Recommendations, first presents a summary of the study and the results. Conclusions were stated followed by

recommendations for a repeat study, future research topics, and changes in classroom practices.

CHAPTER II

REVIEW OF RELATED LITERATURE

INTRODUCTION

The review of literature focuses on three key areas related to this study. The first is group work, often referred to as cooperative or collaborative learning. The second area is language, cognition, and thinking. The last is the development of LOGO, LEGO LOGO, and related research.

GROUP WORK

Cooper and Robinson (1995) in a status report on academic group learning state that much was yet to be resolved about small group instruction. One of the unresolved issues concerns terminology. ‘Cooperative learning’, ‘collaborative learning’, ‘peer-assisted learning’, and ‘team learning’ comprise a partial list of terms used in practice and research to describe or name learning that occurs in small groups of students. Another issue was how small group learning should be conducted. Cooper and Robinson noted that authors advocated a variety of small group techniques that were very detail oriented and had to be followed precisely. While Cooper and Robinson acknowledged that some of these detailed procedures worked better than others, a great variety of techniques were successful in small group learning.

In most of the literature reviewed here, research on group activities within the educational setting is referred to as collaborative or cooperative learning. Though these

two terms can have different meaning to some researchers, they appear to be interchangeable for others. Panitz (1997) differentiates between the two terms and presents ‘collaboration’ as a philosophy of interaction and lifestyles and ‘cooperation’ as a structure of interaction. He states that collaborative learning occurs during consensus building through cooperation by group members necessary to accomplish the goal or develop the product. Collaborative learning appears to imply that the students are freer to talk as they work on solutions whereas cooperative learning appears to be more teacher-directed.

Group learning has been found to have positive effects on student learning. Gokhale (1995) reports on a study completed in 1993-94 with 48 students in a basic electronics course in which results from a group learning individually were compared with results of a group learning collaboratively. Gokhale designed pretests and posttests to assess changes for classwork on dc circuits and parallel dc circuits. The tests were divided in drill and practice items and critical thinking items. Gokhale concluded on the basis of on a statistical analysis of the test scores that students who worked collaboratively performed significantly better on the critical thinking test items. The students in both groups responded to open-ended question equally as well. Those participants who worked collaboratively reported that shared responsibility reduced anxiety, helped them better understand the material, and stimulated their thinking process.

Similar results were found in the research of Kafai (1995) with 16 fourth-grade students working in groups over a six-month period. In her research, Kafai merges the theory of design with the theory of learning, both of which use the process of problem-solving, as she had the students use LOGO to design a game with fractions that was instructional and engaging for the players. Kafai asserts that the design of the game helped

students gain knowledge of fractions and build external representations of fractions as they made sense of things and constructed their games.

Cooper and Robinson (1995) present a compilation of what they learned from a review of several hundred studies, reports, books, and other works on cooperative and collaborative small group instruction in the academic areas of science, mathematics, engineering, and technology at the college level. This extensive review led them to conclude that small group collaborative and cooperative learning improved student achievement and attitudes regarding academics. Further, Cooper and Robinson report that many of the current findings of small group work of college students support previous findings of renowned researchers in the field, such as David and Roger Johnson and Slavin at the K-12 level.

Slavin (1985) concludes from research and experience that working cooperatively may make schoolwork socially-engaging and exciting. In his study, achievement increased as each member of a cooperative group became responsible for a unique task and was accountable for it. Achievement gains were made by low, medium, and high achieving students as they worked cooperatively. Azwell, Harvey, and Lyman (1993) also found that higher student achievement correlated with cooperative learning as did increased student interaction. As learning was supported as a continuous process using cooperative learning, students moved beyond drill and practice and generated original ideas.

Cooper and Robinson (1995) suggest the academic achievement attained higher through cooperative or collaborative learning may be due to the cognitive rehearsal and relating of course material during group work, which produces a deeper contextualized level of understanding for the engaged individuals. Johnson and Johnson (1985) suggest

that higher achievement may be the result of high quality reasoning strategies used in cooperative learning and in the conflict management as ideas are shared and conclusions reached jointly.

Johnson and Johnson (1975) state that “cooperation is a prerequisite for effective problem-solving and for the learning of complex material” (p. 11). In fact they confirm that “no aspect of human experience is more important than cooperative interaction with others” (p. 25). They do not recommend that teachers use only cooperative experiences, to the exclusion of competitive and individualistic experiences, but they propose that the latter structures have been overused while the structure of cooperation had been underused. Gaining experience through cooperation while learning and contributing to a group’s goal enables the student not only to learn new information, but also to become more committed and gain pleasure in success. Slavin (1985) reports a similar and positive effect of cooperative learning on student achievement, a success that extends throughout school populations: at each grade level, in rural and urban settings, among students of different ethnicities, and in different subject areas.

Borthick, Jones, and Wakai (2003) propose that using Vygotsky’s Zone of Proximal Development (ZPD) enables students to achieve and to accomplish independently what they could only accomplish with assistance before cooperative learning experiences. Vygotsky defined his ‘zones’ as conditions in which more advanced learners or adults improved of children’s learning and helped them accomplish tasks they could not otherwise accomplish alone. Borthick et al. state that cooperative learning experience situates learners so that they can construct their own competence. Technology use is matched to the learning experiences to achieve the desired learning outcome. Using

technology, students construct their own mental models, first with the assistance of peers and then individually.

Harland (2003) applied Vygotsky's ZPD in problem-based learning to the teaching of zoology courses. During collaboration, students were encouraged to take responsibility for their own learning. Less able students were observed to assume the role of the more capable peers in the groups. Harland suggested that individual learning gains made by all the students were the result of collaborative problem-solving.

Card and Schmider (1995) report that the three elements that define the group process -- communication, leadership, and decision making -- require planning and consideration when group members have special needs. In their study, the group that had a d/hoh member needed special considerations so that all group members could participate, but not to the exclusion of any member. Card and Schmider recommended preplanning, including deliberation on the purpose of the group, the use of assistive devices and/or interpreters, and the establishment of communication norms. They suggested that group sizes be kept small and that circular tables be used for work areas.

Students with special needs have been found to be successful in cooperative and collaborative learning experiences. Within the framework of cooperative learning environments, Ashman and Gillies (2000) conducted a study to investigate learning outcomes, behaviors, and interactions with 152 third grade students, some of whom were diagnosed with learning difficulties. Results indicated that no significant differences existed in cooperative behavior in structured versus unstructured group activities, but the students with learning difficulties exhibited significantly less group involvement and off task behavior in unstructured groups than their peers in structured groups. Students in

structured groups gave more directions or help to their peers. The researchers concluded that the directions or helping behaviors affected the learning outcomes positively.

An additional positive outcome of cooperative learning has been found to be the acceptance of diverse students. Dotson (2001) describes a study she conducted with sixth-grade social studies students, some of whom were in classes using Spencer Kagan's Structures of Cooperative Learning and some of whom were in class using a more traditional lecture/discussion approach. Though measuring the achievement of students with disabilities was not a focus of her study, she did find that all of the students with special needs who participated in the classroom with cooperative learning were more successful than those students with special needs who participated in the more traditionally lecture instructed group. Students with diverse abilities and disabilities, as well as a student in the beginning stages of learning English, participated together and were observed by the teachers to interact socially in an accepting manner.

Gaining cooperative skills is viewed as a positive life skill achievement. Students experience cooperative groups outside of school. Slavin (1985) observes that human society is composed of many overlapping cooperative groups including families, clubs, teams, and neighborhoods. For adults, these groups include workplace teams, clubs and interest groups, as well as social organizations and political parties. Johnson and Johnson (1975) note "that over 90 percent of all human interaction is cooperative" (p. 14).

Acquiring group skills should begin at early ages. Many have offered suggestions for the teaching of group/social skills. Dotson (2001) stresses the need for the pre-teaching of skills, especially for those with behavior disorders. Each member of the group needs to have equal shares of responsibility and input. Farivar and Webb (1994) stress the

importance of practice of communication skills and pro-social behavior with the focus on specific desired behaviors. They also underscore the strong effects of teacher modeling. Barak and Doppelt (1999a) assert the need to teach tools for creative thinking, delaying judgment, avoidance of affect in ideas, and suggest large number of solutions. Kutnick (1994) emphasizes the need to develop social skills in primary grades but not with piecemeal programs. He suggests instead integrating sensory affective schemes with communication and joint problem-solving.

Johnson and Johnson (1994) list five essential elements that should be developed for students to benefit from group work. These elements include: positive interdependence, face-to-face interaction, individual accountability, social skills, and group-processing. Other important skills are to learn to define and set goals so that realistic goals can be set by a group to accomplish tasks.

Such goal-setting skill development, Luckner and Muir (2002) state, should begin at preschool ages. They studied 20 successfully mainstreamed d/hoh students and recommended structured choices for foods, clothing, and books and involvement in planning near events for ages 2-5; self evaluation of work and setting simple goals for ages 6-8; four step systematic decision making and problem solving for ages 9-11; and decisions on day to day activities, breaking long term goals into manageable parts, and role playing for practicing communication for successful interactions for ages 12-18.

Other considerations for inclusion in the teaching of group skills were the students' concept of knowing information and the students' perspective on different tasks. Abraham, Cavallo, and Saunders (1999) report that some students believed that simply recalling information was the same as knowing information. For example, they thought science-

learning consisted of memorizing. Forman (1994) points out that when teachers try to teach knowledge or skills through collaboration, they cannot assume that the students' view of the task is what they intend. These considerations should be addressed in teaching group skills. Students should learn to share viewpoints and learn from the perspectives of others.

Group work is of great interest since it appears to have the potential to build a number of skills including social interaction skills, language skills, cognitive skills, and critical thinking skills. These skills enhance life achievements.

LANGUAGE, COGNITION, AND THINKING

Among the most recognized theories of language development presented by McAnally, Quigley, and Rose (1994) are Behaviorist Theory, Linguistic Theory, Cognitive Theory, and Sociocultural Theory. Behaviorists claim that the child is a passive learner responding to stimuli in the environment. Linguists theorize that native speakers have an innate knowledge of rules and assume that language has a structure or grammar rule system that is somewhat independent of actual behaviors exhibited. Cognitive theorists are more concerned with syntax and semantics. They believe the two elements are not separable, but that semantics is more basic than syntax. Sociocultural theorists attribute language development to the child's interaction with members of society.

McAnally, Quigley, and Rose (1994) present a number of beliefs based on observation and experience concerning language acquisition that appear to support the Sociocultural Theory. Children, they observe, feel the need to communicate. This compulsion to interact is essential for language development, and is apparent even in use

of the prosodic elements of language, such as babbling, cooing, and using jargon. For the d/hoh child, prosodic elements include extensive gestures and pointing systems. This stage of development tends to last longer for d/hoh children than for hearing children. Especially during acquisition of language, McAnally et al conclude children require feedback on how well they represent intended meanings.

Associated with the language used to communicate in words with others is the language of mathematical thinking and application. DeHaene, Pinel, Spelke, Stanescu, and Tsivkin (1999) conducted numerous behavioral and functional magnetic resonance imaging studies with bilingual subjects in their late teen years. The purpose of these studies was to determine if the human capacity for mathematical intuition is dependent upon linguistic competence or visuo-spatial representations. They concluded that approximate arithmetic show no dependence on language, but rather relied primarily on quantity representations. These representations were implemented in the visuo-spatial networks of the parietal lobes on both sides of the brain. Conversely, exact arithmetic appeared to rely more on language-specific representations. Symbolic arithmetic was dependent on a progressive improvement of number notation systems.

DeHaene (1997) suggests that children have a nonverbal number sense or quantity system. Very young babies attend to the number of sounds and the number of objects and later, combine numbers in elementary addition and subtraction. With cerebral maturation, the rudiments of arithmetic appear and the parsing of the world into discrete categories with linguistic symbols begins. The children in DeHaene's study did not demonstrate ordinal competence before 15 months of age. By age two and a half, they differentiated

number words from other adjectives. Advanced numeration after age three included verbal components and involved counting body parts.

DeHaene (1997) suggests that mathematics is a product of human thought. He views numbers as “mental constructions whose roots are to be found in the adaptation of the human brain to the regularities of the universe” (p. 252). He suggests that to be proficient in math, an individual must establish links between the compartments of the brain as number-sense advances.

DeHaene and Spelke (1999) propose that numerical abilities of the human brain, in different circuits, follow a specific developmental time course and depend upon maturation of certain areas. They accept that rote learning of arithmetic tables is based on a linguistic representation of numbers, and such learning is dependent on non-numerical brain circuits. However, they assert that the understanding of proximity relations between numerical quantities, which is important for approximation and number comparison, is dependent on another brain circuit. This circuit, they said, is in the left and right intraparietal regions. Further evidence of the cerebral bases of calculation can be found in studies of damaged brains, in which lesions, resulted in a loss of number sense, as well as in studies of children with dyscalculia, which indicate that the inferior parietal cortices play a very specific role in number processing. In spite of specialized education, children with dyscalculia were unable to develop a number sense. The reason for this failure, according to DeHaene and Spelke, was that number processing could not be transferred to other brain regions. This particular circuit of the brain was not limited to arithmetic function, but had other functions related to visuospatial tasks.

Vygotsky's (1986) ideas of mental maturation provide theoretical underpinning with DeHaene's findings. Vygotsky states that mental interfunctional systemic unity is established as individuals developed language skills, verbal and nonverbal. Wood (1976) also claims that a biological basis exists for verbal and nonverbal language. Development of both types of language can be explained by the maturation of the human brain and body.

Armstrong, Stokoe, and Wilcox (1995) agree that the maturation of the brain delimits a critical period for acquisition of the first language. They suggest that research on children raised without language, referred to as 'wild children', supports the biological basis for language development. Additionally, they report that d/hoh children who have not been exposed to signed language early have brains that tend to be incompletely lateralized. Brain lateralization of d/hoh children who have learned signed language early is similar to brain lateralization of hearing children who have learned a spoken language.

Schwarz's (2002) study of bilingual subjects who used ASL and English confirmed the findings of Armstrong, Stokoe, and Wilcox. Over half of the 27 participants were hearing persons who learned ASL before puberty from their deaf parents. The rest of the participants learned English as their primary language and ASL after puberty. With the use of functional magnetic resonance imaging, different patterns of brain activity were noted in those who learned ASL before puberty and those who learned it after puberty. Schwarz concluded from the research that a critical period exists for language acquisition of both the primary and secondary language. Those who acquire a language after puberty do not fully acquire and use the principles of the language. Subtle differences such as the use of verb signs of motion in ASL and grammatical differences in spoken language were

noted between those who acquired the language before puberty and those who acquired the language after puberty.

Lenneberg (1967) hypothesizes that the end limits for acquisition of the primary language is puberty. Working with persons who had acquired aphasia, he noted that children, particularly those from age four to age ten, recovered more quickly and with more language intact than did the adults. Also, children appeared to have a more efficient way to rebuild language. He believed the reason for this difference in recovery had to do with the maturation of the brain. Lenneberg's research led him to maintain that cerebral dominance is not established for the first two years of life. Thus, both hemispheres of the brain appear equally involved in early language development. If the left hemisphere does not function properly from a physiological perspective, as in aphasia, the right hemisphere persists with language activities. However, as a person ages, the right hemisphere can not continue to take over functions when left hemisphere is incapacitated as a result of aphasia.

Bever and Ross (2004) conclude from their study of 238 deaf college students that language development is not dependent on a single kind of neurological substrate. They compared the maturational course for language acquisition for right-handed students with only right-handed relatives to that of right-handed students with at least one left-handed relative. They concur that a sensitive period for language development exists, but speculate that there may be different sensitive periods for different individuals and different aspects of Language, and that learning styles affect language acquisition as well. They observed that the right-handed individuals with only right-handed relatives tended to

acquire the grammatical relationships of language first while the right-handed students with at least one left-handed relative acquired words first.

Examining the nonverbal language of newborns, Wood (1976) addresses the initial part of the critical period for language acquisition. Newborns were observed as they moved in reaction to adult speech. Wood notes that newborn movement is synchronized with adult speech behavior: early as 12 to 21 days after birth, newborns imitated manual and facial movements. Wood proposes that children continue to develop language from infancy according to their own set of rules, by creating meanings from their experiences and involvements with people.

Vygotsky (1978), Nelson (1996), and Moskowitz (1995) concur with Wood that language is developed through interactions with other persons. Vygotsky argues that learning by children has its root in sociocultural interaction beginning with persons close to them. Nelson claims that since infants' knowledge constructing activities take place in a social world, social functions play a central mediation role in cognition. Moskowitz presents an example to demonstrate the sociocultural context required for language acquisition: a hearing child of deaf parents, observed over a period of time, watched television for the purpose of acquiring English and communicated with his parents using American Sign Language (ASL). By the age of three, the child was fluent in ASL but could neither understand nor speak English.

Armstrong, Stokoe, and Wilcox (1995) concur with Vygotsky, Nelson, Moskowitz, and Wood as to the necessity for social interaction for language development. They propose that language emerges out of social interaction rather than being developed through interaction with the natural environment. Vosniadou (1996) reiterates the

necessity of interaction to learning and asserts the importance of creating learning environments in which “students can express their own representations of situations, share them with others, and revise them” (p. 22).

Moskowitz (1995) states that language acquisition occurs when children, within the first two years of life, disassemble language to find sounds to combine to form words and then find words that can be combined to form sentences. Language develops as rules are devised in four major areas: phonology, the sounds of words; syntax, the relationships of words in sentence structures; semantics, the correspondence of meanings with words and sentences; and pragmatics, the sequencing of sentences, roles in conversation, and anticipation of information.

Not all researchers have accepted that language is acquired through social interchanges. Bloom and Pinter (1990) suggest that individuals have an innate set of rules and information and that human language is a specialized biological system. This system is a “complex mechanism tailored to the transmission of propositional structures through a serial interface” (p. 707). These internal mechanisms, they argue, underly the acquisition of language: environmental stimuli alone can not account for language acquisition. They see the internal structure as responsible for the core of language acquisition and find that environmental stimuli serve to make it more solid and complex.

However acquired, language served a purpose for humans. Lee (1997) studied the connections between knowledge and language. She states that unique to humans is the ability to create knowledge through language. She takes a constructivist perspective that language continues to form with interaction in the environment. However, deaf children,

she espouses, may create knowledge with a language not totally known by or familiar to those around them.

Cognitive development increases as children discover rules to combine language and progress toward more adult-like language. Once they have mastered the basic elements of language, according to Moskowitz (1995), children begin to revise and refine those elements until their language is more like adult language. Moskowitz established as a time frame for basic language acquisition the first five years of life, with revision and refinements occurring between ages five and ten as the children increase knowledge.

Vosniadou (1996) supports the idea of learning as a developmental process. In the learning process, she purports that children reorganize knowledge rather than just adding new knowledge to that which they already have. In addition to reorganizing knowledge, children revise beliefs and master or create representation systems. Within meaningful activities, children add language to express the knowledge they have acquired. As they move from novice to expert levels, they store and retrieve language differently.

Armstrong, Stokoe, and Wilcox (1995) find that the organization of primary sign language within individuals differs from the organization of spoken languages. Though the organization differs, signed and spoken languages share a common cognitive substrate and grammatical processing. The common purposes for both are to enable communication and to facilitate a human social life.

Marschark (1997) likewise sees the common purposes in both spoken and signed languages. He notes that both signed and spoken language follows the same course of increasing complexity. However, he notes that since the maturation of the fingers, hands, and arms occurs before that of the tongue, mouth, and vocal tract, the child using signed

language starts signing concepts earlier than the child using spoken language begins to utter words.

Not only does the acquisition of signed language allow children to communicate before hearing peers, but also it enhances specific cognitive processes, according to MacSweeney (1998). Regardless of modality, language skill acquisition is an important factor in literacy and achievement. MacSweeney found that signed language promoted the same cognitive potential in d/hoh children as did spoken language for hearing children. The critical factor was the fostering of robust language skills early so that children could reach their potential. MacSweeney reported that the cognitive abilities of d/hoh children who signed early were commensurate with their hearing peers when measured with non-linguistic stimuli, but tended to fall when measured with verbal stimuli.

Though commensurate performance has been reported, Woll (1998) cautions that assessments to measure language skill development of d/hoh children who sign is difficult to interpret due to the variability of language experience of the children. In addition, professionals conducting the assessments are often unfamiliar with both spoken and signed language. Such problems in measurement became a greater problem with d/hoh children who acquire English, for they do not follow the normal development pattern of acquisition and are unable to code switch as are the d/hoh bilingual children who learn ASL and English simultaneously.

Children communicate and express thoughts through language. Frawley (1997) states that thought for language is inseparable from the language children use to communicate with others. If the language for thought is built with the same codes that children use for public and private communication, then thought can be acquired by any

symbolic means and is not limited to speech as its only expressive form. The language for thought according to Frawley (1997) is the vehicle for thinking. Wink (1997) agrees with Frawley and elaborates in the interrelationship between thought and language. Language is used to generate thoughts and thoughts provide the material for language. Wink writes that “language informs thought and thoughts come to life in language” (p. 87).

In an effort to learn more of the thoughts as expressed with inner or private speech, Bershon (1992) studied inner speech of students as they were engaged in problem-solving. Students in grades three through six worked in groups to connect LEGO blocks so that the completed model resembled a pictured model. Upon completion of the activities, students recalled their inner speech, and the recalled information was analyzed. Bershon concluded that as the children developed cognitively, they also developed social speech during the activities. This social speech included mediating speech which had been previously used in task involvement. The students had internalized helpful comments and ideas not only to increase cognitive skills, but also to communicate with group members.

Wink reports on a similar situation during which a student, Pablo, learned and was then able to work alone. After the experience, Pablo expressed the idea that although no one thought he could learn, he learned with his group and then, he worked alone. This approach to increase learning is an application of Vygotsky’s zone of proximal development.

Vygotsky’s (1986) term for the adult or learned peer support given to the younger or less able child is zo-ped. Vygotsky’s zones of proximal development -- the zo-ped-- add another dimension to the learning environment, in that he maintains that children have a greater potential for language-learning and problem-solving under adult guidance or in a

collaborative venture with more capable peers than they do alone. Vygotsky (1986) observes that instruction is often geared to weakness rather than to strength, but instruction could be aimed toward strengths through the use of zones of proximal development. He purposes that a discrepancy exists between a child's actual mental age and what a child can accomplish in problem solving with assistance. The child's empirically rich but disorganized spontaneous concepts are aided by the systematic logic of adult reasoning. Thus, the child learns and then functions alone.

Gray, Hosie, Hunter, Russell, and Scott (1998) focus attention on another aspect of mental development and related skills that may be acquired through social experiences and interactions with adults and more learned siblings in their concept of theory of mind. Theory of mind provides the basis for meaningful use of the pragmatics of language. Abilities such as being able to predict, explain, and manipulate behaviors of other people result from the learner's development of a theory of mind. In addition, attaining moral development, understanding consequences of ignorance and false belief, ability to distinguish between appearance and reality, and inferential reasoning about goals and means of other people comprise resultant skills of theory of mind development.

Gray et al. were interested to discover if d/hoh children could demonstrate age-related improvement in theory of mind abilities. They chose a false-belief test for the study of 32 d/hoh students divided into three groups based on age. Results indicated that the performance of d/hoh students was at levels below their hearing peers and that the performance of older d/hoh students was superior to that of younger students. The results of the study offer hope that theory of mind is not permanently impaired for d/hoh students.

Mason (1997) supports the use of bilingual/bicultural education (DBiBi) incorporating both ASL and English in the educational environment for d/hoh students. Within this environment in the classroom, students develop mutual respect for similarities and differences between deaf and hearing people's way of life. This approach, Mason states, reflects the reality of how d/hoh students live in society.

A mutual respect for both language systems is necessary to avoid the stigma associated with using either language that affected other areas of learning. Hendershott and Henderson (1992) purport that those who use ASL have often been viewed as deviant in society and have suffered from social inequality. This biased viewpoint not only affects the d/hoh students in the school environment or in the community, but also creates a stumbling block for a healthy parent-child interaction. The result of the stigma associated with language usage was noted in learning behavioral and emotional control as well as language. Though hearing children learned emotional and behavioral control through constant communication and reasoning with those around them, d/hoh children learned it without benefit of such interactions.

Though controversy about language teaching for d/hoh students has existed for decades, ASL-using adults, both the culturally Deaf and the ex-oral deaf, generally support the importance of English for d/hoh students. The learning of English, through signed English system, though, has been discouraged. Livingston (1997) states that signed English systems are not natural languages. Deaf adults express difficulty in processing the message content as a whole when it is presented as a stream of sequential elements, as in signed English systems.

A very early start to language learning is necessary due to the critical learning periods and due to the confounding results if a student is without language. Lane (1992) states that if mastery of language is delayed, then growth of intellect is also delayed. The lack of language skills compounds problems for the d/hoh students as they enter the academic settings.

Most d/hoh students come to the academic setting with some language. However, the learning of the second language is influenced considerably by the extent to which the first language has developed. Usually, it is necessary to continue teaching in the primary language as the secondary language is learned. In most of the classrooms that I have visited, this would represent a major change in language teaching. However, I believe strongly that the d/hoh students must have better language instruction that meets individual needs and skills in order to achieve at higher levels.

If a move is to be made toward teaching two languages in most d/hoh classrooms, more knowledge of how languages are acquired is needed. Baker (1996) states that a universal sequence exists for second language learning. This sequence moves from simple vocabulary to basic syntax to structure and shape of simple sentences to complex sentences. Five factors, he continues, should be considered for second language learning. The first, situational factors, such as interaction with environment, may have more influence on production. The second, input, should focus on meaning rather than grammar. The learner differences such as exposure, age, motivation, cognitive style, and learning style are the other three that must be considered. The learner processes included learning not just from input and output but also from opportunities when engaged in meaningful exchanges.

A functional classification of the bilingualism practiced by the d/hoh students provides a practical starting point for examining learner differences and a basis for building additional skills. In a study of 192 subjects ages nine and ten who communicated in Welsh and English, Baker and Hinde (1984) recommended classifying bilingual communicators according to when, where and with whom each language rather than by their abilities, proficiency or performance alone. This approach aided in planning more authentic language learning activities.

Many resources and techniques have been developed for language instruction. Rutherford (1985) purports the use of the group narrative in teaching language. Narrative can serve as the primary vehicle for verbal competence and teaching sequence. The use of narrative fosters and requires linguistic sophistication to master, and it is a good cultural tool. Boyd and Maloof (2000) suggest that literature offers quality talk characterized by reflection and exploration of intertextual connections. When exploring literature together, students are encouraged to relate what is read and to share to their experiences and perspectives.

Programs that can serve as a model for the use of literature, especially the narrative, already exist. Davies (1994) describes Sweden practices with bilingualism. The d/hoh children, he observed, read and told stories in sign language at ages eight and nine, and began reading due to natural curiosity, working with books that addressed both Swedish culture and Deaf culture. The classes discussed what had been read in Swedish and compared and contrasted the information with sign language representations.

The Swedish teachers in Davies' study insisted that language could not be imposed on a child before the child was developmentally ready. To aid the child's development and

plan programs, d/hoh adults were involved from policy creation to implementation. Also, d/hoh adults were paired with hearing parents of deaf children to teach the parents sign language. Both parents and care givers were taught the language used by the d/hoh children.

Once children are in the academic setting, their teachers controlled the environment for learning. Boyd and Maloof (2000) state that it is in the teacher's control to orchestrate and support the kind of classroom discourse that engenders active student communication. The student not only needs to learn the linguistic code, but also must learn what is appropriate in certain social situations. The d/hoh students needed to know when to start, enter, contribute to, and end a conversation. Throughout the conversation, students must be actively engaged in constructing and clarifying meaning. Teacher instructional practices shape the extent of student engagement. The teacher must validate the student's communication.

Other tools are also available to promote language instruction. Campbell, Dudley, and Neill (1986) used a computer program to get 16 d/hoh students in a residential school to verbalize thinking skills. They used self instruction with LOGO as a vehicle for behavior modification that led to reflective problem-solving behavior. Programs such as LOGO generated a need to express thoughts and make inquiries. Students watched videotaped samples of their work and were taught means of monitoring their work and problem solving strategies. Throughout this process, the students were taught the language they might need in such situations.

Though ASL and English are generally assumed to be that the two languages most d/hoh students will use in the classroom, PSE should not be ignored. Many d/hoh students

comfortably communicate using it. Maxwell (1990) recommends the examination of the students' use of PSE as a window into the brains of those using it. Pidgins, such as PSE, may share features that constitute linguistic universals. Such information about students' cognitive activity could be useful in learning about individuals and in helping them develop advancing language skills.

LEGO LOGO

The development of LOGO and later LEGO LOGO was the result of work of Seymour Papert, who developed LOGO when he co-founded the Artificial Intelligence Lab at Massachusetts Institute of Technology (MIT) with Minsky. Papert (1999) states that the definition of LOGO evolved as it was put to use by educators: "LOGO is a programming language plus a philosophy of education" (p. vii).

When, in the 1960s, Papert proposed that children could use computers as instruments for learning and for enhancing creativity, people laughed at him. He was not discouraged. In his laboratory, the first opportunities for children to use the computer to write and to make graphics were developed: LOGO as well as first children's toys with built-in computation.

Before coming to MIT and developing LOGO, Papert worked with Piaget in Switzerland and was influenced by his theories. The focus of Papert's (1993a) work there was "on children, on the nature of thinking, and on how children become thinkers" (p. 208). As a result of this early work, he began to explore the thinking of children and how computers might expand their thinking. One result of his desire to aid in the development of minds of children was LOGO.

In developing LOGO, Papert (1993a) states that he was influenced by what Piaget contributed to the knowledge-based theory of learning. He believed “Piaget learning” to be “natural, spontaneous learning of people in interaction with their environment” (p.156). This was in contrast to traditional learning in the schools, which was generally curriculum-driven. In addition, Papert believed that when Piaget spoke of the developing child, he was often speaking of the development of knowledge. Piaget believed children become less egocentric and benefited cognitively when discussing things with each other, for all do not have the same approach or perspective on an activity or situation. They learned and broadened their perspectives by sharing thoughts and approaches with others.

Early in his work, Papert (1980) spoke of the positive influence and impact of computers on children as they interacted and learned. Later, Papert (1998) states his belief that the computer cultures are different from the pre-computer cultures, in that computer use changes intellectual development. Papert believes that the computer offers the infrastructure on which children can build dreams, for the computer has both informational and constructional sides. According to Papert (1996), by using the computer-based tools he created, children can construct their own games and models. In doing so, he suggests that children can begin to experience control of their own intellectual activity. He uses the term “constructionism” to describe his approach. He contrasts this term with constructivism, noting that his term and approach focus more closely on mental construction. His approach relies on the computer, which he posits can change children’s relationship with knowledge. Such potential interaction to develop these relationships with computers became available with LOGO and put to practice with LEGO LOGO.

LEGO LOGO, an extension of the original LOGO with the turtle, combines LEGO, small building materials consisting of plastic blocks, programmable bricks, cubes, gears, motors, pulleys, sensors, and other assorted pieces, with LOGO, the programming language. Communication is possible between LOGO and LEGO through an interface box connected to a slot card in the computer. With the addition of LEGO, students can work in three dimensions rather than only two, which was the experience using LOGO's computer screen turtle. Martin, Resnick, Sargent, and Silverman (1996) state that the addition of the programmable bricks to the LEGO LOGO environment has enabled students to make new explorations and engage in new types of thinking that cut across disciplinary boundaries.

Javinen (1998) concurs with Martin, Resnick, Sargent, and Silverman. According to Javinen (1998), in the LEGO LOGO environment, students develop the skill to understand the logic and functional mechanism of technology. They solve technological problems by applying knowledge and skills and thereby, acquire more knowledge. To accomplish the increase in knowledge, the students are exposed to subject matter with concrete content or they develop skills to destructure abstract forms into concrete ones. While completing the tasks, students actively and continuously take information from the environment and construct interpretations and meanings. The interpretations and meanings are based on prior knowledge and experience.

Javinen conducted a study with students from the fifth and sixth grade levels working in groups of three or four using LEGO LOGO activities. He concluded that social interaction within the groups promoted problem solving and learning, and noted that while the LOGO programming tasks proved the most frustrating for the students, but they also

fostered feelings of control over the constructions. Though the students required more support for the programming initially, they were able to apply the newly learned skills to new situations and worked alone with later attempts. Though Javinen found the LEGO LOGO environment somewhat limiting in the variety of materials provided by LEGO, he believed the environment offered a familiar one for most students. He felt LEGO LOGO was appropriate for the learning environment since it offered problem-solving opportunities with low stress and allowed for concentration on tasks.

Clements and Nastasi (1999) concur with Javinen and state that “LOGO programming environments, properly designed, beneficially affect students’ metacognition.” Roschelle, Pea, Hoadley, Gordin, and Means (2000), too, agree that computer-based technology improves learning and problem solving. Stating their view in a slightly different way, they suggest that technology can “help children learn things better” and “can help them learn better things.”

Papert (1999) had predicted such gains for students working with computers. In his view, students learn better by doing and better still if talking and thinking are combined with doing. In this process, students learn by constructing new knowledge as opposed to learning information by rote from lectures.

According to Papert, learning is effective when the students are engaged in making meaningful constructions, such as those programs in LEGO/LOGO. Roschelle et al. have expanded this idea, proposing that using technology in collaborative activities could begin a cycle of increasing social skills which encourages conversations and expands students’ understanding of the subject matter being studied. Understanding the subject matter

implies a thought process which Papert (1993b) refers to as “process learning” that occurs as the student thinks about how to develop a project using technology.

Solomon (1986) devotes a chapter of her book, *Computer Environments for Children* to Papert’s and Piaget’s learning theories from which Papert developed his ideas about “process learning.” This chapter notes the need to permit students to explore and learn and presents Papert’s view of learning as a constructive process: Papert draws on the work of Piaget who demonstrated that children have different theories of the world which are modified as they grow. This modification of theories occurs in a constructivist way as “children build their own intellectual structures” (p.103).

Jonassen (2000) claims that students built intellectual structures by forming an intellectual partnership with the computer. Wu (1996) suggests that the computer in the LEGO LOGO environment permits the students to become active knowledge builders rather than the passive listeners they typically are in traditional lecture-approach classrooms. Jonassen reports that students in his study interacted, observed effects, and constructed personal interpretations. These interpretations were integrated with prior knowledge to build new knowledge. Unlike traditional computer-assisted learning into which the student had no input, LEGO LOGO offered a computer based mindtool. Mindtools, Jonassen states, engaged the students he observed in critical thinking and resulted in better comprehension of the topic and acquisition of useful learning skills. Further, these students were intrinsically motivated as they learned by doing. Boecker, Eden, and Fischer (1991) attribute the motivation and expansion of critical thinking by students using LEGO LOGO to the ability to break down complex problems into manageable pieces in the LOGO interactive programming environment.

Ling (1995), in a study of high school d/hoh students working in pairs, found that LOGO provided a concrete means for the students to express abstract ideas. As they worked in pairs to generate ideas to solve problems and completed LOGO tasks, they had to agree, disagree, make counter proposals, argue, and resolve conflicts. LOGO, she observed, motivated the students to engage in more on task communication than did many of the traditional classroom activities. The students were more willing in the LOGO environment than in the traditional class environment to interact with peers when they could not solve problems alone.

Weir (1992), working with special needs elementary students, observed that the LEGO LOGO environment provided an opportunity for the students to improve their self images as they learned to defend their positions for problem-solving. Also, the LEGO LOGO environment gave nonverbal students opportunities to demonstrate their skills at visual-manipulatory activities. These students mobilized skills that were otherwise dormant. By demonstrating the skills, the students developed a clear sense of ownership of the acquired knowledge. The LEGO LOGO environment presented an academic milieu in which students set, achieved, and shared goals.

Weir focused the observations in her study on two students who demonstrated difficulty with language processing and could not read directions. She noted that as the two students worked together, the student with the higher intelligence provided the opportunity and information for the student with the lower intelligence to achieve. As a result, cognitive change was noted for both students as the activities continued. Weir asserts that Vygotsky's ZPD provided the framework for the understanding that led to the

cognitive change. Additionally, the computer, she argues, assumed the role of decontextualizing understanding much as a teacher would have.

Healy, Hoyles, and Pozzi (1995) support the concept that interdependence forms when students work together to support learning. They conducted a three year study with eight groups of upper elementary students working in equally divided gender groups of six each. Each group included high-, middle-, and low-achieving students. They conclude that LOGO procedures on the computer facilitated the long term and robust learning of mathematics. No differences were found across gender or for different abilities. In their review, the group and the computer facilitated the development of approaches to solve problems and helped the students find the needed language to describe strategies.

Similar results have been found with younger elementary students. The work of Masters and Yelland (1995) with elementary students in primary grades supports findings of the development of metacognition using two adaptations of LOGO. They conducted a longitudinal study with eight pairs of students who were supported by the teacher as they explored with LOGO. These researchers conclude that the environment encouraged the students to think and discuss as they shared strategies. They observed that the students were enabled to explain and use mathematical ideas and processes that were considered advanced for their ages. The students, too, were enthusiastic as they talked and shared information about mathematics. The communication was helpful for the students as they remembered a solution used by another group in a previous activity. They opened the file, extracted the desired information, and modified it for their current project.

SUMMARY

Using technology in groups offers the opportunity for language learning, social skills, and thinking skills to increase. Papert (1993a) states that students “could use very simple computer models to think about thinking and to learn about learning.” I intend to just such thinking and learning applications of computer instruction to observe in the education of deaf students. For evidence exists that language skills can be developed as students interact with activities such as LEGO LOGO. The nonverbal forms of language used in thinking by the students and demonstrated in their activities can be translated to verbal forms more suitable in the academic setting. Vygotsky’s ZPD explains how this can occur with teacher-guidance or more learned peer guidance.

During LEGO LOGO group activities, deaf students may use constructivist activities to expand their intellectual structures as they apply thinking skills through trial and error and trial and success. For example, in building a car with blinking lights, the students can use LEGO to build the car and program it with LOGO to make the lights operational. Collaboratively, the students can discuss possible ways to accomplish the task. Their ideas and thoughts can be influenced, and possibly changed, as they use trial and error to construct the car with blinking lights. The teacher, acting as facilitator, or more learned peers can guide and supply correct vocabulary and language for the process when needed, thereby helping the students acquire the related language.

Jonassen (2000) states that “language amplifies the thinking of the learner” (p. 13). With newly acquired language, students can make applications as they program the bricks within the LEGO constructions. Research indicates that LOGO programming with

computers functions to build cognitive skills which amplify and reorganize how learners think.

Though Smiley (2002) concludes that elementary d/hoh students solve problems at a level commensurate with their language ability, evidence from studies with the LEGO LOGO learning environment suggested otherwise. The LEGO LOGO learning environment offers opportunities for students to demonstrate abilities and skills not witnessed prior to the activities and considered above their performance level. When these activities are planned for individual, age, and socio-cultural appropriateness, Beisser and Gillespie (2001) report that LOGO activities offered frequent opportunities for children to initiate their own ideas and experience mastery and competence.

Lust, a developmental cognitive psycholinguist, interviewed by Lang (1998), states that children can understand the smartest things even before they have words to explain them. Given the possibility that understanding may precede the ability to articulate what is understood, it becomes of great importance that d/hoh students have opportunities to build language and thinking skills with meaningful activities. The activities can begin nonverbally, and verbal language can be added as the student progresses and learning occurs.

Information presented in this review of literature supports the use of group- or collaborative-learning as a means of building skills for academics. In groups, students gain language which they later apply. LEGO LOGO activities within the group appeared to aid students in thinking and cognitive skills. With the reported language and academic levels for d/hoh students when they graduate at low levels, use of other pedagogical approaches are indicated.

Barak and Doppelt (1999a) note robust and long-term learning among low achieving high school students in their study. They conducted the study over a period of five years with tenth grade subjects using LEGO LOGO activities. The purpose of their study was to learn about students' perception of influence of the learning environments on outcomes. They conclude, based on responses to the questionnaires and observations, that the LEGO LOGO learning environment promotes independence, personal initiative and interest in technology. In addition, they report that these low-achieving students, who were usually excluded in technology programs, completed authentic projects for which they used their imagination and documented in rich portfolios.

Further, Barak and Doppelt (1999b) conclude that the LEGO LOGO learning environment provides opportunities to explore multiple ideas for problem-solving. It was this multi-faceted aspect of the environment that fostered higher level thinking skills. Students learned to delay judgment and avoid involving affect with ideas as they explored multiple suggestions for designs and solutions. In the process, students' thinking about thinking, or metacognition, improved.

CHAPTER III

METHODOLOGY

INTRODUCTION

The achievement levels of d/hoh students who graduate or leave secondary educational institutions continues to be low when compared with their hearing peers. Changes are indicated in the usual approach to their education.

This study was an opportunity to observe young deaf students while completing work in a group. The group interactions and the language used were the issues of central importance. Therefore, the research questions, as previously mentioned in Chapter I, are:

1. How does a group of deaf students solve problems based on a specific assigned task utilizing LEGO LOGO?
2. What types of language expression do deaf students use to solve problems during LEGO LOGO activities?

Due to the nature of these questions, the qualitative tradition of the case study was selected: this tradition provided a conceptual framework and method to gain insight into how a group of children approached activities with LEGO LOGO. In this case, the study of the children's approach to the activities was the focal point. The extensive fieldwork conducted for this study provided rich information which informed my observations of the children. As recommended by Yin (1989), this case study had the inductive, emerging design appropriate to a study for which no theory base exists and for which the variables are unknown. Inductive logic, rather a preplanned research format, was used as

Table 1: Paradigm of Viewpoints of Researcher

	Ontology	Epistemology	Methodology	Products
Constructivist	Realities are constructed	Researcher and participants co-construct understandings	Naturalistic methods in naturalistic setting	Descriptions, analyses, interpretations

categories emerged from the participants' behaviors. What literature was available on the topic was used inductively within the study to compare and contrast the outcomes, identify behaviors, and find themes. A combination of the research paradigms presented by Lincoln and Guba (2000) and Creswell (1998), presented graphically above in Table 1, best describes my perspective on the research design and process.

A quantitative approach was not chosen for a number of reasons. As mentioned earlier, little research has been conducted involving LEGO LOGO with d/hoh students. Additionally, little literature exists on related topics-certainly not enough literature to provide direction for research questions or a hypothesis for a quantitative project. The traditional, positivist, experimental, or empiricist paradigms were not appropriate for the research proposed since they do not support an emerging design and do accommodate changes as behaviors are identified and categorized in the course of the research.

NUMBER AND CHARACTERISTICS OF PARTICIPANTS

The participants in this study were five Missouri School for the Deaf elementary deaf students. The students are described in Table 2.

Informed parental consent was secured for student participation. Copies of the forms used to secure permission for student participation and use of the site are provided

Table 2: Participants in LEGO LOGO Study

Subject	Age	Sex	Description of Hearing Loss	Grade Level	Comments
Bruce	10	M	Profound bilateral loss	5	Enrolled at MSD 8/19/02, previous public school experience, in same class as Mike and Hallie, had limited exposure to LEGO through Mike
David	10	M	Moderate to profound bilateral loss	4	Enrolled at MSD 8/22/03, previous public school experience, not in class with any other participant, possibly had prior Duplo experience
Hallie	11	F	Profound bilateral loss	5	Enrolled at MSD 8/21/01, blind in left eye, ADHD, in class with Mike and Bruce
Mary	10	F	Profound bilateral loss	4	Enrolled at MSD 10/03, previous public school experience, attended seven different schools before MSD, not in class with any other participant
Mike	10	M	Profound bilateral loss	5	Enrolled at MSD 8/19/02, previous public school experience, in class with Bruce and Hallie, had prior LEGO experience

in Appendix A. The names of the participants have been changed for reasons of confidentiality. All students reported they had some experience with group work. None of the participants had prior experience with LOGO or LEGO LOGO.

DESCRIPTION OF THE SETTING

The site chosen for this study was Stark Hall at Missouri School for the Deaf, where sessions with the students occurred on December 8-12, 2003. The first session and the Pre-Interviews with Bruce, Hallie, and Mike were conducted in the computer lab and the following four sessions, Pre-Interviews with Mary and David and Post-Interviews, were conducted in the conference room. A repeat of the interview with Mike due to technical problems was conducted in the conference room, as well. There were some issues that made the computer lab not conducive to research. The particular room in question functioned as the teacher aide room. This use, with several interruptions and distractions, interrupted the participants' learning and attention to the tasks. Neither the blackboard nor the white boards were accessible due to the "L" arrangement of the computers against the walls. Therefore, six placemat-sized portable white boards were brought from the middle school at the facilitator's request. Use of the white boards somewhat limited writing and signing since the stand for them had to be supported by the facilitator. An additional problem resulted from the "L" shape arrangement of the computer desks: the participants had to turn around to see other participants, the facilitator, or the portable white boards.

It was on the portable white board that the facilitator introduced LOGO commands. Although the participants did have individual folders that contained LOGO

commands for handy assistance beside the computers, they needed to attend to the white board during initial explanations. Extra equipment, such as videocameras, was added to this room. Materials brought by the facilitator could not be left in this room. The table in the computer room was not of sufficient size for the activities. It was comfortable enough for four seats, but not for the six needed. Due to the awkwardness of the room arrangement and the interruptions, only one session was held in this room.

Two videocameras were used in this session, operated by two volunteers. Since the participants could move about during the activities, a third videocamera was added for the second through fifth sessions in an effort to keep all participants in focus of at least one camera.

The site for the remaining four sessions, the conference room, was used since the elementary school supervisor rescheduled meetings to make the room available. Since the computer lab was not an effective environment for participants' learning and group work in this research, the move was welcomed. In the conference room, the manipulatives and computer brought by the facilitator could be left secured in this room from day to day. This made it much easier for the participants to resume the work they had begun the day before. Giving participants access to only one computer was desired in order to facilitate group cooperation in completing tasks. In addition, the videocameras could be placed so that more of every participant's involvement could be recorded. Other furnishings of the room were more conducive for the group work.

On December 3-4, 2003, individual Pre-Interviews were conducted with the participants. The group sessions were conducted from December 8-12, 2003 from 3:15 to

4:00, with the exception of the final session. The Post-Interviews, both individual and group, took place on December 8, 2003.

The afternoon time frame for the sessions coincided with the time the students usually participated in an after-school program before going to their dorms. The final session was a morning session on a home-going weekend departure day due to weather conditions that may have prevented the students from returning to school after a home-going weekend.

MATERIALS FOR THE STUDY

The materials used during the case study consisted of a large LEGO storage box with manipulatives, two LEGO Interface A cables for IBM PC, a transformer box, a Technic Box 9700, two Technic 1038 boxes, three Technic 1039 boxes with battery and directional boxes, and *LOGO Works: Lessons in LOGO workbook*. Also included were an MS-DOS version of LEGO TC LOGO, a master disk which contained LEGO LOGO software, and reference booklets: Quick Reference Guides, Making Machines, Teaching the Turtle, Getting Started, Reference Guide LEGO TC LOGO, and LEGO TC LOGO Teacher's Guide. In addition, the following brochures containing pictured LEGO projects were used: numbers 1038, 1039, and 9700 #4, #5, #6, and #7.

Copies of worksheets, as well as reference materials used by the students during the sessions, are provided in Appendix B.

DESCRIPTION OF THE SESSIONS

Developmentally appropriate LEGO LOGO model building activities as suggested by Beisser and Gillespie (2001) were chosen for the students to complete. The activities involved the Lego manipulatives and the LOGO program at the computer.

LEGO LOGO was chosen as the activities to be used in the group work during the sessions since the learning associated with such activities has been documented using other groups of children. The activities presented for use with children by Kafai (1995); Boeker, Eden, and Fischer (1991); and Ocko and Resnick (1991) were reviewed in preparation for planning the activities for this research. Ocko and Resnick (1991), from the MIT Media Laboratory, document their observations of on how students using LEGO LOGO learned important mathematical and scientific ideas through their design activities. Learning from their work with students, they advise that the good tools and materials provided by LEGO bricks and LOGO software are key ingredients for success. Students are in control of the designs and experiments. Further, Ocko and Resnick advocate that the use of LEGO LOGO offers students the opportunity to approach activities from different directions and perspectives. In sharing ideas, designs, and construction, students achieved a sense of community while learning and sharing.

Similar results were found with another group of students. Masters and Yelland (1995) conducted research over a two year period using two adaptations of LOGO, Geo-LOGO and Turtle Math, with hearing students beginning at age three. Students were actively engaged in the activities and in discussing the activities. These researchers conclude that when students have the opportunity to participate and engage in the activities with support from the teacher, the students are encouraged to think, discuss, and

share their work. In doing this, the students are able to use and explain advanced ideas and processes.

Including LOGO requires the use of computers, which the researcher have potential to expand the learning opportunity for students with hearing losses. Clements (1999) reports that since the 1980s, preschools have gained computers and the ratio of child to computer at the centers had grown smaller. The significance of this increase is that the use of computers can impact the way children think and learn as well as how they interact with peers and adults. Clements makes a case that the adults are most effective in guiding children's problem-solving when computers are used to permit the children to use their own approaches.

Prior to the week of sessions for this study, individual interviews were conducted with the participants. The five sessions were then conducted. Though it had not been planned to conduct in one week, the possible consequences of the continual snowfall necessitated the change. Post-interviews, for individuals and group, were conducted after the final session. The interview questions were based on information of interest to me and ideas for interviews shared by Kvale (1996).

A brief description of the sessions is presented in the following paragraphs. Additional notes on each of the sessions are provided in Appendix C. Copies of specific printed activities mentioned in the activities of the sessions are provided in Appendix B.

Session I on Monday, December 8, had the following objectives: to introduce LOGO commands, to practice the LOGO commands by using the floor exercise and the computer, and to write the journal of today's session. The activities for the session were as follows: an explanation of the LOGO commands by the facilitator, floor exercise

practice of the commands by the participants, floor exercise of the LOGO commands at the direction of the facilitator, an explanation of degrees and how to use them for directions by the facilitator, practice of LOGO commands on the computer by the participants as directed by the facilitator, and practice of LOGO commands on the computer by the participants using trial and error until they achieved trial and success for their desired figure. Due to time limitations, the participants did not write in their journals.

The objective of Session II, conducted on Tuesday, December 9, were as follows: to discuss the time management as shown on the white board, to have participants write a journal entry of previous day's session at the beginning of the session and of the current session at the end of the session, to have participants, as a group, teach Mary LOGO commands, to complete paper assignments #1 and #2 with group interaction and sharing, and to have group discussion of paper assignments #1 and #2. Activities of this session included journal entry #1 at the beginning and journal entry #2 at the end, LOGO command explanations to Mary by the participants due to her absence in Session I, and completion of paper assignments #1 and #2 by the participants.

Though snow was falling heavily outside, Session III began in the conference room with the following objectives: to discuss time management as shown on the white board, to complete LEGO activities as a group, to review LOGO commands on the computer, and to have participants write in the journals at the end of the session. Participants started and became deeply involved in the LEGO tasks. The session concluded with completion of journal entries.

Session IV convened with objectives to review the schedule on the board, to continue building with LEGO, to hook up the LEGO models with the LEGO LOGO computer, and to write journal entries at the end of session. The participants eagerly returned to the LEGO tasks begun during the previous day's session. They were interrupted by the facilitator for a review of the session schedule. They returned to the LEGO tasks, but did not accomplish the LEGO LOGO tasks. Again, the session was concluded with participants completing journal entries.

Amidst continual, heavy snow, the participants were gathered from their classes on campus and assembled in the conference room for the final session, Session V. Due to the home-going weekend that would begin shortly after the completion of the session and the inclement weather conditions, objectives were altered to allow the necessary schedule changes. Session V objectives were to review the schedule on the board, to explain the reason for the schedule change from the afternoon to morning session and from Monday to Friday session, to write LOGO commands of square on the board as a group and to discuss/share them, to hook up the LEGO models with the LEGO LOGO computer, to write journal entries, and to conduct Post-Interviews at the conclusion of the session. The activities of the session incorporated the writing of LOGO commands of a square on the board by each participant and an exercise by the participants to discuss and determine which set of commands was accurate and should be entered into the computer. The commands were entered into the computer and the participants then returned to the floor in an effort to complete one participant's LEGO model. Upon completion of the model construction, the participants attempted LEGO LOGO with the computer, experienced some difficulties, and resorted to the LEGO sensor activities. Session V concluded with

journal entries. The Post-Interviews, both individual and group, were conducted immediately following Session V completion. Photographs taken during the sessions are provided in Appendix J.

TIME LINES

The five sessions using LEGO LOGO activities in a group were 45 minutes each. Interviews were conducted prior to and after the sessions.

FORMS OF DATA COLLECTION

Extensive field notes were taken as I observed the students' behaviors and interactions. Reflective notes were added at the end of sessions to include any additional comments I had about the session. The reflections and daily review of data were conducted to give me insight into how the students were performing. They resulted in revisions of some activities and the use of individual projects within the group framework.

Photographs were taken of projects, materials used, and student work. The work on the computer was saved to a disk. Each session was videotaped to collect information on facial expressions and body language, to observe dialogue, to note vocabulary used, to note group interactions, to note the sharing of ideas, to note the nature of sharing, and to have a full record of the session so that my deafness would not hamper data collection.

Students made journal entries for each session. The interviews were videotaped and field notes of them were made as well.

INTERPRETING AND EVALUATING THE DATA

All data, including the videotapes, the journals, the pre- and post-interviews and the field notes, were reviewed literally, interpretively, and reflexively by me numerous times. This analysis and interpretation began at the close of the first session. After consultation with my committee members, it was decided that I myself as the researcher should be the expert to transcribe the tapes. The committee based this decision on the facts that the researcher is deaf, familiar with deaf language as well as the various signing systems used by the deaf, and familiar with LEGO LOGO. No other experts were available with these qualifications. The transcriptions were completed from the videotapes of sessions 2, 4, and 5 and reviewed numerous times as behaviors were coded. From the coding, categories were established for two charts, one into which student behaviors were entered individually and another with the same categories into which group behaviors were entered. The Individual Data Chart is provided in Appendix D and the Group Data Chart is provided in Appendix E. The coding of the data proved helpful in examining the actions and interactions of the participants, and aided me with vicarious experiences during the examination.

The data were charted from Sessions 2, 4, and 5. Session 2 rather than Session 1 was used since the first group interaction occurred during the second session, while the first one consisted mostly of the introduction of concepts by the facilitator. The sessions were transcribed and behaviors charted in intervals of the first 10 minutes, the second 10 minutes, and the last 10 minutes. The behavior of the students on these tapes was

considered to be reflective of their behaviors throughout the sessions. In addition to these data charts, charts of the pre-and post-interviews were completed and can be found in Appendix H. A chart of the participants' journal entries can be found in Appendix I.

As analysis and interpretation continued of the data, this researcher determined that additional information was needed from the sessions on the behaviors of the participants. To get a clearer view of the data available, I examined behaviors noted in the previous individual and group charts and added information from Sessions One and Three. These data were then arranged in list form and entitled Behaviors Observed in Sessions. This list can be viewed in Appendix F. The behaviors were arranged under two main headings: Behaviors Related to Attentiveness/Task Orientation and Behaviors Related to Student Interaction and Reaction. Included under the behaviors related to attentiveness/task orientation were the following behaviors of the participants: attentive/inattentive during facilitator/peer explanation, began/did not begin task in an appropriate manner, stayed on task, attempted/did not attempt to complete task, experienced trial and error and trial and success, and completed/did not complete task. Included under the behaviors related to student interaction and reaction were the following behaviors of the participants: shared pertinent information with group members, asked/did not ask group member about a task, checked/watched others or the environment, and got others' attention and reaction.

After completing this list, I determined that more specific information about certain aspects of the participants' behavior may be beneficial in the analysis. As a result of this determination, I viewed the second ten minutes of each session on the videotapes

and charted the number of times selected behaviors occurred. The results of this tally can be seen in the chart in Appendix G.

Throughout the analysis process, emergent themes were found. These themes and answers to the research questions are presented in the next chapter.

RELIABILITY, VALIDITY, AND OBJECTIVITY

As a final note in this methodology section, reliability, validity, and objectivity are addressed as they pertained to my study. Though all authors do not agree on how or to what extent reliability and validity should be addressed in qualitative studies, there are elements that are relevant, in my view. In discussing reliability, Mason (2002) states that reliable research has good research design, has appropriate methods, has been carried out carefully, and has been recorded accurately. Denizin and Lincoln (1998) state that reliability is present in a study if the findings can be replicated or reproduced by another. Using the parameters presented by these authors, I believe this research is reliable. The conditions set by these authors have been met.

Validity requires that what has been observed and identified is what the researcher says it is. Another way to view validity is to determine how well the activities of the research are matched to the research questions. I believe that observations and discussion of activities are accurate as they have been identified. The activities of this study presented the behaviors needed to respond to the research questions posed. How well the findings can be generalized to other groups is a matter for further investigation. However, to generalize to groups with the same characteristics as the group of this case study would likely be accurate.

Objectivity as defined by Denzin and Lincoln (1998) implies that research is free from bias. The data in this study provided me with opportunities to triangulate among the data and confirm events and incidences. The purpose in doing so was to minimize bias.

CHAPTER IV

RESULTS

INTRODUCTION

A group of five deaf students participated in this case study. They completed activities with LEGO LOGO throughout five sessions. Data were collected with interviews, observations, work samples, field notes, journal entries, and multiple video recordings of the sessions. Pre- and Post-Interviews were conducted with the students.

RESEARCH QUESTION ONE

1. How does a group of deaf students solve problems based on a specific assigned task utilizing LEGO LOGO?

My overall response to this question is that this group of deaf students did not truly function as a group throughout the sessions. There were instances confirmed in the data of some group functioning, but those instances occurred less frequently and were of shorter duration than what would be needed to gain optimal skills from completing these LEGO LOGO activities as a group. The students tended to approach and complete tasks as individuals. Even when encouraged to discuss how to solve a problem, to complete a task, or to come to consensus, not every student participated in the group framework.

In examining the data and observing during sessions, the practice of certain skills was noted as students worked within the group. From the literature, it is known that certain skills are considered essential for students to function as a group so that each

member of the group assumed proper roles with changing task demands and gained social, cognitive, and thinking or problem solving skills. Johnson and Johnson (1975, 1994) and Dotson (2001) included the following as essential skills: providing leadership, making decisions, exercising coming to consensus, having clear communications, trusting members of the group to complete tasks, and resolving conflicts or differences. These researchers insist that to function effectively in a group, students must share pertinent information rather than completed a task for another group member. In a functioning group, students ask for and receive help from other group members as well as coordinating efforts to accomplish tasks. Use of personal resources and emotional involvement as group members are necessary if group work is to lead to enhanced metacognition and learning.

Though this group of deaf students did not consistently exhibit the essential skills for group work, they brought to the sessions some individual skills and knowledge that could have been used to promote group work and learning. Mary understood hooking up the wires to the models. Though she did not explain the how and why of the hook-up, she was very willing to complete it for Mike. Mary was pleasant and very easy to approach. Bruce tried to lead the group to consensus and moved among the students trying to help them solve problems. Also, Bruce was willing to share and help throughout all five sessions. He had a gentle demeanor which enabled him to move among group members easily. With just a suggestion, he circulated among the group members, offering to aid them. He showed pride in his accomplishments and wanted to share them. In fact, he was impatient if he had to wait for attention to his completed task. David watched the work of others and commented with helpful ideas. Hallie organized, even when it was not needed.

Hallie seemed to sense when an activity was to begin. She passed out journals without being asked. Mike had computer keyboarding skills and prior experience with LEGO, but he tended to dominate and not share.

One example demonstrating a lack of group skills included an incident in Session 3 when Mike was putting the directional buttons together. David picked them up and expressed a need to share them with Mike. Mike took them back and continued to work individually. David then approached other students, but no one would share. David did not attempt to resolve the issue through compromise. He offered no reasons why he needed to share or how others could share with him. He appeared to accept that other students would not share.

In Session 4, Hallie appeared angered that Bruce took a LEGO piece that he needed for his model from the LEGO box she had organized. Hallie's apparent feeling of ownership of the LEGO pieces continued in Session 4 when Mary asked for a LEGO piece. Hallie initially refused to give the LEGO piece to her. Mike showed a similar apparent feeling of possessiveness in Session 1 when he began working at the computer even before the facilitator completed the full explanation. He continued at the computer and pushed a student's hand away to prevent him from entering information.

At times, students ignored each other. In Session 2, both Mike and David ignored Hallie when she requested them to move so she could see the work being done. In Session 3, Mike ignored Hallie and Mary several times when they sought help. At one point in Session 4, it appeared that Mike created tension by initially ignoring a request from the facilitator to permit Hallie to get in a better position. The facilitator pursued the

request, and Hallie moved to a better position. Hallie appeared upset. She was encouraged to work with Mary and Bruce after this incident, but she did not.

So, what did the students do during the sessions? From the tally of behaviors during the second ten minutes of each of the sessions, it appeared that students were attentive to the facilitator and to each other much more than they were inattentive. However, the chart seemed to indicate that some students were neither attentive nor inattentive within the time frame. Explanation for this appeared to be that the activities of the second ten minutes of the sessions did not always require dialogue to which there was the option of attentiveness or inattentiveness. Though such dialogue was appropriate in group work, the students tended to work more individually without questioning or learning from others. This observation was supported by the tally of on task comments. Even casual talk while on task was very limited so it appeared that casual talk interfered very little with on-task behavior. As the tasks progressed through the session, it was noted that the students stayed on-task without any verbal or signing interactions. Perhaps this indicated their fascination with the tasks and provided insight into their reasons for later referring to the work as fun.

Yet there were definitely times when inattentiveness prevented working within the sessions. In Session 2, Mike started the activity before the explanation was completed. Inattentiveness also slowed the transition from one activity to another at times. In Session 1, the students did not attend as the facilitator began instructions on LOGO commands. Instead, they looked at their folders or toyed with the white board markers. Such was the case, also, in Session 5 when the students did not respond to the light blinking signal to attend to the facilitator and get instructions for the journal entry.

Light blinking had been used successfully during other sessions to gain students' attention.

Inattention sometimes necessitated an additional explanation such as LOGO commands for Mike in Session 1 at the table and at the computer. In Session 2, the group task had to be explained to Mike twice, because he toyed with the keyboard rather than attend. In Session 4, the journal entries had to be explained to Hallie a second time. Perhaps her vision interfered. In Session 5, cooperative issues were explained a second time to Mike and Hallie.

The resulting tally on attentiveness/inattentiveness in Sessions 3 and 4 was expected since the students were busy with the LEGO LOGO assignments.

Attentiveness/inattentiveness was further documented when examining the on-task working without any verbal or signing interaction. The students were engrossed in model building and LOGO tasks. As a result, they had a little need for interaction or need for instructions. However, this would have been a time when sharing of ideas and concepts could have led to skill building.

Moreover, there were times when the students should have attended to the speaker to promote group cooperation or to get ideas from other group members. Such was the case in Session 2 when Hallie asked Mike and David to move so she could see the work being done. They ignored her. The failure of Mike and David to move and Hallie's subsequent reaction excluded her from group participation. During Session 3, Mike ignored Hallie's requests three or four times when she sought help to complete a task. The same was true when Mary sought help from Mike.

As mentioned previously, the students stayed on task for far more time than they stayed off task. However, off-task behaviors were noted, and they were totally unproductive at these times. An example of this behavior was Hallie continuing to needlessly sort LEGO pieces in the blue box. During this time, she should have been working with Mary to get the needed pieces for their selected model. Mary sorted the pieces according to the picture of the model to be built, but Hallie organized the unneeded LEGO pieces.

In a few instances, an outsider created a disturbance that took the participants off task. As mentioned before, the computer lab where Session 1 was held was apparently a break room for some staff at the school. Two other times, a person or a commotion from the hallway disturbed the students.

With deaf students, visual checking of the environment is not unusual in my experience. However, the videocameras provided minor distractions. David and Mike both proudly shared their success with the volunteer operating the camera in Session 1. In Session 2, Mary watched the cameras as she waited for the facilitator's attention or waited to begin another task. David and Bruce attended to the cameras in Session 2 as well. Mary again watched the camera in Session 4. David watched it and appeared embarrassed to be in the spotlight.

In order to examine overall behaviors of the students for a comparison, the selected behaviors tallied in the chart in Appendix G were further evaluated by establishing ratios and are presented in Table 3.

The ratios of attentiveness to inattentiveness certainly indicate that the students were more attentive as the facilitator or group members gave directions or shared

Table 3: Ratios for Selected Behaviors in the Second Ten Minutes of Each Session

Comparisons	Session 1	Session 2	Session 3	Session 4	Session 5
Attentive: Inattentive (to facilitator and others)	9:1	6:1	2:1	None of either behavior	4:1
On Task : Off Task	No off task behavior	7:1	4:1	5:1	17:1
On Task Comments and Discussion : On Task Casual Talk	3:1	No casual talk	2:1	6:7	8:1

comments. The ratio in this comparison in Session 3 is somewhat misleading since the students were busy with construction and the need for attention to either the facilitator or other group members was limited. This limit was imposed by the students working individually rather than as a group. It would have been desirable for the students to ask and share as they completed constructions.

On-task behaviors were consistently present more than off-task behaviors. It is of great interest to note the ratio of these on- and off-task behaviors in Session 5. The students were observed to be engrossed with the tasks at that time of the session. This certainly suggested that the LEGO LOGO tasks held their interest and kept them productive, even if on an individual basis.

The ratios for the type of on-task communication piqued my interest, especially in Session 4. During the time when the models were constructed, there was more casual communication than comments and discussion. This was indicative of the numerous observed casual comments that the students made to each other during the construction process. Then, in Session 5 with the emphasis on review of LOGO commands, the type

of communication between students was much more related to LOGO. Casual comments were rare. The students communicated about the commands and the results of the commands they wrote.

A review of all the data, samples of which are in Appendices D through I, shows numerous incidents when the students functioned as individuals rather than as group members. Throughout the sessions, Mike frequently worked in what Johnson and Johnson (1975) referred to as individualistic style. David, too, tended to work alone.

However, at other times, the students exhibited their individual skills previously mentioned and functioned as a group to accomplish a goal. The first of these was noted in Session 2 as they taught LOGO commands to Mary. This teaching was needed since Mary had been absent for Session 1. The students acted out commands, added to what other students explained, and checked Mary's comprehension of what was being explained. David was involved with every member of the group throughout the explanations. He corrected two members of the group during their explanations to Mary.

Mary continued to depend on information from Mike and David as they began Paper Assignments #1 and #2. Both boys offered extra explanations. Mary observed their work rather than complete her assignments.

During Session 4, David shared his completed model with all the students. He did not explain how he accomplished the task, but he shared the completed construction and the movement after the hook-up.

At the beginning of Session 5, while writing LOGO commands to draw a square, all the students worked individually, declining to follow the facilitator's instructions to work as a group. It seemed they fully expected the facilitator to tell them what to do next.

Though the facilitator explained several times how to discuss options for the commands as a group, most of the students continued individually until Bruce began interacting with the group members. Mary sought and received help from Hallie to write commands. Then, after the facilitator reminded the participants how to agree and disagree, Bruce and Mike conversed. Then Bruce, Mike and David conversed. Mary and Hallie conversed with each other. David came to an agreement with Bruce and Mike to try Mike's commands on the computer. Bruce and Mike attempted to convince Hallie to agree with trying Mike's commands on the computer. Hallie finally agreed and discussed it with Mary. Mary just seemed to acquiesce to the decision.

After agreeing that Mike's LOGO commands would be used for the computer entry, Mike entered them into the computer. Bruce and David debated with him as to what was right and what was wrong. Bruce and David shared ideas with the facilitator as well. The facilitator tried to encourage Hallie to move and be more assertive, but she chose to stay with Mary and just watch.

After the computer work with the LOGO commands, the group worked on the floor trying to complete Mary's model. Hallie was about to give up. Then, Bruce and Mary encouraged her to cooperate. Bruce told Hallie that her father would be proud if she worked with the group.

After the work on the floor, the group went to the table for LEGO sensor activities. Mary and then Hallie spoke with Mike about the sensor and then Mary and David spoke about the activity. Bruce attempted his work with the sensor alone.

Sometimes the students worked in pairs. During Session 1, the students shared information about the LOGO commands they had entered into the computer with the

person seated next to them, but not with other members of the group. Bruce guided Hallie as she entered the LOGO commands into the computer. Through trial and error and trial and success, they shared experiences. David and Mike shared their experiences with each other as well. Two conditions may have contributed to pairing for this work. The computers were in a row against the white board, and only four members of the group were present for the session, making pairing by twos easy.

During Session 3, the participants were to construct LEGO models as a group. It was permissible for them to build individual or pair models, but they were to share information in construction so that each attempted model was completed. Hallie and Mary teamed up rather than work in conjunction with the boys. They spent much time looking at or arranging LEGO pieces rather than getting started on the construction of the model. Though they discussed how to receive help from other members of the group, they chose not to do so. Mike and Bruce teamed up for few minutes but when they couldn't make a decision as what to do since both had individual LEGO boxes; they worked individually. David worked alone on the construction though he tried to get Mike to share the battery box. Mary gave some assistance to Mike later in the session with plugging the wires into the battery box. She had figured out how to do this task before the other students.

In Session 4, after Bruce completed his model, he tried to assist Mary and Hallie with the model on which they were working. Hallie had worked with Mary, but stopped after Mary switched places in an attempt to prevent Hallie from doing unnecessary chores, such as organizing LEGO pieces into box. Both Mary and Hallie had completed similar tasks with the battery boxes. Mary did another task with the directional box while

Hallie did not. Mary encouraged Hallie to continue working on the model as she showed her the picture, but Hallie continued to organize the LEGO pieces in the box. So, Bruce and Mary worked on the construction.

During Session 5, Hallie was about to quit. Both Mary and Bruce encouraged her to stay on task. Bruce even told her that her father would be proud if she worked in the group. Later on, during another activity at the table, the students shared their work after the facilitator informed Mike to let others experience what he had completed. After the final session ended and the facilitator conducted individual interviews, the participants worked individually on activities of their choice.

RESEARCH QUESTION TWO

2. What types of language expression do deaf students use to solve problems during LEGO LOGO activities?

It was observed that students did not often use language on ways that would be needed to function as a group: to gain information, to foster sharing of ideas, to take turns, to come to consensus, or to name objects and actions used in their activities. Language tended to be used more for personal use than to promote group work. As a result, the paucity of verbal language usage limited the sharing of knowledge and the processes used to complete tasks. This was counterproductive for learning through group interaction.

The sharing of ideas through language during the activities occurred most during Session I between pairs, Bruce with Hallie and David with Mike. These pairs appeared fascinated with the movement of the turtle on the computer screen, especially when the

wrong number was entered and the turtle went off the screen. They exchanged information with each other as to what they entered on the keyboard and what happened.

During the explanations of LOGO commands to Mary during Session 2, the students used appropriate language. However, the students would demonstrate with body movement rather than words for some of the commands. They used language to communicate agreement or disagreement with each others' explanations.

An additional time that students demonstrated language usage appropriately was during the board LOGO writing exercise and subsequent computer task during Session 5. While there was not total group participation, every member of the group had the opportunity to participate. Additional encouragement from the facilitator was required to initiate the discussion, but Bruce led the group to choose Mike's answer to enter into the computer by explaining why he thought Mike's written response was correct. Bruce, Mike, and David continued to discuss each part of the commands as they were entered them into the computer. Hallie and Mary watched this part of the session without any input or questions.

During Session 2, Hallie asked Bruce for assistance with Paper Assignment #1. She indicated that she had forgotten a command from the previous day. David asked Mike about the number of degrees needed for a command. Mike informed him that it was his choice, but did not explain why that option would work.

When Mary appeared uncertain how to approach Paper Assignments #1 and #2 during Session 2, she watched Mike and David. Both boys offered explanations of what they were doing. Mary appeared to watch and listen intently, but she asked no questions

nor did she indicate that she understood the explanations. She wrote nothing on either of the assignments.

During Session 2, Bruce and Mike shared ideas of what to do with the LEGO pieces for model construction. When they did not agree, rather than come to a compromise, they chose to work alone.

During Session 4, Mary had a problem disconnecting a LEGO block from her model. The facilitator noticed that she had the wrong block and could not proceed with the construction until she changed it. Bruce noticed Mary's dilemma as well. He helped her disconnect the block, but they shared no language about the problem or its solution. Mary did show Bruce the picture and pointed out the problem area.

During Session 5, Mary asked Hallie about the LOGO command. Hallie drew the figure and gave Mary the commands needed, but she did not explain. Mary missed an opportunity to get information that might have helped her with future work and helped her think through the task.

During Session 2, when the facilitator asked if the group agreed with her command, only Bruce responded with the concept of opposite for the needed commands to draw the square. By doing so, he demonstrated that he had thought the process through and had some kind of mental understanding of what was needed to complete the task.

David briefly explained how he constructed his model and how the battery box worked in Session 4. It was obvious that he had processed the needed steps for the construction and completed the task. However, the group members could have learned more and possibly been more successful if David had shared information during the

process so that each group member would have the opportunity to work through the process and apply the gained knowledge to their constructions.

Though the students indicated question usage with the appropriate facial expressions, they tended to question surface issues, rather than probing for information needed for the tasks. They were much more likely to use a questioning facial expression when they desired a yes or no answer. It appeared that using traditional question forms of what, how, when, and why may be needed to obtain information on which to build progressive concepts or to reorganize present knowledge. These question forms were not expressed by the participants and appeared unfamiliar to all but one of the participants in the post-interview.

At several times it was obvious that thoughts or some form of nonverbal language had occurred. During Session 2, three such incidences occurred. Bruce completed Paper Assignment #1 without any assistance from others. He was observed moving his hands in different directions as he checked his answers. Mary used model picture to complete the wiring task. She appeared to have no problems moving from the two dimensional picture to the three dimensional construction. David completed the construction and figured out how to work the directional buttons. He used trial and error or success and then added more wires for different directions. David had no prior experience with LEGO LOGO, but he reasoned out and completed the necessary steps to complete the task. He looked at no pictures of steps nor did he ask for any assistance.

The language used by the students sometimes had to be interpreted to discern the meaning. During Session 1, David asked the facilitator, "Why 500?" He meant 50. He was trying to show that a large number would make the turtle disappear from the screen

on a horizontal plane. During Session 2, David used the ASL sign and question indicator for “What it said?” He meant to ask what he was to complete on Paper Assignment #2. Also during Session 2, Mike signed, “Two weeks?” He again signed, “Two weeks?” and a third time, he signed “Two weeks?” It was determined that he was asking if the LEGO LOGO sessions would last for two weeks. During Session 3, Mary signed to the facilitator, “Don’t know fix mistake mistake need help?” [Direct word for sign transcription] The English translation of this utterance is, “If I don’t know how to fix the mistake, then can I ask them for help?” It was determined that she was asking whether, if she did not know how to fix the mistake, she should get some help. The facilitator encouraged her to get help from other group members, if needed. Also during Session 3, David signed, “Each one each one right?” He was asking if each person should get one battery box.

The expressive language systems used by students in this study reflected the diversity among signers reported by Lucas (1995). Residential schools, she purports, are the centers for dialect innovation since so many students come to them with varied language backgrounds. All the students in this study primarily used signs for communication. Bruce used Pidgin Sign English (PSE) and some English signs. Mike used PSE and many facial expressions. Both Mike and Bruce appeared to function at higher language levels, receptively and expressively, than the other group members. Mary used ASL primarily with some PSE. She did not use much expressive signed language, but she used much body language and facial expressions. It was observed that she appeared to learn more language during the week and used it with the group and facilitator as the sessions progressed. Hallie used primarily English signs and some PSE.

David used PSE with lots of facial expressions. He used language primarily to call attention to an error, or give some pertinent information or explanation.

EMERGENT ISSUES/THEMES

Of particular interest were the issues/themes that emerged from the data. Issues/themes seem to emerge from the data in three areas: group/social skills, time management, and language. It appears these three issues/themes are somewhat interdependent. A possible fourth issue/theme of gender also arose, but its significance was not observed as often as the first three issues mentioned.

GROUP/SOCIAL SKILLS

In the group interview, the participants, in addition to indicating they desired more time and more sessions, indicated they preferred to do group assignments rather than individual assignments, but they wanted individual computers for LOGO commands. All agreed that doing group assignments benefited them by helping to complete tasks, to think better, to share, and to discuss in depth. In addition, they said the group work was fun. I believed that having fun with activities that facilitate learning is of great importance since it promotes motivation to continue and to complete activities.

The positive comments about group work from the students in post-interviews, were somewhat unexpected, given the findings on research question one of limited group interaction. What the students perceived as group work could have been the times they did function together. However, they seemed unaware of the many opportunities missed for learning from the group. Johnson and Johnson (1994) suggest that cooperative

learning should be used “to increase student achievement, create more positive relationships among children, and generally improve students’ psychological well-being” (p. 60). Yet, Azwell, Harvey and Lyman (1993) stress that it cannot be assumed that students have necessary social skills for successful participation in groups even if they have had experiences previously. Some of the reason for this is that cooperative learning moves student thinking beyond drill and practice and requires them to generate some original ideas. Kretschmerr (1997) agrees that d/hoh students required authentic interactions to learn communication skills for narrations, descriptions, explanations, persuasions, and instruction-giving. They need explanations for solutions rather than just knowledge of how to arrive at solutions or to see finished products.

The behaviors exhibited by these deaf students during the sessions appeared to indicate that they, indeed, would have benefited from authentic practice in developing group skills. Though they stated they had some experience working in groups, they rarely demonstrated skills for group communication that encouraged thinking and sharing.

Perhaps these students became individual workers or pair workers because they had difficulty with the amount of information or communication required for a fully functioning group. Garay (2003) states that d/hoh students need time to think about what they needed to say. The students in Garay’s study reported that everyone was talking so fast, they couldn’t understand the question so they said nothing. Garay recommends teaching students to share opinions and to respond positively to shared information. Also, he proposes teaching questions in different situations for students to gain experience in authentic settings. It appears that the students could have benefited from learning to share

information. Perhaps, a slower pace of activities could have encouraged more information sharing.

TIME MANAGEMENT

The four students who attended, Mike, Hallie, David, and Bruce, did not pace their activities during Session 1 to allow for time to complete the journal entry at the end of the session. They had been given the expectations for the session, but they did not readily change activities to accomplish the expected tasks.

Neither discussing the schedule for sessions 2-5 with the students nor leaving the schedule in view for reference seemed to encourage the students to pace themselves and complete tasks in a more timely manner by getting help from group members or by sharing what they knew to help others move on with the task. It was possible that the circumstances of having only five sessions and the knowledge that this was voluntary influenced the use of time as well. However, the data suggest that the students were lacking with regard to concepts related to time management and to pacing themselves in activities. For timing, they were far more facilitator-directed than self-directed.

Lack of wise use of time and proper pacing was easily observed during the journal writing. Hallie wrote little, but took much time to complete the first journal entry. It was obvious that her group members were distressed by this slowness. Hallie again wasted time in Session 2 when she continued to look for batteries in spite of the fact that I told her additional batteries were not available. It was possible that she had not set a goal of completing the task and was simply passing the time. In Session 4, Mike and Hallie spent

much time during the journal entry off-task. In Session 5, both David and Mike played with LEGO intermittently during the journal-writing time.

It appeared during the writing tasks, especially, that time was not used wisely. This could very well be linked to the language skills of these particular students. Thinking of what to write, as well as knowing the forms to express their thoughts appeared to be difficult.

There are facets of group work that may be a reason for less than ideal time management. Mulryan (1995) states that group work involves greater uncertainty and unpredictability than more traditional instruction. He concludes from a study of 46 fifth and sixth grade students that if they benefit from small groups, they have to adapt their behavior and engagement to the demands of the setting. Mulryan also notes that the teacher must set expectations for all members of the group to contribute and to achieve success. The teacher, not the group members, may create a caste system of helper and helped.

Two aspects of time management that should be considered are being able to predict how long a task will take and being aware of time in passing. In a study of 48 adults, Francis-Smythe and Robertson (1999) found that those who reported themselves to be good planners and schedulers were accurate in estimating the duration of the task but poor in estimating time in passing. Perhaps they depended on external clues to pace themselves. From my observations, it was not apparent if these students failed to manage time for either of these reasons. The relaxed atmosphere of a volunteer project may have contributed to the students' inefficient use of time.

Aiding students to understand and practice time management appears to be needed. The skill of time management is a useful lifetime skill in academic and nonacademic settings. For time management skill development, Sweidel (1996) suggests the use of a study strategy portfolio. The keeping of the portfolio not only can help students evaluate their successful study strategies, but also can guide the students into better time management.

Just like the development of group skills, the development of time management skills should begin at an early age. In a longitudinal study of students observed during prime academic instruction from first grade to the end of third grade, Greenwood (1991) found that the instructional practices employed by teachers greatly influence the students' use of time. Genn (2003) suggests that educators should begin in the primary grades to help students manage time. At that level, the teacher should guide students to set objectives and priorities; to think first about sequence that is how and what is needed to complete tasks; learn not to procrastinate; to estimate time needed to complete tasks; to finish one part before starting another; to reduce distractions; to start with tough items; and to take advantage of small amounts of time.

For those students who exhibit poor time management skills, several researchers have studied successful programs. Smith and Young (1992) observed mildly handicapped students who exhibited high rates of off-task behavior relative to peers during independent seat work. Students were given a point card and rated behavior three times during a 30 minute time segment. If their rating matched the teacher's rating, they got points that could be exchanged for free time, magazines, or sodas. However, Smith and Young questioned

carryover outside of the structure. As with any skill development, success often necessitates follow up and follow through into all the desired areas.

Buisson and Murdock (1995) used a system similar to that described by Smith and Young. They studied two d/hoh students in an attempt to shorten the latency period after the assignment was given. Tokens were given for a quick start on the assignment. The tokens could be used for edible treats, school supplies, free time, use of typewriter, and/or a homework pass in one subject. Behaviors were reinforced for the start of the assignment only, but the more efficient use of time generalized to the assignment completion.

Perhaps, the five sessions in this study were not sufficient to determine if familiarity with LEGO LOGO and journal-writing expectations could produce more efficient use of time. However, observations tended to support the conclusion that the students were accustomed to teacher-directed pacing.

LANGUAGE

While lack of academic language certainly contributes to the low achievement for many deaf students, it appears that more language could be taught through group experiences. However, it may be necessary first to teach and practice group/social skills with appropriate language so that students' interactions can more effectively build additional language skills. Many factors must be considered to determine the necessary language skills for students.

Determining how or what language to be taught has long been an area of controversy in the education of d/hoh students. Strong (1995) indicates the importance of adult linguistic role models for students, involvement of the Deaf community in

education, and language classes for parents and staff members. Strong presents the model of the California School for the Deaf in Fremont, where the supportive work of deaf adults has become a resource for aiding students with ASL skills. He stresses that decisions about the teaching of language have to be made on an individual basis. Students who acquire English before deafness need to be taught ASL as a second language. Students who use ASL as their primary language need to continue to learn ASL, but also need English for reading and writing. Those who can use speech should have speech taught during language sessions.

An arbitrary decision about the language taught in the classroom is not desired. Doyle and Maxwell (1996) conducted a study with seven students, ages nine and ten, and observed that formal lessons elicited a variety of communication styles. Each student modified signed and spoken language in different ways. How this was accomplished depended on the student's emotional identification with the individual whose language the student assimilated. To determine what language should be used and what language should be taught, a careful description of the student's repertoire and sense-making efforts should be documented. Doyle and Maxwell (1996) argue that research is needed to determine the different patterns constructed by students and to combat the assumption that patterns of correctness and deviance exist. Instead, diffuse patterns of linguistics features exist.

The varied patterns of linguistic features of the language of the students in this study were noted in response to Research Question Two. These observations supported Doyle and Maxwell's views. Though Stokoe (1972) suggests that fingerspelling or signed English contaminates the purer ASL dialect, d/hoh students with hearing parents tend to

come to the school setting with these elements in their language. Many various forms of expressive language were observed in the students of this study. Doyle and Maxwell note the importance of examining the language of d/hoh students individually as a first step to planning language teaching. Some combination of continuation of the d/hoh students' primary language and the addition of the second language appears necessary to help students develop language skills for academic success.

The language form of greatest concern for students in this case study was the use of questions. As Baker and Cokely (1983) explain, ASL has two related signs that indicate a sentence is a question. One involves the wiggling question mark with the finger and the other is a combination of the brow squint, brow raised, tilting of head, body shift forward, and sometimes raised shoulders. The students in this study appeared to understand the use of these indicators for questions, but they did not use questions to gather information that would have enhanced group work and resulted in learning about learning or acquiring more information to be used for future constructions and projects.

The deaf students in this study tended to use questions that required yes or no answers. Their responses about question forms in the post-interviews suggested unfamiliarity with wh-question forms. McAnally, Quigley, and Rose (1994) suggest that the development of question forms for d/hoh students is similar to that for hearing students: the first to develop is the easiest form requiring yes or no responses. Then, the wh-questions develop followed by tag questions, such as, "We'll go, won't we?" (p. 49). McAnally, Quigley, and Rose (1994) indicate that some of these forms are not mastered before the age of 18.

The students in this study certainly needed wh-question forms to gain academic information in the group activities. From their performance, one would wonder to what models for questions they had been exposed. Lieven, Pine, Rowland, and Theakston (2003) also examined the order in which wh- questions were acquired, looking at determinants, linguistic complexity and input frequency. Their study included 12 two- and three-year old children and their mothers. Input frequency, rather than complexity, was the more powerful predictor of order of acquisition. Perhaps, practice with the desired wh-questions was indicated for these students.

Another issue related to question formation that emerged in the study was the modeling of questions at higher levels to promote learning. Questions used to promote mental activity and thinking increase learning. Wilson (1991) recommends elevating the level of questions in order to affect how students learn. Moving beyond the simple recall question to questions that require students to apply learnings and think critically is desired. Of special importance are the questions that require evaluative thinking in order to respond, a skill especially helpful in group work.

As mentioned before, controversy exists about the many options for teaching language to d/hoh students. This controversy relates to more general concerns about the language of d/hoh students. Coryell and Holcomb (1997) present options for sign language and sign systems, reviewing Manually Coded English (MCE), PSE, and ASL. MCE, which includes such options as Signing Exact English (SEE), is often attractive to parents and teachers because it is based on a language familiar to them. Speech was used as English is manually coded. However, MCE raises concerns among experts who consider it to be artificial and cumbersome, and who believe that the overlay of English

speech and signing is complex and difficult for d/hoh students to process cognitively. Most importantly, MCE has no native language models.

Though unfamiliar to many parents and some teachers, ASL offers a language system that is easily and quickly acquired by most d/hoh children when they have fluent adult models. It serves as a first language for many, providing a framework for second language acquisition. Because it is not possible to speak English and sign ASL simultaneously, students have no speech output. Coryell and Holcomb express concern that sufficient empirical findings do not exist related to the effectiveness of ASL for instruction and its transferability to English acquisition.

PSE is a combination of the grammar and syntax of English without most of the function words and naturalness and richness of ASL. It varies widely depending on the individual's background. However, it had the advantage of being relatively accessible to both d/hoh and hearing persons, as well as to those whose primary language is ASL. The observations of the communications used by the students in this study support the claim that ASL users generally understand PSE.

However, simply recognizing that the students in this study were able to communicate with various forms of language does not address the problem of the level of language they demonstrated in the sessions. For these students, as well as for other d/hoh students, a language without stigma attached is required. Johnson (1999) recommends that English be taught to d/hoh students with the same status as ASL but with an emphasis on reading and writing.

Language use for students extends into and from the home and community. D/hoh students begin language-learning before entering school. Kuntze (1998) supports ASL as

one of the home languages for d/hoh students. He notes that too many d/hoh students came to school without adequate skills in any language. ASL as the first language fosters the development of communication skills, but the question remains whether ASL-acquisition fosters literacy development. There is no written form of ASL so d/hoh students in the United States must read and write in English.

Kuntze suggests that the ideational use of language is of interest to determine if students are engaged cognitively when using the language to communicate. Thinking and reasoning, or ideation, probably forms a basis for literacy development and is promoted by the continual process in communication with others. The journal entries, as well as the academic-context related communication of these students in this study would offer reasons to examine their language instruction to determine if they were engaged cognitively.

GENDER

Possible gender issues were noted in Session 1 as Bruce guided Hallie in typing LOGO commands on the computer. During Session 2, some gender issues were noted in the way the participants handled the explanation of LOGO commands to Mary. During the explanations the participants all criticized each other, but in spite of the criticism, all the boys continued their explanations. Hallie, on the other hand, gave up and did not continue her explanation after criticism. Later in Session 2, when the paper assignments were presented for the participants to complete individual sheets as a group, the boys started immediately. Mary chose to watch Mike and David working on the assignments and have them explain what they were doing rather than complete her sheets and discuss

the tasks with the other group members. By this time in the session, Mary had the same information as the other participants, though she may not have felt as comfortable with the information since she had been absent the previous day.

Mary's behavior tended to reflect lower achievement. Webb (1985) reports lower achievement for female students when in the majority or minority of the group is engaged in cooperative learning. Webb concludes that higher achievement is the result of giving and receiving explanations at critical points in projects or learning. Learning to give and receive information could be included in the teaching of group skills.

Issroff (1994) may have an explanation for some of the behaviors exhibited by the students. He worked with 13 and 14 year old students and found that though there was no difference in actual success or perceived success of the girls and boys, there were differences in approaches to the tasks. Girls were more concerned with social factors such as being liked or respected, and boys were more task-focused. This may explain why Hallie withdrew when others disagreed with her and the boys continued to express their opinions.

Another possible explanation has been noted for the different approaches to tasks. Scanlon, Murphy, Hodgson, and Whitelegg (1994) suggest that boys and girls may have difficulty communicating because they have differences in the perceptions of what is relevant. These researchers, working with students in primary science classrooms, found that boys and girls had different perceptions of the relevance of some aspects of the concepts presented.

Another gender issue/theme that emerged from my observations concerned roles. Francis (2000) discusses power inequalities, stating that though many of the inequality

issues have disappeared due to media attention, girls tend to continue paths in arts and humanities and boys tend to continue on paths in science and technology. The combination of roles and approach may account for the way the students related to the tasks in the sessions. But, it should be noted that in the interviews, all participants expressed having fun. Some also expressed desiring more time at the close of Session 5. Motivation would have to be considered in evaluating this request.

Another aspect of gender issues manifested itself as a comparison of what students said about their work in relationship to what they actually completed. Thompson (1994) observed preschoolers while they completed puzzles. The girls frequently signed that they could not do the task or asked where a piece of the puzzle would fit. However, this self-deprecatory communication style did not reflect inferior ability: both boys and girls finished the task within the allotted time frame. The communication of the girls may bias to observers. Yet, in Mary's case in Session Two, this was not the case. She did not ask questions throughout the explanations nor did she complete the paper assignments.

Fitzpatrick and Hardman (1994) report on their studies of group work on computers. The girls they observed could be equally assertive as boys when working in girl-only groups. In mixed groups, however, the boys were willing to dominate and girls were willing to permit the domination. Fitzpatrick and Hardman (1994) convey that students found it difficult to cooperate in mixed gender pairs in primary classrooms. Boys tended to exhibit a competitive individualistic style. Girls preferred a cooperative style with mutual sharing of ideas. During Session One, Hallie was willing to be dominated initially as work at the computers began. However, she began sharing as the session progressed. Perhaps, continued male dominance is more prevalent in primary grades than

in upper elementary grades. In Session Three, Hallie and Mary did pair up rather than work with any of the boys.

Yelland's (1994) work confirms some of the previously noted gender behaviors. Yelland studied three gender pairs of primary students, girl/girl, boy/boy, and boy/girl, solving tasks with floor and screen versions of LOGO. The girl/girl pair tended to react in a more emotional manner to computer crashes. They criticized themselves and each other. With the floor turtle exercises in this study, the girl/girl pair made far more moves to complete a preliminary task and took more time to complete the task than either of the other two pairs. The number of moves was influenced by the lower numbers they initially chose for the task. The number of errors for all three groups was low. With the screen turtle tasks, the girl/girl pair tended to have much discussion before a move as compared to the boy/boy or boy/girl pair. The communication between the other pairs tended to be more about disputed moves. Rather than come to consensus, the person controlling the keyboard usually made the decision. With tasks for which accuracy was important, the girl/girl pair was more accurate than the other two pairs. At the end of the study the girl/girl pair changed their performance so that they made fewer moves in less time than the other two pairs. Thus, it appears that practice changed some behaviors thought to be gender-related.

What may be considered gender issues may have basis in other issues or areas. Gallas (1998) states that boys and girls each need some of what the other had, but traits they bring to school are not mix-and-match variety. Sometimes the category of gender is blurred and is moved into other social domains. Each classroom is unique and each individual "represents an evolving consciousness" (p. 146). Further, Francis (2000) states

that social class and ethnicity affect educational achievement and somewhat define gender identity. In the classroom, boys tend to monopolize space vocally and girls tended to draw attention to themselves. Francis (2000) recommends consulting with the students themselves on gender issues - some pupil self evaluation along with teacher assessment and explanation. She states that gender positions are not fixed or adopted by all pupils. Deconstructing current gender constructions is not a simple role reversal, but allows both genders the freedom to experiment with more positions and have equal opportunity.

Gender identity is integral to successful social identity. Young children go to great lengths to maintain gender boundaries. Abraham, Cavallo, and Saunders (1999) report that male students they studied were more likely to believe in reasoned knowledge in science while female students were more likely to believe in the received nature of science. Students became a source of scientific knowledge for themselves when allowed and encouraged to do so. Students who believed that knowledge comes from an external source tended to memorize. Abraham, Cavallo, and Saunders (1999) argue that teachers need to be aware of what message their teaching behaviors send to students. With awareness, teaching behaviors that set gender roles in activities should then be changed so that students have the opportunity to fully explore concepts from many perspectives. Awareness of these issues and practice of skills for working together may prevent these issues from interfering with learning and academic success. The observed differences in this study suggested different explanations related to gender. However, with the teaching of group/social skills and language, increased knowledge of expectations may resolve these issues.

INTERDEPENDENCE OF THEMES

An interdependence of the themes, especially those of group skills and language, emerged as language used by the participants was examined. The lack of group interaction during the process of task completion appeared to be partly due to lack of appropriate language skills and vocabulary to share effectively. Practice with mock group work using appropriate language might have been valuable for these students. In addition, vocabulary sessions to teach the names and parts of the materials used for the tasks seemed to be needed. Such vocabulary could be taught at much younger ages than the ages of these students. With LEGO, there are some relatively simple terms that could have been used to get the right piece to continue a construction. When appropriate, I shared names of items with the students, but they did not seek the information. There were times the students needed a four hole piece, a red piece or a long rod, but they did not indicate that. They were unable to attach the next part because they used the wrong size or color in the original construction.

An interdependence of time, group work skills, and language became evident during the journal-writing. If the students had had more advanced language skills, writing, an expressive form of language, might have proceeded more quickly and might have included more details. The interdependence of time and language was noted as well: when the students tried to agree on an answer to be used to enter into the computer, they did not use vocabulary or language forms appropriate to note strengths and weaknesses of the possible choices nor did they truly discuss options and reasons for choices. One student made a decision and attempted to get the others to agree with that decision. Rather than agree because the best answer was given, some students simply accepted a

decision that was chosen or imposed, thereby withdrawing from it, and from the group.

Much time was taken to obtain agreement from all group members with a specific answer rather than to select the best choice after understanding the options.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

SUMMARY

This case study examined the interaction and language usage a group of five deaf students as they worked in five sessions completing LEGO LOGO activities. Missouri School for the Deaf was the site for this research.

The review of literature focused on three main areas related to the study: group work; language cognition and thinking; and LEGO LOGO. The research and information included in the review of literature left no doubt that student learning and thinking were enhanced through group activities. (Cooper and Robinson, 1995; Gokhale, 1995; Kafai, 1995 and Slavin, 1985) These group activities were an application of Vygotsky's Zone of Proximal Development (ZPD).

McAnally, Quigley and Rose (1994) presented the importance of social interactions for language development, even for the prosodic elements. Lenneberg (1967) and Schwarz (2002) concurred that language development should occur at early ages and was limited after puberty. Vosniadou (1996) stressed the importance of meaningful activities for children to develop language to express the knowledge they acquired.

LOGO was developed by Papert, and he considered it to be a philosophy of education in which children can experience natural, spontaneous learning as they interact with their environment. He named this approach to learning constructionism.

LEGO was added later. Jarvinen (1998) claimed that the work with LEGO LOGO offered an opportunity for children, in groups, to destructure abstract forms into concrete

forms. Doing so promoted problem solving and learning via social interaction.

Roschelle, Pea, Hoadley, Gordin, and Means (2000) stated the same ideas that working on such activities help children learn not only better, but also better things. Papert (1999) concurred and so stated that students learn better by doing and better still if talking and thinking were combined.

Results of this study provide answers to the two research questions and had four emergent themes.

- Research Question One-This group of deaf students had some individual skills that would promote group work, but they did not truly function as a group throughout the sessions.
- Research Question Two-This group of deaf students did not use language to gain information, to foster sharing of ideas, to take turns, to come to consensus, or to name objects and actions used in the activities.
- Emergent Themes
 - Group/Social Skills
 - Time Management
 - Language (questions)
 - Gender

The results of this case study cannot be generalized to all groups of d/hoh students since the students in the study comprised a small sample in a residential setting.

However, there were many observed behaviors that are consistent with what I have experienced in d/hoh classrooms over ten years.

CONCLUSIONS

The necessity of improvement in language skills of d/hoh students cannot be denied. Current practices have not resulted in higher levels of achievement for most d/hoh students as noted previously. The area of language requires close scrutiny and sound basis for change. Realistically, two major languages appeared to be needed for academic success for most d/hoh students: English and ASL. ASL does not have a written form. English is required for reading and writing. A third language, PSE, should be considered as well since it offers insight into how the students think.

Additionally in the area of language, the function of questions for deaf students should be evaluated fully. The students in this study did not use the traditional question forms to a great extent and did not seem to gain useful information about many of the tasks with the ASL form of questions.

As the students learn more group skills, it is very likely that their time management skills will improve. The ability to set and reach goals is a skill closely tied to time management. Also, with group skill practice, gender differences should interfere less with task completion. Learning group skills to work with each other, to accept roles and responsibility, and to respect others' opinions should help overcome different gender approaches.

Group work and LEGO LOGO offer ways to improve the educational experience of d/hoh students. Students are involved with the tasks and learn from each other before they accomplish many of the tasks themselves. Perhaps, the reason for this is best expressed the following Chinese Proverb.

I hear, and I forget

I see, and I remember

I do, and I understand.

RECOMMENDATIONS

Recommendations for changes in a repeat study include:

- Back up equipment
- WEBquest agenda
- Electronic journals
- Hidden or ceiling video cameras
- Pre-teaching of LEGO LOGO vocabulary

Recommended topics for future research include:

- Effective teaching of group/social and related time management skills
- Effective language building with LEGO LOGO
- Different gender groupings
- Different school settings-public day and residential
- Use of the programmable brick and Brick LOGO

Recommended changes for classroom practice include:

- Teaching of skills related to each of the emerging themes at early ages
- Examining language systems that are successful expressively and receptively (tri-lingual, bi-cultural)
- Using of WEBquests from the Internet to offer a variety of topics in an enhanced visual mode in d/hoh classrooms

Education should prepare students with life skills, including language and cooperative skills. Since the education of d/hoh students has not succeeded in this task so that the skills of the d/hoh students are commensurate with their hearing peers, methods and approaches to improve educational skills for d/hoh students should be the focus of research. There is no more important reason to conduct research with d/hoh students than to discover ways to improve the educational setting so that d/hoh students achieve at higher levels. Students should not complete formal schooling without needed life and/or job skills. The immediate application of research findings that enhance improvement of the educational experience for d/hoh students is crucial.

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APPENDICES

Appendix A
Copies of Forms and Letters Pertinent to this Research



Missouri
School
for the
Deaf

DIVISION OF INSTRUCTIONAL AND
RESIDENTIAL SERVICES

505 EAST FIFTH STREET, FULTON, MISSOURI 65251-1799 • (573) 682-2508 VOICE/TDD • FAX (573) 592-2570

November 25, 2003

Amy R. McDaniel
2749 Sullins St. #109
Knoxville, Tennessee 37919

Dear Ms. McDaniel:

We are granting you permission to conduct your LEGO LOGO research with our students on campus. We understand that you will randomly select five elementary school students to participate in your research.

There are two things that you will have to do before you proceed with your research. First, you will need to send a letter to the students' parents requesting permission from their parents to participate in the activity. We will need a copy of the permission letter and parent's approval before the students can participate. Two, since this is an after school activity, you will need to contact Mr. Richard Keller, Student Life Director, and let him know the date you plan on providing the activity and how it will blend into the dormitory activity calendar and time.

We would like to have a copy of your results when your research is completed.

Sincerely,

Tom Bastean
Assistant Superintendent

c: Supt Barb Garrison
Richard Keller, Student Life Director
Allan Ensor, Director of Resource Center on Deafness
Mary Ann Herring, Elementary Supervisor

ACCREDITED BY THE NORTH CENTRAL ASSOCIATION OF COLLEGES AND SCHOOLS AND THE CONFERENCE OF EDUCATIONAL
ADMINISTRATORS SERVING THE DEAF, INC. • ADMINISTERED BY THE MISSOURI STATE BOARD OF EDUCATION

Figure A-1. Missouri School for the Deaf Permission for Research Letter

2749 Sullins Street #109
Knoxville, TN 37919
October 28, 2003

xxxxxx (address)

Dear Parent:

Please allow me to introduce myself. My name is Amy McDaniel. I have been deaf since birth. I am a graduate of the University of Georgia with a B. S. in Math Education and the University of Tennessee with an M.S. in Deaf Education. Currently, I am completing a doctoral program at the University of Tennessee in Instructional Technology Educational Studies.

I have had experience with using the LOGO program with one student in my master's program. I believe the use of LEGO LOGO has the possibility of helping students develop language and thinking skills. LEGO LOGO is a combination of LEGO manipulatives and the programming of LOGO communication between LEGO and LOGO through an interface card. After completing my master's degree, I taught at the Missouri School for the Deaf for three years and then in the Cobb County Public School System in Georgia for seven years before returning to college for further study.

Your child has been selected from the Missouri School for the Deaf by elementary school supervisor, Mary Ann Herring as a possible student to work on the project. Any work on the project would be scheduled around the student's schedules so they will not miss their usual activities. Please feel free to read the attachment for your child's participation in a computer group activity for five days of 45 minute sessions. A pre interview and post interview will be taken for approximately 20 minutes. This group activity will be held within the next few weeks. This research study is voluntarily and there will be **no** penalty if the child wishes to discontinue his/her participation. Most importantly, your child's identity will not be published and he/she will remain anonymous.

Please sign your name and date on the attached form and return it in the enclosed, stamped self-address envelope by **(date)** if you wish for your child to participate. Should you have any questions, please feel free to contact me via email, phone, or through Mrs. Mary Ann Herring.

I look forward working with your child. I appreciate your time and consideration in this matter.

Sincerely,

Amy R. McDaniel
Email: armcdani@aol.com
Phone: (865) 525-5521 (TTY only)
Mary Ann Herring: (573) 592- 2535

Figure A-2. Parental Letter

**PARENT'S PERMISSION
FOR RESEARCH PARTICIPATION**

For my dissertation, I am writing an analysis and description of how a group of elementary students interact with LEGO LOGO activities. I hope that this project will add insight into how hearing impaired students learn. Especially since I am a deaf individual, I am very interested in expanded and improved educational opportunities for hearing impaired students.

LOGO is a computer program in which the children can type the inputs in to see the turtle moving or program the special bricks of LEGO consists of small, colorful manipulatives consisting of plastic blocks, cubes, gears, motors, pulleys, sensors, and other assorted pieces. LEGO LOGO is a combination of LEGO manipulatives and the programming of LOGO, communication between LEGO and LOGO is through interface card. Students must use logical thinking to complete the tasks.

For this project, I would like to work with five students for five 60 minute LEGO LOGO sessions after school; ask him/her to keep a log about what is being learned, and have him/her complete pre and post interviews before and after LEGO LOGO sessions. The interview questions will be about experience with LEGO LOGO, and working in groups. Since the sessions will be conducted in sign language, a video record of the session is necessary for accurate data recording. Photographs of the completed projects will be made. All data will be kept in a locked filing cabinet in Dr. Edward Count's office (Claxton 442) at the University of Tennessee, Knoxville. Only Dr. Counts and Ms. McDaniel will have access to the data. Confidentiality of the data, as well as the students' identity, will be maintained. The names of the students will not be used in any part of this project. The information will be used only for my dissertation.

Figure A-3. Parental Consent Form

I had experience with using LOGO with a single student in my master's program. I believe the use of LEGO LOGO has the possibility of helping students develop language and thinking skills. After the work on my master's degree, I taught at the Missouri School for the deaf for three years and in the Cobb County Public Schools for seven years before returning to college for further study.

Student's participation in this research is voluntary. Refusal to participate will involve no penalty. He/she may discontinue participation at any time. Your signature on this form will constitute legal agreement for his/her participation.

If you have questions about your rights as a participant, contact the University of Tennessee compliance Section at (865) 974-3466.

Parent's signature

Date

Amy R. McDaniel
Director of Project

*Director and Chairman may be
reached at 442 Claxton,
(865) 974-4246

Edward Counts, Ph. D.
Chairman

Figure A-3. Continued.

ASSENT FORM FOR STUDENTS

I have been given permission by my parent(s) to work in this Lego Logo project directed by Ms. McDaniel.
I have willingly and voluntarily agreed to participate.

Name

Date

Figure A-4. Assent Form for Students

Appendix B
Copies of Worksheets and References Used by the Participants

Logo Command Summary

COMMAND	Abbreviation	FUNCTION	EXAMPLE
Drawing Commands			
FORWARD	FD	Moves the turtle in the direction it is heading.	FD 50
BACK	BK	Moves the turtle in the opposite direction from which it is heading.	BK 50
LEFT	LT	Rotates the turtle to the left.	LT 30
RIGHT	RT	Rotates the turtle to the right.	RT 60
DRAW		Clears all graphics, shows the turtle, and positions it in the center of the graphics area, heading straight up.	
HOME		Positions the turtle in the center of the graphics area, heading straight up.	
PENUP	PU	Stops the turtle from leaving a trail when it moves.	
PENDOWN	PD	Causes the turtle to leave a trail when it moves.	
SETPC		Sets the color of the trail the turtle leaves.	SETPC 6
SETBG		Sets the background color.	SETBG 10
PENERASE	PE	Turns the turtle's pen into an eraser. Use PENDOWN (PD) to draw again.	
HIDETURTLE	HT	Makes the turtle invisible.	
SHOWTURTLE	ST	Makes the turtle visible.	
REPEAT		Tells the turtle to follow command(s) a given number of times	REPEAT 4 [FD 50 RT 90]



Figure B-1. Orange Reference Sheet

Type LOGO commands



then write LOGO commands

name: _____
date: _____

Figure B-2. Paper Assignment #1

GROUP ACTIVITY DATE: _____

You may use the graph paper.... to help you drawingwhatever you want the turtle to draw

Write commands that you typed: What the turtle drew:

Figure B-3. Paper Assignment #2

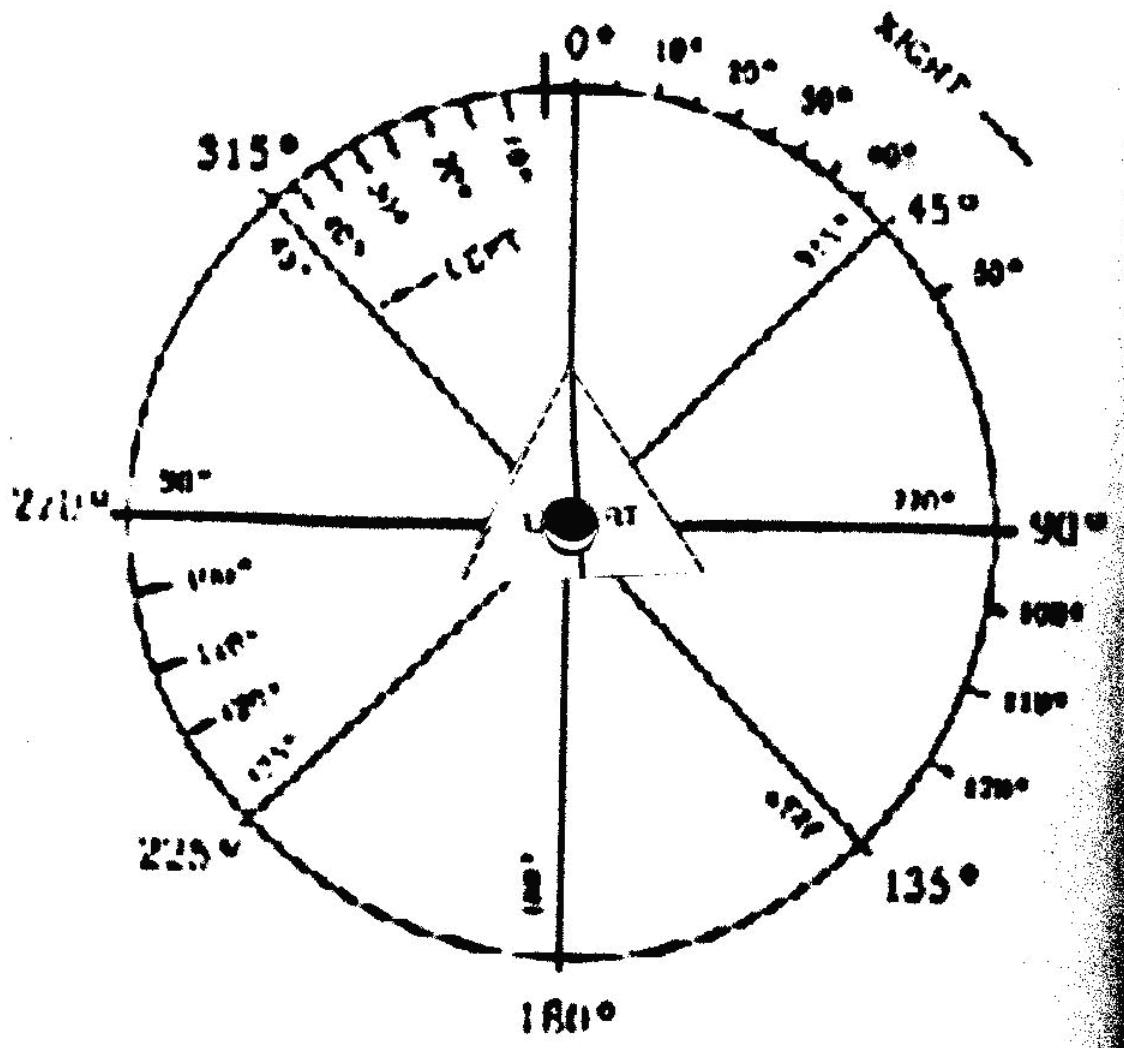


Figure B-4. Turtle

LOGO commands

FORWARD - FD

BACK - BK

LEFT - LT

RIGHT - RT

SHOWTURTLE - ST

HIDETURTLE - HT

HOME

REPEAT

CLEAR Commands - CC

CLEAR Graphics - CG

Figure B-5. Reference Materials

RESET Graphics - RG

PENUP - PU

PENDOWN - PD

PENERASE - PE

NAMEPAGE - NP "....."

DOS - exit the program

Figure B-5. Continued.

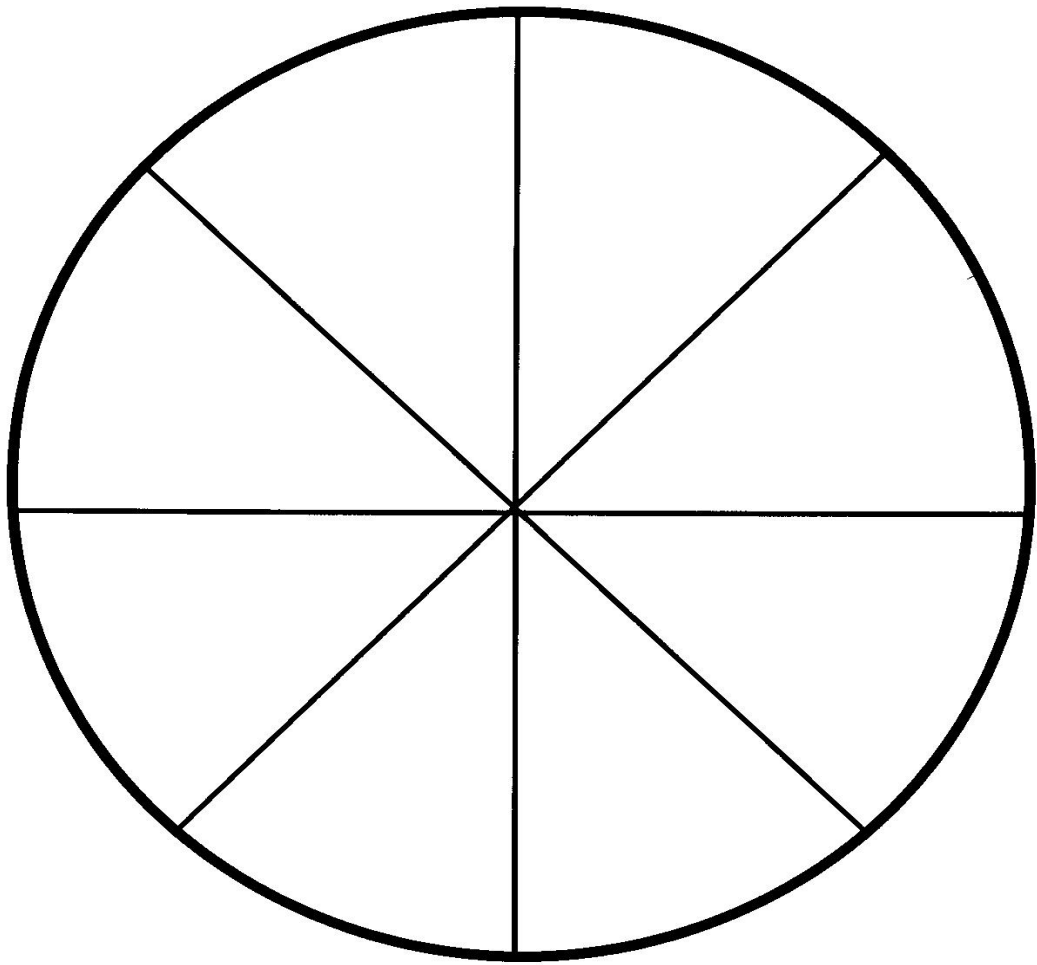


Figure B-6. Circle for Degrees

Appendix C

Notes on Sessions

NOTES ON THE SESSIONS

Session I

Participants: All attended except Mary

Site: Computer Lab (classroom size)

of videocameras: two

Videorecording volunteer(s): two

Amount of time used: 45 minutes

Materials used: Pencils, markers, log books, folders, portable white boards, tablets

Activities Conducted/ Notes:

- Each student had an individual computer.
- LOGO commands were taught/were introduced by the facilitator.
- Students had individual opportunity to try different LOGO commands to see the outcomes.
- No boards space available since both the white and chalk boards were blocked by the computers.
- The computers were arranged in an “L” shape against adjacent walls.
- Since the computers were placed against the wall, it was difficult for them to see the facilitator.
- Participants sat at the center table for the explanation by the facilitator of the session goals and explanation of what LOGO COMMANDS are.
- From the table, the participants had space and time to stand up and complete floor exercises according to the facilitator’s LOGO commands (during which time they experienced trial and error and trial and success).
- Each participant had personal folder on the table.
- Personal Log books were on the table.
- The computers were ready for the participants to use. Unfortunately no printer was attached to these computers.
- Other computers with a printer available, but, due to school computer security, no new programs were allowed on these computers.
- Since printers were not available, student work was saved for later reference.
- Two videorecording volunteers were present to operate the cameras.

Session II

Participants: All attended

Site: Conference room (approx. 15 by 9 feet)

of videocameras: three

Videorecording volunteer: one

Amount of time used: 45 minutes

Materials used: Pencils, markers, log books, folders, portable white boards, tablets, paper assignments#1 and #2

Activities conducted/ Notes:

- Explanation by facilitator of videocamera positions, cooperation, teaching Mary LOGO commands by participants) and schedule: 3 minutes
- Journal entry#1: 6 minutes
 - Mike: 3 minutes
 - Bruce: 4 minutes (another minute for signing)
 - David: 4.75 minutes
 - Mary: 5 minutes
 - Hallie: 6 minutes
- LOGO instruction to Mary: 3.25 minutes
- Paper assignment#1: 7 minutes
- Paper assignment#2: 8 minutes
- Journal entry#2: 6.5 minutes
 - David: 3 minutes
 - Mike: 4.5 minutes
 - Bruce: 5.5 minutes and another minute for signing
 - Mary (out of sight) (check other tape for exact amt of minutes)
 - Hallie: 6.5 minutes
- Explanation of meeting in this same conference room for tomorrow's session: 2.25 minutes
- Schedule written on the board:
 - 3:15 – 3:25 journal (LOG) (written in black ink)
 - What did you learn yesterday? (written in black ink)
 - 3:25 – 3:50 Activities (written in red ink)
 - LOGO (written in red ink)
 - LEGO (written in red ink)
 - 3:50 – 4:00 journal (written in blue ink); (two questions were written at end of session to avoid confusion)
 - had red smiley drawn
 - What did you learn today? (in blue ink)
 - How did you teach Mary LOGO? (in blue ink)
- LOGO commands written on board as well (in red ink)
 - HT FORWARD
 - ST BACK
 - RG LEFT
 - CG RIGHT
 - HOME
- The spelling word, "turtle" was written in black and in between columns of LOGO commands.
- Magnetic turtle was on the board for aid.

- Videocamera (on tripods) placement: two of them placed about four feet apart at end of the room for front viewing of students; other one placed at the entrance of the room for side view (mostly at the back of students at the computer table)
- Different videorecording volunteer
- Had time management schedule written on the white board to help students pace themselves since on the previous day the journal activity had not been completed
- Explained why the journal was included
- Explained each activity and its purpose for today's session
- Journal was completed at the end of session for today's session.
- Due to Mary's absent the day before, the participants had the opportunity to teach/share what they learned during their first session and LOGO commands with Mary. This was first group interaction.
- There was one computer brought by the facilitator on the table for participants' use.
- Long conference sized table were placed in the middle of the conference room.
- Computers were placed near the middle of the table.
- MSD printer connected to and placed aside the computer at the end of the table. (not used because no printer software available)
- Participants did not want to leave session until the facilitator encouraged them to leave.
- Hallie, individually, complained the session was too short; wanted longer session.

Session III

Participants: All attended

Site: conference room (approx. 15 by 9 feet)

of videocameras: three

Videorecording volunteer: none

Amount of time used: 45 minutes

Materials used: Pencils, markers, log books, folders, portable white boards, tablets, extra batteries, blue LEGO box(individual pieces), three LEGO boxes (selected pieces) and three battery boxes

Activities Conducted/Notes:

- Explanation of schedule, task, meaning of LOGO and LEGO, and inquiries of facilitator and participants: 4 minutes (Bruce joined a minute later b/c he was in the clinic.)
- LEGO activities: 30.75 minutes
- Journal entry#3: 6.25 minutes
- Information written in BLACK ink on the board so Hallie can see them better (seeing better may increase her speed)
- Schedule written on the board:
 - 3:15 – 3:50 Activities
 - LEGO
 - LOGO
 - 3:50 – 4:00 journal (LOG)
- Journal question written on the board at the end of the session:
 - How did you help your group to complete the assignment?
 - (written approx. 2.75 - 3 times bigger in black ink)
- The spelling word, button, was written on the board on the top of the journal question.
- Three videocameras were used; one was positioned in the corner of the room by the white board; another one was placed in the back of the room; different one was placed in the middle of the room for the side view of participants at the table
- No videorecording volunteer available-set in place after consultation with media specialist prior to session and set to run during session
- Blinds closed by media specialist for better lighting for videocamera.
- Schedule on board
- Journal writing at end of session only
- Printer removed
- Computer placed near the wall on the table; logbooks and folder near the wall beside the computer
- Markers in the pencil case on the window sill
- Pencils in another pencil case on the window sill
- LEGO blue box on the table
- Three LEGO boxes on the table
- Picture of battery box left on the table
- Blue box opened and left on the table; getting started booklet was on the top of the opened LEGO blue box
- Table location was changed for the videorecording purposes; table was turned 90 degrees right from previous day's placement and the end of table was placed against the wall to prevent participants from walking around
- Almost the entire LEGO activity was done on the floor; the boys took the LEGO pieces and boxes to the floor from the table.
- Mike first person to grab a LEGO box, then Bruce, and David

- Both Hallie and Mary walked around the table to get two battery boxes.
- Mike asked Bruce to team with him. Hallie and Mary were already buddies. David ended up alone.
- Mike, Bruce, and David did LEGO activities on the floor.
- Hallie and Mary did theirs on the computer table.
- Both Mike and Bruce discussed what to do and they decided to split up building individual cars on their own.
- Facilitator suggested to Hallie and Mary to share with the boys. Hallie went up to share the battery box with Mike while Mary gathered LEGO pieces (so did Bruce), but Mike decided to do his own and Hallie shared with Mary.
- David on his own
- All batteries were used- one more battery was needed since participants not sharing
- Due to participants' great interest in LEGO activity, review of LOGO commands was postponed for another session. (Friday)
- Had student intruder ...curious and wanted to join the participants
- Participants left session immediately- wanted to have time to play in snow outside, especially Hallie.

Session IV

Participants: All attended

Site: conference room (approx. 15 by 9 feet)

of videocameras: three

Videorecording volunteer: one

Amount of time used: 45 minutes

Materials used: Pencils, markers, log books, folders, portable white boards, tablets, 9700 LEGO technic box(more LEGO pieces), more batteries, three LEGO boxes and instruction books left on the floor, three battery boxes and blue LEGO box (pieces) left on the table

Activities conducted/ Notes:

- Quick explanation of schedule: 1 minute (participants went on floor activity immediately as they entered from the Christmas party.)
- Journal entry#4: 5.25 minutes
 - David: 2 minutes
 - Mary: 2.75 minutes
 - Mike: 3.25 minutes (on/off task doing LEGO while journal and additional three minutes on LEGO task after journal task)
 - Bruce: 5 minutes
 - Hallie: 5.25 minutes
- Three videocameras were used; two on tripods and one on the volunteer's shoulder
- Different videorecording volunteer
- Journal completed at the end of session.
- Schedule on board
- Same table placement as previous day
- 9700 LEGO technic box(more pieces) made available since more individuals needed more manipulatives
- Whole LEGO session was done on the floor
- Participants did not want to leave session until the facilitator encouraged them to leave and informed the girls there was a Girl Scout party in the library.
- Bruce expressed that he thought the facilitator staying at MSD for whole school year.
- Snow continued to fall heavily.
- Before session- facilitator expressed concerns about the weather (continual snow) and chances for the students to return to school after the home-going weekend- elementary school supervisor informed facilitator that, at the teachers meeting, they agreed for the facilitator to have a Friday morning session since the elementary school supervisor did not want to take chance and fail to complete the final session and post interviews should the students be unable to return to campus next week.

Session V

Participants: All attended

Site: conference room (approx. 15 by 9 feet)

of videocameras: three

Videorecording volunteer: one

Amount of time used: 45 minutes

Materials used: Pencils, markers, log books, folders, portable white boards, tablets, batteries, three LEGO boxes, two battery boxes, 9700 LEGO technic box(more pieces), instruction books, and blue LEGO box (pieces) left on the table

Activities conducted:

- Schedule written on the board:
 - 9:10 – 9:55 Activity
 - 9:55 – 10:05 journal
 - 10:05 – post interview (ended at 10:35)
- Amount of time used: 85 minutes
 - Explanation of today's session: 2 minutes
 - Whole LEGO LOGO activities: 53 minutes
 - Journal entry#5: 6 minutes
 - Mary: 2 minutes
 - Hallie: 3 minutes
 - Mike: 3 minutes (on/ off task with journal and LEGO)
 - Bruce: 5 minutes (signing for a minute afterward)
 - David: 6 minutes (on/ off task with journal and LEGO)
 - Post interviews (both individual and group): 24 minutes
- Morning session due to the weather
- Post interviews were planned to be done as individual and group next week but were done in this session instead due to weather.
- Different videorecording volunteer (high school senior)
- Schedule on board
- Three videocameras used; two on tripods and one on the volunteer's shoulder
- Journal written at the end of session
- Same table placement as last two days
- Today's activity was mostly done on the table though some LEGO pieces were on the floor.
- LEGO LOGO session; hooked up David's completed car with the computer
- Problem with computer; therefore, used motorized boxes to experiment with motion directions and assembled cars and other models such as helicopter blades.
- More shared experiences among boys as they built cars
- Girls had opportunities for assistance from the boys to try the motorized boxes.
- Post interview conducted at close of this session –Interviews were conducted individually while other participants had their choice of LOGO LEGO activities with which to experiment. After individual post interviews were completed, the group interview was held.
- After the group interview, four of the participants decided to continue LEGO LOGO activities. Only Mary wanted to go back to PE according to their regular schedule. Mary asked Hallie to change her mind to go with her, which Hallie did. Only the boys stayed in the conference room experiencing different LEGO LOGO activities for another forty-five minutes.
- Important note to be addressed: at the end of session, especially the girls complained there are not enough special LEGO boxes with certain model

pictures for them to build their own as the boys did. They want to have more time do that.

- Activities during individual Post Interviews: their choice, David on computer with LOGO commands, Mike and Bruce with LEGO model sensor
- After interviews completed students given choice of activities-boys continued with LEGO LOGO and girls went to PE

Appendix D
Individual Data Charts from Transcribed Sessions

Individual Charts of Hallie's Behaviors during Transcribed Sessions Second Session- First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator explanation	Hallie appeared to understand the schedule written on the white board. After completing the journal assignment, Hallie appeared to understand as the facilitator explained what the group was doing and what she needs to do in order to teach LOGO command to Mary.
Student(s) began task in an appropriate manner	Hallie began writing in journal as instructed.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	Hallie completed the journal assignment and then signed her journal entry #1 and the four LOGO commands to the facilitator during the LOGO instruction of group's (to Mary).
Student(s) checked/watched others or the environment	Hallie watched the conversation between the volunteer and facilitator about the videorecording placement. (Hallie took a break from writing in journal to watch.) Hallie checked something on the white board and then the room to see what is up with her group. Hallie watched Bruce signing his journal entry to the facilitator then resumed her journal writing. Hallie watched Mary and the facilitator while the facilitator fingerspelled a word for Mary and then resumed her journal writing. Hallie noticed Bruce signing something (about her). Hallie checked something on the white board and then resumed her journal writing. Hallie left her position to join the group and had a puzzled look during the explanation by David to Mary.

Student(s) checked other student's assignment	Hallie looked at Bruce's journal and then resumed writing in her journal. Hallie moved away from her position and checked on what Bruce was doing.
Student(s) stayed on task	Hallie continued writing her journal as others wrote. The rest of group waited for Hallie to complete her journal task even though they wanted to move on next assignment: to teach Mary. Hallie continued writing in her journal while the facilitator gave other group members instruction of what to teach Mary about LOGO commands. Hallie still on journal writing while the group took their turn explaining LOGO commands to Mary.
Student(s) got others' attention	Hallie waved for facilitator's attention during the LOGO instruction by group to Mary.
Student's reaction	

Individual Charts of Hallie's Behaviors during Transcribed Sessions Individual Session Two- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Hallie watched the facilitator as she told her to continue explaining RIGHT, the LOGO command, to Mary. Individually, Hallie listened to the facilitator tell her what to do on the paper assignment as she explained the turtle movement on the board and the LOGO computer assignment from the previous day. Hallie attended as Bruce explained how to write LOGO commands by showing her his paper assignment #1. Hallie immediately raised her hand to volunteer after the facilitator's explanation for the next task: to discuss with group before entering data on the screen from the paper assignment #1. The facilitator told Hallie that she needed to be more assertive and tell her group members that she needs to be closer to the screen during Mike's entry. Hallie signed- "ME!" (meaning my turn!) to the group members after the facilitator asked, "What would you do if you don't understand?" Unfortunately, Hallie was ignored as Mike, without being approved by group members, showed an orange laminated paper to Mary to clarify the understanding of LOGO commands. Hallie responded to the facilitator after the tapings on the table from the facilitator and continued to watch instructions for the next task: paper assignment #2.
Student(s) began task in an appropriate manner	After Bruce's explanation, Hallie began to write LOGO commands on her paper assignment #1.
Student(s) asked group members about task	Hallie was told by the facilitator to ask group for help. Hallie asked Bruce for help on paper assignment #1 by indicating that she didn't remember the LOGO commands from the previous day's activity. Hallie shared an opinion and exchanged conversation with Bruce during Mike's entry of LOGO commands from paper assignment #1.
Student(s) shared pertinent information with group members	Hallie explained the term of LOGO command, RIGHT, to Mary and moved her body to left instead of right. Mike and David corrected her by moving back to right. Hallie resumed her explanation by signing –"turtle move how right" as her hand turned right and then its moved "30" steps forward and continued to explain another LOGO command, LEFT, before both David and Mike interrupted her and informed her that command, LEFT, was already explained.

Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	Hallie completed her turn by explaining what RIGHT was to Mary. Hallie wrote LOGO commands on her paper assignment #1.
Student(s) checked/watched others or the environment	Hallie returned to her position after checking the group activity. Hallie watched Bruce signing to the facilitator about the facilitator being in the television or videocamera. The facilitator told both Hallie and Bruce to watch their group activity. Hallie moved to be closer to the group. Hallie moved her position during explanation for videorecording purpose.
Student(s) checked other student's assignment	Hallie checked Bruce's work as he explained assignment #1.
Student(s) stayed on task	Hallie continued to write LOGO commands on the paper assignment #1. Hallie read the entries from Mike on the screen while Mike completed the entries from paper assignment #1.
Student(s) got others' attention	Hallie tapped Mary's shoulder as she was ready to explain but David told her to use the LOGO command, RIGHT. Hallie picked up and showed her paper assignment #1 to the facilitator and then resumed to complete it. After being told by the facilitator about moving to a better placement, Hallie tapped David's shoulder. David paid no attention as he appeared so focused on the screen during Mike's entry and explanation to Mary. Hallie finally gave up and moved to another better position beside Mary at other end of computer table. Hallie tapped the facilitator's shoulder, interrupting during the explanation of saving the file, and asked if her file from yesterday's activity was saved.
Student's reaction	Hallie laughed at her error. Hallie resumed to her position after Mike and David informed that LOGO command, LEFT was already explained. Hallie signed "ME! ME! FIRST!" when Mike wanted to be a volunteer to enter the data from paper assignment#1 and again

	demanded it's her turn. Unfortunately, Mike went ahead to took over the keyboard entry. Hallie appeared disappointed as she was far away from the computer position and stayed in her position at the very end of computer table away from the group. Later, the facilitator checked by asking her to see if she can see the screen. Her reply was that she sees it fine by signing – “fine. I see FINE!” Later after putting her cochlear implant away, she moved to where the group was. Bruce moved her to a better position, closer to the screen. Hallie returned to her position after being ignored by the group during the clarification of LOGO commands to Mary.
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Individual Charts of Hallie's Behaviors during Transcribed Sessions Session Two- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Hallie looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing. Hallie looked at the white board where the two questions were written during the facilitator's explanation. Hallie responded to the light blinking which indicated it was time to end the session. Hallie interrupted the facilitator at the end of session by tapping on her arm. The facilitator was informing the group to come to this same conference room for the next day's session. She tried to say something but the facilitator continued her message. Hallie was asked by the facilitator if she understood the instruction for tomorrow's session. Hallie nodded slightly indicating that she understood. Hallie raised her hand and replied that Mary was in her class. David disagreed and stated that Mary was not in her class. Hallie replied that Mary was in her class in response to the facilitator's question about whose class Mary was in. Hallie was informed by the facilitator to be in this room at 3:15 pm for the next day's session. She continued the conversation with the facilitator inquiring why it ends at 4 pm as she complained it was so short.
Student(s) began task in an appropriate manner	After the facilitator's assistance in copying two questions from the board into Hallie's log book and the clarification of first question, Hallie wrote journal entry #2. She answered the first question by signing, "move ..." and was told by the facilitator that she needs to write in her journal instead of orally telling the answer.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	

Student(s) checked/watched others or the environment	Hallie followed the facilitator to the computer screen and looked at the screen while the other group members began gathering for paper assignment #2 entries. Hallie adjusted her position by moving closer to the screen during the entry of paper assignment #2. After looking at Bruce's paper assignment #2, Hallie studied something on the white board and then checked the room surroundings to see what was going on. Then, she moved her material to a better position on the table and again watched the conversation about these two questions on the board along Mike, David, and the facilitator. While writing on her journal, Hallie checked the clock after Bruce signed to the facilitator to look at the time.
Student(s) checked other student's assignment	Hallie looked at Bruce's paper assignment #2 answers.
Student(s) stayed on task	Hallie continued working paper assignment #2 task.
Student(s) got others' attention	Hallie picked up her paper assignment #2 and showed facilitator. The facilitator asked, "What is it?" Hallie replied, "House." Then, she resumed working on her paper assignment #2 task. Hallie tried to get the facilitator's attention, appeared to change her mind, and continued writing her journal.
Student's reaction	

Individual Charts of Hallie's Behaviors during Transcribed Sessions Session Three– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator suggested to Hallie that if she needs help to build the LEGO model car she could ask the boys. The facilitator explained that boys were busy building their model cars on their own, but she was right that they could help her if she asked. As Hallie was organizing unnecessary LEGO pieces in the large blue box, Mary tapped her and asked her to work together on the car. Hallie told her to move closer. Mary and Hallie switched places.
Student(s) began task in an appropriate manner	Hallie started looking for the certain LEGO pieces with Mary according to the pictured model car brochure as soon as she got some guidance from the facilitator how to find the pieces. After some encouragement to continue the task, Hallie resumed gathering the sorted LEGO pieces from a small box with Mary and the facilitator. Later, without the facilitator's assistance, both Mary and Hallie continued to sort out pieces needed to build the car.
Student(s) asked group members about task	Hallie, teamed with Mary on the floor, discussed what model to build from the pictured brochure. Mary already picked the one she wanted to build and Hallie complained and did not want to help Mary to find LEGO pieces. She indicated that she wanted to organize new LEGO pieces into the big, plastic blue box. Mary disagreed. Mary convinced Hallie to find LEGO pieces according to the pictured model brochure.
Student(s) shared pertinent information with group members	Hallie and Mary exchanged conversation about finding more of certain LEGO pieces and beginning to build the model car. Both Hallie and Mary continued to exchange conversation while they put LEGO pieces together.
Student(s) attempted to complete task	Hallie was told by the facilitator not to lay back while Mary was finding LEGO pieces. Hallie appeared to dislike the comment. Then, Hallie put unnecessary LEGO pieces into the big, plastic blue box instead of helping Mary. Mary began helping Hallie, but Hallie turned her head around in the direction of where the boys were working.
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	Hallie appeared curious as to what the boys were doing while building their model car and told the facilitator about Mike's task.

	Hallie was informed by the facilitator not to worry. While ignoring the facilitator's question, Hallie checked on what Bruce was doing as he built his model car.
Student(s) checked other student's assignment	
Student(s) stayed on task	After the suggestion made by the facilitator, Hallie and Mary put the LEGO pieces in a smaller box to avoid the confusion.
Student(s) got others' attention	
Student's reaction	Hallie appeared upset after a suggestion from the facilitator. Hallie did not reply when she was asked by the facilitator about what was wrong. Hallie just stared at the picture model car brochure. Mary informed the facilitator that Hallie did not want to do the task even though Mary encouraged her earlier. This was done few minutes after switching places between Mary and Hallie as Mary had suggested. It can be another reason that Hallie became unhappy. The facilitator reminded Mary that Hallie may not see it very well and suggested for her to help Hallie. Mary freely gave Hallie some assistance.

Individual Charts of Hallie's Behaviors during Transcribed Sessions Session four- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	Hallie went back to put other unnecessary LEGO pieces into the big blue box and let Mary and Bruce work together to build the car.
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	
Student(s) checked other student's assignment	
Student(s) stayed on task	Hallie and Mary continued to sort out the LEGO pieces with facilitator. Hallie and Mary teamed up to begin building the model car. Hallie resumed her task after getting the facilitator's attention for Mary. After the facilitator's suggestion about watching Mary's and Bruce's activity, Hallie resumed her unnecessary task organizing LEGO pieces in the big blue box.
Student(s) got others' attention	As the facilitator conversed with Bruce about how to put the rubber on the wheel, Hallie interrupted and asked about a certain LEGO piece in comparison to the picture. The facilitator explained to Mary and Hallie how to understand the size of the rod piece and to notice the different sizes of rod pieces. Mary asked Hallie to get the facilitator's attention which she did by tapping the facilitator's leg. Hallie informed the facilitator that Mary wanted her attention.

Student's reaction	While she was organizing the LEGO pieces in the blue box, the facilitator asked Hallie what she was doing. Hallie did not respond and then, the facilitator asked the same question again. Still, there was no response. Then, the facilitator suggested for Hallie to watch what Mary and Bruce were doing (since it was Hallie's and Mary's car.). Hallie appeared not to want to follow the suggestion as she shrugged with her shoulder and ignored the facilitator. Hallie continued the unnecessary organization with new LEGO pieces for the blue box by herself.
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Individual Charts of Hallie's Behaviors during Transcribed Sessions Session Four- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Mary tapped Hallie's hand several times to get her attention. Finally, Hallie attended to Mary and was asked to find the certain LEGO piece that Mary pointed to in the picture. Hallie quickly responded to the facilitator when the facilitator crawled and got Hallie's attention by pulling her cardigan while she was organizing pieces into the blue box. The facilitator informed Hallie what to write in the journal by signing, "Write what you do-do today" and pointed to her log book. Hallie quickly replied by signing, "fix that" as she pointed the blue box. The facilitator informed Hallie to write in her log book. While Hallie was organizing pieces into the blue box, the facilitator tapped Hallie's shoulder to inquire if her journal writing had been finished. Hallie paused and the facilitator again asked the same question. Hallie's reply was that she was not done. Mary tapped Hallie's shoulder and attempted to show her journal, but Hallie had already opened her log book and resumed her journal writing.
Student(s) began task in an appropriate manner	Hallie began writing in her journal after the facilitator told her to write her reply to the questions in her log book.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	Hallie did not complete her journal writing and resumed her unnecessary organization task on the blue box
Student(s) experienced trial and error	
Student(s) completed task	Hallie wrote in her journal after asking the facilitator to spell the word, "thing." The facilitator spelled "stuff" instead of "thing". (Actually the sign for both words, stuff and thing, are the same.) Hallie wrote each letter as she looked back and forth. Hallie completed her journal at the very end session after David, Bruce, and Mary left.
Student(s) checked/watched others or the environment	Hallie and Mary both watched conversation exchanged between David and the facilitator during the journal entry.
Student(s) checked other student's assignment	

Student(s) stayed on task	Hallie continued her unnecessary task for organizing LEGO pieces into the big blue box. (Hallie stayed with a self directed rather than an assigned task.) Hallie resumed writing after getting Bruce's attention for Mary and again after watching the conversation between David and the facilitator.
Student(s) got others' attention	Hallie got Bruce's attention for Mary since Mary asked Hallie to get Bruce for her. Hallie used her pencil to point to Mary to inform Bruce that Mary wanted him. Hallie waved for the facilitator's attention and asked for spelling of this word, "thing." (mistook for stuff)
Student's reaction	

Individual Charts of Hallie's Behaviors during Transcribed Sessions Session Four– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	At the beginning of this session, Hallie, along with the group, replied that she understood the schedule for the last day of LEGO LOGO sessions explained on the white board. (Though the facilitator continued and stated that it was very important that each group member cooperate with the others, not ignore them, and assist others as well, Hallie was silent and did not indicate if she understood. She could have been inattentive.) Mary tapped Hallie's shoulder and asked her if she remembers something and Hallie indicated that she did not. The facilitator informed David, Hallie, and Mary that their work was enough and it was time for a group discussion. Hallie joined this group and listened the facilitator who told them what to do next. Hallie and the others were asked if all assignments were to be done as same or different. Hallie, along the group, replied in signing, "different."
Student(s) began task in an appropriate manner	After a brief explanation of the white board assignment by the facilitator in a group gathering and after watching three boys began their tasks, Hallie was the fourth person to come forward to begin the task of writing LOGO commands for a square.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Hallie and Mary exchanged information on the board and then Hallie exchanged more information with Mike. Again, Mary and Hallie conversed about their assignments on the board after Hallie made several changes. Then, Hallie helped Mary draw the line down on the board and wrote the command. They continued to exchange opinions with each other. Since Hallie's completed her assignment, Mary inquired about LOGO commands and Hallie explained what they were. After Mary's erasure, Mary and Hallie again discussed about the assignment. There were some disagreements between them.
Student(s) attempted to complete task	After exchanging information with Mary and Mike, Hallie appeared to be thinking.
Student(s) experienced trial and error	Hallie resumed her task after Mary inquired her if she remembered something. Hallie erased a command on the board. After appeared to think, Hallie erased some commands on the board.

Student(s) completed task	
Student(s) checked/watched others or the environment	At the beginning of white board task assignment, Hallie watched three other boys writing their LOGO commands before she began hers.
Student(s) checked other student's assignment	
Student(s) stayed on task	Hallie continued writing her LOGO commands on the board. Hallie resumed her task after Mary asked her if she remembered something. After erasure, Hallie continued to complete her task. After several verbal exchanges between Hallie and Mary, Hallie resumed trying to complete her assignment.
Student(s) got others' attention	
Student's reaction	

Individual Charts of Hallie's Behaviors during Transcribed Sessions Session Five- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Hallie checked her answers on the board after the explanation from the facilitator about how to discuss and to agree on right or wrong answers. After the light blinking for all group members' attention, Hallie did not respond to this system and continued on writing her assignment on the board. The facilitator asked Bruce to get Hallie's attention. Hallie discussed with Mary, after the explanation by the facilitator, about agreeing and picking which one on the board to enter data into the computer. Hallie nodded negatively after the facilitator asked if she can see the screen. The facilitator asked her what would she do if she could not see. Mary raised her hand and immediately signed, "I can't see." Then, Hallie signed, "I can't see." The facilitator informed them to move. Hallie was assisted by the facilitator to be placed between Mike and David so she could be much closer to the screen. The facilitator asked the group what was on the screen and all replied, "square." After correction of the error on the screen by Mike and David, the facilitator asked the group if that was opposite. There was no response from the group. The facilitator asked the group a different question, "Why think Bruce is right? Why it's opposite?" Only David replied.
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Hallie and Mary exchanged opinions. Hallie assisted Mary on her answers after Mary asked Hallie for assistance. After explanation by the facilitator, Hallie discussed with Mary about agreeing and picking which one on the board to enter data into the computer. Hallie did not respond to Mike's question when he tapped her shoulder and asked if she agreed that his answer was right. Hallie and Mary stayed at the board even though the facilitator informed them to go ahead enter data into the computer. The boys went ahead to the computer table. Hallie began to erase her answer, but the facilitator told her not to.

	After asking the group what was on the screen, Mike and Hallie exchanged information while Bruce was talking to the facilitator. Both Mike and Hallie then discussed it with the facilitator while others were watching on the screen. Mike continued to type and Hallie appeared discouraged since she wanted to type.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	After the boys went to the computer table, Hallie left the board area and stood at the other side of the computer at the corner of the table. Hallie left the table to put her cochlear implant away and returned to her position.
Student(s) checked other student's assignment	
Student(s) stayed on task	
Student(s) got others' attention	
Student's reaction	

Individual Charts of Hallie's Behaviors during Transcribed Sessions Session five- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	No one paid attention to the facilitator as the facilitator flashed the light to indicate it was time for journal entry. The light was again being flashed. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing in the journal. The facilitator signed, rather than write on the white board, to them, "What you do today? What you do with group?"
Student(s) began task in an appropriate manner	Hallie began to carry the log books without being told or asking the facilitator. She was passing the books, then pencils, out to individuals. Hallie began her journal entry for the two questions that were signed by the facilitator. (The questions were not written on the board.) After exchanging conversation with Mike, Hallie went ahead to collect pencils to be put away log books.
Student(s) asked group members about task	Before collecting the pencil from Mike, Hallie asked Mike if he was done using the pencil by signing, "finish?" as Mike was moving his model car.
Student(s) shared pertinent information with group members	The facilitator informed Mike that he could stop moving his car alone and share it with the group. Mike let Hallie share the experience first and assisted her on how to do it. Hallie tried to push the button. The model which Mike held fell apart into the table. Hallie laughed about the incident and continued to laugh. After spelling word, computer, both Hallie and Mike exchanged conversation.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	While exchanging conversation with Mike, Hallie closed her log book.
Student(s) checked/watched others or the environment	Hallie and Mary watched what Mike was doing with his model car battery box on the computer table. After the incident, Hallie appeared curious as to what Mary was doing as she gathered more pieces with Bruce to fix his model. Mike gave another try on his model and his model surged forward hitting both Hallie's finger and Mary's arm. Hallie moved to the very end of the computer table past where Mary was.

Student(s) checked other student's assignment	
Student(s) stayed on task	After long pause with the facilitator, she resumed her journal writing. While the facilitator was busy dealing with others, Hallie continued her writing. After showing her journal to the facilitator, Hallie resumed her journal writing.
Student(s) got others' attention	David tried to get Hallie's attention by banging his hand on the computer table several times and continued to tap his finger until he got her attention. Hallie was getting log books out of the folders so they can be ready for the group. She was not told to get them and she just volunteered by herself. Both David and Hallie exchanged conversation about his model. David went to get more pieces and Hallie resumed arranging the log books to be handed out. Hallie stopped her journal writing and checked where the facilitator was. She took her log book and showed her journal to me. Then, she resumed to her task. Hallie waved for the facilitator's attention and asked for the spelling of the word, computer. The facilitator started spelling, "C-" and was interrupted by Mike because he wanted to know why LEGO LOGO on computer was not working today. Hallie waited for the facilitator to spell more letters. The facilitator noticed the word, computer on Mike's journal and told Hallie to check the spelling from Mike's log and go ahead to copy. Mike disliked the idea and the facilitator told him it was okay to share that word! And just let her copy. Mike did volunteer without being told to spell this word, "c-o-m-p then signed "put" and then fingerspelled e-r." Mike then checked the spelling by looking at Hallie's journal to be sure it was spelled correctly.
Student's reaction	No one paid attention to the facilitator when the facilitator flashed the light to indicate that it was time for journal entries. The light was again being flashed for second time. Hallie was busy passing out log books and pencils. Shortly after starting the journal writing, Hallie waved for the facilitator's attention, but the facilitator was busy dealing with Mike. A few minutes later, the facilitator signed to Hallie, "what?" and Hallie paused a long time. So, the facilitator suggested for her to write in her journal.

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Two- First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator explanation	Bruce, along the group, appeared to understand the schedule written on the white board. As the facilitator got the participants' attention to gather together, all did except Hallie. Bruce signed to the facilitator "she slow." Hallie noticed Bruce signing about her. Bruce continued signing, "three-of-us (Bruce, Mike, David) in public school she not" and then realized Hallie was watching him. Hallie turned her head away and Bruce tapped her shoulder. He signed, "what?" and appeared to pretend he wasn't talking about her. Shortly afterwards, he waved for the facilitator's attention and signed, "three-of-us." But, the facilitator was busy signing to Mike. Bruce raised his hand as the facilitator asked who would volunteer start to teach LOGO commands to Mary. Both Bruce and Mike raised their hands and Mike volunteered himself. The facilitator decided suggested they take turns. Bruce and David watched the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began teaching even before the facilitator finished explaining.
Student(s) began task in an appropriate manner	Bruce began writing in journal as instructed as he soon as he found enough space to have elbow room from other participants to open his log book. After Mike asked who was next to explain another LOGO command to Mary, Bruce immediately signed, "FORWARD means F-T" and shook his head indicating no. He then fingerspelled, "F" as Mike interrupted him that he already taken care of it and signed, "finish tell her." Bruce signed, "sorry anyway." He continued signing, "you will like" and moved both his hands maze-like. Mike again interrupted him and signed, "if prefer back." Bruce checked the white board and signed, "back" He continued signing, "anyway B-K means" as he moved his body backward and fingerspelled B-K simultaneously. He then signed, "for example b-k b-k", checked the board, and resumed signing, "50 means" as his

	finger drawing back 50 'steps'. He completed his task by signing, "well" and tapped David's shoulder to inform him it was his turn to explain to Mary as he signed, "explain her."
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	While waiting for Hallie to complete her journal entry #1 task, both Bruce and Mike exchanged conversation.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	Bruce completed his journal entry #1 and signed, "finish" to the facilitator. Bruce finished signing his journal entry #1 to the facilitator and the rest of group who happened to watch him. Only Mike did not watch and chose to read or look at his journal instead. Bruce again signed, "finish" to the facilitator indicating that he was done with his journal entry #1.
Student(s) checked/watched others or the environment	Bruce watched the conversation between the volunteer and facilitator about the videorecorder placement. Bruce looked at Hallie's journal. Bruce continued scanning the environment of the room. Bruce watched Mary and the facilitator while they conversed. Bruce tapped Mike's shoulder and Mike informed him to pay attention to David who was explaining the LOGO command, LEFT, to Mary. Bruce quieted down and watched them. Shortly afterwards, Bruce waved for the facilitator's attention during David's explanation. (end of First 10 minutes)
Student(s) checked other student's assignment	
Student(s) stayed on task	Bruce continued writing his journal as others wrote.

	Bruce checked his journal after scanning his surroundings in the room. Bruce continued writing in his journal. Then, he read his journal. He resumed his journal writing. Bruce signed to himself while waiting for Hallie to complete her journal entry #1 task.
Student(s) got others' attention	Bruce waved for facilitator's attention and asked for the spelling word, LOGO. After spelling, he signed, "that all?" Bruce signed what he wrote in his journal entry #1 to the facilitator. The rest of group, except Mike, watched him sign. Bruce waved for the facilitator's attention and showed something on the white board. He then returned to his position. Bruce tried to question the facilitator and signed the number as well. He waved for the facilitator's attention while she was busy watching Mike teach LOGO command, FORWARD, to Mary. In the middle of Mike's fingerspelling, F-O-R, Bruce interrupted and got the facilitator's attention by signing, "number 50 50 50." Then, he continued watching Mike teaching.
Student's reaction	

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Two- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	As Bruce put chap stick on his lips, he appeared to watch as the facilitator explained what to do on the paper assignment #1. The facilitator was ready to explain the next task but had to wave several times to get Bruce's attention. Bruce appeared to be staring at the wall. Bruce received his second paper assignment from the facilitator. (end of Second 10 minutes)
Student(s) began task in an appropriate manner	Bruce was the second person to get a marker to begin paper assignment #1.
Student(s) asked group members about task	Bruce signed, "Hallie's turn" after Mike said he would explain the second assignment. Mike tapped Bruce's shoulder again, "me fine?" Bruce gave in and signed, "fine."
Student(s) shared pertinent information with group members	Hallie resumed her explanation by signing –"turtle move how right" as her hand turned right and then its moved "30" steps forward and continued to explain another LOGO command, LEFT before both David and Mike interrupted her and informed her that command, LEFT, had already been explained. Mary and Bruce watched them. While Mike input LOGO command, RIGHT, from his paper, he explained it to Mary from the screen. Both Bruce and Hallie interacted by communicating with each other.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	Bruce mimicked what Mike did as Mike moved his hand to explain to Mary. Bruce and Mike looked at me while Hallie was about ready to explain LOGO command to Mary. Bruce followed the facilitator as she went to check the second videocamera. After Hallie's attempted explanation, Bruce looked at the facilitator.

	Bruce checked something in his pocket and informed the facilitator that he forgot to give the hall pass that was in his pocket to his teacher. The facilitator asked him to give it to her. Bruce gave it to her and used chap stick on his lips. Bruce watched the facilitator explain to Hallie how to seek group help. While Hallie sought help, the facilitator gave a hint to Bruce to help Hallie. Bruce then tapped Hallie's shoulder, explained what to do on paper assignment #1 to her, and showed his work. Hallie immediately started writing on her paper assignment #1. After completing paper assignment #1, Bruce looked out the window at outdoor activity while waiting for others to complete their assignments. Again, Bruce checked the room surrounding while waiting. Bruce struggled to see the computer screen after Hallie moved, and he moved Hallie to a better, closer position. Bruce, with Hallie, watched the screen as Mary typed while Mike and David argued about the error. Bruce checked as Mike and Mary were at the computer screen. Bruce continued to watch Mike and Mary while communicating with the facilitator.
Student(s) checked other student's assignment	Bruce looked at Mike's paper assignment #1 while he explained how the LOGO turtle turned to Mary.
Student(s) stayed on task	Bruce continued to write LOGO commands on the paper assignment #1. After the facilitator's discussion of the answer with group, Bruce checked his paper assignment #1.
Student(s) got others' attention	Bruce waved for the facilitator's attention and signed for few seconds by asking if the facilitator had been in TV before (probably meant videorecording). The facilitator told him to watch the group activity. Bruce waved for the facilitator's attention and signed, "Right?" as he showed his paper assignment #1. The facilitator explained to Bruce that he had to have a group discussion to see if his assignment were right or not. Bruce fingerspelled to the facilitator, "d-a-t-e" three times as he asked for today's date. The facilitator was busy. After Bruce interacted with Hallie while Mike explained of his entries to Mary, he talked to the facilitator.
Student's reaction	

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Two- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Bruce, along the group, looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing. Bruce, along the group, looked at the white board where the two questions were written during the facilitator's explanation. Bruce waited to write his journal entry #2 and checked what Mike was typing. Then, he checked to see if the facilitator finished writing on the white board. He read the questions and got his log book out of his folder. Bruce, along the boys, responded to the light blinking that indicated the facilitator wanted to explain two questions on the board. Bruce, along the group, responded to the light blinking which indicated it was time to end the session. Bruce paid attention to the facilitator as she gave instruction for the next day's session. Bruce raised his hand and signed, "me out there all-the-way out-there" as he pointed at the window. The facilitator signed, "oh no here not out-there no no." It indicated that the session will be in this same room for the next day.
Student(s) began task in an appropriate manner	After reading the questions on the white board, Bruce began writing his journal entry #2 as soon as he got his log book out of his folder. After the explanation from the facilitator about two questions on the white board, Bruce copied the questions into his journal entry #2. Bruce knelt on the floor to continue his journal writing. Then, he erased and resumed his writing. Bruce paused and appeared to think. Then, he resumed his journal writing.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	

Student(s) completed task	Bruce informed the facilitator that he was done with his paper assignment #2. He also double checked it Bruce finished signing his journal to the facilitator and looked at the clock on the wall. He informed her by signing, "Time!" as he indicated it was time to go.
Student(s) checked/watched others or the environment	Bruce checked the computer screen as soon as he put his paper assignment #2 down. After looking at the screen, he checked his paper assignment #2.
Student(s) checked other student's assignment	
Student(s) stayed on task	Bruce continued working paper assignment #2 task.
Student(s) got others' attention	Bruce raised and waved for the facilitator's attention, but she was busy assisting Hallie. Hallie picked up her paper assignment #2 and showed facilitator. The facilitator asked, "What is it?" Hallie replied, "House." Then, she resumed working on her paper assignment #2 task. Bruce looked at her assignment and then looked at the screen. After David informed the facilitator that he was done with his paper assignment #2, Bruce signed, "yes" indicating that he was done, too. Bruce showed his paper assignment #2 as the facilitator walked around the computer table to check on the computer screen. He then put it down. Bruce got up and waved for the facilitator's attention, but the facilitator was busy dealing with Mike. Then, the facilitator got Bruce's attention and signed, "what?" Bruce signed what he wrote in his journal. Bruce waved for the facilitator's attention but she was busy communicating with Hallie. Bruce watched us.
Student's reaction	

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Four– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	
Student(s) began task in an appropriate manner	Bruce was on the floor doing his task by building his model car.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Bruce signed to Mike, "me too for that no wheel."
Student(s) attempted to complete task	
Student(s) experienced trial and error	Shortly after Bruce resumed his task, he tried to fix something with his. He got up and went to box to get other parts.
Student(s) completed task	
Student(s) checked/watched others or the environment	Bruce looked at the girls working.
Student(s) checked other student's assignment	
Student(s) stayed on task	Bruce continued constructing his model car. After checking with the girls, Bruce resumed his task by continuing to build his car. Bruce continued getting more pieces from the blue LEGO box. He was still building his car.
Student(s) got others' attention	Bruce talked to the facilitator about finding the certain piece and checking out the blue LEGO box. He got the motorized wheel box and again checked the pieces from the blue LEGO box.
Student's reaction	Hallie appeared not to like Bruce disturbing the box to find pieces for his car.

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Four - Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator tapped Bruce's shoulder and signed, "Can I see your car?" (after the facilitator explained to Mary and Hallie about using these two LEGO pieces according to the picture). Bruce gave his car to the facilitator and the facilitator showed him how to put the rubber on the wheel. The facilitator tapped on Bruce's knee to ask him to get David's attention. Bruce tapped on David's shoes and got his attention. And then David waved for the facilitator's attention.
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	Both Mary and Bruce tried to disassemble the LEGO pieces. Mary asked Bruce for help to disassemble the LEGO piece. When Bruce finally disassembled the piece, Mary signed, "Right! Right!" Mary then showed the picture to Bruce indicating that she wanted the same model as shown in the picture. Both Mary and Bruce exchanged conversation about putting LEGO pieces together.
Student(s) shared pertinent information with group members	Bruce had conversation with the facilitator about his model car. After Mary showed Bruce the picture of the model she wanted to build, both Mary and Bruce exchanged conversation about putting LEGO pieces together. After a while Mary signed to Bruce, "me messed up" and Bruce fixed it. Mary again showed the picture to Bruce. Mary helped Bruce fix and then let him fix alone. Mary looked at the picture and put it on the floor for Bruce to look at it while fixing.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	Bruce checked on other boys as they were working. Bruce watched the conversation exchanged between Mike and the facilitator about two different sizes of rods.
Student(s) checked other student's assignment	

Student(s) stayed on task	After showing off the wheel to the facilitator, Bruce put its wheel to his model car. Then, he immediately tested his car which ran on the floor. The facilitator tapped his shoulder and signed, "Finally! Good job!" The facilitator informed Bruce that she wanted to hold his car and wanted to put it away for safely. After the car was put away, the facilitator asked Bruce by signing, "finish what you do?" Bruce paused and then signed, "race?" The facilitator signed, "No. I meant that car finish." and Bruce interrupted and signed, "journal-writing what I do." The facilitator signed, "No. That is much later." "Now will u laid-back?" Bruce paused and appeared thinking. He nodded negatively as his head turned left to right to left meaning he will not lay back. The facilitator signed, "No? then what do you do?" Bruce paused and signed, "I-don't-know." The facilitator signed, "what group mean?" Bruce signed, "we-as-group." The facilitator signed, "Right. What group do?" Bruce then signed, "help." The facilitator then smiled. Bruce immediately asked Mike by signing, "help?" but Mike did not want any help. Bruce next asked David by signing, "help?" and David did not respond at all. The facilitator tapped Bruce's shoe, gave him a tiny hint to assist the girls, and smiled. Bruce asked Mary if she needed some help. And he moved over where the girls were. The facilitator waved for Bruce's attention and immediately decided to stay out by signing, "me-hand-off." Bruce went ahead to help fix Mary's stuff while Hallie was looking for LEGO pieces. Both Bruce and Mary were still on task while Mary investigated the picture on the floor as Bruce tried to fix the model as shown in the picture.
Student(s) got others' attention	Bruce got the facilitator's attention for Mike. Bruce interrupted the facilitator by tapping on her shoulder while the facilitator was communicating with David. The facilitator ignored Bruce and continued informing David of what to fix on his car. Bruce tapped the facilitator's shoulder again. He then shoved his LEGO piece toward the facilitator's face as he demanded for attention. (WOW!) The facilitator tapped Bruce's shoulder and signed, "LOOK! (<i>I'm</i>)talk(talking) thank you." Bruce immediately signed, "sorry." The facilitator smiled and signed "ok now what?" The facilitator had to delay Bruce for few seconds and check on David to be sure he understood what he was supposed to do. Then, the facilitator tapped Bruce's leg and signed, "now what?" Bruce indicated that he needed help with the rubber to be put on wheel. Both the facilitator and Bruce figured out how to put it on. Then, Bruce took it back without informing the facilitator and fixed it by himself. While assisting Mary to find a certain LEGO piece shown in the picture, Bruce again shoved his wheel toward the facilitator's face. The facilitator fingerspelled with a disapproved facial look, "w-h-a-t?" and then realized that Bruce was just showing off that he succeeded putting the rubber to the wheel.
Student's reaction	

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Four- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator waved for the group's attention to watch David's action. The facilitator asked Bruce to get Mary's attention. Finally, the facilitator informed them to watch David's moving car. The facilitator waved for Bruce's attention and signed, "d-o you mind get (<i>getting</i>) log books from table?" The facilitator then informed him to pass the books to the other group members. The facilitator signed to Bruce, "put-it on-floor it's-easier." Bruce responded to the facilitator that it was Mike's and he was not cooperating. The facilitator again signed, "me-as-a-teacher do what me (<i>I</i>) say." The message was for Bruce to put the log book there on the floor even though Mike refused to cooperate. Bruce then gave the facilitator his book and pencil. Bruce gave pencil to David and he did not throw it. The facilitator signed to Bruce, "you d-o what-do today?" He began to write his journal.
Student(s) began task in an appropriate manner	After the facilitator informed Bruce the question for his journal, he began to write.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mary waited for Bruce's attention since she asked Hallie to get Bruce's attention. Hallie used her pencil pointed Mary indicating to inform Bruce that Mary wanted him. Mary signed to Bruce, "spell name" Bruce began to spell his name, "B-" and then decided to show her his name on the log book cover for her to copy. Bruce leaned over and checked Mary's journal to be sure that Mary spelled his name correctly. Bruce signed to Mary, "spell wrong." Mary erased and Bruce corrected it.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	Bruce wanted Mike's attention, but he apparently changed his mind and resumed his journal writing. Bruce watched the facilitator and Mary while Mary signed her journal entry.

Student(s) checked other student's assignment	
Student(s) stayed on task	Bruce continued writing his journal while the facilitator dealt with issues with Hallie about journal entry. After watching Mary sign her journal entry, Bruce resumed his journal writing. Bruce was very focused writing his journal while the facilitator dealt the videocamera position with David. Bruce was still writing even after David left. After the facilitator tapped Hallie's shoulder and inquired if she was done with her journal task, Bruce signed, "finish." He put his log book and pencil away on the computer table.
Student(s) got others' attention	After Bruce completed his journal task, he asked the facilitator if she had done this before with group. The facilitator signed, "yes" and smiled. Bruce signed, "different state?" and the facilitator signed, "yes different state." He then signed, "cool." He was the second person to leave the session.
Student's reaction	While communicating with David about his experience with LEGO, the facilitator signed to Bruce, "do not throw o-k? be nice to-pass" (Bruce threw David's log book across the room).

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Five– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	At the beginning, Bruce, along the group, replied that he understood the schedule explained on the white board. After the facilitator's explanation that it was last day of LEGO LOGO sessions and that it was very important for each group member to cooperates with each other, not ignore, and assist others as well, Bruce was in silence and did not really indicate if he understood or he was not paying attention. During the group discussion after the first task of this session was completed, Bruce listened the facilitator telling what to do next. The group was asked if all assignments were done same or different. Bruce, along the group, replied by signing, "different."
Student(s) began task in an appropriate manner	After a brief explanation of the white board assignment by the facilitator in a group discussion, Bruce was the first person to come forward to the white board to begin the task of writing LOGO commands for a square. He started writing the command, "FORWARD."
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	After checking David's and Mike's answers and writing few commands, Bruce erased one of the commands. Then, he continued to write more commands.
Student(s) completed task	Bruce got the facilitator's attention to check his assignment on the board and informed her that he was done with it.
Student(s) checked/watched others or the environment	Bruce looked at David's answer on the board and then Mike's answer as well while he was trying to write the next LOGO command. After looking at Mike's answer, Bruce checked answers against his. Then, Bruce again watched Mike writing his.
Student(s) checked other student's assignment	
Student(s) stayed on task	Bruce resumed his task after checking the answers from David and Mike. After Bruce's erasure, he continued adding more commands. He then paused and appeared thinking before he again continued to add some more commands.

Student(s) got others' attention	After talking to a volunteer videorecorder, Bruce immediately tapped the facilitator because he wanted the facilitator to look at his assignment on the board and informed the facilitator that he was done with it.
Student's reaction	

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Five- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Bruce appeared to be the only group member who understood the facilitator's instruction about how, as a group, to discuss and to agree with right or wrong answers of LOGO command assignment on the white board. Bruce displayed his understanding when he stood back and watched what his group was doing. He then tapped Mike's shoulder and signed, "I think you're right" indicating that Bruce agreed with Mike's answer on the board. Both Bruce and Mike exchanged conversations about their answers, especially Mike's. They were comparing their answers against each other and Bruce then fixed his error. After the light blinked for all group members' attention, Bruce did respond to this system. The explanation was given by the facilitator about how to pick which answer from the board would be typed into the computer. Bruce picked Mike's answer to be tried first. The facilitator asked the group if they reached their agreement yet. Hallie and Mary were exchanging their opinions while David appeared unsure and was trying to decide between Mike's answer and his which data to enter into the computer. Bruce convinced David that Mike's answer is right. Both Bruce and Mike explained David by virtually drawing the square according Mike's LOGO command answer. The facilitator informed the group to begin entering the answer into the computer. Bruce left with David and Mike to go to the computer table before the facilitator finished explaining. Bruce was third person positioned after Mike and David. He was positioned in the middle of the computer table after the girls joined. The facilitator asked the group what was on the screen and they all replied, "square." Bruce explained each LOGO command of square as the facilitator walked on the floor while he virtually drew a square according the LOGO commands from the screen that Mike entered.
Student(s) began task in an appropriate manner	After discussing about his answer with Mike, Bruce fixed his error on the board.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	After fixing his error, Bruce asked Mike about his corrected answer on the board. After Bruce's input about using the left angle square, Bruce and the facilitator exchanged comments about using the LEFT command while Mike and Hallie exchanged information Both Mike and Hallie then discussed it with the facilitator while others were watching on the screen. Mike continued to type and Hallie appeared discouraged since she wanted to type.
Student(s) attempted to complete task	

Student(s) experienced trial and error	Bruce fixed his error on the board after discussing with Mike. After Mike and David fixed the error on the screen, the facilitator asked the group if that was opposite. Bruce replied, “opposite” and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group different questions by signing, “why think Bruce is right? Why it’s opposite?” Only David replied that it was opposite by using the LEFT command.
Student(s) completed task	
Student(s) checked/watched others or the environment	Bruce watched the conversation exchanged between Mike and Hallie about agreeing to use Mike’s answer to input into the computer since the boys agreed that Mike’s answer was right. Bruce watched the screen as Mike keyed his LOGO command from the white board into the computer. Bruce became the last person positioned of the computer table because of new Hallie’s and Mary’s placement. Yet, Bruce did not move much further toward the end of the computer table and was able to see the computer activity on the screen. Bruce watched with the group while both Mike and David argued about who would type and fix the error. Mike, by pushing David’s hand away from the keyboard, did not allow David to fix the error.
Student(s) checked other student’s assignment	
Student(s) stayed on task	
Student(s) got others’ attention	Shortly after the inquiry of a shape on the screen by the facilitator, Bruce tapped the facilitator’s shoulder and explained that LEFT command can be used instead of right. He gave a floor exercise going opposite direction from the right angle square as shown on the computer screen.
Student’s reaction	

Individual Charts of Bruce's Behaviors during Transcribed Sessions Session Five- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	No one appeared to pay attention to the facilitator as the facilitator flashed the light to indicate it was time for journal entry. The light was again flashed. Hallie passed out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing in the journals by signing to them, "What you do today? What you do with group?" (Journal assignment was signed only, not written on the board.)
Student(s) began task in an appropriate manner	Bruce was the first person to start writing his journal entry. He continued writing until he raised his hand and interrupted the facilitator. He did not appear to notice that Mary was signing her journal entry to the facilitator. Bruce immediately signed asking for the spelling of "board." The facilitator spelled the word, "board." Bruce resumed his writing.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	Bruce tried to figure out how to plug the wire into the battery box for his model car. He added some more LEGO pieces to his model car. After checking what David was doing with his model car, Bruce kept trying to figure out how the battery box works. Bruce tested his model car by running it with the battery box that has four different direction buttons.
Student(s) completed task	Bruce completed his journal entry #5 and afterwards signed his journal to the facilitator.
Student(s) checked/watched others or the environment	Bruce, along Mary and Hallie, watched what Mike was doing with his model car into the battery box that ran on the computer table. Shortly after Bruce resumed writing after the spelling of the word "board," Bruce looked at videocamera for few seconds. Then, he returned to his writing task.
Student(s) checked other student's assignment	
Student(s) stayed on task	Bruce continued his task by adding LEGO pieces to his model car and fixing it to run. He also continued getting more LEGO pieces for third time.
Student(s) got others' attention	Bruce waved for the facilitator's attention and then immediately signed his journal entry to the facilitator. He completed sharing this before the post interview started.

Student's reaction	
Individual Charts of Mike's Behaviors during Transcribed Sessions Second Session- First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator explanation	Mike, along the group, appeared to understand the schedule written on the white board. The facilitator explained agenda of that session and Mike immediately raised his hand indicating that he wanted to be a volunteer to teach LOGO commands to Mary even before the facilitator explained. She told Mike to write the journal entry first. As the facilitator got the participants' attention to gather together, everyone, except Hallie, followed the directions. Bruce signed, "she slow" and Hallie noticed Bruce sign about her. Bruce continued signing, "three-of-us (meaning Bruce, Mike, David) in public school - she not." Then, Bruce realized Hallie was watching him. Hallie turned her head away and Bruce tapped her shoulder. He signed, "what?" and pretended he had not talked about her. In a short time, he waved for the facilitator's attention and signed, "three-of-us." But, the facilitator was busy signing to Mike. As the facilitator was explaining the next task, Mike played with his folder. The facilitator stopped explaining and, then, waved for Mike's attention. Finally, he looked at her. She then resumed her explanation. Mike raised his right hand and Bruce raised his left hand. Mike then raised his left hand and emphatically signed, "Me! Me! Me!" Bruce continued to hold his hand up. The facilitator suggested for them to take turns. Bruce and David were still watching the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began to teach even before the facilitator finished explaining. David, along the group, appeared to pay attention to the facilitator when she was explaining how to teach LOGO commands to Mary. Mike tried to get David's attention, but David chose to pay attention to the facilitator and to the white board as well.
Student(s) began task in an appropriate manner	Mike began writing in the journal before the facilitator finished explaining so the facilitator informed him to wait. He crossed the facilitator's name out in his log book. Then, he resumed writing at the proper time with other participants. Mike began explaining the LOGO command, FORWARD, to Mary even though he did not inform the group that he would start his turn first. Mike signed, "FORWARD," then pointed on the white board, and

	fingerspelled, “F-O-R. He pointed the word, FORWARD on the white board. He signed, “know that?” and checked for Mary’s understanding. Mary slightly nodded in agreement. He then explained what FORWARD meant by moving both of his hands together... and signed, “FORWARD FORWARD turtle move FORWARD.” He then checked for Mary’s understanding and waited for her reply. Mary gave no response. He signed, “well”, checked with the facilitator as what to do next, and signed, “who next.” After Bruce informed David that it was his turn to explain another LOGO command to Mary, David began signing, “LEFT LEFT”, checked with the group, and then fingerspelled, “L...” as he moved it left side. He then signed, “LEFT LEFT LEFT” He checked the white board and signed, “LEFT L-T.” He appeared puzzled and asked Mike if he were on the right track. David was assured and continued signing, “L-T L-T LEFT.” David again appeared puzzled and looked at Mike as he asked him about number. Mike signed, “your choice.” David resumed his teaching, “90” and moved both hand turning left at 90 degrees. (end of First 10 minutes)
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mike and Bruce exchanged conversation. David and Mike looked at each other’s journals. Mike signed to David, “Can I show you something?” He spelled, “D-a-v-i-d.” Both of them looked at the screen.
Student(s) attempted to complete task	
Student(s) experienced trial and error	After Bruce began his turn to explain the LOGO command, FORWARD, Mike stopped him by pulling his arm and signed, “finish tell her” indicating that he already told her. Bruce apologized and continued to sign. Mike stopped him again and signed, “if prefer back” indicating for Bruce to sign LOGO command, BACK if he wishes to do so.
Student(s) completed task	Mike completed his journal entry #1, started to give the log book to the facilitator, but ended up putting it on the computer table. After looking at Mike’s journal, David closed his log book and put it in his folder. So did Mike.
Student(s) checked/watched others or the environment	Mike got up and started looking for the spelling of the word of LOGO and fingerspelled L-O-G-O twice before writing it in his journal entry #1.

	Again, Mike signed, “turtle” twice as he tried to fingerspell it. He then looked at the facilitator and Mary. He spelled, “t-c-t-c-t.” He waved for the facilitator’s attention. He nodded in agreement when the facilitator asked him if he wanted the spelling of the word, “turtle.” She spelled it slowly so Mike can write it in his journal entry #1. Bruce and Mike watched the conversation between the volunteer and facilitator about the videorecorder placement. Mike looked at the volunteer videorecorder and looked around the room. Then, he looked at Mary and waved for the facilitator’s attention while playing with his log book cover. He continued to watch the conversation exchanged between the facilitator and the volunteer videorecorder. Then, Mike appeared to stare at the computer screen. He turned around and looked at what the volunteer videorecorder was doing. He continued to watch her while playing with his log book cover. He then raised his hand and waved for the facilitator’s attention. Mary quickly raised her hand as well. Mike signed, “me finish” to indicate that he was done with his journal #1 entry. Mike fingerspelled his name from the log book cover. He waved for the facilitator’s attention again. He turned around and looked at the volunteer videorecorder and then raised his hand. He waved his right hand for the facilitator’s attention and put his left hand on the top of his head. Then, with his right hand, he signed, “finish.” A short time later after the facilitator dealt with David, Mike waved his log book at her. He then raised his eyebrow as if he was asking her to put the log book in his folder or not. The facilitator told him to leave it out. Mike appeared to be very frustrated as he waited for Hallie to complete her journal and indicated that he wanted to move on.
Student(s) checked other student’s assignment	David looked at Mike’s journal – perhaps for the spelling of the word, “turtle.” He, then, wrote in his journal. Mike did offer to help David by fingerspelling first and then letting him copy the word from his journal instead. Mike looked at Bruce’s journal #1 because he appeared to read it. Mike checked back and forth between his journal and David’s to be sure he spelled the word, turtle, correctly. Both of them continued to check each other’s journal. While Bruce signed his journal entry #1, Mike read his

	instead of watching. After watching Bruce signing his journal#1, David read Mike's journal. Mike noticed David was reading his journal and closed his log book immediately. Mike realized that David was checking his journal and appeared to frustrate. Mike decided to open his log book to check what David needed. After Bruce signed, "finish" indicating he finished signing his journal, Mike immediately raised his hand and signed, "two weeks?" He again signed, "two weeks?" He was asking the facilitator if the LEGO LOGO lasts two weeks. He again waved for the facilitator's attention and signed right away, "two weeks?"
Student(s) stayed on task	
Student(s) got others' attention	Mike wanted to give his pencil and folder to the facilitator while she was signing to Mary. After exchanging conversation with Bruce, Mike waved for the facilitator's attention and showed frustration since the facilitator was busy. Bruce tapped Mike's arm and He told Bruce to pay attention David who was teaching LOGO command, LEFT to Mary.
Student's reaction	

Individual Charts of Mike's Behaviors during Transcribed Sessions
Second Session- Second 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Hallie resumed to her position after her explanation of the LOGO command to Mary. Mike and Bruce looked at the facilitator. The rest of group then looked at Mary. David told Mary to move, but Mary did not understand. Therefore, the facilitator explained to Mary to move for the purpose of the videocamera. She then moved. As the facilitator explained what to do on the paper assignment #1, David opened his folder, looked at something there, and then closed it. He then watched the facilitator. The facilitator explained the next task for the group: how to discuss who/what was right or wrong and asked for a volunteer to discuss to the group about paper assignment #1. Mike was the first to respond and signed, "me first!" He was ready to take the paper assignment #1 from the facilitator. He then tapped David's shoulder and signed, "FORWARD FORWARD." David appeared unsure. Then all participants looked at the facilitator as she explained to Mike to use paper first and then computer afterward. Mike gave a disappointing look. He then read the assignment #1 with his hand moving as he read. After the facilitator instructed the group how to discuss what was right or wrong with their paper assignment #1 and then to put data into the computer, Hallie was the first person to raise her hand to be a volunteer. Mike tapped Bruce's shoulder and signed, "me me." Other participants watched them. Bruce signed, "Hallie's turn" and Mike tapped Bruce's shoulder again and signed, "me fine?" Hallie immediately signed indicating strong feeling, "ME ! FIRST!" She was ignored. Mike took over at the computer area by pushing David away from the computer so he could have access to the keyboard. After Mike did that, the facilitator informed Mike to be sure to explain clearly as Mary entered the data. After Mike assisted Mary type the data from paper assignment #1, the facilitator signed, "good job wonderful." The facilitator then saved the data into the disk while participants watched to learn how to save the data. The facilitator signed, "busy means saving now." After saving the data, the facilitator used the escape key and signed, "me escape go back busy now saving." Hallie tapped her arm to see if she saved her data from yesterday's assignment and the facilitator told her that she did as well as others. Mike then tapped her shoulder and signed, "finish mine?" She signed, "yes all of yours don't worry now we need wait a minute." The facilitator realized that all of Mary's data was not yet saved. The facilitator asked Mary if she understood. Mary was not sure and the facilitator signed, "if you do not understand what you do?" twice. When Mary did not respond, the facilitator mentioned to her that she needed to ask the group for the answer. Mike waved for the facilitator's attention and signed, "FORWARD F-D" and the facilitator tapped his arm and signed, "wait a minute" She then signed to Mary, " not understand ask-them (individually) to explain you." Mary slightly nodded in agreement. The facilitator checked to see if Mary really understood by signing,

	“if you do not understand what you do?” Mike immediately answered by signing, “help.” Unfortunately, Mary didn’t get a chance to reply. The facilitator signed, “help help help help (individually) understand discuss o-k?” and paused for a moment before she signed again, “now we stop.” Hallie signed, “Me!” as she indicated it was her turn and David then signed, “me!” Mike grabbed his folder to rearrange and moved David’s log book. David patiently took his laminated orange paper and rearranged his paper assignment #1. Hallie tapped Mike’s shoulder but he ignored her. Without giving others a chance, Mike went ahead to explain to Mary. He took his laminated, orange paper out of his folder to show Mary. He pointed FORWARD with his finger on the orange paper to Mary. David, Bruce, and Hallie watched them. Mike explained by signing, “FORWARD F-D.” Since the facilitator could not get Mike’s attention, David volunteered to brush his laminated orange paper on Mike’s arm. Mike’s facial expression was unpleasant as he signed, “WHAT!” He decided to ignore David and went on an unnecessary task explaining to Mary. The facilitator then lost all participants’ attention. She had to tap the table little harder to get Mike’s attention and then rest of participants quickly responded to this system. After finally getting Mike’s attention along with the rest of the group’s, the facilitator explained what should be done with the next task: paper assignment #2. Mike pulled the laminated blue paper and checked something else in his folder while the facilitator was explaining. The facilitator waved to Mike to pay attention. He put things away in his folder. The facilitator gave out paper assignment #2. Mike showed a frustrated facial expression as he got another paper assignment. Bruce received his second paper assignment from the facilitator. (end of Second 10 minutes)
Student(s) began task in an appropriate manner	Mike was the very first person to get the marker to begin his paper assignment #1. Mike began to move the mouse and to key into the computer while other participants watched him. Hallie appeared unhappy and was not with the group. Mike pointed to Mary and Mary nodded in agreement. Mike typed and pointed to which Mary again nodded slightly. Mike realized an error on the turtle activity on the screen. David signed, “sick.” Mike corrected it by typing. He signed, “Understand? Understand?” Mary slightly nodded. Mike then pointed his finger on the screen and showed how the turtle moved up on the screen. He signed, “Now RIGHT,” and typed RIGHT. Bruce struggled to see the screen after Hallie moved closer to the group. Mike continued signing, typing, and explaining to Mary. He then signed, “Understand? Understand?” He wanted Mary to type. He fingerspelled, “R-T R-T” and showed Mary where to type RT. Mary typed and entered the correct command. Mike explained how the turtle turned and informed Mary to type FD as he helped her type FD. Hallie tapped Mike’s shoulder but he did not respond to her. Mike continued assisting Mary to type 50. Then, both Mike and Mary shared turns by typing as Mike assisted Mary. Mike signed,

	"90" and showed Mary where to type 90. Afterwards David informed Mike it was wrong. Mike pushed David's arm away and thumbed up. He explained how the turtle turned. Then, Mary finally typed by herself without any assistance to complete a square of LOGO commands. Mike then asked her by signing, "What is that? What is that?" as he pointed the screen. Mary responded, "square." Mike signed, "right!"
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mike tapped Hallie's shoulder while David signed, "finish" and Mike signed, "enough enough." Hallie started to explain the LOGO command, LEFT, to Mary but David had already explained that command.
Student(s) attempted to complete task	
Student(s) experienced trial and error	David signed, "wrong" and pointed on the screen, but Mike pushed his arm away while Mary continued typing. Both Bruce and Hallie watched this action.
Student(s) completed task	When Mike completed his paper assignment #1 task, he asked the facilitator if he could show his assignment to the group.
Student(s) checked/watched others or the environment	Mike watched David explain the LOGO command, LEFT, to Mary. Bruce and Mike looked at me while Hallie was about ready to explain LOGO command to Mary. Mike looked at the videocamera for few seconds. Mike watched Bruce as he asked the facilitator for the date three times.
Student(s) checked other student's assignment	
Student(s) stayed on task	Mike continued writing on his paper assignment #1 and quickly glanced at David's assignment. He resumed working on his task. David continued to write LOGO commands on the paper assignment #1 and then checked Mike's. He opened his folder and got the laminated orange paper with LOGO commands. Then, he resumed his task. After writing LOGO commands on his paper assignment #1, he put the orange paper back in his folder. Then, he resumed working on assignment#1. He again took the orange paper out of his folder so that he could compare it against his work on paper assignment#1. He then continued working on it. He signed, "doesn't matter." (appeared to be informing Mary) David then asked Mike by signing, "right?" Mike's eyebrow went up. David explained to Mike again and signed again, "right?" Mike checked his assignment and appeared puzzled as he pointed with his finger on his paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment.

Student(s) got others' attention	Mike interrupted David's LOGO command explanation and waved for Mary's attention. He began signing, "turtle will move" as his hand showed Mary how it turned left while David watched and Bruce mimicked Mike's hand movement. Hallie moved closer to group. Then, both Mike and Bruce looked at the facilitator. Mike moved Hallie's shoulder for videorecording purpose while she attempted to explain the LOGO command to Mary. Mike waved for the facilitator's attention and signed, "show?" He was asking to see if he could go ahead to show his paper assignment #1 to the group. The facilitator told him to wait since the rest of group was not finished with their task.
Student's reaction	

Individual Charts of Mike's Behaviors during Transcribed Sessions Second Session- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Mike, along the group, looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing. While the facilitator was explaining about journal entry #2, David picked up his paper assignment #2. Mike went ahead to get his log book. The facilitator had to tap their shoulders and sign, "wait not finish explaining." Then, all were paying attention to the facilitator. Mike, along the other boys, responded to the light blinking that indicated the facilitator needed their attention. The facilitator wanted to explain two questions on the board. Mike typed and then got his log book out of the folder even before the facilitator finished instructing. Mike then typed to save the data while the facilitator asked him to stop typing and to pay attention. He informed her that he was trying to save the data. The facilitator indicated concern, because she feared that Mike might have saved the current file under the same filename that he used earlier. The facilitator discovered that failed to replace the previous file. The facilitator informed Mike that he was not to save the same under the same filename. He said, "o-k." The facilitator asked him to leave it alone please and he obeyed with no outward sign of frustration. Mike, along the group, responded to the light blinking which indicated it was time to end the session. Mike put his pencil in the folder and began walking away to leave the room. The facilitator told him to wait and he walked backward to his position. While the facilitator dealt the issues for the next day's session with other participants, Mike put his chap stick on his lips. Mike agreed to help Mary come to the session the next day. After answering to Bruce's question, Mike waved for the facilitator's attention and signed, "prefer computer lab." She signed, "sorry can't help." The facilitator explained the reason why the computer lab was not being used: the next day's session would be different as they would begin LEGO tasks. Mike signed, "not computer?" and the facilitator signed, "yes tomorrow o-k?" The facilitator reminded them to come to this conference room for the next day's session. Mike left.
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	David showed his paper assignment #2 to Mike while the facilitator wrote the questions on the white board. Mike typed and David assisted him to continue typing from his paper assignment #2. Mike fixed the error as David assisted him by pointing on the screen. Mike continued typing, paused, appeared to think, and again typed. Mike checked to see if the facilitator was still writing the questions on the white board.

	Mike resumed typing. David, Bruce, and Mary watched the screen while Mike typed. Hallie looked at the white board where the facilitator wrote. While Bruce read what questions the facilitator wrote on the white board, both David and Mike shared their thoughts and then Mike typed. (MIKE had excellent position to control typing on the keyboard even though David wanted to.) David and Mary continued watching Mike typing.
Student(s) attempted to complete task	Mike appeared to complete his journal entry #2 task. As he was about to close his log book, he noticed something on the screen. He typed and signed, "finish" as he indicated for the computer stop acting up. The facilitator informed Mike to please leave the computer alone. He stopped and showed little expression as David watched the exchange. Mike returned to writing his journal entry #2 by picking up his pencil. As Mike was ready to put his paper assignment in the folder, he stopped and wrote something on it. He put pencil down, tied his shoe, and resumed work.
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	Mike watched David as David was about to complete his journal entry #2. While doing the paper assignment, Mike checked what David wanted. Mike put his assignment in his folder and then David was told him about the previous day's activity when turtle went out of the loop.
Student(s) checked other student's assignment	
Student(s) stayed on task	Mike explained about turtle movement to Mary. He then wrote on his paper assignment #2 and showed one of the LOGO commands from laminated, orange paper to Mary. With his interesting facial expression, he signed, "H-T means gone". Mary nodded in agreement. He then signed, "S-T pops-up" with an open mouth facial expression and continued to sign. "H-T if H-T hide." He was still signing, "S-T not hide none show" as he pointed on the screen. Mary looked at the screen. After reviewing the LOGO commands on the laminated orange paper, he tapped Mary and signed, "HOME." Mary nodded in agreement. Mike typed HOME and showed Mary that on the screen the turtle returned home. He explained what HOME means. He then pointed on screen and asked Mary to watch the screen as he typed some commands and HOME. David interrupted Mike to tell him of the error, but Mike ignored him. Mike waved for the facilitator's attention and tried to explain that the LOGO activity of square on the screen went the other way. He asked the facilitator to come to the screen. He signed, "square." The rest of the group checked what was happening on the screen. The facilitator signed, "square see turtle went-out-of-space look" as she informed the group to look at the turtle on the screen. Mike signed, "see different well" and typed. Mike's facial

	expression indicated “oh geez” as he put his forefinger on his mouth indicated that he did not tell the turtle follow that command Mike typed. He checked his orange paper to see what went wrong. David tried to tell him but the facilitator tapped him and informed him that he needed to stop. Then, all participants watched the facilitator as it was time for journal assignment. While the facilitator wrote the questions on the white board, Mike typed more LOGO activity to show Mary.
Student(s) got others’ attention	David tapped on the computer table once and Mike checked to determine what he wanted. David turned around and waited. After Mike put his assignment in the folder and closed it, David then informed Mike by signing, “Yesterday I type one more 500”, pointed his finger to the screen, signed, “I type 499.” He showed the key to Mike and typed. He then signed, “not yet add one more.” He explained to Mike what happened by adding another zero and showed what happened on the screen. He continued explaining without showing the screen and Mike signed, “I-know.” Shortly after that, Mike tapped David’s arm and informed him by signing, “If that way (vertically) will go around (vertically)” as he pointed on the screen vertically. David nodded in agreement and signed, ‘mess up.” Both David and Mike discussed their trials and errors. David continued explaining to Mike.
Student’s reaction	

Individual Charts of Mike's Behaviors during Transcribed Sessions Session Four– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	After talking to Mary about a certain LEGO piece, the facilitator checked on what the boys were doing and then signed to Mike, “ If you finish what do you do? “ Mike appeared unsure of what to respond, and the facilitator informed him by signing, “help help check see if help remember cooperate.” Mike just resumed his task on his car by plugging the wire into the interface box.
Student(s) began task in an appropriate manner	Mike was already on the floor doing his task by continuing to work on model car that he built the day before.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	After the facilitator questioned Mike about what to do if he were done with his task, Mike continued to test his car with the interface box several times. He appeared to be trying to figure out what the problem was.
Student(s) completed task	
Student(s) checked/watched others or the environment	
Student(s) checked other student's assignment	
Student(s) stayed on task	Mike continued building his model car with LEGO pieces. After talking to Bruce about needing more wheels, Mike resumed his task of fixing his car.
Student(s) got others' attention	Mike tapped on the floor for Bruce's attention. He appeared frustrated and signed, “me no for that (point to wheel).” Bruce signed, “me too for that no wheel.” Mike signed, “not enough wheel need two more.”
Student's reaction	

Individual Charts of Mike's Behaviors during Transcribed Sessions Session Four- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	
Student(s) checked other student's assignment	
Student(s) stayed on task	After trying the rubber band on the car, Mike continued working on building his car until he was satisfied with results. Since Bruce offered his help, Mike continued working on his task with his car.
Student(s) got others' attention	Mike talked to the facilitator and then looked at David. Mike signed to the facilitator, "need round." The facilitator asked him if that were tire or rod thing. He replied, "rod." The facilitator then signed, "have two sizes." The facilitator was ready to give Mike the rod piece, but he signed, "no", and showed what he needed on his car. He resumed signing, "running-around-wheel." The facilitator signed, "show-me picture." Mike then signed, "running-around-wheel" and the facilitator signed, "o-h you mean rubber band?" The facilitator got the rubber band and then signed, "this?" Mike slightly nodded and the facilitator signed, "this rubber band rubber band." She was informing him the word for that was rubber band. Mike appeared to understand. The facilitator waved for his attention and signed, "How many? 1 (or) 2?" Mike replied, "I think 2." The facilitator signed, "2 fine" and got another one. Mike informed the facilitator that he didn't need the second one since his car worked fine after putting one rubber band.
Student's reaction	Mike did not want any help from Bruce when Bruce offered.

Individual Charts of Mike's Behaviors during Transcribed Sessions Session Four- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator waved for the group's attention to watch David's action. The facilitator asked Bruce to get Mary's attention. Finally, the facilitator informed them to watch David's moving car. Mike watched.
Student(s) began task in an appropriate manner	Mike began his journal entry after looking at Bruce's journal.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	After recording the spelling of the word "later," Mike immediately closed his log book.
Student(s) checked/watched others or the environment	While writing his journal Mike either checked the clock on the wall or the board.
Student(s) checked other student's assignment	While the facilitator watched Mike for few seconds, he viewed his model car in the air and rotated it. Mike looked at Bruce's journal and wanted to know what to write in his journal entry.
Student(s) stayed on task	Mike was very focused on his car building task while the facilitator tried to his attention by tapping on the floor for four times. Mike continued working on his car even though that was not the assigned task for that time. While the facilitator was spelling words for the rest of group, Mike continued his car model task. After checking Bruce's journal, Mike continued writing in his journal. In between writing in his journal, Mike resumed his car model task. After closing his log book, Mike resumed his car model task again. The facilitator walked over where Mike was and stood there watching him. He finally got up and left. He was the last person leaving for that session.
Student(s) got others' attention	Shortly after his journal entry and model car task, Mike got the facilitator's attention by patting his hand on the floor and asked her for the spelling of the word, later. The facilitator fingerspelled, "L-a-t," paused, "e-r." Mike only checked spelling twice while writing.

Student's reaction	The facilitator explained to Mike that he “can do that tomorrow let’s do this.” She indicated that Mike can finish his car task tomorrow and encouraged him to begin writing his journal. He refused to cooperate and wanted to complete his task. The facilitator put his log and pencil close to where he was. The facilitator tapped on the floor to get Mike’s attention and continued to tap at different area of the floor, closer to where Mike was. It took the facilitator four times before Mike finally responded. The facilitator signed, “please stop now please write what do today.” Mike immediately chose not to pay attention and was very focused with his car building task. After responding to Hallie for her journal task, the facilitator crawled over to tap for Mike’s attention. This time he immediately looked at the facilitator. The facilitator signed, “please cooperate” and Mike looked away and chose to continue his car building task. The facilitator paused for a while and watched Mike’s action. Then, she fingerspelled, “o-k” as she signed, “hands-back-off” and left Mike alone. (Mike did later write in the journal.)
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Individual Charts of Mike's Behaviors during Transcribed Sessions Session Five– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	At the beginning of Day 5, Mike, along the group, replied that he understood the schedule explained on the white board. The group was informed that it was their last day because of the schedule change due to the weather. The facilitator emphasized that it was very important for each group member to cooperate, not ignore, and assist others as well. Mike was in silence, as were other group members. The facilitator instructed the group members on the methods of how to write the LOGO commands of square on the white board as a group and to use the laminated orange LOGO commands for an assistance if needed. Mike raised his hand, but he seemed to change his mind. Mike appeared to listen to the facilitator explanation about how to agree or disagree by discussing with group. And the group was asked if the answers on the board from each participant were done the same or different. Mike, along the group replied in signing, "different."
Student(s) began task in an appropriate manner	After a brief explanation about the LOGO command assignment on the white board by the facilitator, Mike was the second person coming forward from the group to the white board.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mary and Hallie exchanged information on the board and then again Hallie exchanged more information with Mike about LOGO command assignment.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	Mike was the first person to complete his LOGO command assignment and got the facilitator's attention. Conversation was exchanged between the facilitator and Mike about his LOGO command assignment.
Student(s) checked/watched others or the environment	
Student(s) checked other student's assignment	Mike watched Bruce writing his answer before he began his task writing LOGO commands of square. Shortly after Mike began his task of writing LOGO commands on the white board, he looked at Hallie's answer. Then, he resumed writing. After some time, Mike wrote LOGO commands on the board. He looked at Hallie's. Then, he continued writing more LOGO commands. After checking Hallie's answer, Mike continued writing more commands.

Student(s) stayed on task	Mike continued writing LOGO commands on the white board while Hallie and Mary watched him. Mike paused for a while and appeared to think what LOGO command to write next. Then, he wrote it. Mike continued writing LOGO commands of square while Bruce looked at Mike's answer. After the conversation about LOGO commands between Mike and Hallie, Mike appeared to think before he resumed his task writing more LOGO commands on the board.
Student(s) got others' attention	Mike tapped my arm while I was talking to a volunteer videorecorder. He immediately realized that I was busy and did not continue to try to get my attention.
Student's reaction	

Individual Charts of Mike's Behaviors during Transcribed Sessions Session Five- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	After the facilitator's instruction about how to discuss and to agree with right or wrong answers of LOGO command assignment on the white board as a group, Mike went up to the board to write more LOGO commands. After the light was blinked for all group members' attention, Mike did respond to this system. The facilitator explained how to pick which answer from the board would be typed into the computer. Immediately, Mike was the first person who raised his hand. The facilitator again reminded the group to discuss clearly which answer they would want to try first. Bruce picked Mike's answer. The facilitator asked the group if they reached their agreement yet. Hallie and Mary were exchanging their opinions while David appeared unsure. Bruce convinced David that Mike's answer is right. Both Bruce and Mike explained to David by virtually drawing the square according Mike's LOGO command answer. David checked Mike's answer step by step by all himself and finally agreed with Bruce that the answer is right. Then, Mike asked Hallie and Mary if they were in agreement for Mike to input his answer into the computer first. They both gave Mike no response. The facilitator informed the group to begin entering the answer into the computer. Mike was the first person leaving. He was at the very end of the computer table where they keyboard was before the facilitator finished explaining. Due to activity in the hall, Mike informed the facilitator that the schedule had changed. The facilitator replied that he should not worry about that and just follow the schedule on the board. The facilitator asked the group what was on the screen and they all replied, "square." Bruce explained each LOGO command of square as the facilitator walked on the floor while he virtually drew a square according the LOGO commands from the screen that Mike entered. After the error was fixed on the screen by Mike and David, the facilitator asked the group if that was opposite. Bruce replied, "opposite" and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group the different questions by signing, "Why think Bruce is right? Why it's opposite?" Only David replied that it was opposite by using the LEFT command. After explaining the reason why Mike could not continue type while the group discussion of squares being opposite was going on, David explained why the two squares are mirror-like. The facilitator signed, "Yes" and then "same square or different?" by inquiring the group. (end of Second 10 minutes)
Student(s) began task in an appropriate manner	Mike began his task by typing his answer from the board into the computer before the end of the instruction.

	Mike wrote more LOGO commands. Mike went ahead and typed while David replied that square was opposite by using the LEFT command. The facilitator informed Mike to stop typing, but he did not. The facilitator had to turn Mike around away from the computer. The facilitator had to explain to him why he could not type. The facilitator stated that nothing would happen to the information in the computer while the group finished discussing the squares being opposite.
Student(s) asked group members about task	Bruce tapped Mike's shoulder and signed, "I think you're right" indicating that Bruce agreed with Mike's answer on the board. Both Bruce and Mike exchanged conversations about their answers, especially Mike's. They were comparing their answers against each other and Bruce then corrected his error.
Student(s) shared pertinent information with group members	After Bruce corrected his error on LOGO commands of square on the board, both Bruce and Mike exchanged conversation. Mike mostly made comments about both Bruce's and Mike's answers. They compared their answers against each other. After Bruce's input about using the left angle square, Bruce and the facilitator exchanged comments about using the LEFT command while Mike and Hallie exchanged information. Both Mike and Hallie then discussed it with the facilitator while others were watched on the screen. Mike continued to type using the LEFT command instead RIGHT command drawing another square and Hallie appeared discouraged since she wanted to type.
Student(s) attempted to complete task	
Student(s) experienced trial and error	David pushed the enter key. Mike and David argued about who would type and fixed the error. By pushing David's hand away from the keyboard, Mike did not allow David to fix the error. David signed, "Finish!" and Mike signed, "See." By signing "finish," David meant for the turtle going out of space on the computer screen to stop. And what Mike meant about signing, "see" was that David should not push the enter key. Mike corrected the error.
Student(s) completed task	Mike completed entering the data from the board: his answer to the assignment of LOGO command square. Mike again completed another task by typing another square using the LEFT command.
Student(s) checked/watched others or the environment	Mike now became the second person positioned of the computer table because of Hallie's and Mary's new placement. Yet, Mike continued typing. Mary watched the conversations between Bruce and the facilitator about using LEFT command instead of RIGHT when drawing a square and Mike and Hallie about using particular LOGO commands by pointing to them on the screen.

Student(s) checked other student's assignment	
Student(s) stayed on task	Mike continued typing his answers from the board while the facilitator discussed the better placement with the girls. Mike was still typing the LEFT angle square while others were watching him. David tried to type to fix the error but Mike wouldn't allow him to do that.
Student(s) got others' attention	
Student's reaction	

Individual Charts of Mike's Behaviors during Transcribed Sessions Session Five- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator informed Mike it was enough for him to make several runs of his model car and let the rest of group to have the experience. (share) No one paid attention to the facilitator as the facilitator flashed the light to indicate it was time for journal entry. The light was again being flashed. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing in the journal. The facilitator signed, rather than write on the white board, to them, "What you do today? What you do with group?"
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	Before trying to collect the pencil from Mike, Hallie asked Mike if he had finished using the pencil by signing, "finish?" Mike was running his model car and ignored her.
Student(s) shared pertinent information with group members	The facilitator informed Mike that he had tried his car enough and that he should share it with the group. Mike let Hallie share the experience first before others. Mike explained how to do it to her and Hallie tried to push the button. The model which Mike held fell apart onto the table. Hallie laughed about the incident and continued to laugh. After the spelling word, "computer," both Hallie and Mike exchanged conversation.
Student(s) attempted to complete task	Mike gave another try on his model and his model flew off accidentally hitting both Hallie's finger and Mary's arm. Hallie moved to the very end of the computer table past where Mary was. Mary did not move. Mike fixed the model car and then tested the car by pushing the turn direction button. Mike got more LEGO pieces from the floor when the facilitator blinked the lights to change tasks.
Student(s) experienced trial and error	Mike was the first person who plugged the wire to the battery box so that his model car could run on the computer table. This gave the idea to both Bruce and David of what to do with theirs. Mike wanted to know the real reason why it was not working properly and the facilitator signed, "L-O-G-O L-E-G-O not work don't know why I'm sorry."
Student(s) completed task	Mike finished his journal writing and resumed his LEGO activity with his car.
Student(s) checked/watched others or the environment	
Student(s) checked other	

student's assignment	
Student(s) stayed on task	Mike continued on his task by trying different direction buttons for a few minutes. After helping Hallie with the spelling of the word "computer," Mike resumed his journal writing.
Student(s) got others' attention	Hallie waved for the facilitator's attention and asked for the spelling of this word, "computer." The facilitator started spelling, "C-" and was interrupted by Mike. Hallie waited for the facilitator to spell more letters. The facilitator noticed the word, "computer" on Mike's journal and told Hallie to check the spelling from Mike's log and go ahead to copy the spelling. Mike appeared to dislike the idea and the facilitator told him it was okay to share! Just let her copy the word. Mike did volunteer without being told to spell this word, "c-o-m-p then signed "put" and then fingerspelled e-r." Mike then checked the spelling by looking at Hallie's journal to be sure it's spelled correctly.
Student's reaction	No one paid attention to the facilitator when the facilitator flashed the light to indicate it was time for journal entry. The light was again being flashed. Mike appeared unhappy when it was time for journal. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing journal by signing to them, "what you do today? What you do with group?" Mike was the only person who did not start journal until third time the facilitator talked with him. The facilitator made a deal with him to begin the journal since he was very persistent to continue his LEGO activity task. The facilitator was interrupted by Hallie and then resumed to deal with Mike's behavior. She noticed that Mike was watching David doing his LEGO activity. David had already started his journal writing and Mike did not. The facilitator encouraged Mike to begin writing. Shortly after Mike began his journal entry, the facilitator noticed David was watching Mike doing his LEGO activity task again. David shared his experience with Mike by pushing the turn direction button. The facilitator was busy watching Mary signing her journal entry and assisting other students to spell words. Mike continued his LEGO activity task while the facilitator checked David's journal entry. After checking David's entry, the facilitator took Mike's model car away and put it a little farther from him on the computer table. The facilitator tried to encourage Mike to complete the journal and informed him of the second question. Mike chose not to look at the facilitator for the second question. However, he did write his journal. A few minutes later, Mike interrupted by asking the facilitator about LEGO LOGO activity on the computer while Mary asked the facilitator for the spelling of the word.

Individual Charts of Mary's Behaviors during Transcribed Sessions Session Two- First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator explanation	Mary, along the group, appeared to understand the schedule written on the white board. Mary appeared puzzled while the facilitator explained what to do. The facilitator asked her if she could write as the facilitator pointed to her journal. As the facilitator got the participants' attention to gather together, all did except Hallie. Bruce signed to the facilitator "she slow." Hallie noticed Bruce signing about her. Bruce continued signing, "three-of-us (Bruce, Mike, David) in public school she not" and then realized Hallie was watching him. Hallie turned her head away and Bruce tapped her shoulder. He signed, "what?" and appeared to pretend he wasn't talking about her. Shortly afterwards, he waved for the facilitator's attention and signed, "three-of-us." But, the facilitator was busy signing to Mike. Bruce and David watched the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began teaching even before the facilitator finished explaining.
Student(s) began task in an appropriate manner	Mary smiled at the facilitator and signed to her, "me absent me date." She did sign date even though she meant doctor. After the facilitator asked Mary to write in her journal, Mary signed, "I will (was)" and then began writing.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	Mary groomed her hair as she waited for the facilitator to spell the word, "absent." Then, she started writing the word as the facilitator spelled it. A short time later, she patiently waited for the attention of the facilitator as the facilitator was busy spelling words for other participants. Mary requested that the facilitator again spell "absent." Mary wrote each letter as she turned her head back and forth to see the each letter spelled by the facilitator. After looking at the videocamera, Mary looked at her journal and signed to herself, "tomorrow for doctor" and then nodded with her shrugged shoulder. She then waved for the facilitator's attention and waited. The facilitator was spelling for Mike. Mary tried to get the facilitator's attention as she let her left hand go from the top of the computer. Her raise her eyebrows indicating that she wanted the attention of the facilitator right away. She then signed to the facilitator, "I was absent not here not here." Mary had a frustrated look as the facilitator continued with another student. She fingerspelled, "n" and then looked at her journal and signed, "here" with a disappointed facial expression.

Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	Mary turned her head looking at the videocamera for few seconds and then looked at her journal. Mary watched the rest of participants as they continued their journal writing. Mary looked at Mike and David as what they watched the volunteer. Then, she turned her head to look at Hallie and Bruce while they were writing their journals. Shortly after that, she watched the facilitator discuss videocamera positions with the volunteer. She again watched Mike who was looking at the volunteer after checking the computer screen. Mary quickly turned around and looked at the facilitator. After Mike waved for the facilitator's attention, Mary immediately raised her hand. Then, she let her hand go down and groomed her ponytail instead. Mary spelled, "M-i-k-e M-i-k-e" by looking at his log book cover. She then spelled, "M-a-r-y M-a-r-y" and spelled, "D-a-v-i-d D-a-v-i-d." She raised her right hand as she looked at her journal. The facilitator was busy assisting others. Mary waved her right hand in an attempt to get the facilitator's attention. After a while, she got the facilitator's attention and asked how to spell, "absent." Then, she appeared to be frustrated and signed, "not here." The facilitator spelled, "H-." Mary wrote each letter by looking back and forth as the facilitator spelled each letter very slowly for the word, "here." Then, she continued writing in her journal. Mary watched the conversation between the facilitator and Bruce. Mary raised her hand as Bruce began signing his journal entry to the facilitator. She put her hand down and continued watching Bruce sign. As soon as Bruce finished signing, Mary immediately raised her hand and asked for spelling word, "doctor." Mary looked at Mike as he began explaining the LOGO command to her. Mike began explaining the LOGO command, FORWARD, to Mary even though he did not inform the group that he would start his turn first. Mike signed, "FORWARD," then pointed on the white board, and fingerspelled, "F-O-R." He pointed the word, FORWARD on the white board. He signed, "know that?" and checked for Mary's understanding. Mary slightly nodded in agreement. He then explained what FORWARD meant by moving both of his hands together... and signed, "FORWARD FORWARD turtle move FORWARD." He then checked for Mary's understanding and waited for her reply. Mary gave no response. He signed, "well", checked with the facilitator as what to do next, and signed, "who next." After Mike asked who was next to explain another LOGO command to Mary, Bruce immediately signed, "FORWARD means F-T" and shook his head indicating no. He then fingerspelled, "F" as Mike

	interrupted him saying that he had already taken care of it. Mike signed, “finish tell her.” Bruce signed, “sorry anyway.” He continued signing, “you will like” and moved both his hands maze-like. Mike again interrupted him and signed, “if prefer back.” Bruce checked the white board and signed, “back” He continued signing, “anyway B-K means” as he moved his body backward and fingerspelled B-K simultaneously. He then signed, “for example b-k b-k”, checked the board, and resumed signing, “50 means” as his finger drawing back 50 steps. He completed his task by signing, “well” and tapped David’s shoulder to inform him it was his turn to explain to Mary as he signed, “explain her.”
Student(s) checked other student’s assignment	
Student(s) stayed on task	After the spelling the words, “not here,” Mary continued writing her journal and signed, “we are not”, and resumed writing. Mary wrote the word, “doctor” with assistance of the facilitator, who spelled each letter very slowly. Mary continued writing her journal. Mary looked at the screen with Mike and David.
Student(s) got others’ attention	Mary raised her hand for the facilitator’s attention and asked for spelling the word, “absent.” After watching the other participants write in their journals, Mary waved for the facilitator’s attention immediately after David waved for attention. Mary continued to raise her hand. She turned her head to watch the volunteer person as she raised her left hand. Then, she turned her head back and checked on the facilitator. She groomed her hair as she read David’s journal. Then, she looked at the volunteer again.
Student’s reaction	

Individual Charts of Mary's Behaviors during Transcribed Sessions
Second Session- Second 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator asked Mary to move for the videorecording purpose and she did not understand at first. The volunteer videorecorder tapped her shoulder and informed her to move. Mike interrupted David's LOGO command explanation and waved for Mary's attention. He began signing, "turtle will move" as his hand showed Mary how it turned left while David watched. Hallie resumed to her position after her explanation of the LOGO command to Mary. Mike and Bruce looked at the facilitator. The rest of group then looked at her. David informed Mary to move, but Mary did not understand. Therefore, the facilitator explained Mary to move for videocamera purpose. She then relocated. As the facilitator explained what to do on the paper assignment #1, David opened his folder, looked at something there, and then closed it. He then watched the facilitator. The facilitator explained the next task for the group: how to discuss who/what is right and wrong and asked for volunteer to begin the discussion for the group about paper assignment #1. Mike first responded, "me first!" He was ready to take the paper assignment #1 from the facilitator. He then tapped David's shoulder and signed, "FORWARD FORWARD." David appeared unsure of what to do. Then all participants looked at the facilitator as she explained to Mike to use paper first and then computer afterwards. Mike gave a disappointing look. He then read assignment #1, moving as he read. Mary had been watching all these actions since the facilitator began to explain paper assignment #1. I told Mary not to worry about this assignment and just watch what the group was doing. David signed, "what to-do" and checked on Mike's paper assignment #1. Mary watched him and looked at his assignment. She continued to watch him get his laminated, orange paper out of his folder. Then, she looked at what Bruce and Hallie were doing. Then, she checked David's paper. She turned her head around and checked the videocamera and stared at it for few seconds. She turned her head and checked on her group activity. She looked at Mike to see what he was doing on his assignment. She picked up her paper assignment #1 and fanned. Then, she stared at the window and then watched Bruce as he asked the facilitator for the date three times. David informed Mary by signing, "doesn't matter" as his hand turned left. Mary watched David asking Mike if he were right. Mike's eyebrow went up though he did not pay attention to them. David spoke to Mike again and signed again, "right?" Mike checked his assignment and appeared puzzled as he pointed with his finger on his paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment. Mary watched this whole activity. Mike began to move the mouse and to keyboard while other participants watched him. Hallie appeared unhappy and was not with

	the group. Mike pointed to Mary and Mary nodded in agreement. Mike typed and pointed as Mary again nodded slightly. Mike realized the error on the turtle activity on the screen. David signed, "sick." Mike corrected it by typing. He signed, "Understand? Understand?" Mary slightly nodded. Mike then pointed his finger on the screen and showed how the turtle moved up on the screen. He signed, "Now RIGHT" and typed RIGHT. Bruce struggled to see the screen after Hallie moved closer to the group. Mike continued signing, typing, and explaining to Mary. He then signed, "Understand? understand?" He wanted Mary to type. He fingerspelled, "R-T R-T" and showed Mary where to type RT. Mary typed and entered the information by tapping the appropriate key. Mike explained how the turtle turned and informed Mary to type FD as he helped her type FD. Hallie tapped Mike's shoulder but he did not response to her. Mike continued assisting Mary type 50. Then, both Mike and Mary shared turns by typing as Mike assisted Mary. Mike signed, "90" and showed Mary where to type 90. Afterwards, David informed Mike it was wrong. Mike pushed his arm away and thumbed up. He explained how the turtle turned. Then, Mary typed by herself without any assistance to complete a square of LOGO commands. Mike then asked her by signing, "What is that? What is that?" as he pointed the screen. Mary responded, "square." Mike signed, "right!" After Mike assisted Mary typing the data from paper assignment #1, the facilitator signed, "good job wonderful." Mary watched what the facilitator said. The facilitator then saved the data into the disk while participants watched to see how to save the data. The facilitator signed, "busy means saving now." After saving the data, she used the escape key and signed, "me escape go back busy now saving." Hallie tapped her arm and checked to see if she had correctly saved her data from the previous day's assignment. The facilitator told her that she did as well as others. Mike then tapped the facilitator's shoulder and signed, "finish mine?" She signed, "yes all of yours don't worry now we need wait a minute" as she realized not all of Mary's data had been saved. The facilitator asked Mary if she understood. Mary was not sure and the facilitator signed, "If you do not understand what you do?" twice. Then, the facilitator said that she needed to ask group for the answer. Mike waved for the facilitator's attention and signed, "FORWARD F-D" and the facilitator tapped his arm and signed, "wait a minute" She then signed to Mary, "not understand ask-them (individually) to explain you." Mary slightly nodded in agreement. The facilitator tested to see if Mary really understood by signing, "If you do not understand what you do?" Mike immediately answered by signing, "help." Unfortunately, Mary didn't get a chance to reply. The facilitator signed, "help help help help (individually) understand discuss discuss o-k?" and paused for a moment before she signed again, "Now we stop." Hallie signed, "Me!" indicating that it was her turn and David then signed, "me!" Mike grabbed his folder, rearranged where he was, and moved David's log book. David patiently took his laminated orange paper and rearranged his paper assignment #1. Hallie tapped Mike's shoulder, but he ignored her.
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	Mike went ahead to explain Mary as he did not want other participants to take over. He took his laminated, orange paper out of his folder to show Mary. He pointed to FORWARD with his finger on the orange paper to Mary. David, Bruce, and Hallie watched them. Mike explained by signing, “FORWARD F-D.” Since the facilitator could not get Mike’s attention, David volunteered to brush his laminated orange paper on Mike’s arm. Mike’s facial expression was unpleasant as he signed, “WHAT!” He decided to ignore David and continued an unnecessary task explaining to Mary. The facilitator then lost all participants’ attention. She had to tap the table little harder to get Mike’s attention and then the rest of participants quickly responded to this system. After finally getting Mike’s attention along with the rest of the group, the facilitator explained what was needed to do with next task: paper assignment #2. Mike pulled the laminated blue paper and checked something else in his folder while the facilitator was explaining. The facilitator waved to Mike to pay attention. He put things away in his folder. The facilitator gave out paper assignment #2. Mike appeared frustrated as he got another paper assignment. Bruce received his second paper assignment from the facilitator. The rest of group began writing the assignment and Mary looked at them and appeared not know what to do. (end of Second 10 minutes)
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Hallie resumed her explanation by signing –“turtle move how right” as her hand turned right and then its moved “30” steps forward and continued to explain another LOGO command, LEFT before both David and Mike interrupted her and informed her that command, LEFT, had already been explained. Mary and Bruce watched them.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	
Student(s) checked other student’s assignment	Mary looked at Mike’s log book while Hallie explained the LOGO command to her.
Student(s) stayed on task	
Student(s) got others’ attention	Hallie tapped Mary’s shoulder as she was ready to explain but David told her to use the LOGO command, RIGHT.
Student’s reaction	Hallie laughed at her error as Mary looked at her. Mary looked at David after he put his hand on his head indicating, “duh” to Hallie.

Individual Charts of Mary's Behaviors during Transcribed Sessions Session Two- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Mary, along the group, looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing. Mary did not respond to the light blinking to indicate that the facilitator wanted to explain two questions on the board. She was looking at the LOGO activity on the screen. She finally looked at the facilitator after the facilitator finished discussing behavior with Mike. Mary watched the facilitator as she instructed about writing in the journal responding to the two questions. Both David and Mike went ahead and copied the questions. The facilitator noticed Mary wasn't doing anything and asked her to come around so she can assist her to start her journal entry #2. She explained the first question to Mary. (Mary was out of sight for this rest of session videotape.)
Student(s) began task in an appropriate manner	Mary got her log book after the facilitator's explanation and appeared not sure what to do. She played with her log book cover. She turned her head around and smiled at the volunteer videorecorder. Then, she read Mike's journal entry #2 while she played with her log book cover.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	David checked on the screen and informed Mike by signing, "turtle head there" while Mike explained, "turtle..." to Mary. David showed his paper assignment #2 to Mike while the facilitator was writing the questions on the white board. Mike typed and David assisted him to continue typing from his paper assignment #2. Mike fixed the error as David assisted him by pointing on the screen. Mike continued typing, paused, appeared to think, and again typed. Mike checked to see if the facilitator was still writing the questions on the white board. Mike resumed typing. David, Bruce, and Mary watched the screen while Mike typed. Hallie looked at the white board where the facilitator wrote. While Bruce read the questions that the facilitator wrote on the white board, both David and Mike shared their thoughts and then Mike typed. (MIKE had excellent position to control typing on the keyboard even though David wanted.) Mary watched the activity on the screen. David and Mary continued watching Mike type.
Student(s) attempted to complete task	
Student(s) experienced trial and error	

Student(s) completed task	
Student(s) checked/watched others or the environment	Mary looked at David's paper assignment #2 while the facilitator was busy writing the questions on the white board.
Student(s) checked other student's assignment	
Student(s) stayed on task	Mike explained the turtle movement to Mary. He then wrote on his paper assignment #2 and showed one of the LOGO commands from the laminated, orange paper to Mary. With an interesting facial expression, he signed, "H-T means gone". Mary nodded in agreement. He then signed, "S-T pops-up" with an open mouth facial expression and continued to sign. "H-T if H-T hide." He continued to sign, "S-T not hide none show" as he pointed on the screen. Mary looked at the screen. After reviewing the LOGO commands on the laminated orange paper, he tapped Mary and signed, "HOME." Mary nodded in agreement. Mike typed HOME and showed Mary that on the screen the turtle returned home. He explained what HOME means. He then pointed on screen and asked Mary to watch the screen as he typed some commands and HOME. David interrupted Mike as he wanted to tell him of the error, but Mike ignored him. Mike waved for the facilitator's attention and tried to explain that the LOGO activity of square on the screen went the other way. He asked the facilitator to come to the screen. He signed, "square." The rest of the group checked what was going on the screen. The facilitator signed, "square see turtle went-out-of-space look" as she informed the group to look at the turtle on the screen. Mike signed, "see different well" and typed. Mike's facial expression was like 'oh geez' and he put his forefinger on his mouth and indicated that he did not tell the turtle follow the command Mike typed. He checked his orange paper to see what went wrong. David tried to tell him, and the facilitator tapped him and informed him that he needed to stop. Then, all participants watched the facilitator as it was time for journal assignment. While the facilitator wrote the questions on the white board, Mike went ahead typing more LOGO commands to show Mary. After Mike's explanation from the laminated orange paper of LOGO command to Mary, David went back to write on his paper assignment #2. He appeared to correct it. Yes, he did erase it and then corrected it after checking Bruce's assignment and checked the activity on the screen.
Student(s) got others' attention	
Student's reaction	

Individual Charts of Mary's Behaviors during Transcribed Sessions Session Four– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Both Mary and Hallie were offered assistance by the facilitator to build the LEGO model car. Hallie asked the facilitator if she could ask the boys for help. The facilitator told her she could. The boys might not respond, but she was right to ask them for help. The facilitator explained to Mary and Hallie how to find LEGO pieces according to the pictured brochure. The facilitator made a suggestion for the girls to avoid confusion with LEGO pieces and to separate the pieces they needed and put them into a smaller box. The facilitator informed Mary not to lay back and continue to work together.
Student(s) began task in an appropriate manner	Shortly after Mary found the LEGO pieces, she needed to get some more. She got up from the floor and grabbed the blue LEGO box from the computer table to be put on the floor. Hallie started looking for the certain LEGO pieces with Mary according to the pictured model car brochure after she got some guidance from the facilitator on how to find the pieces. After some encouragement from the facilitator to continue the task, Hallie resumed gathering the sorted LEGO pieces from a small box with Mary. Then, later, without the facilitator's assistance, both Mary and Hallie continued to sort out pieces again in order to build the car.
Student(s) asked group members about task	Mary already teamed with Hallie on the floor and discussed what model to build from the pictured brochure. Mary already picked the one she wanted to build. Hallie complained and did not want to help Mary to find LEGO pieces. Hallie indicated that she wanted to organize new LEGO pieces into the big, plastic blue box. Mary disagreed. She put her hand up toward Hallie's face while her face was turned to other side and ignored her complaint. Mary told Hallie to find LEGO pieces according to the pictured model brochure.
Student(s) shared pertinent information with group members	Hallie and Mary exchanged conversation about finding more of certain LEGO pieces and beginning to build the model car. Both Hallie and Mary continued to exchange conversation while they found LEGO pieces.
Student(s) attempted to complete task	Mary began helping Hallie but Hallie turned her head around as she appeared to be curious as to what the boys were doing.
Student(s) experienced trial and error	

Student(s) completed task	
Student(s) checked/watched others or the environment	Mary checked the conversation between the volunteer and the facilitator. Then, she looked at the facilitator and indicated that she needed the facilitator's help. Mary looked at the videocamera for few seconds and smiled as if she were having her picture made.
Student(s) checked other student's assignment	
Student(s) stayed on task	After the suggestion made by the facilitator, Hallie and Mary put the LEGO pieces in a smaller box to avoid the confusion.
Student(s) got others' attention	Mary tapped the facilitator's shoulder and inquired why the videocamera was being used. The facilitator explained to her that it was for her research. Mary continued getting LEGO pieces. Mary smiled and signed "yes." She then resumed her task on LEGO pieces.
Student's reaction	After the facilitator discussed a matter with Hallie, Mary informed the facilitator that Hallie did not want to work even though Mary encouraged her. (This was done a few minutes after Mary and Hallie switched places at Mary's suggestion. (Switching places could have bothered Hallie.) The facilitator reminded Mary that Hallie may not see very well and suggested to her to help Hallie. Mary seemed to realize that she needed some assistance.

Individual Charts of Mary's Behaviors during Transcribed Sessions Session four- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	Both Mary and Bruce tried to disassemble the LEGO pieces. Mary asked Bruce for help to disassemble the LEGO piece. When Bruce finally disassembled the piece, Mary signed, "Right! Right!" Mary then showed the picture to Bruce indicating that she wanted the same model as shown in the picture.
Student(s) shared pertinent information with group members	After Mary showed Bruce the picture of the model she wanted to build, both Mary and Bruce exchanged conversation about putting LEGO pieces together. Afterwhile Mary signed to Bruce, "me messed up" and Bruce fixed it. Mary again showed the picture to Bruce. Mary helped Bruce fix and then let him fix alone. Mary was looking at the picture and put it on the floor for Bruce to see while fixing.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	
Student(s) checked/watched others or the environment	
Student(s) checked other student's assignment	
Student(s) stayed on task	Hallie and Mary continued to sort out the LEGO pieces with the facilitator. Hallie and Mary are teamed up to begin building the model car. Mary and Hallie stayed on task finding certain LEGO pieces to build a car according the picture.
Student(s) got others' attention	Hallie interrupted and asked the facilitator about a certain LEGO piece in the picture as the facilitator conversed with Bruce about how to put the rubber on the wheel. Then, the facilitator explained to Mary and Hallie how to understand the size of the rod piece and to notice the different sizes of rod pieces. Mary asked Hallie to get the facilitator's attention by tapping the facilitator's leg and Hallie informed the facilitator that Mary wanted her. Mary informed the facilitator to look at the picture for a certain LEGO piece she needed.
Student's reaction	

Individual Charts of Mary's Behaviors during Transcribed Sessions Session four- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator waved for the group's attention to watch David's action. The facilitator asked Bruce to get Mary's attention. Finally, with all attending, the facilitator informed them to watch David's moving car.
Student(s) began task in an appropriate manner	Mary began opening her log book and was ready. Yet, she had to wait for the facilitator. After dealing the matter with Mike, the facilitator checked on Mary, turned to the correct page in the log book, and showed Mary that it was where she should begin writing. The facilitator signed the question for the journal entry, "What you do today? Do?" Mary paused then got back to begin her journal writing.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	Mary closed her log book after the facilitator's compliments. After Bruce left for the day, Mary was the second person to leave the computer room and was informed to attend the girl scout party in the library.
Student(s) checked/watched others or the environment	Mary watched Bruce as the facilitator informed him to get log books from the computer table. Mary watched the facilitator spelling the word, "stuff," to Hallie. Hallie and Mary both watched the conversation exchanged between David and the facilitator during the journal entry. While watching the facilitator asking Hallie if she finished her journal writing, Mary nodded in agreement to the facilitator to indicate that she was done with hers.
Student(s) checked other student's assignment	
Student(s) stayed on task	Mary resumed her task after watching David's moving car. Mary continued writing in her journal.
Student(s) got others' attention	Mary tapped Hallie's hand several times as Mary was trying to get her attention. Finally, Hallie was asked to find the certain LEGO piece that Mary pointed to in the picture. Mary tried to get the facilitator's attention by tapping the facilitator's knee, but the facilitator was busy talking to David about his experience.

	Mary tapped the facilitator's shoulder and tried to sign "B-J" on her head. David tapped on the floor to get the facilitator's attention while the facilitator signed to Mary. The facilitator signed to Mary, "B-J B-J" on the right side of its forehead twice. "You want spelling his name?, " the facilitator signed, "well you (<i>why don't</i>) ask-him?" Mary waited for Bruce's to attend after she asked Hallie to get Bruce's attention. Hallie used her pencil and pointed to Mary indicating that Mary wanted him. Mary signed to Bruce, "spell name." Bruce began to spell his name, "B-" and then decided to show her his name on the log book cover for her to copy. Bruce leaned over and checked Mary's journal to be sure that Mary spelled his name correctly. Bruce signed to Mary, "spell wrong." Mary erased and Bruce corrected it. While the facilitator was communicating with David, Mary tapped on the facilitator's shoulder. The facilitator continued communicating with David and Mary again tapped on the facilitator's arm. The facilitator signed to David, "good" and then turned her head to pay attention to Mary. Mary began to sign her journal and the facilitator signed, "say-again" Mary signed while reading from her log book. The facilitator signed, "good nice." Mary closed her log book. After indicating that she was done with journal writing, Mary tapped Hallie's shoulder to show her journal as Hallie was opening her log book to resume her writing.
Student's reaction	Mary tapped Hallie's shoulder because Mary wanted to show her journal, but Hallie had already opened her log and resumed her journal writing.

Individual Charts of Mary's Behaviors during Transcribed Sessions Session Five– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	At the beginning, Mary, along the group, replied that she understood the schedule explained on the white board. The facilitator explained this was last day of LEGO LOGO sessions and it was very important that each group member cooperate with each other, not ignore, and assist others as well. Mary was silent and did not indicate if she understood this or not. The facilitator informed David, Hallie, and Mary that their work was enough and it was time for a group discussion. Mary added more commands. Mary gathered within this group and listened the facilitator as what to do next. When as asked if all assignments were to be done same or different. Mary, along the group, replied in signing, "different."
Student(s) began task in an appropriate manner	After a brief explanation of the white board assignment by the facilitator in a group gathering, Mary was the last person coming forward to the white board to begin the task writing LOGO commands of square after watching three boys begin their tasks. Mary began to write some commands on the board and appeared unsure of what to do on the LOGO command board task. She watched her group members write commands. Then, she appeared to think and decided to erase.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mary and Hallie exchanged information on the board and then again Hallie exchanged more information with Mike. After asking Hallie if she remembers something, Mary resumed writing task. Mary had chance to exchange information with Mike about the commands. After copying one of boys' answer, Mary and Hallie again exchanged conversation about their assignments on the board. Then, Hallie helped Mary draw the line down the board and wrote the command. They continued to exchange opinions with each other. During Hallie's and Mary's attempt to complete the assignment, Mary asked Hallie about LOGO commands. Hallie explained what they were. After Mary's erasure, Mary and Hallie again discussed about the assignment. There were some disagreements between them.
Student(s) attempted to complete task	

Student(s) experienced trial and error	After appearing to think about what she wrote, Mary erased. And then, she looked at boys' assignment on the board. After some conversation with Hallie, Mary erased some commands on the board. Then, she tapped Hallie's shoulder and asked if she remembered something about commands. Hallie nodded negatively. Mary then resumed her task. After some discussion for clarification on commands with Hallie, Mary again erased some commands.
Student(s) completed task	
Student(s) checked/watched others or the environment	At the beginning of white board task assignment, Mary and Hallie watched the three boys write their LOGO commands before beginning theirs. After erasing commands, Mary looked at boys' assignments.
Student(s) checked other student's assignment	
Student(s) stayed on task	Mary resumed writing her LOGO commands on the board and appeared to think a while. Mary resumed her task after exchanging information with Mike. And she copied one of the boy's written LOGO command answers. After exchanging information with Hallie and getting assistance drawing the line, Mary continued writing the commands. After being told by the facilitator that it was sufficient, Mary added more commands.
Student(s) got others' attention	
Student's reaction	

Individual Charts of Mary's Behaviors during Transcribed Sessions Session Five- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Mary checked her answers on the board against Hallie's after the explanation from the facilitator about how to discuss and to agree with right or wrong answers. After the light was blinked for all group members' attention, Mary did respond to this system and then continued writing her LOGO command assignment on the board. After the facilitator explained how to agree and pick which answer from the board was to be entered into the computer, Mary discussed options with Hallie. They were discussing whose answer to try on the computer. Both wanted to try their own answer until Mike asked them if it was alright with them if he tried his answer in the computer first. They both gave Mike no response. The facilitator informed the group to begin entering the answer into the computer. The boys left their positions before the facilitator finished explaining. Both Mary and Hallie stayed until the facilitator completed the explanation. Mary positioned herself between Bruce and Hallie by the computer table. After the facilitator asked Hallie if she could see the screen and what she would do if she can't see, Mary raised her hand and immediately signed, "I can't see." Then, Hallie signed, "I can't see." The facilitator suggested that they move. Mary moved to the other side of the computer table adjacent to the window before Mike. The facilitator asked the group what was on the screen and they all replied, "square." After the error was fixed on the screen by Mike and David, the facilitator asked the group if that was opposite. There was no response from the group. The facilitator asked the group the different questions by signing, "Why think Bruce is right? Why it's opposite?" Only David replied.
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Hallie and Mary exchanged opinions about their LOGO command assignment. Hallie assisted Mary by writing her answers since Mary asked Hallie for her assistance.
Student(s) attempted to complete task	
Student(s) experienced trial and error	After Hallie's assistance, Mary erased one of LOGO command on the board.
Student(s) completed task	

Student(s) checked/watched others or the environment	Mary watched with the group while both Mike and David argued as who should type and fix the error. By pushing David's hand away from the keyboard, Mike did not allow David to fix the error. Mary watched the conversations between Bruce and the facilitator about using LEFT command instead of RIGHT when drawing square and between Mike and Hallie about using particular LOGO commands by pointing to them on the screen.
Student(s) checked other student's assignment	
Student(s) stayed on task	
Student(s) got others' attention	
Student's reaction	

Individual Charts of Mary's Behaviors during Transcribed Sessions Session Five- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	No one paid attention to the facilitator when the facilitator flashed the light to indicate it was time for journal entry. The light was again flashed. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing journal. The facilitator signed the questions rather than write them on the board: "What you do today? What you do with group?"
Student(s) began task in an appropriate manner	David let Mary to try a run on his model car. Mary tried different directions of the model car by pushing different buttons while David watched that action. Both Mary and David exchanged conversation as David assisted her to make some runs with his model car. After Mary's arm got hit by Mike's model, she continued giving David's model some runs by pushing different direction buttons. Mary started writing in her journal right after Bruce did.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	As no one paid attention to the classroom light being blinked, both David and Mary exchanged conversation.
Student(s) attempted to complete task	Mary continued her task by testing the model after the facilitator told her it was time to start writing in the journal. Both David and Mary were doing the LEGO car activity together. David paused his journal writing for few minutes and then resumed his task. A few seconds later, he helped Mary fix the model car.
Student(s) experienced trial and error	
Student(s) completed task	Mary completed her journal writing, and afterwards she signed her journal entry #5 to the facilitator. Then, she was told to close her log book.
Student(s) checked/watched others or the environment	Hallie and Mary watched what Mike was doing with his model car and the battery box as he ran the car on the computer table. Mary watched Mike assisting Hallie as he tried to get the model car running on the table. Mike gave another try on his model and his model flew off and accidentally hit both Hallie's finger and Mary's arm. Hallie moved to the very end of the computer table past where Mary was. Mary did not move.
Student(s) checked other student's assignment	

Student(s) stayed on task	Mary continued on her task by trying different direction buttons for next few minutes. Then, Mary fixed the model and gave it a run. Mary and David then exchanged conversation. Mary resumed her task after asking the facilitator about the turn direction and continued testing the model car with David. Mary continued writing in her journal until she sought the facilitator's attention to share her journal. Mary resumed the previous task after putting her log book away. Mary continued the same task with David after David paused from making his journal entry. Both Mary and David shared the task by trying different direction buttons of David's model car. Mary took the LEGO piece out by using her teeth. After David completed his journal entry, he helped Mary to resume fixing the LEGO pieces on David's car. Mary got more LEGO pieces from the floor.
Student(s) got others' attention	Mary waved for the facilitator's attention and asked the facilitator if the turn direction button means it turns. The facilitator signed, "yes." Mary raised her hand for the facilitator's attention and then shared her journal with the facilitator by signing. Bruce interrupted as Mary was about done. The facilitator informed Mary to put her log book away.
Student's reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Two- First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator explanation	David, along the group, appeared to understand the schedule written on the white board. David, along the group, appeared to pay attention to the facilitator as she explained how to teach LOGO commands to Mary. Mike tried to get David's attention, but David chose to pay attention to the facilitator and to the white board as well.
Student(s) began task in an appropriate manner	David began writing in journal as instructed as soon as he found enough space to have room from other participants to open his log book. After Bruce informed David that it was his turn to explain another LOGO command to Mary, David began signing, "LEFT LEFT", checked with his group, and then fingerspelled, "L..." as he moved it left side. He then signed, "LEFT LEFT LEFT" He checked the white board and signed, "LEFT L-T." He appeared puzzled and asked Mike if he was on the right track. David then was assured and continued signing, "L-T L-T LEFT." David again appeared puzzled and looked at Mike as he asked him about number. Mike signed, "your choice." David resumed his teaching, "90" and moved both hand turning left at 90 degrees. (end of First 10 minutes)
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Both David and Mike looked at each other's journal.
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	After looking at Mike's journal, David closed his log book and put it in his folder. So did Mike.
Student(s) checked/watched others or the environment	David looked at the volunteer videorecorder and looked around the room. Then, he looked at what Mary was doing. He licked his thumb and forefinger while waiting. He then watched the conversation between the facilitator and the volunteer videorecorder. He again put his thumb and forefinger in his mouth and ended up licking them. He continued watching the action between the facilitator and the volunteer videorecorder while they discussed about the placement of videocameras. He continued licking his finger while leaning on the computer table and watching

	us. After Mike and Mary raised their hands for the facilitator's attention, David waved his. After watching other participants' actions asking for the spelling of words or writing in journals, the facilitator did speak to David had asked for her attention earlier. Afterwards, he erased something in his journal entry #1. David, Mary, and Hallie watched Bruce signing his journal entry #1 to the facilitator. David, Bruce, and Mike watched Mary and the facilitator converse. David continued watching the facilitator's actions with Mary. David, Mike, Mary looked at the screen. David looked at the facilitator and Bruce as Bruce made an inquiry. David looked at Mike's signing to Mary during the explanation of LOGO commands. He continued watching as Mike explaining the LOGO command, FORWARD.
Student(s) checked other student's assignment	David looked at Mary's journal and then looked at the white board. David checked what Mike was doing and saw the facilitator. He signed, "help me" with a frustrated look face. He asked for the spelling word, "turtle." David looked at Mike's journal possibly to get the spelling of the word, "turtle." He then wrote his journal. Mike did offer to help David by starting to fingerspell; then, he let him to copy the word from his journal instead. After watching Bruce signing his journal#1, David read Mike's journal. Mike noticed David was reading his journal and closed his log book immediately.
Student(s) stayed on task	David continued writing in his journal while the facilitator was busy assisting Mary on her journal entry #1. David resumed his journal writing after trying to get the facilitator's attention. David continued writing his journal entry #1 and

	then checked Mike's journal. After David read Mike's journal, he checked his journal and had a frustrated look on his face.
Student(s) got others' attention	David waved for facilitator's attention and then, Mary immediately waved for facilitator's attention, too. David patted the table for the facilitator's attention and again waved (This disturbed Mike). Mike closed his log book. David wanted the spelling of turtle. The facilitator informed him to check with Mike since Mike already asked for the spelling of turtle. After watching the action between the facilitator and the volunteer videorecorder, David waved for the facilitator's attention and still couldn't get her because she was busy assisting Mike and Mary. David then checked his teeth.
Student's reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Two- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	While the facilitator explained what to do on the paper assignment #1, David opened his folder, looked at something there, and then closed it. He then watched the facilitator. The facilitator explained the next task to the group on how to discuss who/what is right and wrong and asked for volunteer to discuss as a group about paper assignment #1. After the facilitator discussed with group as what to do if they didn't understand, Mike signed, "help." The facilitator then signed, "help help individually understand discuss discuss o-k? now we stop." Hallie emphatically signed, "Me!" indicating that it was her turn. David then signed, "me!" Mike grabbed his folder to move from where he was and moved David's log book. David patiently took his laminated orange paper and rearranged his paper assignment #1. Hallie tapped Mike's shoulder, but he ignored her. Mike immediately explained to Mary as apparently, he did not want other participants to take over. David, Bruce, and Hallie watched them. With some persistence the facilitator got Mike's attention and explained what was needed to do the next task: paper assignment #2.
Student(s) began task in an appropriate manner	David was the third person to get the marker to begin his paper assignment #1. After inquiry to the facilitator about what had been said, David began his paper assignment #2.
Student(s) asked group members about task	David signed, "what to-do" and checked Mike's paper assignment #1.
Student(s) shared pertinent information with group members	After Mike informed David to type FORWARD, David appeared unsure.
Student(s) attempted to complete task	
Student(s) experienced trial and error	David signed, "wrong" and pointed on the screen, but Mike pulled his arm away while Mary continued typing. Both Bruce and Hallie watched this action.
Student(s) completed task	
Student(s) checked/watched others or the environment	David watched Mike's explanation how the LOGO turtle turned LEFT. David watched Hallie explain LOGO command to Mary. He told her to use the LOGO command, RIGHT. Hallie turned her body left instead of right. David, with an appropriate facial expression, pointed for her to turn right. Mike turned her shoulder. David kept pointing

	his right hand in the direction of right and signed, “sick.” He then watched Hallie explain to Mary how the turtle moved. As Hallie was about to explain another LOGO command, LEFT, David signed, “finish.” It indicated that the command had already been explained. He then signed, “me left” as he meant that he did that explanation. He put his hand on his head indicating duh. David then looked at Mary. He told her to move for videotaping purpose. David signed, “sick” while Mike explained to Mary about paper assignment #1 on the computer screen. He continued to watch them. He carefully watched Mary type R-T as if to check that she entered the right data. After David informed that an error was on the screen while Mary typed, he continued to watch the screen with them.
Student(s) checked other student’s assignment	David looked at Mike’s paper assignment #2 and then discussed with Mike. (end of Second 10 minutes)
Student(s) stayed on task	David continued explaining LOGO command, LEFT to Mary. He fingerspelled, “L-T.” He typed on the keyboard and signed, “your choice doesn’t matter.” (This was in regard to the number to be used.) David continued to write LOGO commands on the paper assignment #1 and then checked Mike’s. He opened his folder and got the laminated orange paper with LOGO commands. Then, he resumed his task. After writing LOGO commands on his paper assignment #1, he put the orange paper back in his folder. Then, he resumed working on assignment #1. He again took the orange paper out of his folder and compared it against his work on his paper assignment #1. He then continued working on #1. He signed, “doesn’t matter.” (He appeared to be responding to Mary.) David then asked Mike by signing, “right?” Mike’s eyebrow went up as he had not been paying attention to them. David explained to Mike again and signed again, “right?” Mike checked his assignment and appeared puzzled as he pointed with his finger to something on the paper. David picked up his pencil and appeared to think. He signed, “oh yes 90” and corrected his assignment. David continued writing on his paper assignment #2 and then looked at Mike’s assignment.
Student(s) got others’ attention	Since the facilitator could not get Mike’s attention, David volunteered to brush his laminated orange paper on Mike’s arm. Mike’s facial expression indicated that he did not want to be bothered as he signed, “WHAT!” He decided to ignore David and went on an unnecessary task of explaining to Mary. At this point, the facilitator lost all participants’ attention. She tapped a little harder on the table to get Mike’s attention and then rest of participants quickly responded to this strategy. After the facilitator passed out the paper assignment #2, David looked at it and asked her by signing, “what it-said?”
Student’s reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Two- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	David, along the group, looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing. While the facilitator explained about journal entry #2, David picked up his paper assignment #2. Mike went ahead to get his log book. The facilitator had to tap their shoulders and to sign, "wait not finish explaining." At this point, all others were paying attention to the facilitator. David, along the other boys, responded to the light blinking at the time when the facilitator wanted to explain two questions on the board. He then got his log book out of the folder. David, along the group, responded to the light blinking which indicated it was time to end the session. David paid attention to the facilitator as she gave instruction for the next day's session. David nodded in agreement that he will come to the computer room the next day by himself. Hallie raised her hand and replied that Mary was in her class. David disagreed and stated that Mary was not in her class. David volunteered to bring Mary to the next day's session. While the facilitator talked to Hallie, David tapped on the table and the facilitator signed, "wait" to him. Then, she looked at David and signed, "what?" David signed, "I will", paused, and then signed, "help." Mary agreed.
Student(s) began task in an appropriate manner	David began copying the questions from the white board that the facilitator wrote into his log book while the facilitator was still explaining.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	David checked on the screen and informed Mike by signing, "turtle head there" while Mike explained, "turtle..." to Mary. David showed his paper assignment #2 to Mike while the facilitator wrote the questions on the white board. Mike typed and David assisted him to continue typing from his paper assignment #2. Mike was fixing the error as David assisted him by pointing on the screen. Mike continued typing, paused, appeared to think, and again typed. Mike checked to see if the facilitator was still writing the questions on the white board. Mike resumed typing. David, Bruce, and Mary watched the screen while Mike typed. Hallie was looking at the white board where the facilitator was writing. While Bruce read what questions the facilitator wrote on the white board, both David and Mike share their thoughts and then Mike typed. (Mike had an excellent position to control the keyboard even though

	David wanted to type.) David and Mary continued watching Mike typing.
Student(s) attempted to complete task	
Student(s) experienced trial and error	Since the screen turtle went out of control, David pointed out the error on the screen as he informed Mike of the error.
Student(s) completed task	David completed his journal entry #2 task by closing his log book. After informing the facilitator that he was done with journal entry #2, David opened his folder so that he can put his log book in along with the laminated orange paper of LOGO commands. He held his paper assignment #2. Mike checked that and then, David put it in his folder and then, closed the folder. David opened the folder to put the pencil in it. Then, he leaned on the computer table waiting. He signed, “raining” with a disapproved facial expression, then signed, “coat there”, and smiled.
Student(s) checked/watched others or the environment	David checked his laminated orange paper of LOGO commands against the screen while Mike showed the laminated orange paper to Mary as he explained. David signed, “Finish! Finish!” as the turtle on the screen went out of control. David pointed on the screen and signed, “weird.” He pointed on the screen again while rest of the participants watched him. After informing the facilitator of his error about using number 500 instead of 50 from the previous day’s assignment, David, with the rest of the group, watched the screen as Mike fixed the error. As Mike continued typing after fixing the error, all three boys kept checking to see if the facilitator had finished writing questions on the white board. David watched the conversation exchange between the facilitator and Mike about leaving the computer alone and continuing to write journal entry #2. David checked the room and then checked on what Mike was doing.
Student(s) checked other student’s assignment	
Student(s) stayed on task	After Mike’s explanation from the laminated orange paper of LOGO command to Mary, David went back to write on his paper assignment #2. Perhaps, he was correcting it. Yes, he did erase it and then corrected it after checking Bruce’s assignment and the activity on the screen. While David wrote his journal entry #2, he erased something on his log book.
Student(s) got others’ attention	After pointing out that he thought the screen was weird, David

	informed the facilitator by signing, “yesterday me wrong typed 500 went-out-of-space add one more 0 me wrong ...should be 50.” David informed the facilitator that he completed his journal entry #2 task by signing, “finish” and played with his log book cover while waiting. David tapped on the computer table once and Mike responded to see what he wanted. David turned around and waited. After Mike put his assignment in the folder and closed it, David then informed Mike by signing, “yesterday I type one more 500”, pointed his finger to the screen, signed, “I type 499.” He showed the key to Mike and typed. He then signed, “not yet add one more.” He explained to Mike the result of adding another zero: showed on the screen that it goes out of space diagonally. He continued explaining without showing on the screen and Mike signed, “I-know.” Shortly after that, Mike tapped David’s arm and informed him by signing, “if that way (vertically) will go around (vertically)” as he pointed on the screen vertically. David nodded in agreement and signed, ‘mess up.” Both David and Mike discussed trials and errors. David continued explaining more to Mike.
Student’s reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Four– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	
Student(s) began task in an appropriate manner	David was already on the floor doing his task by building his model car.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	After attempting some runs, David finally looked at the picture to solve the problem. He then resumed making some runs. David conducted some trails without his car by pushing four different direction buttons. He then tried it with his car. He signed, "sick" as he tried to get the car to move by pushing the direction button. He finally attached the battery box with the direction button box and tried to figure out how it worked.
Student(s) completed task	
Student(s) checked/watched others or the environment	David watched the conversation between Bruce and Mike.
Student(s) checked other student's assignment	
Student(s) stayed on task	David continued fixing his model car and then got up getting the motorized interface box from the table. He plugged the wire into the interface box. After watching the conversation between Bruce and Mike, David resumed his task by testing his car with the interface box. David continued testing with his car.
Student(s) got others' attention	
Student's reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Four- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator tapped Bruce's knee to ask him to get David's attention. Bruce tapped on David's shoes and got his attention. And then David waved for the facilitator's attention. The facilitator asked him by signing, "Alright? Need help? Or doing fine?" He nodded slightly. Bruce interrupted the facilitator for a second, but she ignored him. The facilitator signed, "Hey" as she waved for David's attention and continued signing, "do that last fix car first fix that later car first." David signed, "not this box?" The facilitator had to deal with Bruce's demand for attention. Then, the facilitator waved for David's attention while he was working on the box. She waved for his attention again and signed, "understand me?" David slightly nodded in agreement. The facilitator signed, "finish fix car?" He replied by signing, "yes." The facilitator then signed, "oh ok" and finally realized that David was done fixing the car and was now figuring out with battery box.
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Both the facilitator and David exchanged conversation about the rod and how it works. The facilitator planned to assist David, but he wanted to do it alone. The facilitator got the picture to investigate. David tried to make his car to be motorized. The facilitator tapped his shoulder, showed that the wire has to be plugged, and signed, "flip over, flip over." The facilitator had to help him flip over (David may not have understood the concept – flip over) and explained how the motor works. Both the facilitator and David looked at the picture. The facilitator explained to David how it works according to the picture, helped him fix the motorized device and the rod, and then, let him complete fixing them. He paused for a while. The facilitator picked up the picture brochure and showed it to him. He investigated it.
Student(s) attempted to complete task	
Student(s) experienced trial and error	David tried several trials with his car with motorized box. David looked at the picture on the floor and signed, "me right! Right! Mess up." The facilitator tapped his shoulder and signed, "what mess up?" He replied, "won't run." The facilitator examined his car and explained that the rod was too short and he needed a longer one. He then looked for one and got the right one. The facilitator had to crawl over to get another rod.
Student(s) completed task	David succeeded having his car motorized run and was very thrilled to show it to Mike. He signed to Mike, "Look," and showed him that it has different directions.

Student(s) checked/watched others or the environment	
Student(s) checked other student's assignment	
Student(s) stayed on task	David hooked up his car with motorized box. He continued figuring out how to plug the wires. David continued working and figuring out how to make his car run by using the motorized battery box.
Student(s) got others' attention	
Student's reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Four- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	The facilitator signed, "finish write (<i>writing</i>) write no more?" David stared at me. The facilitator then signed, "you don't-know?" David nodded his head negatively and signed, "short." The facilitator signed, "short. You enjoy this?" as she pointed his model car task. David pushed the direction button letting his car run. The facilitator waved for his attention and signed, "yes (<i>or</i>) no?" David signed, "yes." The facilitator signed, "yes. You like that" as she pointed back and forth on his car task and paused. She again signed, "fun?" David eagerly nodded as he agreed it was so fun. The facilitator signed, "make more?" and David again agreed that he did want to build more cars. The facilitator then checked the rest of the group.
Student(s) checked/watched others or the environment	David got up and went to the computer table. The facilitator reminded him about walking in front of the videocamera and signed, "be careful." He was already walking in front of it instead of going around it. He luckily got out of its way and smiled toward it. He then looked at another pictured brochure. He signed, "sick that" as he pointed the picture. He opened the next page, viewed both pages, and then turned another page. He showed the facilitator picture and signed, "sick that", pointing the picture, "better these-two", again pointing another picture, "better better", pointing different picture, "crazy." The facilitator asked him what is that and David signed, "paper move." The facilitator signed, "paper-lined-up-moving assembly like food put there place-cup-like place-cup-like place-cup-like assembly run-over assembly", pointed the picture, and again signed "understand?" David nodded slightly. The facilitator signed, "we will do more tomorrow o-k?" David fingerspelled, "o-k." The facilitator informed him that we will use either these two tomorrow and signed, "see-you tomorrow good night bye." David was the first person who got dismissed for the session.
Student(s) checked other student's assignment	

Student(s) stayed on task	David fixed his motorized car and pushed the direction button. It FINALLY moved!! David held his hands up as he said, “yea!” The facilitator cheered with him and waved for the rest of group’s attention. She had to tell Bruce to get Mary’s attention and then informed them to watch David’s car moving. David explained, “add one more” and then showed his moving car. It went forward, backward, forward, another forward. He then looked at the facilitator and explained something to her. He also asked her to get one more plugged wire. The facilitator got it and gave it to David. David tested by adding another plug into the direction box. He continued his task by testing it with different directions by pushing the buttons. David tapped the facilitator’s shoulder to show his car turning. Finally, his car was turned into the directions. It was first turned left then right. The facilitator signed, “Congratulations! Good Job!” and asked him if he has done that before. David paused and still gave no response. The facilitator then signed, “first time?” David slightly nodded in agreement and the facilitator fingerspelled, “o-k.” David then signed, “No. long time ago.” David watched the conversation exchange between the facilitator and Bruce. The facilitator tapped David’s shoulder after responding to Bruce. The facilitator signed, “you experience fix that before?” David did not response and the facilitator again signed, “or first time?” David signed, “No.” The facilitator was confused momentarily and signed, “No? wait a minute doing that see that before? You don’t see that before?” while her head shook negatively. David signed, “No.” and the facilitator fingerspelled, “o-k.” to affirm. David went back to his task by pushing different direction buttons. After informing Bruce to get pencils, the facilitator watched David’s actions. David was still on his task by pushing different directions for his car to move all directions. The facilitator informed him to stop. He agreed to stop by nodding his head. The facilitator signed, “I need you write what you do today? Understand me?” He understood me by nodding his head and got his log book and pencil. The facilitator fingerspelled, “o-k.” While the facilitator was dealing issues with Hallie and Mike, David was still writing his journal. He did tap on the floor for the facilitator’s attention while she talked to Mary. David continued trying to get the facilitator’s attention and the facilitator signed, “yes?” David signed, “finish?” The facilitator paused to think and signed, “you want spelling finish?” David slightly nodded his head and picked up his pencil from the floor. The facilitator fingerspelled, “F-”, paused, “I-”, paused... He just completed his journal writing.
Student(s) got others’ attention	Following the conversation with David about how he liked the task, the facilitator checked on rest of group. David waved for facilitator’s attention and signed, “computer.” The facilitator signed, “computer tomorrow no time” as she pointed the clock on the wall. “Out ,we try that,” (pointing his model car) “hooked up there computer type see move,” pointing table, “move.” David indicated understood by nodding. The facilitator waved for his attention and signed, “if they cooperate, important.” He signed, “me cooperate.” The facilitator signed, “good.”
Student’s reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Five– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	At the beginning, David, along the group, replied that he understood the schedule explained on the white board. Also, after the explanation by the facilitator that it was last day of LEGO LOGO sessions and it was very important that each group member cooperate with each other, not ignore, and assist others as well, David did not respond as to whether he understood or not. After David was informed that his work on LOGO command assignment was enough, it was time for a group discussion, the facilitator informed David, Hallie, and Mary that their work was enough and it was time for a group discussion. David listened the facilitator as to what to do next and was asked if all assignments on the board were done the same or different. David, along the group, replied in sign, "different."
Student(s) began task in an appropriate manner	After a brief explanation of the white board assignment by the facilitator in a group discussion, David was the third person to come forward to the white board. He watched Bruce and Mike write their answers before he got the marker to begin the task writing LOGO commands of square.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	
Student(s) completed task	David's LOGO command assignment on the board was completed and the facilitator informed him that was enough.
Student(s) checked/watched others or the environment	After David was paused and appeared to think, he looked at Bruce's answer on the board. David again checked Bruce's answer on the board and wrote more LOGO commands.
Student(s) checked other student's assignment	
Student(s) stayed on task	David continued writing LOGO commands on the white board while Hallie and Mary watched him. David resumed his task of writing LOGO commands on the white board after checking the answers from Bruce. David continued writing LOGO commands of square while Mary and Hallie exchanged information about LOGO commands. After checking Bruce's answer on the board, David resumed his task

	by writing more LOGO commands. David continued writing LOGO commands of square while Mike informed the facilitator that his task on writing LOGO commands of square was done. David still worked on writing more LOGO commands of square though he paused and appeared to think several times. Then, David put the marker down and used his finger virtually drawing on the board as he double-checked his answers.
Student(s) got others' attention	
Student's reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Five- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	After the facilitator's instruction about how to discuss and to agree with right or wrong answers of LOGO command assignment on the white board as a group, David went up to the board to write more LOGO commands. After the light was blinked for all group members' attention, David did not respond to this system. The facilitator explained how to pick which answer from the board to type into the computer. Bruce picked Mike's answer to be tried first. The facilitator asked the group if they reached agreement yet. Hallie and Mary were exchanging their opinions while David appeared unsure about entering data into the computer from Mike's answer and his. Bruce convinced David that Mike's answer was right. Both Bruce and Mike explained to David by virtually drawing the square according Mike's LOGO command answer. David checked Mike's answer step by step by all himself and finally agreed with Bruce that the answer is right. The facilitator informed the group to begin entering the answer into the computer. David left with Mike to go to the computer table before the facilitator finished explaining. David was second person positioned after Mike. He was positioned in between Mike and Bruce at the computer table. Mike and David were the only two that had easy access to the computer keyboard. The facilitator asked the group what was on the screen and they all replied, "square." Bruce explained each LOGO command of square as the facilitator walked on the floor while he virtually drew a square according the LOGO commands from the screen that Mike entered. After explaining the reason why Mike could not continue to type during a group discussion of squares being opposite, David explained why the two squares are mirror-like. The facilitator signed, "Yes" and then "same square or different?" by inquiring the group. (end of Second 10 minutes)
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	
Student(s) attempted to complete task	
Student(s) experienced trial and error	After correction of the error on the screen by Mike and David, the facilitator asked the group if that was opposite. Bruce replied, "opposite" and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group the different questions by signing, "why think Bruce is right? Why it's opposite?" Only David replied that it was opposite by using the LEFT command.

	David pushed the enter key. Both Mike and David argued as who should type and fix the error. By pushing David's hand away from the keyboard, Mike did not allow David to fix the error. David signed, "Finish!" and Mike signed, "See." What David meant about signing finish was for the turtle going out of space on the computer screen to stop. And what Mike meant about signing, "see" was that Mike was indicating that David should not push the enter key. Mike fixed the error.
Student(s) completed task	
Student(s) checked/watched others or the environment	David, along the group, watched the conversation exchanged between Mike and Hallie about agreeing to use Mike's answer to input into the computer since the boys agreed that Mike's answer is right. David and Bruce watched the screen as Mike keyed his LOGO command from the white board into the computer while both Hallie and Mary changed their placements. David now became the fourth person positioned of the computer table because of Hallie's and Mary's new placement. Yet, David did not move much further from the keyboard and was able to key in if he needed to. David looked at the screen while Mike keyed the LOGO commands from the white board.
Student(s) checked other student's assignment	David checked Bruce's answer while writing more LOGO commands on the board.
Student(s) stayed on task	David continued writing his LOGO commands on the board after the facilitator's explanation of how to discuss and to agree with right or wrong answers of LOGO command assignment on the white board as a group.
Student(s) got others' attention	David signed, "Same!" to the facilitator when Mike completed typing the left angle square. That square was the opposite of other right angled square as they were like a mirror to each other.
Student's reaction	

Individual Charts of David's Behaviors during Transcribed Tapes Session Five- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	No one paid attention to the facilitator as the facilitator flashed the light to indicate it was time for journal entry. The light was again being flashed. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing in the journal. The facilitator signed, rather than write on the white board, to them, "What you do today? What you do with group?"
Student(s) began task in an appropriate manner	David let Mary to try a run with his model car. Mary tried different directions of the model car by pushing different buttons while David watched that action. Both Mary and David exchanged conversation as David assisted her make some runs with his model car. After Mary's arm was hit by Mike's model, she continued giving David's model some runs by pushing different direction buttons. David was third person to start his journal writing. Shortly after he began this task, he went back testing his model car again and then resumed his journal writing. Then, he watched what Mike was doing with his model car and pushed the direction button with Mike.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	As no one paid attention to the classroom light being blinked, both David and Mary exchanged conversation. After the spelling word was written by David, he talked to the facilitator about his journal entry. Then, he resumed his journal writing.
Student(s) attempted to complete task	David came back to the computer table with more LEGO pieces that he got from the floor to continue building a better model car. David did not immediately start his journal. He chose to resume his task on testing his model car instead. Both David and Mary were doing the LEGO car activity together. David paused his journal writing for few minutes and then resumed his task. A few seconds later, he helped Mary fix the model car.
Student(s) experienced trial and error	David tried several times to figure out how to plug the wire into the battery box for his model car. So did Bruce for his own model car. After adding some more LEGO pieces to his model car, David ran a test.
Student(s) completed task	The facilitator checked David's journal and assisted him to write since he was playing with the model car with Mike. He then completed task.
Student(s) checked/watched others or the environment	

Student(s) checked other student's assignment	
Student(s) stayed on task	Mary continued on her task by trying different direction buttons for next few minutes. Then, Mary fixed the model and gave it a run. Mary and David then exchanged conversation. Mary resumed her task after asking the facilitator about the turn direction and continued testing the model car with David. Both Mary and David shared the task together by trying different direction buttons for David's model car. Mary got the LEGO piece out by using her teeth to take it out. After David completed his journal entry, he helped Mary resume fixing the LEGO pieces on David's car. Mary got more LEGO pieces from the floor.
Student(s) got others' attention	David tried to get Hallie's attention by banging his hand on the computer table several times and continued to tap his finger until he got her attention. Hallie appeared focused to get log books out of the folders so they can be ready for the group. She was not told to get them; she just volunteered herself. Both David and Hallie exchanged conversation about his model. David went to get more pieces from the floor and Hallie resumed arranging the log books to be handed out. David tapped the facilitator's arm to ask for spelling help. The facilitator began to spell the word but decided to write it on the board.
Student's reaction	

Appendix E
Group Data Charts from Transcribed Sessions

Group Charts for Behaviors in Transcribed Sessions
Session Two- First 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator explanation	Mike, Bruce, Mary, Hallie, and David appeared to understand the schedule written on the white board. The facilitator explained agenda of that session and Mike immediately raised his hand indicating that he wanted to be a volunteer to teach LOGO commands to Mary even before the facilitator explained. She told Mike to write the journal entry first. Mary appeared puzzled while the facilitator explained what to do. The facilitator asked her if she could write as the facilitator pointed to her journal. As the facilitator got the participants' attention to gather together, everyone, except Hallie, followed the directions. Bruce signed, "she slow" and Hallie noticed Bruce sign about her. Bruce continued signing, "three-of-us (meaning Bruce, Mike, David) in public school -she not." Then, Bruce realized Hallie was watching him. Hallie turned her head away and Bruce tapped her shoulder. He signed, "what?" and pretended he had not talked about her. In a short time, he waved for the facilitator's attention and signed, "three-of-us." But, the facilitator was busy signing to Mike. As the facilitator was explaining the next task, Mike played with his folder. The facilitator stopped explaining and, then, waved for Mike's attention. Finally, he looked at her. She then resumed her explanation. Mike raised his right hand and Bruce raised his left hand. Mike then raised his left hand and emphatically signed, "Me! Me! Me!" Bruce continued to hold his hand up. The facilitator suggested for them to take turns. Bruce and David were still watching the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began to teach even before the facilitator finished explaining. Bruce and David watched the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began teaching even before the facilitator finished explaining. Mike tried to get David's attention, but David chose to pay attention to the facilitator and to the white board as well. After completing the journal assignment, Hallie

	appeared to understand as the facilitator explained what the group was doing and what she needs to do in order to teach a LOGO command to Mary.
Student(s) began task in an appropriate manner	Mike began writing in the journal before the facilitator finished explaining so the facilitator informed him to wait. He crossed the facilitator's name out in his log book. Then, he resumed writing at the proper time with other participants. Bruce and David began writing in their journals as instructed as soon as they found enough space to have elbow room from other participants to open their log books. Hallie began writing in journal as instructed. Mary smiled at the facilitator and signed to her, "me absent me date." She did sign date even though she meant doctor. After the facilitator asked Mary to write in her journal, Mary signed, "I will (was)" and then began writing. Mike began explaining the LOGO command, FORWARD, to Mary even though he did not inform the group that he would start his turn first. Mike signed, "FORWARD," then pointed on the white board, and fingerspelled, "F-O-R. He pointed the word, FORWARD on the white board. He signed, "know that?" and checked for Mary's understanding. Mary slightly nodded in agreement. He then explained what FORWARD meant by moving both of his hands together... and signed, "FORWARD FORWARD turtle move FORWARD." He then checked for Mary's understanding and waited for her reply. Mary gave no response. He signed, "well", checked with the facilitator as what to do next, and signed, "Who next." After Mike asked who was next to explain another LOGO command to Mary, Bruce immediately signed, "FORWARD means F-T" and shook his head indicating no. He then fingerspelled, "F" as Mike interrupted him that he already taken care of it and signed, "Finish tell her." Bruce signed, "Sorry anyway." He continued signing, "You will like" and moved both his hands maze-like. Mike again interrupted him and signed, "If prefer back." Bruce checked the white board and signed, "Back" He continued signing, "anyway B-K means" as he moved his body backward and fingerspelled B-K simultaneously. He then signed, "For example b-k

	b-k”, checked the board, and resumed signing, “50 means” as his finger drawing back 50 ‘steps’. He completed his task by signing, “Well” and tapped David’s shoulder to inform him it was his turn to explain to Mary as he signed, “Explain her.” After Bruce informed David that it was his turn to explain another LOGO command to Mary, David began signing, “LEFT LEFT”, checked with the group, and then fingerspelled, “L....” as he moved it left side. He then signed, “LEFT LEFT LEFT” He checked the white board and signed, “LEFT L-T.” He appeared puzzled and asked Mike if he were on the right track. David was assured and continued signing, “L-T L-T LEFT.” David again appeared puzzled and looked at Mike as he asked him about number. Mike signed, “your choice.” David resumed his teaching, “90” and moved both hand turning left at 90 degrees. (end of First 10 minutes)
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mike and Bruce exchanged conversation. David and Mike looked at each other’s journals. Mike signed to David, “Can I show you something?” He spelled, “D-a-v-i-d.” Both of them looked at the screen. While waiting for Hallie to complete her journal entry #1 task, both Bruce and Mike exchanged conversation.
Student(s) attempted to complete task	Mary groomed her hair as she waited for the facilitator to spell the word, “absent.” Then, she started writing the word as the facilitator spelled it. A short time later, she patiently waited for the attention of the facilitator as the facilitator was busy spelling words for other participants. Mary requested that the facilitator again spell “absent.” Mary wrote each letter as she turned her head back and forth to see the each letter spelled by the facilitator. After looking at the videocamera, Mary looked at her journal and signed to herself, “Tomorrow for doctor” and then nodded and shrugged her shoulder. She then waved for the facilitator’s attention and waited. The facilitator was spelling for Mike. Mary tried to get the facilitator’s attention as she let her left hand go from the top of the computer. Her raise her eyebrows indicating that she wanted the attention of the facilitator right away. She then signed to the facilitator, “I was absent not here not here.” Mary had a frustrated

	look as the facilitator continued with another student. She fingerspelled, “n” and then looked at her journal and signed, “here” with a disappointed facial expression.
Student(s) experienced trial and error	After Bruce began his turn to explain the LOGO command, FORWARD, Mike stopped him by pulling his arm and signed, “Finish tell her” indicating that he already told her. Bruce apologized and continued to sign. Mike stopped him again and signed, “If prefer back” indicating for Bruce to sign LOGO command, BACK if he wishes to do so.
Student(s) completed task	Mike completed his journal entry #1, started to give the log book to the facilitator, but ended up putting it on the computer table. Bruce completed his journal entry #1 and signed, “Finish” to the facilitator. Bruce finished signing his journal entry #1 to the facilitator and the rest of group who happened to watch him. Only Mike did not watch and chose to read or look at his journal instead. After looking at Mike’s journal, David closed his log book and put it in his folder. So did Mike. Bruce again signed, “finish” to the facilitator indicating that he was done with his journal entry #1. Hallie completed the journal assignment and then signed her journal entry #1 and the four LOGO commands to the facilitator during the LOGO instruction of group’s (to Mary).
Student(s) checked/watched others or the environment	Mike got up and started looking for the spelling of the word of LOGO and fingerspelled L-O-G-O twice before writing it in his journal entry #1. Again, Mike signed, “Turtle” twice as he tried to fingerspell it. He then looked at the facilitator and Mary. He spelled, “t-c-t-c-t.” He waved for the facilitator’s attention. He nodded in agreement when the facilitator asked him if he wanted the spelling of the word, “turtle.” She spelled it slowly so Mike could write it in his journal entry #1. Mary turned her head looking at the videocamera for few seconds and then looked at her journal. Mary watched the rest of participants as they continued their journal writing. Hallie watched the conversation between the

	volunteer and facilitator about the videorecording placement. (Hallie took a break from writing in journal to watch.) Bruce and Mike watched the conversation between the volunteer and facilitator about the videorecorder placement. Bruce looked at Hallie's journal. David looked at the volunteer videorecorder and looked around the room. Then, he looked at what Mary was doing. He licked his thumb and forefinger while waiting. He then watched the conversation between the facilitator and the volunteer videorecorder. He again put his thumb and forefinger in his mouth and ended up licking them. He continued watching the action between the facilitator and the volunteer videorecorder while they discussed about the placement of videocameras. He continued licking his finger while leaning on the computer table and watching us. After Mike and Mary raised their hands for the facilitator's attention, David waved his. Mike looked at the volunteer videorecorder and looked around the room. Then, he looked at Mary and waved for the facilitator's attention while playing with his log book cover. He continued to watch the conversation exchanged between the facilitator and the volunteer videorecorder. Then, Mike appeared to stare at the computer screen. He turned around and looked at what the volunteer videorecorder was doing. He continued to watch her while playing with his log book cover. He then raised his hand and waved for the facilitator's attention. Mary quickly raised her hand as well. Mike signed, "Me finish" to indicate that he was done with his journal entry #1. Mike fingerspelled his name from the log book cover. He waved for the facilitator's attention again. He turned around and looked at the volunteer videorecorder and then raised his hand. He waved his right hand for the facilitator's attention and put his left hand on the top of his head. Then, with his right hand, he signed, "Finish." A short time later after the facilitator dealt with David, Mike waved his log book at her. He then raised his eyebrow as if he was asking her to put the log book in his folder or not. The facilitator told him to leave it out. Mary looked at Mike and David as they watched the volunteer. Then, she turned her head to look at Hallie and Bruce while they were writing their
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	journals. Shortly after that, she watched the facilitator discuss videocamera positions with the volunteer. She again watched Mike who was looking at the volunteer after checking the computer screen. Mary quickly turned around and looked at the facilitator. After Mike waved for the facilitator's attention, Mary immediately raised her hand. Then, she let her hand go down and groomed her ponytail instead. Mary spelled, "M-i-k-e M-i-k-e" by looking at his log book cover. She then spelled, "M-a-r-y M-a-r-y and spelled, "D-a-v-i-d D-a-v-i-d." She raised her right hand as she looked at her journal. The facilitator was busy assisting others. Mary waved her right hand in an attempt to get the facilitator's attention. After a while, she got the facilitator's attention and asked how to spell, "absent." Then, she appeared to be frustrated and signed, "not here." The facilitator spelled, "H-." Mary wrote each letter by looking back and forth as the facilitator spelled each letter very slowly for the word, "here." Then, she continued writing in her journal. After watching other participants' actions asking for the spelling of words or writing in journals, the facilitator did speak to David who had asked for her attention earlier. Afterwards, he erased something in his journal entry #1. Hallie checked something on the white board and then the room to see what is up with the group. Mary watched the conversation between the facilitator and Bruce. Mary raised her hand as Bruce began signing his journal entry to the facilitator. She put her hand down and continued watching Bruce sign. As soon as Bruce finished signing, Mary immediately raised her hand and asked for spelling word, "doctor." Hallie watched Bruce signing his journal entry to the facilitator then resumed her journal writing. David, Mary, and Hallie watched Bruce signing his journal entry #1 to the facilitator. Bruce continued scanning the environment of the room. Bruce watched Mary and the facilitator while they conversed. Hallie watched Mary and the facilitator while the facilitator fingerspelled a word for Mary and then
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	resumed her journal writing. David, Bruce, and Mike watched Mary and the facilitator converse. David continued watching the facilitator's actions with Mary. David, Mike, Mary looked at the screen. David looked at the facilitator and Bruce as Bruce made an inquiry. Hallie noticed Bruce signing something (about her). Mike appeared to be very frustrated as he waited for Hallie to complete her journal and indicated that he wanted to move on. Hallie checked something on the white board and then resumed her journal writing. Mary looked at Mike as he began explaining the LOGO command to her. Mike began explaining the LOGO command, FORWARD, to Mary even though he did not inform the group that he would start his turn first. Mike signed, "FORWARD," then pointed on the white board, and fingerspelled, "F-O-R. He pointed the word, FORWARD on the white board. He signed, "know that?" and checked for Mary's understanding. Mary slightly nodded in agreement. He then explained what FORWARD meant by moving both of his hands together... and signed, "FORWARD FORWARD turtle move FORWARD." He then checked for Mary's understanding and waited for her reply. Mary gave no response. He signed, "well", checked with the facilitator as what to do next, and signed, "who next." David looked at Mike's signing to Mary during the explanation of LOGO commands. He continued watching as Mike explaining the LOGO command, FORWARD. After Mike asked who was next to explain another LOGO command to Mary, Bruce immediately signed, "FORWARD means F-T" and shook his head indicating no. He then fingerspelled, "F" as Mike interrupted him saying that he had already taken care of it. Mike signed, "Finish tell her."
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	Bruce signed, "Sorry anyway." He continued signing, "You will like" and moved both his hands maze-like. Mike again interrupted him and signed, "If prefer back." Bruce checked the white board and signed, "back" He continued signing, "Anyway B-K means" as he moved his body backward and fingerspelled B-K simultaneously. He then signed, "For example b-k b-k", checked the board, and resumed signing, "50 means" as his finger drawing back 50 steps. He completed his task by signing, "Well" and tapped David's shoulder to inform him it was his turn to explain to Mary as he signed, "Explain her." Bruce tapped Mike's shoulder and Mike informed him to pay attention to David who was explaining the LOGO command, LEFT, to Mary. Bruce quieted down and watched them. Hallie left her position to join the group and had a puzzled look during the explanation by David to Mary. Shortly afterwards, Bruce waved for the facilitator's attention during David's explanation. (end of First 10 minutes)
Student(s) checked other student's assignment	David looked at Mary's journal and then looked at the white board. David checked what Mike was doing and saw the facilitator. He signed, "Help me" with a frustrated look face. He asked for the spelling word, "turtle." Hallie looked at Bruce's journal and then resumed writing in her journal. David looked at Mike's journal possibly to get the spelling of the word, "turtle." He then wrote his journal. Mike did offer to help David by starting to fingerspell; then, he let him to copy the word from his journal instead. Mike looked at Bruce's journal #1 because he appeared to read it. Mike checked back and forth between his journal and David's to be sure he spelled the word, turtle, correctly. Both of them continued to check each other's journal. Hallie moved away from her position and checked on what Bruce was doing. After watching Bruce signing his journal #1,

	David read Mike's journal. Mike noticed David was reading his journal and closed his log book immediately. While Bruce signed his journal entry #1, Mike read his instead of watching. After watching Bruce signing his journal #1, David read Mike's journal. Mike noticed David was reading his journal and closed his log book immediately. Mike realized that David was checking his journal and appeared frustrated. Mike decided to open his log book to check what David needed. After Bruce signed, "Finish" indicating he finished signing his journal, Mike immediately raised his hand and signed, "Two weeks?" He again signed, "Two weeks?" He was asking the facilitator if the LEGO LOGO lasts two weeks. He again waved for the facilitator's attention and signed right away, "Two weeks?"
Student(s) stayed on task	Hallie, Bruce, and Mike continued writing their journals. Bruce checked his journal after scanning his surroundings in the room. David continued writing in his journal while the facilitator was busy assisting Mary on her journal entry#1. Bruce continued writing in his journal. Then, he read his journal. He resumed his journal writing. David resumed his journal writing after trying to get the facilitator's attention. David continued writing his journal entry #1 and then checked Mike's journal. After David read Mike's journal, he checked his journal and had a frustrated look on his face. After the spelling the words, "not here," Mary continued writing her journal and signed, "We are not", and resumed writing. Mary wrote the word, "doctor" with assistance of the facilitator, who spelled each letter very slowly. Mary continued writing her journal. Bruce signed to himself while waiting for Hallie to complete her journal entry #1 task. He also

	fingerspelled to himself. The rest of group waited for Hallie to complete her journal task even though they wanted to move on next assignment to teach Mary. Hallie continued writing in her journal while the facilitator gave other group members instruction of what to teach Mary about LOGO commands. Hallie still on journal writing while the group took their turn explaining LOGO commands to Mary.
Student(s) got others' attention	Mary raised her hand for the facilitator's attention and asked for spelling the word, "absent." David waved for facilitator's attention and then, Mary immediately waved for facilitator's attention, too. David patted the table for the facilitator's attention and again waved (This disturbed Mike). Mike closed his log book. Bruce waved for facilitator's attention and asked for the spelling word, LOGO. After spelling, he signed, "That all?" After watching the action between the facilitator and the volunteer videorecorder, David waved for the facilitator's attention and still couldn't get her because she was busy assisting Mike and Mary. David then checked his teeth. After watching the other participants write in their journals, Mary waved for the facilitator's attention immediately after David waved for attention. Mary continued to raise her hand. She turned her head to watch the volunteer person as she raised her left hand. Then, she turned her head back and checked on the facilitator. She groomed her hair as she read David's journal. Then, she looked at the volunteer again. Bruce signed what he wrote in his journal entry #1 to the facilitator. The rest of group, except Mike, watched him sign. Mike wanted to give his pencil and folder to the facilitator while she was signing to Mary. After exchanging conversation with Bruce, Mike waved for the facilitator's attention and showed frustration since the facilitator was busy. Bruce waved for the facilitator's attention and

	showed something on the white board. He then returned to his position. Bruce tried to question the facilitator and signed the number as well. He waved for the facilitator's attention while she was busy watching Mike teach LOGO command, FORWARD, to Mary. In the middle of Mike's fingerspelling, F-O-R, Bruce interrupted and got the facilitator's attention by signing, "number 50 50 50." Then, he continued watching Mike teaching. Hallie waved for facilitator's attention during the LOGO instruction by group to Mary. Bruce tapped Mike's arm and He told Bruce to pay attention David who was teaching LOGO command, LEFT to Mary.
Student's reaction	

Group Charts for Behaviors in Transcribed Sessions
Session Two- Second 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator asked Mary to move for the videorecording purpose, but she did not understand at first. The volunteer videorecorder tapped her shoulder and informed her to move. Mike interrupted David's LOGO command explanation and waved for Mary's attention. He began signing, "turtle will move" as his hand showed Mary how it turned left while David watched. The rest of group then looked at her. Hallie watched the facilitator as she told her to continue explaining RIGHT, the LOGO command, to Mary. Hallie resumed to her position after her explanation of the LOGO command to Mary. Mike and Bruce looked at the facilitator. The rest of group then looked at Mary. David told Mary to move, but Mary did not understand. Therefore, the facilitator explained Mary to move for videocamera purpose. She then relocated. As the facilitator explained what to do on the paper assignment #1, David opened his folder, looked at something there, and then closed it. He then watched the facilitator. The facilitator explained the next task for the group: how to discuss who/what was right or wrong and asked for a volunteer to discuss to the group about paper assignment #1. Mike was the first to respond and signed, "me first!" He was ready to take the paper assignment #1 from the facilitator. He then tapped David's shoulder and signed, "FORWARD FORWARD." David appeared unsure. David opened his folder, looked at something there, and then closed it. He then watched the facilitator. Then all participants looked at the facilitator as she explained to Mike to use paper first and then computer afterwards. Mike gave a disappointing look. He then read the assignment #1 with his hand moving on the paper as he read. As Bruce put chap stick on his lips, he appeared to watch as the facilitator explained what to do on the paper assignment #1. Individually, Hallie listened to the facilitator tell her what to do on the paper assignment as she explained the turtle movement on the board and the LOGO computer assignment from the previous day. Mary had been watching all these actions since the facilitator began to explain paper assignment #1. I told Mary not to worry about this assignment and just watch what the group was doing. David signed, "What to-do" and checked on Mike's paper assignment #1. Mary watched him and looked at his assignment. She continued to watch him get his laminated, orange paper out of his folder. Then, she looked at what Bruce and Hallie were doing. Then, she checked David's paper. She turned her head around and checked the videocamera and stared at it for few seconds. She turned her head and checked on the group activity. She looked at Mike to see what he was doing on his assignment. She picked up her paper assignment #1 and fanned. Then, she stared at the window and then watched Bruce as he asked the facilitator for the date three times. David informed Mary by signing, "Doesn't matter" as his hand turned left. Mary watched David asking

	Mike if he were right. Mike's eyebrow went up though he did not pay attention to them. David spoke to Mike again and signed again, "Right?" Mike checked his assignment and appeared puzzled as he pointed with his finger on his paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment. Mary watched this whole activity. Hallie signed, "Me!" as she indicated it was her turn and David then signed, "me!" Mike grabbed his folder to rearrange and moved David's log book. David patiently took his laminated orange paper and rearranged his paper assignment#1. Hallie signed- "ME!" (meaning my turn!) to the group members after the facilitator asked, "What would you do if you don't understand?". Unfortunately, Hallie was ignored as Mike, without being approved by group members, showed an orange laminated paper to Mary to clarify the understanding of LOGO commands. Hallie tapped Mike's shoulder but he ignored her. Without giving others a chance, Mike went ahead to explain to Mary. He took his laminated, orange paper out of his folder to show Mary. He pointed FORWARD with his finger on the orange paper to Mary. David, Bruce, and Hallie watched them. Mike explained by signing, "FORWARD F-D." Mike began to move the mouse and to keyboard while other participants watched him. Hallie appeared unhappy and was not with the group. Mike pointed to Mary and Mary nodded in agreement. Mike typed and pointed as Mary again nodded slightly. Mike realized the error on the turtle activity on the screen. David signed, "Sick." Mike corrected it by typing. He signed, "Understand? Understand?" Mary slightly nodded. Mike then pointed his finger on the screen and showed how the turtle moved up on the screen. He signed, "Now RIGHT" and typed RIGHT. Bruce struggled to see the screen after Hallie moved closer to the group. Mike continued signing, typing, and explaining to Mary. He then signed, "Understand? understand?" He wanted Mary to type. He fingerspelled, "R-T R-T" and showed Mary where to type RT. Mary typed and entered the information by tapping the appropriate key. Mike explained how the turtle turned and informed Mary to type FD as he helped her type FD. Hallie tapped Mike's shoulder but he did not response to her. Mike continued assisting Mary type 50. Then, both Mike and Mary shared turns by typing as Mike assisted Mary. Mike signed, "90" and showed Mary where to type 90. Afterwards, David informed Mike it was wrong. Mike pushed his arm away and thumbed up. He explained how the turtle turned. Then, Mary typed by herself without any assistance to complete a square of LOGO commands. Mike then asked her by signing, "What is that? What is that?" as he pointed the screen. Mary responded, "square." Mike signed, "right!" After Mike assisted Mary typing the data from paper assignment #1, the facilitator signed, "good job wonderful." Mary watched what the facilitator said. Hallie emphatically signed, "Me!" indicating that it was her turn. David then signed, "me!" Mike grabbed his folder to move from where he was and moved David's log book. David patiently took his laminated orange paper and rearranged his paper assignment #1. Hallie tapped Mike's shoulder, but he ignored her. Mike immediately explained to Mary as apparently, he did not want other participants to
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	take over. David, Bruce, and Hallie watched them. Hallie attended as Bruce explained how to write LOGO commands by showing her his paper assignment #1. The facilitator was ready to explain the next task but had to wave several times to get Bruce's attention. Bruce appeared to be staring at the wall. The facilitator explained the next task to the group on how to discuss who/what is right and wrong and asked for volunteer to discuss as a group about paper assignment #1. Hallie immediately raised her hand to volunteer after the facilitator's explanation for the next task: to discuss with group before entering data on the screen from the paper assignment #1. The facilitator told Hallie that she needed to be more assertive and tell her group members that she needs to be closer to the screen during Mike's entry. After Mike assisted Mary type the data from paper assignment #1, the facilitator signed, "Good job wonderful." The facilitator then saved the data into the disk while participants watched to learn how to save the data. The facilitator signed, "busy means saving now." After saving the data, the facilitator used the escape key and signed, "me escape go back busy now saving." Hallie tapped her arm to see if she saved her data from yesterday's assignment and the facilitator told her that she did as well as others. Mike then tapped her shoulder and signed, "finish mine?" She signed, "yes all of yours don't worry now we need wait a minute." The facilitator realized that all of Mary's data was not yet saved. The facilitator asked Mary if she understood. Mary was not sure and the facilitator signed, "If you do not understand what you do?" twice. When Mary did not respond, the facilitator mentioned to her that she needed to ask the group for the answer. Mike waved for the facilitator's attention and signed, "FORWARD F-D" and the facilitator tapped his arm and signed, "Wait a minute" She then signed to Mary, "Not understand ask-them (individually) to explain you." Mary slightly nodded in agreement. The facilitator checked to see if Mary really comprehended the instruction by signing, "If you do not understand what you do?" Mike immediately answered by signing, "Help." Unfortunately, Mary didn't get a chance to reply. The facilitator signed, "Help help help help (individually) understand discuss o-k?" and paused for a moment before she signed again, "Now we stop." Since the facilitator could not get Mike's attention, David volunteered to brush his laminated orange paper on Mike's arm. Mike's facial expression was unpleasant as he signed, "WHAT!" He decided to ignore David and went on an unnecessary task explaining to Mary. The facilitator then lost all participants' attention. She had to tap the table little harder to get Mike's attention and then rest of participants quickly responded to this system. With some persistence the facilitator got Mike's attention and
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	explained what was needed to do the next task: paper assignment #2. Hallie responded to the facilitator after the tappings on the table from the facilitator and watched for the next task: paper assignment #2. Mike pulled the laminated blue paper and checked something else in his folder while the facilitator was explaining. The facilitator waved to Mike to pay attention. He put things away in his folder. The facilitator gave out paper assignment #2. Mike showed a frustrated facial expression as he got another paper assignment. Bruce received his second paper assignment from the facilitator. The rest of group began writing the assignment and Mary looked at them and appeared not know what to do. (end of Second 10 minutes)
Student(s) began task in an appropriate manner	Mike was the very first person to get the marker to begin his paper assignment #1. Bruce was the second person to get a marker to begin paper assignment #1. David was the third person to get the marker to begin his paper assignment #1. After Bruce's explanation, Hallie began to write LOGO commands on her paper assignment #1. After inquiry to the facilitator about what had been said, David began his paper assignment #2. Mike began to move the mouse and to key into the computer while other participants watched him. Hallie appeared unhappy and was not with the group. Mike pointed to Mary and Mary nodded in agreement. Mike typed and pointed to which Mary again nodded slightly. Mike realized an error on the turtle activity on the screen. David signed, "Sick." Mike corrected it by typing. He signed, "Understand? Understand?" Mary slightly nodded. Mike then pointed his finger on the screen and showed how the turtle moved up on the screen. He signed, "Now RIGHT," and typed RIGHT. Bruce struggled to see the screen after Hallie moved closer to the group. Mike continued signing, typing, and explaining to Mary. He then signed, "Understand? Understand?" He wanted Mary to type. He fingerspelled, "R-T R-T" and showed Mary where to type RT. Mary typed and entered the correct command. Mike explained how the turtle turned and informed Mary to type FD as he helped her type FD. Hallie tapped Mike's shoulder but he did not respond to her. Mike continued assisting Mary to type 50. Then, both Mike and Mary shared turns by typing as Mike assisted Mary. Mike signed, "90" and showed Mary where to type 90. Afterwards David informed Mike it was wrong. Mike pushed David's arm away and thumbed up. He explained how the turtle turned. Then, Mary finally typed by herself without any assistance to complete a square of LOGO commands. Mike then asked her by signing, "What is that? What is that?" as he pointed the screen. Mary responded, "Square." Mike signed, "Right!"
Student(s) asked group members about task	David signed, "What to-do" and checked Mike's paper assignment #1. Hallie was told by the facilitator to ask group for help.

	Hallie asked Bruce for help on paper assignment #1 by indicating that she didn't remember the LOGO commands from the previous day's activity. Hallie shared an opinion and exchanged conversation with Bruce during Mike's entry of LOGO commands from paper assignment #1. Bruce signed, "Hallie's turn" after Mike said he would explain the second assignment. Mike tapped Bruce's shoulder again, "me fine?" Bruce gave in and signed, "fine."
Student(s) shared pertinent information with group members	Hallie explained the term of LOGO command, RIGHT, to Mary and moved her body to left instead of right. Mike and David corrected her by moving back to right. Hallie resumed her explanation by signing –"turtle move how right" as her hand turned right and then its moved "30" steps forward and continued to explain another LOGO command, LEFT before both David and Mike interrupted her and informed her that command, LEFT, had already been explained. Mary and Bruce watched them. Mike tapped Hallie's shoulder while David signed, "finish" and Mike signed, "enough enough." Hallie started to explain the LOGO command, LEFT, to Mary but David had already explained that command. After Mike informed David to type FORWARD, David appeared unsure. While Mike input LOGO command, RIGHT, from his paper, he explained it to Mary from the screen. Both Bruce and Hallie interacted by communicating with each other.
Student(s) attempted to complete task	
Student(s) experienced trial and error	David signed, "Wrong" and pointed on the screen, but Mike pushed his arm away while Mary continued typing. Both Bruce and Hallie watched this action.
Student(s) completed task	Hallie completed her turn by explaining what RIGHT was to Mary. When Mike completed his paper assignment #1 task, he asked the facilitator if he could show his assignment to the group. Hallie wrote LOGO commands on her paper assignment #1.
Student(s) checked/watched others or the environment	Hallie returned to her position after checking the group activity. Mike watched David explain the LOGO command, LEFT, to Mary. David watched Mike's explanation how the LOGO turtle turned LEFT. Hallie watched Bruce signing to the facilitator about the facilitator being in the television or videocamera. The facilitator told both Hallie and Bruce to watch their group activity. David watched Hallie explain LOGO command to Mary. He told her to

	use the LOGO command, RIGHT. Hallie turned her body left instead of right. David, with an appropriate facial expression, pointed for her to turn right. Mike turned her shoulder. David kept pointing his right hand in the direction of right and signed, "sick." He then watched Hallie explain to Mary how the turtle moved. Bruce mimicked what Mike did as Mike moved his hand to explain to Mary. Hallie moved to be closer to the group. Bruce and Mike looked at me while Hallie was about ready to explain LOGO command to Mary. Hallie moved her position during explanation for videorecording purpose. Mike looked at the videocamera for few seconds. Bruce followed the facilitator as she went to check the second videocamera. After Hallie's attempted explanation, Bruce looked at the facilitator. As Hallie was about to explain another LOGO command, LEFT, David signed, "finish." It indicated that the command had already been explained. He then signed, "me left" as he meant that he did that explanation. He put his hand on his head indicating duh. David then looked at Mary. He told her to move for videotaping purpose. Bruce checked something in his pocket and informed the facilitator that he forgot to give the hall pass that was in his pocket to his teacher. The facilitator asked him to give it to her. Bruce gave it to her and used chap stick on his lips. Bruce watched the facilitator explain to Hallie how to seek group help. While Hallie sought help, the facilitator gave a hint to Bruce to help Hallie. Bruce then tapped Hallie's shoulder, explained what to do on paper assignment #1 to her, and showed his work. Hallie immediately started writing on her paper assignment #1. After completing paper assignment #1, Bruce looked out the window at outdoor activity while waiting for others to complete their assignments. Again, Bruce checked the room surrounding while waiting. Mike watched Bruce as he asked the facilitator for the date three times. David signed, "sick" while Mike explained to Mary about paper assignment #1 on the computer screen. He continued to watch them. He carefully watched Mary type R-T as if to check that she entered the right data. Bruce struggled to see the computer screen after Hallie moved, and he moved Hallie to a better, closer position.
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	After David informed that an error was on the screen while Mary typed, he continued to watch the screen with them. Bruce, with Hallie, watched the screen as Mary typed while Mike and David argued about the error. Bruce checked as Mike and Mary were at the computer screen. Bruce continued to watch Mike and Mary while communicating with the facilitator.
Student(s) checked other student's assignment	Mary looked at Mike's log book while Hallie explained the LOGO command to her. Bruce looked at Mike's paper assignment #1 while he explained how the LOGO turtle turned to Mary. Hallie checked Bruce's during of the explanation of Bruce on paper assignment #1 David looked at Mike's paper assignment #2 and then discussed with Mike. (end of second 10 minutes)
Student(s) stayed on task	David continued explaining LOGO command, LEFT to Mary. He fingerspelled, "L-T." He typed on the keyboard and signed, "your choice doesn't matter." (This was in regard to the number to be used.) Bruce continued to write LOGO commands on the paper assignment #1. David continued to write LOGO commands on the paper assignment #1 and then checked Mike's. He opened his folder and got the laminated orange paper with LOGO commands. Then, he resumed his task. After writing LOGO commands on his paper assignment #1, he put the orange paper back in his folder. Then, he resumed working on assignment #1. He again took the orange paper out of his folder and compared it against his work on his paper assignment #1. He then continued working on #1. He signed, "doesn't matter." (He appeared to be responding to Mary.) David then asked Mike by signing, "right?" Mike's eyebrow went up as he had not been paying attention to them. David explained to Mike again and signed again, "right?" Mike checked his assignment and appeared puzzled as he pointed with his finger to something on the paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment. Hallie continued to write LOGO commands on the paper assignment #1. Mike continued writing on his paper assignment #1 and quickly glanced at David's assignment. He resumed working on his task. After the facilitator's discussion of the answer with group, Bruce checked his paper assignment #1.

	Hallie read the entries from Mike on the screen while Mike completed the entries from paper assignment #1. David continued writing on his paper assignment #2 and then looked at Mike's assignment.
Student(s) got others' attention	Bruce waved for the facilitator's attention and signed for few seconds by asking if the facilitator had been in TV before (probably meant videorecording). The facilitator told him to watch the group activity. Mike interrupted David's LOGO command explanation and waved for Mary's attention. He began signing, "turtle will move" as his hand showed Mary how it turned left while David watched and Bruce mimicked Mike's hand movement. Hallie moved closer to group. Then, both Mike and Bruce looked at the facilitator. Hallie tapped Mary's shoulder as she was ready to explain but David told her to use the LOGO command, RIGHT. Mike moved Hallie's shoulder for videorecording purpose while she attempted to explain the LOGO command to Mary. Bruce waved for the facilitator's attention and signed, "Right?" as he showed his paper assignment #1. The facilitator explained to Bruce that he had to have a group discussion to see if his assignment were right or not. Hallie picked up and showed her paper assignment #1 to the facilitator and then resumed to complete it. Bruce fingerspelled to the facilitator, "d-a-t-e" three times as he asked for today's date. The facilitator was busy. Mike waved for the facilitator's attention and signed, "show?" He was asking to see if he could go ahead to show his paper assignment#1 to the group. The facilitator told him to wait since the rest of group was not finished with their task. After Bruce interacted with Hallie while Mike explained of his entries to Mary, he talked to the facilitator. After being told by the facilitator about moving to a better placement, Hallie tapped David's shoulder. David paid no attention as he appeared so focused on the screen during Mike's entry and explanation to Mary. Hallie finally gave up and moved to another better position beside Mary at other end of computer table. Hallie tapped the facilitator's shoulder, interrupting during the explanation of saving the file, and asked if her file from yesterday's activity was saved. Since the facilitator could not get Mike's attention, David volunteered to brush his laminated orange paper on Mike's arm. Mike's facial expression indicated that he did not want to be bothered as he signed, "WHAT!" He decided to ignore David and went on an unnecessary

	task of explaining to Mary. At this point, the facilitator lost all participants' attention. She tapped a little harder on the table to get Mike's attention and then rest of participants quickly responded to this strategy. After the facilitator passed out the paper assignment #2, David looked at it and asked her by signing, "what it-said?"
Student's reaction	Hallie laughed at her error as Mary looked at her. Hallie resumed to her position after Mike and David informed that LOGO command, LEFT was already explained. Mary looked at David after he put his hand on his head indicating, "duh" to Hallie. Hallie signed "ME! ME! FIRST!" when Mike wanted to be a volunteer to enter the data from paper assignment#1 and again demanded it's her turn. Unfortunately, Mike went ahead to took over the keyboard entry. Hallie appeared disappointed as she was far away from the computer position and stayed in her position at the very end of computer table away from the group. Later, the facilitator checked by asking her to see if she can see the screen. Her reply was that she sees it fine by signing – "fine. I see FINE!" Later after putting her cochlear implant away, she moved to where the group was. Bruce moved her to a better position, closer to the screen. Hallie returned to her position after being ignored by the group during the clarification of LOGO commands to Mary.

Group Charts for Behaviors in Transcribed Sessions
Session Two- Last 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Mike, Hallie, Bruce, David, and Mary looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing. Mike, David, Hallie, and Bruce responded to the light blinking that indicated the facilitator needed their attention. The facilitator wanted to explain two questions on the board. Mike typed and then got his log book out of the folder even before the facilitator finished instructing. David went and got his log book. Mike then typed to save the data while the facilitator asked him to stop typing and to pay attention. He informed her that he was trying to save the data. The facilitator indicated concern, because she feared that Mike might have saved the current file under the same filename that he used earlier. The facilitator discovered that the current save failed to replace the previous file. The facilitator informed Mike that he was not to save the same under the same filename. He said, "o-k." The facilitator asked him to leave it alone please and he obeyed with no outward sign of frustration. Mary did not respond to the light blinking to indicate that the facilitator wanted to explain two questions on the board. She was looking at the LOGO activity on the screen. Mary finally looked at the facilitator after the facilitator finished discussing saving with Mike. As the facilitator explained about journal entry #2, David picked up his paper assignment#2. Hallie looked at the white board where the two questions were written during the facilitator's explanation. Mike went ahead to get his log book. The facilitator had to tap their shoulders and sign, "Wait not finish explaining." Then, all were paying attention to the facilitator. Bruce, along the group, looked at the white board on which the two questions were written during the facilitator's explanation. Bruce waited to write his journal entry #2 and checked what Mike was typing. Then, he checked to see if the facilitator finished writing on the white board. He read the questions and got his log book out of his folder. Both David and Mike went ahead and copied the questions. The facilitator noticed Mary wasn't doing anything and asked her to come around so she can assist her to start her journal entry #2. She explained the first question to Mary. (Mary was out of sight for this rest of session videotape.) Bruce, David, Hallie, Mary, and Mike responded to the light blinking which indicated it was time to end the session. Bruce paid attention to the facilitator as she gave instruction for the next day's session. Bruce raised his hand and signed, "Me out there all-the-way out-there" as he pointed at the window. The facilitator signed, "oh no here not out-there"

	no no.” It indicated that the session will be in this same room for the next day. Hallie interrupted the facilitator at the end of session by tapping on her arm. The facilitator was informing the group to come to this same conference room for the next day’s session. She tried to say something but the facilitator continued her message. Mike put his pencil in the folder and began walking away to leave the room. The facilitator told him to wait and he walked backward to his position. While the facilitator dealt the issues for the next day’s session with other participants, Mike put his chap stick on his lips. Mike agreed to help Mary come to the session the next day. After answering to Bruce’s question, Mike waved for the facilitator’s attention and signed, “Prefer computer lab.” She signed, “Sorry can’t help.” The facilitator explained the reason why the computer lab was not being used: the next day’s session would be different as they would begin LEGO tasks. Mike signed, “Not computer?” and the facilitator signed, “Yes tomorrow o-k?” The facilitator reminded them to come to this conference room for the next day’s session. Mike left. David paid attention to the facilitator as she gave instruction for the next day’s session. David nodded in agreement that he will come to the session the next day by himself. Hallie was informed by the facilitator to be in this room at 3:15 pm for the next day’s session. She continued the conversation with the facilitator inquiring why it ends at 4 pm as she complained it was so short. Hallie was asked by the facilitator if she understood the instruction for tomorrow’s session. Hallie nodded slightly indicating that she understood. Hallie raised her hand and replied that Mary was in her class. David disagreed and stated that Mary was not in her class. David volunteered to bring Mary to the next day’s session. While the facilitator talked to Hallie, David tapped on the table and the facilitator signed, “Wait” to him. Then, she looked at David and signed, “What?” David signed, “I will”, paused, and then signed, “Help.” Mary agreed.
Student(s) began task in an appropriate manner	After reading the questions on the white board, Bruce began writing his journal entry #2 as soon as he got his log book out of his folder. Bruce copied the questions into his journal for entry #2. David began copying the questions from the white board that the facilitator wrote into his log book while the facilitator was still explaining. After the facilitator’s assistance in copying two questions from the board into Hallie’s log book and the clarification of first question, Hallie wrote journal entry #2. She answered the first question by signing, “Move ...” and was told by the facilitator that she needs to write in her journal instead of orally telling the answer. Mary got her log book after the facilitator’s explanation and appeared

	not sure what to do. She played with her log book cover. She turned her head around and smiled at the volunteer videorecorder. Then, she read Mike's journal entry #2 while she played with her log book cover. Bruce kneeled on the floor to continue his journal writing. Then, he erased and resumed his writing. Bruce paused and appeared to think. Then, he resumed his journal writing.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	David checked on the screen and informed Mike by signing, "Turtle head there" while Mike explained, "Turtle..." to Mary. David showed his paper assignment #2 to Mike while the facilitator wrote the questions on the white board. Mike typed and David assisted him to continue typing from his paper assignment #2. Mike fixed the error as David assisted him by pointing on the screen. Mike continued typing, paused, appeared to think, and again typed. Mike checked to see if the facilitator was still writing the questions on the white board. Mike resumed typing. David, Bruce, and Mary watched the screen while Mike typed. Hallie looked at the white board where the facilitator wrote. While Bruce read what questions the facilitator wrote on the white board, both David and Mike shared their thoughts and then Mike typed. (MIKE had excellent position to control typing on the keyboard even though David wanted to.) David and Mary continued watching Mike type.
Student(s) attempted to complete task	Mike appeared to complete his journal entry #2 task. As he was about to close his log book, he noticed something on the screen. He typed and signed, "Finish" as he indicated for the computer stop acting up. The facilitator informed Mike to please leave the computer alone. He stopped and showed little expression as David watched the exchange. Mike returned to writing his journal entry #2 by picking up his pencil. As Mike was about to put his paper assignment in the folder, he stopped and wrote something on it. He put pencil down, tied his shoe, and resumed work.
Student(s) experienced trial and error	Since the screen turtle went out of control, David pointed out the error on the screen as he informed Mike of the error.
Student(s) completed task	David completed his journal entry #2 task and closed his log book. After informing the facilitator that he was done with journal entry #2, David opened his folder so that he could put his log book in along with the laminated orange paper of LOGO commands. He held his paper assignment #2. Mike checked that and then, David put it in his folder and then, closed the folder. David opened the folder to put the pencil in it. Then, he leaned on the computer table waiting. He signed, "Raining" with a disapproved

	facial expression, then signed, “Coat there”, and smiled. Bruce informed the facilitator that he was done with his paper assignment #2. He also double checked it Bruce finished signing his journal to the facilitator and looked at the clock on the wall. He informed her by signing, “Time!” as he indicated it was time to go.
Student(s) checked/watched others or the environment	David checked his laminated orange paper of LOGO commands against the screen while Mike showed the laminated orange paper to Mary as he explained. David signed, “Finish! Finish!” as the turtle on the screen went out of control. David pointed on the screen and signed, “Weird.” He pointed on the screen again while rest of the participants watched him. Hallie followed the facilitator to the computer screen and looked at the screen while the other group members began gathering for paper assignment #2 entries. Bruce checked the computer screen as soon as he put his paper assignment #2 down. After looking at the screen, he checked his paper assignment #2. Hallie adjusted her position by moving closer to the screen during the entry of paper assignment #2. After looking at Bruce’s paper assignment #2, Hallie studied something on the white board and then checked the room surroundings to see what was going on. Then, she moved her material to a better position on the table and again watched the conversation about these two questions on the board along Mike, David, and the facilitator. Mary looked at David’s paper assignment #2 while the facilitator was busy writing the questions on the white board. Mike watched David as David was about to complete his journal entry #2. After informing the facilitator of his error about using number 500 instead of 50 from the previous day’s assignment, David, with the rest of the group, watched the screen as Mike fixed the error. As Mike continued typing after fixing the error, all three boys kept checking to see if the facilitator had finished writing questions on the white board. David watched the conversation exchange between the facilitator and Mike about leaving the computer alone and continuing to write journal entry #2. David checked the room and then checked on what Mike was doing.

	While completing the paper assignment, Mike checked what David wanted. Mike put his assignment in his folder and then David was told him about the previous day's activity when turtle went out of the loop. While writing on her journal, Hallie checked the clock after Bruce signed to the facilitator to look at the time.
Student(s) checked other student's assignment	Hallie looked at Bruce's paper assignment #2 answers
Student(s) stayed on task	Hallie continued working paper assignment #2 task. Bruce continued working paper assignment #2 task. Mike explained about turtle movement to Mary. He then wrote on his paper assignment #2 and showed one of the LOGO commands from laminated, orange paper to Mary. With his interesting facial expression, he signed, "H-T means gone". Mary nodded in agreement. He then signed, "S-T pops-up" with an open mouth facial expression and continued to sign. "H-T if H-T hide." He was still signing, "S-T not hide none show" as he pointed on the screen. Mary looked at the screen. After reviewing the LOGO commands on the laminated orange paper, he tapped Mary and signed, "HOME." Mary nodded in agreement. Mike typed HOME and showed Mary that on the screen the turtle returned home. He explained what HOME means. He then pointed on screen and asked Mary to watch the screen as he typed some commands and HOME. David interrupted Mike to tell him of the error, but Mike ignored him. Mike waved for the facilitator's attention and tried to explain that the LOGO activity of square on the screen went the other way. He asked the facilitator to come to the screen. He signed, "square." The rest of the group checked what was happening on the screen. The facilitator signed, "square see turtle went-out-of-space look" as she informed the group to look at the turtle on the screen. Mike signed, "see different well" and typed. Mike's facial expression indicated "oh geez" as he put his forefinger on his mouth indicated that he did not tell the turtle follow that command Mike typed. He checked his orange paper to see what went wrong. David tried to tell him but the facilitator tapped him and informed him that he needed to stop. Then, all participants watched the facilitator as it was time for journal assignment. While the facilitator wrote the questions on the white board, Mike went ahead typing more LOGO commands to show Mary. After Mike's explanation from the laminated orange paper of LOGO command to Mary, David went back to write on his paper assignment #2. Perhaps, he was correcting it. Yes, he did erase it and then corrected it after checking Bruce's assignment and the activity on the screen. While David wrote his journal entry #2, he erased something on his log book.
Student(s) got others' attention	Bruce raised and waved for the facilitator's attention, but she was busy assisting Hallie. Hallie picked up her paper assignment #2 and showed facilitator. The facilitator asked, "What is it?" Hallie replied, "House." Then, she resumed working on her paper assignment #2 task. Bruce

	looked at her assignment and then looked at the screen. After David informed the facilitator that he was done with his paper assignment #2, Bruce signed, “Yes” indicating that he was done, too. Hallie picked up her paper assignment #2 and showed facilitator. The facilitator asked, “What is it?” Hallie replied, “House.” Then, she resumed working on her paper assignment #2 task. Bruce showed his paper assignment #2 as the facilitator walked around the computer table to check on the computer screen. He then put it down. After pointing out that he thought the screen was weird, David informed the facilitator by signing, “yesterday me wrong typed 500 went-out-of-space add one more 0 me wrong ...should be 50.” David informed the facilitator that he completed his journal entry #2 task by signing, “finish” and played with his log book cover while waiting. Hallie tried to get the facilitator’s attention, appeared to change her mind, and continued writing her journal. Bruce got up and waved for the facilitator’s attention, but the facilitator was busy dealing with Mike. Then, the facilitator got Bruce’s attention and signed, “what?” Bruce signed what he wrote in his journal. David tapped on the computer table once and Mike checked to determine what he wanted. David turned around and waited. After Mike put his assignment in the folder and closed it, David then informed Mike by signing, “Yesterday I type one more 500”, pointed his finger to the screen, signed, “I type 499.” He showed the key to Mike and typed. He then signed, “not yet add one more.” He explained to Mike what happened by adding another zero and showed what happened on the screen. He continued explaining without showing the screen and Mike signed, “I-know.” Shortly after that, Mike tapped David’s arm and informed him by signing, “If that way (vertically) will go around (vertically)” as he pointed on the screen vertically. David nodded in agreement and signed, ‘mess up.” Both David and Mike discussed their trials and errors. David continued explaining to Mike. Bruce waved for the facilitator’s attention but she was busy communicating with Hallie. Bruce watched us.
Student’s reaction	

Group Charts for Behaviors in Transcribed Sessions
Session Four– First 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	Both Mary and Hallie were offered assistance by the facilitator to build the LEGO model car. Hallie inquired if she needed some help should she not ask the boys. The facilitator explained that boys may not help as each of them was busy building model cars on their own. However, she was very right that they should help her if she asked. The facilitator explained to Mary and Hallie how to find LEGO pieces according to the pictured brochure. The facilitator made a suggestion for the girls to avoid confusion with LEGO pieces, to separate the pieces they needed and to put them into a smaller box. After talking to Mary about a certain LEGO piece, the facilitator checked on what the boys were doing and then signed to Mike, "If you finish what do you do?" Mike appeared unsure of what to respond, and the facilitator informed him by signing, "help help check see if help remember cooperate." Mike just resumed his task on his car by plugging the wire into the interface box. The facilitator informed Mary not to lay back and continue to work together. As Hallie was organizing unnecessary LEGO pieces in the large blue box, Mary tapped her and asked her to work together on the car. Hallie told her to move closer. Mary and Hallie switched places.
Student(s) began task in an appropriate manner	Mike was already on task on the floor continuing to work on the model car that he built the day before. Bruce was on task on the floor doing building his model car. David was already on task on the floor building his model car. Shortly after Mary found some LEGO pieces, she needed to get some more. She got up from the floor, grabbed the blue LEGO box from the computer table, and put it on the floor. After Mary got some guidance from the facilitator on how to find the pieces, she worked with Hallie to look for the certain LEGO pieces according to the pictured model car brochure. After some encouragement from the facilitator to continue the task, Hallie resumed gathering the sorted LEGO pieces from a small box with Mary. Then, later, without the facilitator's assistance, both Mary and Hallie continued to sort out pieces again in order to build the car.
Student(s) asked group members about task	Mary already teamed with Hallie on the floor and discussed what model to build from the pictured brochure. Mary picked the one she

	wanted to build. Hallie complained and did not want to help Mary to find LEGO pieces. Hallie indicated that she wanted to organize new LEGO pieces into the big blue plastic box. Mary disagreed. She put her hand up toward Hallie's face as Hallie had turned her face to other side and had Mary's complaint. Mary told Hallie to find LEGO pieces according to the pictured model brochure.
Student(s) shared pertinent information with group members	Hallie and Mary exchanged conversation about finding more of certain LEGO pieces and beginning to build the model car. Bruce signed to Mike, "me too for that no wheel." Both Hallie and Mary continued to exchange conversation as they found LEGO pieces.
Student(s) attempted to complete task	Hallie was told by the facilitator not to lay back while Mary was finding LEGO pieces. Hallie appeared to dislike the comment. Then, Hallie put unnecessary LEGO pieces into the big, plastic blue box instead of helping Mary. Mary began helping Hallie, but Hallie turned her head around as she appeared to be curious as to what the boys were doing.
Student(s) experienced trial and error	Shortly after Bruce resumed his task, he tried to fix something with his model. He got up and went to box to get other parts. After attempting some runs, David finally looked at the picture to solve the problem. He then resumed making some runs. David conducted some trails without his car by pushing four different direction buttons. He then tried it with his car. He signed, "sick" as he tried to get the car to move by pushing the direction button. He finally attached the battery box with the direction button box and tried to figure out how it worked.
Student(s) completed task	
Student(s) checked/watched others or the environment	Mary checked the conversation between the volunteer and the facilitator. Then, she looked at the facilitator and indicated that she needed the facilitator's help. David watched the conversation between Bruce and Mike. Bruce looked at the girls working. Mary looked at the videocamera for few seconds and smiled as if she were having her picture made. Hallie appeared curious as to what the boys were doing while building their model car and told the facilitator about Mike's task. Hallie was informed by the facilitator not to worry. While ignoring the facilitator's question, Hallie checked on what Bruce was doing as he built his model car.

Student(s) checked other student's assignment	
Student(s) stayed on task	David continued fixing his model car and then got up to get the motorized interface box from the table. He plugged the wire into the interface box. After watching the conversation between Bruce and Mike, David resumed his task by testing his car with the interface box. Mike continued building his model car with LEGO pieces. After the suggestion made by the facilitator, Hallie and Mary put the LEGO pieces in a smaller box to avoid confusion. After talking to Bruce about needing more wheels, Mike resumed his task of fixing his car. David continued testing his car.
Student(s) got others' attention	Mike tapped the floor for Bruce's attention. He appeared frustrated and signed, "me no for that (point to wheel)." Bruce signed, "me too for that no wheel." Mike signed, "not enough wheel need two more." Bruce talked to the facilitator about finding the certain piece and checking out the blue LEGO box. He got the motorized wheel box and again checked the pieces from the blue LEGO box. Mary tapped the facilitator's shoulder and inquired why the videocamera was being used. The facilitator explained to her that it was for her research. Mary continued getting LEGO pieces. Mary smiled and signed "yes." She then resumed her task on LEGO pieces.
Student's reaction	Hallie appeared not to like Bruce disturbing the box to find pieces for his car. Hallie appeared upset after a suggestion from the facilitator. Hallie did not reply when she was asked by the facilitator about what was wrong. Hallie just stared at the picture model car brochure. After the facilitator discussed a matter with Hallie, Mary informed the facilitator that Hallie did not want to work even though Mary encouraged her. (This was done a few minutes after Mary and Hallie switched places at Mary's suggestion. (Switching places could have bothered Hallie.) The facilitator reminded Mary that Hallie may not see very well and suggested to her to help Hallie. Mary seemed to realize that she needed some assistance. Mary freely gave Hallie some assistance.

Group Charts for Behaviors in Transcribed Sessions Session four- Second 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	After the facilitator explained to Mary and Hallie about using these two LEGO pieces according to the picture, the facilitator tapped Bruce's shoulder and signed, "Can I see your car?". Bruce gave his car to the facilitator and the facilitator showed him how to put the rubber on the wheel. The facilitator tapped Bruce's knee to ask him to get David's attention. Bruce tapped on David's shoes and got his attention. And then David waved for the facilitator's attention. The facilitator asked him by signing, "Alright? Need help? Or doing fine?" He nodded slightly. Bruce attempted to interrupt the facilitator for a second, but she ignored him. The facilitator signed, "Hey" as she waved for David's attention and continued signing, "do that last fix car first fix that later car first." David signed, "not this box?" The facilitator responded to Bruce's request for attention. Then, the facilitator waved for David's attention as he was working on the box. She waved for his attention again and signed, "understand me?" David slightly nodded in agreement. The facilitator signed, "finish fix car?" He replied by signing, "yes." The facilitator then signed, "oh ok" and finally realized that David had completed fixing the car and was now figuring out the battery box.
Student(s) began task in an appropriate manner	
Student(s) asked group members about task	Both Mary and Bruce tried to disassemble the LEGO pieces. Mary asked Bruce for help to disassemble the LEGO piece. When Bruce finally disassembled the piece, Mary signed, "Right! Right!" Mary then showed the picture to Bruce indicating that she wanted the same model as shown in the picture. Mary and Bruce exchanged conversation about putting LEGO pieces together.
Student(s) shared pertinent information with group members	Bruce had conversation with the facilitator about his model car. After a while Mary signed to Bruce, "me messed up" and Bruce fixed it. Mary again showed the picture to Bruce. Mary helped Bruce fix and then let him fix alone. Mary was looking at the picture and put it on the floor for Bruce to see while fixing. Both the facilitator and David exchanged conversation about the rod and how it works. The facilitator planned to assist David, but he wanted to do it alone. The facilitator got the picture to investigate. David tried to make his car to be motorized. The facilitator tapped his shoulder, showed that the wire has to be plugged in, and signed, "flip over, flip over." The facilitator had to help him flip over (David may not have understood the concept – flip over) and then explained how the motor works. Both the facilitator and David looked at the picture. The facilitator

	explained to David how it worked according to the picture, helped him fix the motorized device and the rod, and then, let him complete fixing them. He paused for a while. The facilitator picked up the picture brochure and showed it to him. He investigated it.
Student(s) attempted to complete task	Hallie went back to putting other unnecessary LEGO pieces into the big blue box and let Mary and Bruce work together to build the car.
Student(s) experienced trial and error	David tried several trials using his car with motorized box. David looked at the picture on the floor and signed, "Me right! Right! Mess up." The facilitator tapped his shoulder and signed, "What mess up?" He replied, "Won't run." The facilitator examined his car and explained that the rod was too short and he needed a longer one. He then looked for one and got the right one. The facilitator had to crawl over to get another rod.
Student(s) completed task	David succeeded having his car motorized run and appeared very thrilled to show it to Mike. He signed to Mike, "Look," and showed him that it has different directions.
Student(s) checked/watched others or the environment	Bruce checked on other boys as they were working. Bruce watched the conversation exchanged between Mike and the facilitator about two different sizes of rods.
Student(s) checked other student's assignment	
Student(s) stayed on task	Hallie and Mary continued to sort out the LEGO pieces with facilitator. David hooked up his car with motorized box. He continued figuring out how to plug in the wires. Hallie and Mary teamed up to begin building the model car. David continued working and figuring out how to make his car run by using the motorized battery box. After showing the wheel to the facilitator, Bruce put the wheel on his model car. Then, he immediately tested his car, which ran on the floor. The facilitator tapped his shoulder and signed, "Finally! Good job!" The facilitator informed Bruce that she wanted to hold his car and wanted to put it away for safety. After the car was put away, the facilitator asked Bruce by signing, "finish what you do?" Bruce paused and then signed, "race?" The facilitator signed, "No. I meant that car finish." and Bruce interrupted and signed, "journal-writing what I do." The facilitator signed, "No. That is much later." "Now will u laid-back?" Bruce paused and appeared thinking. He nodded negatively as his head turned left to right to left meaning he will not lay back. The facilitator signed, "No? then what do you do?" Bruce paused and signed, "I-don't-know." The facilitator signed, "What group mean?" Bruce signed, "We-as-group." The facilitator signed, "Right. What group do?" Bruce then signed, "Help." The facilitator then smiled. Bruce immediately asked Mike by signing, "Help?" but Mike did not want any help. Bruce next asked David by signing, "Help?" and David did not respond at all. The facilitator tapped Bruce's shoe, gave him a tiny

	hint to assist the girls, and smiled. Bruce asked Mary if she needed some help. Then, he moved over to where the girls were. The facilitator waved for Bruce's attention and immediately decided to stay out by signing, "me-hand-off." Bruce went ahead to help fix Mary's construction while Hallie was looking for LEGO pieces. After the facilitator's suggestion about watching Mary's and Bruce's activity, Hallie resumed her unnecessary task of organizing LEGO pieces in the big blue box. Both Bruce and Mary were still on task while Mary investigated the picture on the floor as Bruce tried to fix the model as shown in the picture.
Student(s) got others' attention	Bruce got the facilitator's attention for Mike. As the facilitator conversed with Bruce about how to put the rubber on the wheel, Hallie interrupted and asked about a certain LEGO piece in comparison to the picture. The facilitator explained to Mary and Hallie how to understand the size of the rod piece and to notice the different sizes of rod pieces. Mike signed to the facilitator, "need round." The facilitator asked him if that were tire or rod thing. He replied, "Rod." The facilitator then signed, "Have two sizes." The facilitator was ready to give Mike the rod piece, but he signed, "No", and showed what he needed it on his car. He resumed signing, "Running-around-wheel." The facilitator signed, "show-me picture." Mike then signed, "Running-around-wheel" and the facilitator signed, "O-h you mean rubber band?" The facilitator got the rubber band and then signed, "This?" Mike slightly nodded and the facilitator signed, "This rubber band, rubber band." (She was informing him the word for that was rubber band.) Mike appeared to understand. The facilitator waved for his attention and signed, "How many? 1 (or) 2?" Mike replied, "I think 2." The facilitator signed, "2 fine" and got another one. Mike informed the facilitator that he didn't need the second one since his car worked fine after putting on one rubber band. Bruce interrupted the facilitator by tapping on her shoulder while the facilitator was communicating with David. The facilitator ignored Bruce and continued informing David of how to fix on his car. Bruce tapped the facilitator's shoulder again. He then shoved his LEGO piece toward the facilitator's face as if to demand attention. The facilitator tapped Bruce's shoulder and signed, "LOOK! (<i>I'm</i>)talk(talking) thank you." Bruce immediately signed, "Sorry." The facilitator smiled and signed "Ok, now what?" The facilitator had to delay Bruce for few seconds and check on David to be sure he understood what he was supposed to do. Then, the facilitator tapped Bruce's leg and signed, "Now what?" Bruce indicated that he needed help with the rubber band for the wheel. Both the facilitator and Bruce figured out how to put it on. Then, Bruce took the wheel back without informing the facilitator and fixed it by himself.

	Mary asked Hallie to get the facilitator's attention by tapping the facilitator's leg. Hallie informed the facilitator that Mary wanted her. Mary informed the facilitator to look at the picture for a certain LEGO piece she needed. While assisting Mary to find a certain LEGO piece shown in the picture, Bruce again shoved his wheel toward the facilitator's face. The facilitator fingerspelled with a disapproved facial look, "w-h-a-t?" and then realized that Bruce was just showing that he succeeded putting the rubber to the wheel.
Student's reaction	Mike did not want any help from Bruce when Bruce offered. While she was organizing the LEGO pieces in the blue box, the facilitator asked Hallie what she was doing. Hallie did not respond and then, the facilitator asked the same question again. Still, there was no response. Then, the facilitator suggested for Hallie to watch what Mary and Bruce were doing (since it was to be Hallie's and Mary's car.). Hallie appeared not to want to follow the suggestion as she shrugged with her shoulder and ignored the facilitator. Hallie continued the unnecessary organization with new LEGO pieces for the blue box by herself.

Group Charts for Behaviors in Transcribed Sessions
Session Four- Last 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator waved for the group's attention to watch David's action. The facilitator asked Bruce to get Mary's attention. Finally, with all attending, the facilitator informed them to watch David's moving car. Mike watched. Mary tapped Hallie's hand several times to get her attention. Finally, Hallie attended to Mary and was asked to find the certain LEGO piece that Mary pointed to in the picture. The facilitator waved for Bruce's attention and signed, "D-o you mind get (<i>getting</i>) log books from table?" The facilitator then informed him to pass the books to the other group members. The facilitator signed to Bruce, "Put-it on-floor it's-easier. Bruce responded to the facilitator that it was Mike's and he was not cooperating. The facilitator again signed, "Me-as-a-teacher do what me (<i>I</i>) say." (The intent of the message was for Bruce to put the log book there on the floor since Mike refused to cooperate.) Bruce then gave the facilitator his book and pencil. Bruce gave pencil to David. The facilitator signed to Bruce, "You d-o what-do today?" He began to write his journal. After the facilitator moved close to Hallie as she organized LEGO pieces in the blue box and tugged lightly on her sweater, Hallie quickly responded to the facilitator. The facilitator informed Hallie what to write in the journal by signing, "Write what you do-do today." and then pointed to her log book. Hallie quickly replied by signing, "fix that" as she pointed the blue box. The facilitator informed Hallie to write in her log book. While Hallie was organizing pieces into the blue box, the facilitator tapped Hallie's shoulder to inquire if her journal writing had been finished. Hallie paused and the facilitator again to ask the same question. Hallie's reply was that she was not finished. Mary tapped Hallie's shoulder and attempted to show Hallie her journal, but Hallie had already opened her log book and resumed her journal writing.
Student(s) began task in an appropriate manner	Mary opened her log book and was ready. Yet, she had to wait for the facilitator. After communicating with Mike, the facilitator checked on Mary, turned to the correct page in her log book, and showed Mary that it was where she should begin writing. The facilitator signed the question for the journal entry, "What you do today? Do?" Mary paused then began her journal writing.

	After the facilitator informed Bruce of the question for his journal, he began to write. Hallie began writing in her journal after the facilitator told her to write her reply to the questions in her log book. Mike began his journal entry after looking at Bruce's journal.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mary waited for Bruce's attention after she asked Hallie to get Bruce's attention. Hallie used her pencil and pointed at Mary indicating to Bruce that Mary wanted him. Mary signed to Bruce, "Spell name" Bruce began to spell his name, "B-"and then decided to show her his name on the log book cover for her to copy. Bruce leaned over and checked Mary's journal to be sure that Mary spelled his name correctly. Bruce signed to Mary, "Spell wrong." Mary erased and Bruce corrected it.
Student(s) attempted to complete task	Hallie did not complete her journal writing and resumed her unnecessary organization task on the blue box.
Student(s) experienced trial and error	
Student(s) completed task	The facilitator signed, "Finish write (<i>writing</i>) write no more?" David stared at me. The facilitator then signed, "You don't-know?" David nodded his head negatively and signed, "Short." The facilitator signed, "Short. You enjoy this?" as she pointed his model car task. David pushed the direction button letting his car run. The facilitator waved for his attention and signed, "Yes (<i>or</i>) no?" David signed, "Yes." The facilitator signed, "Yes. you like that" as she pointed back and forth on his car task and paused. She again signed, "Fun?" David eagerly nodded in agreement that it was so fun. The facilitator signed, "Make more?" and David again agreed that he did want to build more cars. The facilitator then checked the rest of the group. Mary closed her log book after the facilitator's compliments. Hallie wrote in her journal after asking the facilitator to spell the word, "thing." The facilitator fingerspelled "stuff" instead of "thing". (Actually the sign for both words, stuff and thing, is the same.) Hallie wrote each letter as she looked back and forth. After recording the spelling of the word "later," Mike immediately closed his log book. After Bruce left for the day, Mary was the second person to leave the computer room and was informed to attend the girl scout party in the library. Hallie completed her journal at the very end session after David, Bruce, and Mary left.
Student(s) checked/watched others or the environment	Mary watched Bruce as the facilitator informed him to get log books from the computer table.

	Bruce wanted Mike's attention, but he, apparently, changed his mind and resumed his journal writing. Bruce watched the facilitator and Mary while Mary signed her journal entry. While writing his journal, Mike either checked the clock on the wall or the board. Mary watched the facilitator spelling the word, "stuff," to Hallie. Hallie and Mary both watched the conversation exchanged between David and the facilitator during the journal entry. While watching the facilitator ask Hallie if she had finished her journal writing, Mary nodded in agreement to the facilitator to indicate that she was done with hers. David got up and went to the computer table. The facilitator reminded him about walking in front of the videocamera and signed, "Be careful." He was already walking in front of it instead of going around. He luckily got out of its way and smiled toward it. He then looked at another pictured brochure. He signed, "Sick that" as he pointed the picture. He opened the next page, viewed both pages, and then turned to another page. He showed the facilitator picture and signed, " Sick that", pointing the picture, "Better these-two", again pointing another picture, "Better better" , pointing different picture, "Crazy." The facilitator asked him what is that and David signed, "Paper move." The facilitator signed, "Paper-lined-up-moving assembly like food put there place-cup-like place-cup-like place-cup-like assembly run-over assembly", pointed the picture, and again signed "Understand?" David nodded slightly. The facilitator signed, "We will do more tomorrow o-k?" David fingerspelled, "o-k." The facilitator informed him that we will use either of these two tomorrow and signed, "See-you tomorrow. Good night. Bye." David was the first person dismissed for the session.
Student(s) checked other student's assignment	While the facilitator watched Mike for few seconds, he viewed his model car in the air and rotated it. Mike looked at Bruce's journal and wanted to know what to write for his journal entry.
Student(s) stayed on task	David fixed his motorized car and pushed the direction button. It FINALLY moved!! David held his hands up as he said, "Yea!" The facilitator cheered with him and waved for the rest of group's attention. She had to tell Bruce to get Mary's attention and then informed them to watch David's car moving. David explained, "Add one more" and then showed his moving car. It went forward, backward, forward, and another forward. He then looked at the facilitator and explained something to her. He also asked her to get one more plugged wire. The facilitator got it and gave it to David. David tested by adding another plug into the direction box. He continued his task by testing it with different directions by pushing the buttons. David tapped the facilitator's shoulder to show his car turning. Finally, his car turned into the directions. It was first turned left then right. The facilitator signed, "Congratulations! Good Job !" and asked him if he has done that

	before. David paused and still gave no response. The facilitator then signed, "First time?" David slightly nodded in agreement and the facilitator fingerspelled, "O-k." David then signed, "No. long time ago." David watched the conversation exchange between the facilitator and Bruce. The facilitator tapped David's shoulder after responding to Bruce. The facilitator signed, "You experience fix that before?" David did not response and the facilitator again signed, "Or first time?" David signed, "No." The facilitator was confused momentarily and signed, "No? Wait a minute. Doing that. See that before? You don't see that before?" while her head shook negatively. David signed, "No." and the facilitator fingerspelled, "o-k." to affirm. David went back to his task by pushing different direction buttons. After informing Bruce to get pencils, the facilitator watched David's actions. David was still on his task by pushing different directions for his car to move all directions. The facilitator informed him to stop. He agreed to stop and nodded his head. The facilitator signed, "I need you write what you do today. Understand me?" He indicated that he understood the facilitator by nodding his head. He got his log book and pencil. The facilitator fingerspelled, "o-k." Mary resumed her task after watching David's moving car. Mike was very focused on his car building task while the facilitator tried to his attention by tapping on the floor four times. Hallie continued her unnecessary task for organizing LEGO pieces into the big blue box. (Hallie stayed with a self directed rather than on the assigned task.) Bruce continued writing his journal while the facilitator dealt with issues with Hallie about her journal entry. While the facilitator was dealing issues with Hallie and Mike, David was still writing his journal. He did tap on the floor for the facilitator's attention while she talked to Mary. David continued trying to get the facilitator's attention and the facilitator signed, "Yes?" David signed, "Finish?" The facilitator paused to think and signed, "You want spelling finish?" David slightly nodded his head and picked up his pencil from the floor. The facilitator fingerspelled, "F-", paused, "I", paused... Mike continued working on his car even though that was not the assigned task for that time. Hallie resumed writing after getting Bruce's attention for Mary and again after watching the conversation between David and the facilitator. While the facilitator was spelling words for the rest of group, Mike continued working on his car model task. After checking Bruce's journal, Mike continued writing in his journal.
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	David just completed his journal writing. After watching Mary sign her journal entry, Bruce resumed his journal writing. In between writing in his journal, Mike resumed his car model task. Bruce was very focused writing his journal while the facilitator dealt the videocamera position with David. Bruce was still writing even after David left. After the facilitator tapped Hallie's shoulder and inquired if she was done with her journal task, Bruce signed, "Finish." He put his log book and pencil away on the computer table. After closing his log book, Mike resumed his car model task again. The facilitator walked over to where Mike was and stood there watching him. He finally got up and left. He was the last person leaving for that session.
Student(s) got others' attention	Mary tapped Hallie's hand several times as Mary was trying to get her attention. Finally, Hallie was asked to find the certain LEGO piece that Mary pointed to in the picture. Mary tried to get the facilitator's attention by tapping the facilitator's knee, but the facilitator was busy talking to David about his experience. Mary tapped the facilitator's shoulder and tried to sign "B-J" on her head. David tapped on the floor to get the facilitator's attention while the facilitator signed to Mary. The facilitator signed to Mary, "B-J B-J" on the right side of its forehead twice. "You want spelling of his name?," the facilitator signed, "Well you (<i>why don't</i>) ask-him?" Hallie got Bruce's attention for Mary since Mary asked Hallie to get Bruce for her. Hallie used her pencil to point to Mary to inform Bruce that Mary wanted him. Mary waited for Bruce's to attend after she asked Hallie to get Bruce's attention. Hallie used her pencil and pointed to Mary indicating that Mary wanted him. Mary signed to Bruce, "Spell name." Bruce began to spell his name, "B-"and then decided to show her his name on the log book cover for her to copy. Bruce leaned over and checked Mary's journal to be sure that Mary spelled his name correctly. Bruce signed to Mary, "Spell wrong." Mary erased and Bruce corrected it. Following the conversation with David about how he liked the task, the facilitator checked on rest of group. David waved for facilitator's attention and signed, "Computer." The facilitator signed, "Computer tomorrow, no time." as she pointed the clock on the wall. "Out ,we try that," (pointing his model car) "Hooked up there computer type see move," pointing table, "Move." David indicated he understood by nodding. The facilitator waved for his attention and signed, "If they cooperate, important." He signed, "Me cooperate." The facilitator signed, "Good."

	While the facilitator was communicating with David, Mary tapped on the facilitator's shoulder. The facilitator continued communicating with David and Mary again tapped on the facilitator's arm. The facilitator signed to David, "Good" and then turned her head to pay attention to Mary. Mary began to sign her journal and the facilitator signed, "say-again" Mary signed while reading from her log book. The facilitator signed, "Good... nice." Mary closed her log book. Hallie waved for the facilitator's attention and asked for spelling of this word, "thing." (mistook for stuff) Shortly after his journal entry and model car task, Mike got the facilitator's attention by patting his hand on the floor and asked her for the spelling of the word, "later." The facilitator fingerspelled, "L-a-t," paused, "e-r." Mike only checked the fingerspelling twice while writing. After indicating that she was done with journal writing, Mary tapped Hallie's shoulder to show her journal as Hallie was opening her log book to resume her writing. After Bruce completed his journal task, he asked the facilitator if she had done this before with group. The facilitator signed, "Yes" and smiled. Bruce signed, "Different state?" and the facilitator signed, "Yes different state." He then signed, "Cool." He was the second person to leave the session.
Student's reaction	While communicating with David about his experience with LEGO, the facilitator signed to Bruce, "Do not throw o-k? Be nice to-pass" (Bruce threw David's log book across the room). The facilitator explained to Mike that he "can do that tomorrow let's do this." She indicated that Mike can finish his car task tomorrow and encouraged him to begin writing his journal. He refused to cooperate and wanted to complete his task. The facilitator put his log and pencil close to where he was. The facilitator tapped on the floor to get Mike's attention and continued to tap at different area of the floor, closer to where Mike was. It took the facilitator four times before Mike finally responded. The facilitator signed, "Please stop now please write what do today." Mike immediately chose not to pay attention and stayed very focused with his car building task. After responding to Hallie about her journal task, the facilitator crawled over to tap for Mike's attention. This time he immediately looked at the facilitator. The facilitator signed, "Please cooperate" and Mike looked away and chose to continue his car building task. The facilitator paused for a while and watched Mike's action. Then, she fingerspelled, "o-k" as she signed, "hands-back-off" and left Mike alone. (Mike did later write in the journal.) Mary tapped Hallie's shoulder to show her journal, but Hallie had already opened her log and resumed her journal writing.

Group Charts for Behaviors in Transcribed Sessions Session Five– First 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	At the beginning of the session on Day 5, the members of the group replied that they understood the schedule as explained on the white board. The group was informed that it was their last day because of the schedule change due to the weather. The facilitator emphasized that it was very important for each group member to cooperate, not ignore, and assist others as well. The group was silent as the change in session schedules was explained. The facilitator instructed the group members on the methods of how to write the LOGO commands of a square on the white board as a group and how to use the laminated orange LOGO commands for an assistance, if needed. With the exception of Mike, group members showed no response. Mike raised his hand, but he seemed to change his mind. Mary tapped Hallie's shoulder and asked her if she remembers something and Hallie indicated that she did not. The facilitator informed David, Hallie, and Mary that their work was enough, and it was time for a group discussion. Mary added more commands before joining the group for discussion. During the group discussion after the first task of this session was completed, the group appeared to listen to the facilitator explain what to do next, how to agree or disagree by discussing with the group, and then, ask if all assignments on the board were done the same or different. The group members replied in sign, "Different."
Student(s) began task in an appropriate manner	After a brief explanation of the white board assignment by the facilitator in a group discussion, Bruce was the first person to come forward to the white board to begin the task of writing LOGO commands for a square. He started writing the command, "FORWARD." Mike was the second person to come forward from the group to the white board. David was the third person to come forward to the white board. He watched Bruce and Mike write their answers before he got the marker to begin the task writing LOGO commands of square. Hallie was the fourth person to come forward to begin the task of writing LOGO commands for a square. Mary was the last person coming forward to the white board to begin the task writing LOGO commands of square after watching three boys begin their tasks. Mary began to write some commands on the board; then she appeared unsure of what to do on the LOGO command board task. She watched her group members write commands. Then, she appeared think and decided to erase.
Student(s) asked group members about task	
Student(s) shared pertinent information with group members	Mary and Hallie exchanged information on the board and then again Hallie exchanged more information with Mike about LOGO command assignment. After asking Hallie if she remembers something, Mary resumed the

	writing task. Mary had a chance to exchange information with Mike about the commands. After copying one of boys' answer, Mary and Hallie again exchanged conversation about their assignments on the board. Then, Hallie helped Mary draw the line down the board and wrote the command. They continued to exchange opinions with each other. Again, Mary and Hallie conversed about their assignments on the board after Hallie made several changes. Then, Hallie helped Mary draw the line down on the board and wrote the command. They continued to exchange opinions with each other. During Hallie's and Mary's attempt to complete the assignment, Mary asked Hallie about LOGO commands. Hallie explained what they were. After Mary's erasure, Mary and Hallie again discussed about the assignment. There were some disagreements between them.
Student(s) attempted to complete task	After exchanging information with Mary and Mike, Hallie appeared to be thinking.
Student(s) experienced trial and error	After appearing to think about what she wrote, Mary erased. And then, she looked at boys' assignment on the board. After checking David's and Mike's answers and writing a few commands, Bruce erased one of the commands. Then, he continued to write more commands. Hallie resumed her task after Mary inquired her if she remembered something. Hallie erased a command on the board. After appearing to think, Hallie erased some commands on the board. After some conversation with Hallie, Mary erased some commands on the board. Then, she tapped Hallie's shoulder and asked if she remembered something about commands. Hallie nodded negatively. Mary then resumed her task. After some discussion for clarification on commands with Hallie, Mary again erased some commands.
Student(s) completed task	Mike was the first person to complete his LOGO command assignment and got the facilitator's attention. Conversation was exchanged between the facilitator and Mike about his LOGO command assignment. Bruce got the facilitator's attention to check his assignment on the board and informed her that he was done with it. David's LOGO command assignment on the board was completed and the facilitator informed him that was enough.
Student(s) checked/watched	At the beginning of white board task assignment, Hallie watched three

others or the environment	other boys writing their LOGO commands before she began hers. At the beginning of white board task assignment, Mary and Hallie watched the three boys write their LOGO commands before beginning theirs. Bruce looked at David's answer on the board and then Mike's answer as well while he was trying to write the next LOGO command. After looking at Mike's answer, Bruce checked answers against his. Then, Bruce again watched Mike writing his. After erasing commands, Mary looked at boys' assignments. After David was paused and appeared to think, he looked at Bruce's answer on the board. David again checked Bruce's answer on the board and wrote more LOGO commands.
Student(s) checked other student's assignment	Mike watched Bruce writing his answer before he began his task writing LOGO commands of square. Shortly after Mike began his task of writing LOGO commands on the white board, he looked at Hallie's answer. Then, he resumed writing. After some time, Mike wrote LOGO commands on the board. He looked at Hallie's. Then, he continued writing more LOGO commands. After checking Hallie's answer, Mike continued writing more commands.
Student(s) stayed on task	Mike continued writing LOGO commands on the white board while Hallie and Mary watched him. David continued writing LOGO commands on the white board while Hallie and Mary watched him. David resumed his task of writing LOGO commands on the white board after checking the answers from Bruce. Mike paused for a while and appeared to think what LOGO command to write next. Then, he wrote it. Mike continued writing LOGO commands of square while Bruce looked at Mike's answer. Mary resumed writing her LOGO commands on the board and appeared to think a while. Hallie continued writing her LOGO commands on the board. David continued writing LOGO commands of square while Mary and Hallie exchanged information about LOGO commands. After the conversation about LOGO commands between Mike and Hallie, Mike appeared to think before he resumed his task writing more

	LOGO commands on the board. Hallie resumed her task after Mary asked her if she remembered something. After erasure, Hallie continued to complete her task. After checking Bruce's answer on the board, David resumed his task by writing more LOGO commands. Mary resumed her task after exchanging information with Mike. And she copied one of the boy's written LOGO command answers. After exchanging information with Hallie and getting assistance drawing the line, Mary continued writing the commands. David continued writing LOGO commands of square while Mike informed the facilitator that his task on writing LOGO commands of square was done. David still worked on writing more LOGO commands of square though he paused and appeared to think several times. Then, David put the marker down and used his finger virtually drawing on the board as he double-checked his answers. After several verbal exchanges between Hallie and Mary, Hallie resumed trying to complete her assignment. After being told by the facilitator that it was sufficient, Mary added more commands.
Student(s) got others' attention	Mike tapped the facilitator's arm as she was talking to a volunteer videorecorder. He immediately realized that the facilitator was busy and did not continue to try to get her attention. After talking to a volunteer videorecorder, Bruce immediately tapped the facilitator because he wanted the facilitator to look at his assignment on the board. He informed the facilitator that he was done with it.
Student's reaction	

Group Charts for Behaviors in Transcribed Sessions
Session Five- Second 10 minutes

Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	After the facilitator's instruction about how to discuss and to agree with right or wrong answers of LOGO command assignment on the white board as a group, David and Mike went up to the board to write more LOGO commands. Hallie checked her answers on the board after the explanation from the facilitator about how to discuss and to agree on right or wrong answers. Mary checked her answers on the board against Hallie's after the explanation. Bruce appeared to be the only group member who understood the facilitator's instruction about how, as a group, to discuss and to agree with right or wrong answers of LOGO command assignment on the white board. Bruce displayed his understanding when he stood back and watched what his group was doing. He then tapped Mike's shoulder and signed, "I think you're right" indicating that Bruce agreed with Mike's answer on the board. Both Bruce and Mike exchanged conversations about their answers, especially Mike's. They were comparing their answers against each other and Bruce then fixed his error. After the light blinked for all group members' attention, Bruce did respond to this system. David did not respond to this system. Hallie did not respond to this system and continued on writing her assignment on the board. The facilitator asked Bruce to get Hallie's attention. Mary did respond to this system and then continued writing her LOGO command assignment on the board. The explanation was given by the facilitator about how to pick which answer from the board would be typed into the computer. Bruce picked Mike's answer to be tried first. The facilitator asked the group if they reached their agreement yet. Hallie and Mary were exchanging their opinions while David appeared unsure and was trying to decide between Mike's answer and his which data to enter into the computer. Bruce convinced David that Mike's answer is right. Both Bruce and Mike explained to David by virtually drawing the square according Mike's LOGO command answer. David checked Mike's answer step by step by all himself and finally agreed with Bruce that the answer is right. Mary discussed options with Hallie. They were discussing whose answer to try on the computer. Both wanted to try their own answers until Mike asked them if they agreed that he could try his answer in the computer first. Neither gave Mike a response. The facilitator informed the group to begin entering the answer into the computer. Immediately, Mike was the first person who raised his hand. The boys left their positions before the facilitator finished explaining. David left with Mike to go to the computer table before the facilitator finished explaining. Mike was at the very end of the computer table where they keyboard was before the facilitator finished explaining. David was second person positioned after Mike. He was positioned in between Mike and Bruce at the computer table. Mike and David were the only two that had easy access to the computer keyboard. Both Mary and Hallie stayed until the facilitator completed the explanation. Then, Mary positioned herself between Bruce and Hallie by the computer

	table. Due to activity in the hall, Mike informed the facilitator that the schedule had changed. The facilitator replied that he should not worry about that and just follow the schedule on the board. Hallie nodded negatively after the facilitator asked if she could see the screen. The facilitator asked her what would she do if she can not see. Mary raised her hand and immediately signed, "I can't see." Then, Hallie signed, "I can't see." The facilitator informed them to move. Hallie was assisted by the facilitator to be placed between Mike and David so she could be much closer to the screen. Mary moved to the other side of the computer table adjacent to the window before Mike. The facilitator asked the group what was on the screen and they all replied, "square." Bruce explained each LOGO command of square as the facilitator walked on the floor while he virtually drew a square according the LOGO commands from the screen that Mike entered. After correction of the error on the screen by Mike and David, the facilitator asked the group if that was opposite. There was no response from the group. The facilitator asked the group a different question, "Why think Bruce is right? Why it's opposite?" Only David replied at first. Then, Bruce replied, "opposite" and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group the different questions by signing, "Why think Bruce is right? Why it's opposite?" Only David replied that it was opposite by using the LEFT command. After explaining the reason why Mike could not continue type while the group discussion of squares being opposite was going on, David explained why the two squares are mirror-like. The facilitator signed, "Yes" and then "Same square or different?" by inquiring the group. (end of Second 10 minutes.)
Student(s) began task in an appropriate manner	After discussing about his answer with Mike, Bruce fixed his error on the board. Mike began his task by typing his answer from the board into the computer before the end of the instruction. Mike wrote more LOGO commands. Mike went ahead and typed while David replied that square was opposite by using the LEFT command. The facilitator informed Mike to stop typing, but he did not. The facilitator had to turn Mike around away from the computer. The facilitator had to explain to him why he could not type. The facilitator stated that nothing would happen to the information in the computer while the group finished discussing the squares being opposite.
Student(s) asked group members about task	Bruce tapped Mike's shoulder and signed, "I think you're right" indicating that Bruce agreed with Mike's answer on the board. Both

	Bruce and Mike exchanged conversations about their answers, especially Mike's. They were comparing their answers against each other and Bruce then corrected his error.
Student(s) shared pertinent information with group members	Hallie and Mary exchanged opinions about their LOGO command assignment. Hallie assisted Mary by writing her answers since Mary asked Hallie for her assistance. After fixing his error, Bruce asked Mike about his corrected answer on the board. After explanation by the facilitator, Hallie discussed with Mary about agreeing and picking which one on the board to enter data into the computer. Hallie did not respond to Mike's question when he tapped her shoulder and asked if she agreed that his answer was right. Hallie and Mary stayed at the board even though the facilitator informed them to go ahead enter data into the computer. The boys went ahead to the computer table. Hallie began to erase her answer, but the facilitator told her not to. After Bruce's input about using the left angle square, Bruce and the facilitator exchanged comments about using the LEFT command while Mike and Hallie exchanged information. Both Mike and Hallie then discussed it with the facilitator while others were watching on the screen. Mike continued to type and Hallie appeared discouraged since she wanted to type. After Bruce corrected his error on LOGO commands of square on the board, both Bruce and Mike exchanged conversation. Mike mostly made comments about both Bruce's and Mike's answers. They compared their answers against each other.
Student(s) attempted to complete task	
Student(s) experienced trial and error	Bruce fixed his error on the board after discussing with Mike. After Hallie's assistance, Mary erased one of LOGO command on the board. After correction of the error on the screen by Mike and David, the facilitator asked the group if that was opposite. Bruce replied, "opposite" and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group the different questions by signing, "why think Bruce is right? Why it's opposite?" Only David replied that it was opposite by using the LEFT command. David pushed the enter key. Both Mike and David argued as to who should type and fix the error. By pushing David's hand away from the keyboard, Mike did not allow David to fix the error. David signed, "Finish!" and Mike signed, "See." What David meant about signing finish was for the turtle was going out of space on the computer screen to stop. And what Mike meant by signing, "see" was that David should not push the enter key. Mike fixed the error.

Student(s) completed task	Mike completed entering the data from the board: his answer to the assignment of LOGO command square. Mike again completed another task by typing another square using the LEFT command.
Student(s) checked/watched others or the environment	Bruce watched the conversation exchanged between Mike and Hallie about agreeing to use Mike's answer to input into the computer since the boys agreed that Mike's answer was right. David, along the group, watched the conversation exchanged between Mike and Hallie about agreeing to use Mike's answer to input into the computer. After the boys went to the computer table, Hallie left the board area and stood at the other side of the computer at the corner of the table. Bruce watched the screen as Mike keyed his LOGO command from the white board into the computer. Hallie left the table to put her cochlear implant away and returned to her position. Bruce became the last person positioned of the computer table because of Hallie's and Mary's new placement. Yet, Bruce did not move much further toward the end of the computer table and was able to see the computer activity on the screen. Mike now became the second person positioned of the computer table because of Hallie's and Mary's new placement. Mike continued typing. David did not move much further from the keyboard and was able to key in if he needed to. Bruce watched with the group while both Mike and David argued about who would type and fix the error. Mike, by pushing David's hand away from the keyboard, did not allow David to fix the error. David and Bruce watched the screen as Mike keyed his LOGO command from the white board into the computer while both Hallie and Mary changed their placements. David looked at the screen while Mike keyed the LOGO commands from the white board. Mary watched with the group while both Mike and David argued as who should type and fix the error. Mary watched the conversations between Bruce and the facilitator about using LEFT command instead of RIGHT when drawing square and between Mike and Hallie about using particular LOGO commands by pointing to them on the screen.
Student(s) checked other student's assignment	David checked Bruce's answer while writing more LOGO commands on the board.
Student(s) stayed on task	David continued writing his LOGO commands on the board after the facilitator's explanation of how to discuss and to agree with right or

	wrong answers on the LOGO command assignment on the white board as a group. Mike continued typing his answers from the board while the facilitator discussed the better placement with the girls. Mike was still typing the LEFT angle square while others were watching him. David tried to type to fix the error but Mike wouldn't allow him to do that.
Student(s) got others' attention	Shortly after the inquiry of a shape on the screen by the facilitator, Bruce tapped the facilitator's shoulder and explained that LEFT command can be used instead of RIGHT. He gave a floor exercise going opposite direction from the right angle square as shown on the computer screen. David signed, "Same!" to the facilitator when Mike completed typing the left angle square. That square was the opposite of other right angled square. They were like a mirror to each other.
Student's reaction	

Group Charts for Behaviors in Transcribed Sessions Session Five- Last 10 minutes	
Student Behavior	Example
Student(s) appeared attentive during facilitator's or other's explanation	The facilitator informed Mike it was enough for him to make several runs of his model car and let the rest of group to have the experience. (share) No one paid attention to the facilitator as the facilitator flashed the light to indicate it was time to write the journal entry. The light was again flashed. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing in the journal. The facilitator signed, rather than write on the white board, to them, "What you do today? What you do with group?"
Student(s) began task in an appropriate manner	David let Mary try a run with his model car. Mary tried different directions of the model car by pushing different buttons while David watched that action. Both Mary and David exchanged conversation as David assisted her to make some runs with his model car. After Mary's arm was hit by Mike's model, she continued giving David's model some runs by pushing different direction buttons. Hallie began to carry the log books without being told or asking the facilitator. She was passing the books, then pencils, out to individuals. Bruce was the first person to start writing his journal entry. Mary started writing in her journal right after Bruce did. Bruce continued writing until he raised his hand and interrupted the facilitator. He did not appear to notice that Mary was signing her journal entry to the facilitator. Bruce immediately signed asking for the spelling of "board." The facilitator spelled the word, "board." Bruce resumed his writing. David was third person to start his journal writing. Shortly after he began this task, he went back testing his model car again and then resumed his journal writing. Then, he watched what Mike was doing with his model car and pushed the direction button with Mike. Hallie began her journal entry for the two questions that were signed by the facilitator. (The questions were not written on the board.) After exchanging conversation with Mike, Hallie went ahead to collect pencils to be put away log books.
Student(s) asked group members about task	Before collecting the pencil from Mike, Hallie asked Mike if he was done using the pencil by signing, "Finish?" as Mike was moving his model car.
Student(s) shared pertinent information with group members	The facilitator informed Mike that he could stop moving his car alone and share it with the group. Mike let Hallie share the experience first and assisted her on how to do it. Hallie tried to push the button. The model which Mike held fell apart into the table.

	Hallie laughed about the incident and continued to laugh. As no one paid attention to the classroom light being blinked, both David and Mary exchanged conversation. After the spelling word was written by David, he talked to the facilitator about his journal entry. Then, he resumed his journal writing. After spelling the word, “computer,” both Hallie and Mike exchanged conversation.
Student(s) attempted to complete task	Mike gave another try on his model and his model flew off accidentally hitting both Hallie’s finger and Mary’s arm. Hallie moved to the very end of the computer table, past where Mary was. Mary did not move. Mike fixed the model car and then tested the car by pushing the turn direction button. Mike got more LEGO pieces from the floor when the facilitator blinked the lights to change tasks. Mary continued her task by testing the model after the facilitator told her it was time to start writing in the journal. David came back to the computer table with more LEGO pieces that he got from the floor to continue building a better model car. David did not immediately start his journal. He chose to resume his task of testing his model car instead. Both David and Mary were doing the LEGO car activity together. David had paused his journal writing for few minutes and then resumed his task. A few seconds later, he helped Mary fix the model car.
Student(s) experienced trial and error	Mike was the first person who plugged the wire to the battery box so that his model car could run on the computer table. This gave the idea to both Bruce and David of what to do with theirs. Bruce tried to figure out how to plug the wire into the battery box for his model car. He added some more LEGO pieces to his model car. David tried several times to figure out how to plug the wire into the battery box for his model car. So did Bruce for his own model car. After adding some more LEGO pieces to his model car, David ran a test. After checking what David was doing with his model car, Bruce kept trying to figure out how the battery box works. Bruce tested his model car by running it with the battery box that has four different direction buttons.

	Mike wanted to know the real reason why it was not working properly and the facilitator signed, “L-O-G-O L-E-G-O not work don’t know why I’m sorry.”
Student(s) completed task	Mary completed her journal writing after she signed her journal entry #2 to the facilitator and was told to close her log book. While exchanging conversation with Mike, Hallie closed her log book. Mike finished his journal writing and resumed his LEGO activity with his car. Bruce completed his journal entry #2 after he signed his journal to the facilitator. The facilitator checked David’s journal and assisted him to write since he was playing with the model car with Mike. He then completed task.
Student(s) checked/watched others or the environment	Bruce, along Hallie and Mary, watched what Mike was doing with his model car and the battery box as he ran the car on the computer table. Mary watched Mike assisting Hallie as he tried to get the model car running on the table. After the incident, Hallie appeared curious as to what Mary was doing as she gathered more pieces with Bruce to fix his model. Mike gave another try on his model and his model surged forward hitting both Hallie’s finger and Mary’s arm. Hallie moved to the very end of the computer table past where Mary was. Mary did not move. Shortly after Bruce resumed writing after the spelling of the word “board,” Bruce looked at videocamera for few seconds. Then, he returned to his writing task.
Student(s) checked other student’s assignment	
Student(s) stayed on task	Bruce continued his task by adding LEGO pieces to his model car and fixing it to run. He also continued getting more LEGO pieces for third time. Mary continued on her task by trying different direction buttons for next few minutes. Then, Mary fixed the model and gave it a run. Mary and David then exchanged conversation. Mike continued on his task by trying different direction buttons for a few minutes. Mary resumed her task after asking the facilitator about the turn direction and continued testing the model car with David.

	After long pause with the facilitator, she resumed her journal writing. Mary continued writing in her journal until she sought the facilitator's attention to share her journal. Mary resumed the previous task after putting her log book away. While the facilitator was busy dealing with others, Hallie continued her writing. After showing her journal to the facilitator, Hallie resumed her journal writing. After helping Hallie with the spelling of the word "computer," Mike resumed his journal writing. Mary continued the same task with David after David paused from making his journal entry. Both Mary and David shared the task together by trying different direction buttons for David's model car. Mary got the LEGO piece out by using her teeth to take it out. After David completed his journal entry, he helped Mary resume fixing the LEGO pieces on David's car. Mary got more LEGO pieces from the floor.
Student(s) got others' attention	David tried to get Hallie's attention by banging his hand on the computer table several times and continued to tap his finger until he got her attention. Hallie appeared focused to get log books out of the folders so they can be ready for the group. She was not told to get them; she just volunteered herself. Both David and Hallie exchanged conversation about his model. David went to get more pieces from the floor and Hallie resumed arranging the log books to be handed out. Mary waved for the facilitator's attention and asked the facilitator if the turn direction button means it turns. The facilitator signed, "yes." Mary raised her hand for the facilitator's attention and then shared her journal with the facilitator by signing. David tapped the facilitator's arm to ask for spelling of the word, "help." The facilitator began to spell the word, but decided to write it on the board. Hallie stopped her journal writing and checked where the facilitator was. She took her log book and showed her journal to me. Then, she resumed to her task. Hallie waved for the facilitator's attention and asked for the spelling of the word, "computer." The facilitator started spelling, "C-" and was interrupted by Mike because he wanted to know why LEGO LOGO on computer was not working today. Hallie waited for the facilitator to spell more letters. The facilitator noticed the word, "computer" on Mike's journal and told Hallie to check the spelling

	from Mike's log and go ahead to copy. Mike disliked the idea and the facilitator told him it was okay to share that word! And just let her copy. Mike did volunteer without being told to spell this word, "c-o-m-p then signed "put" and then fingerspelled e-r." Mike then checked the spelling by looking at Hallie's journal to be sure it was spelled correctly. Bruce waved for the facilitator's attention and then immediately signed his journal entry to the facilitator. He completed sharing this before the post interview started.
Student's reaction	No one paid attention to the facilitator when the facilitator flashed the light to indicate it was time for journal entry. The light was again flashed. Mike appeared unhappy when it was time for journal. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing journal by signing to them, "What you do today? What you do with group?" Mike was the only person who did not start journal until third time the facilitator talked with him. The facilitator made a deal with him to begin the journal since he was very persistent to continue his LEGO activity task. The facilitator was interrupted by Hallie and then resumed to deal with Mike's behavior. She noticed that Mike was watching David doing his LEGO activity. David had already started his journal writing and Mike did not. The facilitator encouraged Mike to begin writing. Shortly after Mike began his journal entry, the facilitator noticed David was watching Mike doing his LEGO activity task again. David shared his experience with Mike by pushing the turn direction button. The facilitator was busy watching Mary signing her journal entry and assisting other students by spelling words. Mike continued his LEGO activity task while the facilitator checked David's journal entry. After checking David's entry, the facilitator took Mike's model car away and put it a little farther from him on the computer table. The facilitator tried to encourage Mike to complete the journal and informed him of the second question. Mike chose not to look at the facilitator for the second question. However, he did write in his journal. A few minutes later, Mike interrupted by asking the facilitator about LEGO LOGO activity on the computer as Mary asked the facilitator for the spelling of a word. Shortly after starting the journal writing, Hallie waved for the facilitator's attention, but the facilitator was busy dealing with Mike. A few minutes later, the facilitator signed to Hallie, "What?" and Hallie paused a long time. So, the facilitator suggested for her to write in her journal.

Appendix F
Behaviors of Students from all Sessions

Behaviors Observed in Sessions

Behaviors Related to Attentiveness/Task Orientation

I. Student(s) appeared attentive/inattentive during facilitator/ peer explanation

Session 1: (Mary absent)

Attentive

All participants got up from the chair as per the facilitator's instruction.

All were attentive when the facilitator gave different LOGO commands for the floor exercise.

Only Hallie paid attention as the facilitator informed them to get the laminated, orange sheet out of the folder.

Both Hallie and Bruce answered the facilitator's question when she inquired about the shape that the LOGO turtle drew.

The facilitator again tapped the table when it was time for journal and all except Mike did respond to it.

Inattentive

The facilitator had a hard time getting all participants' attention as she began instructing about the LOGO commands. The participants were either looking at what was inside the folder or playing with white board marker writing on the portable white board. The light switch was at the other end of the room- approx 15 feet from where the facilitator stood. The facilitator was aware that they were excited and informed them that she understood they were excited. Yet, there was limited time and we needed to move on – so please pay attention.

David wasn't paying attention during the explanation of first LOGO command, FORWARD.

With exception of Hallie, the rest of participants did not pay attention to the facilitator as she instructed them to get the laminated, orange sheet out of the folder.

The facilitator noticed Hallie was not very attentive during explanation of the examples on the laminated, orange sheet. So she bent down on her knees for Hallie to see much better.

At the computer activity, the facilitator had to tap the table to get the attention of the participants. It was hard to get Mike's attention, because he was at a different computer table. David, since he sat beside Mike, got Mike's attention for the facilitator.

Both Mike and David were not attentive when the facilitator asked the question about what shape the LOGO turtle drew.

David had to get Mike's attention by tapping his shoulder, waving, and ending up turning Mike's chin to watch the facilitator announce that it was time for journal.

Mike was still so focused at his computer task and ignored the facilitator.

Session 2:

Attentive

Hallie, Bruce, David, Mary, and Mike appeared to understand the schedule written on board.

As the facilitator got the participants' attention to gather together, all did except Hallie. Bruce signed to the facilitator "she slow." Hallie noticed Bruce signing about her. Bruce continued signing, "three-of-us (Bruce, Mike, David) in public school she not" and then realized Hallie was watching him. Hallie turned her head away and Bruce tapped her shoulder. He signed, "what?" and appeared to pretend he wasn't talking about her. Shortly afterwards, he waved for the facilitator's attention and signed, "three-of-us." But, the facilitator was busy signing to Mike.

Hallie, Bruce, and David watched the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began teaching even before the facilitator finished explaining.

Bruce raised his hand as the facilitator asked who would volunteer start to teach LOGO commands to Mary. Both Bruce and Mike raised their hands. Mike was adamant that he teach the commands himself. The facilitator suggested they take turns.

Hallie attended during explanation of the paper assignment.

Hallie attended to Bruce as he explained paper assignment #1.

Hallie raised her hand in response to facilitator request for a volunteer.

Hallie moved her body in the wrong direction. Mike and David corrected Hallie. Hallie started to explain LEFT to Mary, but David and Mike interrupted since the command had been explained.

Hallie looked at the clock on the wall when the facilitator announced that five minutes remained before it was time for journal writing.

Hallie looked at the white board as the facilitator explained the two questions for journal entry.

As Bruce put chap stick on his lips, he appeared to watch as the facilitator explained what to do on the paper assignment #1.

Bruce, along the group, looked at the white board where the two questions were written during the facilitator's explanation. Bruce waited to write his journal entry #2 and checked what Mike was typing. Then, he checked to see if the facilitator finished writing on the white board. He read the questions and got his log book out of his folder.

Bruce, along the boys, responded to the light blinking that indicated the facilitator wanted to explain two questions on the board.

Bruce, along the group, responded to the light blinking which indicated it was time to end the session. Bruce paid attention to the facilitator as she gave instruction for the next day's session. Bruce raised his hand and signed, "me out there all-the-way out-there" as he pointed at the window. The facilitator signed, "oh no here not out-there no no." It indicated that the session will be in this same room for the next day.

After the facilitator discussed with group as what to do if they didn't understand, Mike signed, "help." The facilitator then signed, "Help, help individually understand discuss discuss o-k? Now we stop." Hallie emphatically signed, "Me!" indicating that it was her turn. David then signed, "me!" Mike grabbed his folder to move from where he was and moved David's log book. David patiently took his laminated orange paper and rearranged his paper assignment #1. Hallie tapped Mike's shoulder, but he ignored her. Mike

immediately explained to Mary as apparently, he did not want other participants to take over. David, Bruce, and Hallie watched them.

David, along the other boys, responded to the light blinking at the time when the facilitator wanted to explain two questions on the board. He then got his log book out of the folder.

David, along the group, responded to the light blinking which indicated it was time to end the session. David paid attention to the facilitator as she gave instruction for the next day's session. David nodded in agreement that he will come to the computer room the next day by himself.

While the facilitator was explaining about journal entry #2, David picked up his paper assignment #2. Mike went ahead to get his log book. The facilitator had to tap their shoulders and sign, "wait not finish explaining." Then, all were paying attention to the facilitator.

The facilitator indicated concern, because she feared that Mike might have saved the current file under the same filename that he used earlier. The facilitator discovered that failed to replace the previous file. The facilitator informed Mike that he was not to save the same under the same filename. He said, "o-k." The facilitator asked him to leave it alone please and he obeyed with no outward sign of frustration.

Hallie resumed to her position after her explanation of the LOGO command to Mary. Mike and Bruce looked at the facilitator. The rest of group then looked at her. David informed Mary to move, but Mary did not understand. Therefore, the facilitator explained Mary to move for videocamera purpose. She then relocated.

Mary had been watching all these actions since the facilitator began to explain paper assignment #1. I told Mary not to worry about this assignment and just watch what the group was doing. David signed, "what to-do" and checked on Mike's paper assignment #1. Mary watched him and looked at his assignment. She continued to watch him get his laminated, orange paper out of his folder. Then, she looked at what Bruce and Hallie were doing. Then, she checked David's paper. She turned her head around and checked the videocamera and stared at it for few seconds. She turned her head and checked on her group activity. She looked at Mike to see what he was doing on his assignment. She picked up her paper assignment #1 and fanned. Then, she stared at the window and then watched Bruce as he asked the facilitator for the date three times. David informed Mary by signing, "doesn't matter" as his hand turned left. Mary watched David asking Mike if he were right. Mike's eyebrow went up though he did not pay attention to them. David spoke to Mike again and signed again, "right?" Mike checked his assignment and appeared puzzled as he pointed with his finger on his paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment. Mary watched this whole activity. Mike began to move the mouse and to keyboard while other participants watched him. Hallie appeared unhappy and was not with the group. Mike pointed to Mary and Mary nodded in agreement. Mike typed and pointed as Mary again nodded slightly. Mike realized the error on the turtle activity on the screen. David signed, "sick." Mike corrected it by typing. He signed, "Understand? Understand?" Mary slightly nodded. Mike then pointed his finger on the screen and showed how the turtle moved up on the screen. He signed, "Now RIGHT" and typed RIGHT. Bruce struggled to see the screen after Hallie moved closer to the group. Mike continued signing, typing, and explaining to Mary. He then signed, "Understand? understand?" He wanted Mary to type. He fingerspelled, "R-T R-T" and showed Mary where to type RT. Mary typed and entered the information by tapping the appropriate key. Mike explained how the turtle turned and informed Mary to type FD as he helped her type FD. Hallie tapped Mike's shoulder but he did not response to her. Mike continued assisting Mary type 50. Then, both Mike and Mary shared turns by typing as Mike assisted Mary. Mike signed, "90" and showed Mary where to type 90. Afterwards, David informed Mike it was wrong. Mike pushed his arm away and thumbed up. He explained how the turtle turned. Then, Mary typed by herself without any assistance to complete a square of LOGO commands. Mike then asked her by signing, "What is that? What is that?" as he pointed the screen. Mary responded, "square." Mike signed, "right!" After Mike assisted Mary typing the data from paper assignment #1, the facilitator signed, "good job wonderful." Mary watched what the facilitator said.

Inattentive

Mike did not wait for the facilitator to complete discussion before he began explaining to Mary.

Mike ignored Hallie when she volunteered to explain to Mary.

David ignored Hallie when she tapped his shoulder to get him to move so she could see the screen.

The facilitator was ready to explain the next task but had to wave several times to get Bruce's attention. Bruce appeared to be staring at the wall.

Mike tried to get David's attention, but David chose to pay attention to the facilitator and to the white board as well.

While the facilitator explained what to do on the paper assignment #1, David opened his folder, looked at something there, and then closed it. He then watched the facilitator.

As the facilitator was explaining the next task, Mike played with his folder. The facilitator stopped explaining and, then, waved for Mike's attention. Finally, he looked at her. She then resumed her explanation. Mike raised his right hand and Bruce raised his left hand. Mike then raised his left hand and emphatically signed, "Me! Me! Me!" Bruce continued to hold his hand up. The facilitator suggested for them to take turns. Bruce and David were still watching the facilitator explain how to teach Mary LOGO commands. Only Mike went on and began to teach even before the facilitator finished explaining.

With some persistence the facilitator got Mike's attention and explained what was needed to do the next task: paper assignment #2.

While the facilitator explained about journal entry #2, David picked up his paper assignment #2. Mike went ahead to get his log book. The facilitator had to tap their shoulders and to sign, "wait not finish explaining." At this point, all others were paying attention to the facilitator.

Since the facilitator could not get Mike's attention, David volunteered to brush his laminated orange paper on Mike's arm. Mike's facial expression was unpleasant as he signed, "WHAT!" He decided to ignore David and went on an unnecessary task explaining to Mary. The facilitator then lost all participants' attention. She had to tap the table little harder to get Mike's attention and then rest of participants quickly responded to this system.

The facilitator noticed Mary wasn't doing anything and asked her to come around so she can assist her to start her journal entry #2. She explained the first question to Mary.
(Mary was out of sight for this rest of session videotape.)

Session 3:

Attentive

All participants appeared attentive as the facilitator explained the day's session agenda and again for the journal entry explanation.

Inattentive

Mike looked at the LEGO picture booklet instead of listening to other peers' inquiries at the beginning of the session.

Session 4:

Attentive

The facilitator suggested to Hallie that if she needs help to build the LEGO model car she could ask the boys. The facilitator explained that boys were busy building their model cars on their own, but she was right that they could help her if she asked.

The facilitator tapped Bruce's shoulder and signed, "Can I see your car?" (after the facilitator explained to Mary and Hallie about using these two LEGO pieces according to the picture). Bruce gave his car to the facilitator and the facilitator showed him how to put the rubber on the wheel.

The facilitator tapped on Bruce's knee to ask him to get David's attention. Bruce tapped on David's shoes and got his attention. And then David waved for the facilitator's attention.

The facilitator waved for the group's attention to watch David's action. The facilitator asked Bruce to get Mary's attention. Finally, the facilitator informed them to watch David's moving car.

The facilitator waved for Bruce's attention and signed, "d-o you mind get (*getting*) log books from table?" The facilitator then informed him to pass the books to the other group members.

The facilitator signed to Bruce, "put-it on-floor it's-easier." Bruce responded to the facilitator that it was Mike's and he was not cooperating. The facilitator again signed, "me-as-a-teacher do what me (*I*) say." The message was for Bruce to put the log book there on the floor even though Mike refused to cooperate. Bruce then gave the facilitator his book and pencil.

The facilitator tapped Bruce's knee to ask him to get David's attention. Bruce tapped on David's shoes and got his attention. And then David waved for the facilitator's attention. The facilitator asked him by signing, "Alright? Need help? Or doing fine?" He nodded slightly. Bruce interrupted the facilitator for a second, but she ignored him. The facilitator signed, "Hey" as she waved for David's attention and continued signing, "do that last fix car first fix that later car first." David signed, "not this box?" The facilitator had to deal with Bruce's demand for attention. Then, the facilitator waved for David's attention while he was working on the box. She waved for his attention again and signed, "understand me?" David slightly nodded in agreement. The facilitator signed, "finish fix car?" He replied by signing, "yes." The facilitator then signed, "oh ok" and finally realized that David was done fixing the car and was now figuring out with battery box.

The facilitator waved for the group's attention to watch David's action. The facilitator asked Bruce to get Mary's attention. Finally, the facilitator informed them to watch David's moving car. Mike watched.

Inattentive

Hallie was told by the facilitator not to lay back while Mary was finding LEGO pieces. Hallie appeared to dislike the comment. Then, Hallie put unnecessary LEGO pieces into the big, plastic blue box instead of helping Mary.

Mary began helping Hallie, but Hallie turned her head around in the direction of where the boys were working.

Mary tapped Hallie's hand several times to get her attention. Finally, Hallie attended to Mary and was asked to find the certain LEGO piece that Mary pointed to in the picture.

Hallie quickly responded to the facilitator when the facilitator crawled and got Hallie's attention by pulling her cardigan while she was organizing pieces into the blue box. The facilitator informed Hallie what to write in the journal by signing, "Write what you do-do today." and pointed to her log book. Hallie quickly replied by signing, "fix that" as she pointed the blue box. The facilitator informed Hallie to write in her log book.

While Hallie was organizing pieces into the blue box, the facilitator tapped Hallie's shoulder to inquire if her journal writing had been finished. Hallie paused and the facilitator again asked the same question. Hallie's reply was that she was not done.

(Mike's inattention) The facilitator signed to Bruce, "put-it on-floor it's-easier." Bruce responded to the facilitator that it was Mike's and he was not cooperating. The facilitator again signed, "me-as-a-teacher do what me (*I*) say." The message was for Bruce to put the log book there on the floor even though Mike refused to cooperate. Bruce then gave the facilitator his book and pencil.

Session 5:

Attentive

At the beginning of this session, Hallie, Mary, Bruce, Mike, and David replied that they understood the schedule for the last day of LEGO LOGO sessions explained on the white board. (Though the facilitator continued and stated that it was very important that each group member cooperate with the others, not ignore them, and assist others as well, Hallie was silent and did not indicate if she understood. She could have been inattentive.)

The facilitator informed David, Hallie, and Mary that their work was enough and it was time for a group discussion. Hallie joined this group and listened the facilitator who told them what to do next. Hallie and the others were asked if all assignments were to be done as same or different. Hallie, along the group, replied in signing, "different."

Hallie checked her answers on the board after the explanation from the facilitator about how to discuss and to agree on right or wrong answers.

After the light blinking for all group members' attention, Hallie did not respond to this system and continued on writing her assignment on the board. The facilitator asked Bruce to get Hallie's attention.

Hallie discussed with Mary, after the explanation by the facilitator, about agreeing and picking which one on the board to enter data into the computer.

Hallie nodded negatively after the facilitator asked if she can see the screen. The facilitator asked her what she would do if she could not see. Mary raised her hand and immediately signed, "I can't see." Then, Hallie signed, "I can't see." The facilitator informed them to move. Hallie was assisted by the facilitator to be placed between Mike and David so she could be much closer to the screen.

The facilitator asked the group what was on the screen and all replied, "square."

After correction of the error on the screen by Mike and David, the facilitator asked the group if that was opposite. There was no response from the group. The facilitator asked the group a different question, "Why think Bruce is right? Why it's opposite?" Only David replied.

Bruce appeared to be the only group member who understood the facilitator's instruction about how, as a group, to discuss and to agree with right or wrong answers of LOGO command assignment on the white board. Bruce displayed his understanding when he stood back and watched what his group was doing. He then tapped Mike's shoulder and signed, "I think you're right" indicating that Bruce agreed with Mike's answer on the board. Both Bruce and Mike exchanged conversations about their answers, especially Mike's. They were comparing their answers against each other and Bruce then fixed his error.

After the light blinked for all group members' attention, Bruce did respond to this system. The explanation was given by the facilitator about how to pick which answer from the board would be typed into the computer. Bruce picked Mike's answer to be tried first. The facilitator asked the group if they reached their agreement yet. Hallie and Mary were exchanging their opinions while David appeared unsure and was trying to decide between Mike's answer and his which data to enter into the computer. Bruce convinced

David that Mike's answer is right. Both Bruce and Mike explained David by virtually drawing the square according Mike's LOGO command answer.

The facilitator informed the group to begin entering the answer into the computer. Bruce left with David and Mike to go to the computer table before the facilitator finished explaining. Bruce was third person positioned after Mike and David. He was positioned in the middle of the computer table after the girls joined.

The facilitator asked the group what was on the screen and they all replied, "square." Bruce explained each LOGO command of square as the facilitator walked on the floor while he virtually drew a square according the LOGO commands from the screen that Mike entered.

David listened the facilitator as to what to do next and was asked if all assignments on the board were done the same or different. David, along the group, replied in sign, "different."

After the facilitator's instruction about how to discuss and to agree with right or wrong answers of LOGO command assignment on the white board as a group, David went up to the board to write more LOGO commands.

Inattentive

Hallie and Mary stayed at the board even though the facilitator informed them to go ahead enter data into the computer. The boys went ahead to the computer table. Hallie began to erase her answer, but the facilitator told her not to.

No one appeared to pay attention to the facilitator as the facilitator flashed the light to indicate it was time for journal entry. The light was again flashed. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing in the journals by signing to them, "What you do today? What you do with group?" (Journal assignment was signed only, not written on the board.)

After the light was blinked for all group members' attention, David did not respond to this system.

After explaining the reason why Mike could not continue to type during a group discussion of squares being opposite, David explained why the two squares are mirror-like. The facilitator signed, "Yes" and then "same square or different?" by inquiring the group.

Due to activity in the hall, Mike informed the facilitator that the schedule had changed. The facilitator replied that he should not worry about that and just follow the schedule on the board.

Before trying to collect the pencil from Mike, Hallie asked Mike if he had finished using the pencil by signing, "finish?" Mike was running his model car and ignored her.

Mary continued her task by testing the model after the facilitator told her it was time to start writing in the journal.

II. Student(s) began/did not begin task in an appropriate manner

Session 1: (Mary absent)

All did floor exercise as per facilitator's instruction.

All except Hallie did respond to the question asking of the facilitator inquiring where the turtle's head was. The facilitator guided Hallie.

All did response to the facilitator's exercise to demonstrate which LOGO turtle would go or turn.

All already began the task at the computer activity with no resistance.

Only Mike went ahead typing before the facilitator could instruct the exact steps to complete.

Hallie did her computer task much better after switching seats with Bruce so she could see the facilitator better.

Mike again typed more commands and made a mistake before the facilitator gave instructions on the next LOGO command.

All worked on their own after the facilitator finished explaining.

Session 2:

Hallie began writing journal # 1 as instructed.

Mike began explaining to Mary before the facilitator completed explanation and group members made decision about who would be first to explain.

Hallie began to write commands after Bruce's explanation.

After Mike asked who was next to explain another LOGO command to Mary, Bruce immediately signed, "FORWARD means F-T" and shook his head indicating no. He then fingerspelled, "F" as Mike interrupted him that he already taken care of it and signed, and "finish tell her." Bruce signed, "sorry anyway." He continued signing, "you will like" and moved both his hands maze-like. Mike again interrupted him and signed, "if prefer back." Bruce checked the white board and signed, "back" He continued signing, "anyway B-K means" as he moved his body backward and fingerspelled B-K simultaneously. He then signed, "for example b-k b-k", checked the board, and resumed signing, "50 means" as his finger drawing back 50 'steps'. He completed his task by signing, "well" and tapped David's shoulder to inform him it was his turn to explain to Mary as he signed, "explain her."

After Bruce informed David that it was his turn to explain another LOGO command to Mary, David began signing, "LEFT LEFT", checked with his group, and then fingerspelled, "L...." as he moved it left side. He then signed, "LEFT LEFT LEFT" He checked the white board and signed, "LEFT L-T." He appeared puzzled and asked Mike if he was on the right track. David then was assured and continued signing, "L-T L-T LEFT." David again appeared puzzled and looked at Mike as he asked him about number. Mike signed, "your choice." David resumed his teaching, "90" and moved both hand turning left at 90 degrees.

Bruce and David began writing in the journal as instructed as soon as they found enough space to have elbow room from other participants to open their log books.

Bruce was the second person to get a marker to begin paper assignment #1.

David was the third person to get the marker to begin his paper assignment #1.

After inquiry to the facilitator about what had been said, David began his paper assignment #2.

After the facilitator assisted Hallie in copying the two questions from the board in the log boo and clarified the first question, Hallie wrote journal entry # 2.

After reading the questions on the white board, Bruce began writing his journal entry #2 as soon as he got his log book out of his folder.

After the explanation from the facilitator about two questions on the white board, Bruce copied the questions into his journal for entry #2.

David began copying the questions from the white board that the facilitator wrote into his log book while the facilitator was still explaining.

David was already on the floor doing his task by building his model car.

Mike began to move the mouse and to key into the computer while other participants watched him. Hallie appeared unhappy and was not with the group. Mike pointed to Mary and Mary nodded in agreement. Mike typed and pointed to which Mary again nodded slightly. Mike realized an error on the turtle activity on the screen. David signed, "sick." Mike corrected it by typing. He signed, "Understand? Understand?" Mary slightly nodded. Mike then pointed his finger on the screen and showed how the turtle moved up on the screen. He signed, "Now RIGHT," and typed RIGHT. Bruce struggled to see the screen after Hallie moved closer to the group. Mike continued signing, typing, and explaining to Mary. He then signed, "Understand? Understand?" He wanted Mary to type. He fingerspelled, "R-T R-T" and showed Mary where to type RT. Mary typed and entered the correct command. Mike explained how the turtle turned and informed Mary to type FD as he helped her type FD. Hallie tapped Mike's shoulder but he did not respond to her. Mike continued assisting Mary to type 50. Then, both Mike and Mary shared turns by typing as Mike assisted Mary. Mike signed, "90" and showed Mary where to type 90. Afterwards David informed Mike it was wrong. Mike pushed David's arm away and thumbed up. He explained how the turtle turned. Then, Mary finally typed by herself without any assistance to complete a square of LOGO commands. Mike then asked her by signing, "What is that? What is that?" as he pointed the screen. Mary responded, "square." Mike signed, "right!"

Mary smiled at the facilitator and signed to her, "me absent me date." She did sign date even though she meant doctor.

After the facilitator asked Mary to write in her journal, Mary signed, "I will (was)" and then began writing.

Mary got her log book after the facilitator's explanation and appeared not sure what to do. She played with her log book cover. She turned her head around and smiled at the volunteer videorecorder. Then, she read Mike's journal entry #2 while she played with her log book cover.

Inappropriate

Mike began writing in the journal before the facilitator finished explaining so the facilitator informed him to wait. He crossed the facilitator's name out in his log book. Then, he resumed writing at the proper time with other participants.

Mike began explaining the LOGO command, FORWARD, to Mary even though he did not inform the group that he would start his turn first. Mike signed, "FORWARD," then pointed on the white board, and fingerspelled, "F-O-R." He pointed the word, FORWARD on the white board. He signed, "know that?" and checked for Mary's understanding. Mary slightly nodded in agreement. He then explained what FORWARD meant by moving both of his hands together... and signed, "FORWARD FORWARD turtle move FORWARD." He then checked for Mary's understanding and waited for her reply. Mary gave no response. He signed, "well", checked with the facilitator as what to do next, and signed, "who next." After Bruce informed David that it was his turn to explain another LOGO command to Mary, David began signing, "LEFT LEFT", checked with the group, and then fingerspelled, "L...." as he moved it left side. He then signed, "LEFT LEFT LEFT" He checked the white board and signed, "LEFT L-T." He appeared puzzled and asked Mike if he were on the right track. David was assured and continued signing, "L-T L-T LEFT." David again appeared puzzled and looked at Mike as he asked him about number. Mike signed, "your choice." David resumed his teaching, "90" and moved both hand turning left at 90 degrees.

Session 3:

All participants began the LEGO building tasks right after the facilitator's agenda discussion.

All participants started writing in their journals with no resistance after the explanation.

Session 4:

Bruce was on the floor doing his task by building his model car.

When she should have been working with group members, Hallie was organizing unnecessary LEGO pieces in the large blue box. Mary tapped her and asked her to work together on the car. Hallie told her to move closed. Mary and Hallie switched places.

Hallie began writing in her journal after the facilitator told her to write her reply to the questions in her log book.

After the facilitator informed Bruce the question for his journal, he began to write.

Mike was already on the floor doing his task by continuing to work on model car that he built the day before.

Mike began his journal entry after looking at Bruce's journal.

Shortly after Mary found the LEGO pieces, she needed to get some more. She got up from the floor and grabbed the blue LEGO box from the computer table to be put on the floor.

Mary began opening her log book and was ready. Yet, she had to wait for the facilitator. After dealing the matter with Mike, the facilitator checked on Mary, turned to the correct page in the log book, and showed Mary that it was where she should begin writing. The facilitator signed the question for the journal entry, "What you do today? Do?" Mary paused then got back to begin her journal writing.

Session 5:

After a brief explanation of the white board assignment by the facilitator in a group gathering and after watching three boys began their tasks, Hallie was the fourth person to come forward to begin the task of writing LOGO commands for a square.

Hallie began to carry the log books without being told or asking the facilitator. She was passing the books, then pencils, out to individuals.

Hallie began her journal entry for the two questions that were signed by the facilitator. (The questions were not written on the board.)

After exchanging conversation with Mike, Hallie went ahead to collect pencils to be put away log books.

After a brief explanation of the white board assignment by the facilitator in a group discussion, Bruce was the first person to come forward to the white board to begin the task of writing LOGO commands for a square. He started writing the command, "FORWARD."

After discussing about his answer with Mike, Bruce fixed his error on the board.

Bruce was the first person to start writing his journal entry. He continued writing until he raised his hand and interrupted the facilitator. He did not appear to notice that Mary was signing her journal entry to the

facilitator. Bruce immediately signed asking for the spelling of “board.” The facilitator spelled the word, “board.” Bruce resumed his writing.

After a brief explanation of the white board assignment by the facilitator in a group discussion, David was the third person to come forward to the white board. He watched Bruce and Mike write their answers before he got the marker to begin the task writing LOGO commands of square.

The facilitator explained how to pick which answer from the board to type into the computer. Bruce picked Mike’s answer to be tried first. The facilitator asked the group if they reached agreement yet. Hallie and Mary were exchanging their opinions while David appeared unsure about entering data into the computer from Mike’s answer and his. Bruce convinced David that Mike’s answer was right. Both Bruce and Mike explained to David by virtually drawing the square according Mike’s LOGO command answer. David checked Mike’s answer step by step by all himself and finally agreed with Bruce that the answer is right.

David was third person to start his journal writing. Shortly after he began this task, he went back testing his model car again and then resumed his journal writing. Then, he watched what Mike was doing with his model car and pushed the direction button with Mike.

After a brief explanation about the LOGO command assignment on the white board by the facilitator, Mike was the second person coming forward from the group to the white board.

After a brief explanation of the white board assignment by the facilitator in a group gathering, Mary was the last person coming forward to the white board to begin the task writing LOGO commands of square after watching three boys begin their tasks.

Mary started writing in her journal right after Bruce did Mary started writing in her journal right after Bruce did.

III. Student(s) stayed on task

Session 1: (Mary absent)

All stayed on task during the whole session except Mike who went ahead several times. As Mike worked on a task, he was very focused: floor exercise, laminated orange sheet figuring out with turtle’s degree sheet, and computer activities.

Session 2:

Hallie continued to write LOGO commands on paper assignment #1.

Hallie continued writing in her journal as rest of group explained LOGO commands to Mary.

Bruce checked his journal after scanning his surroundings in the room.

Bruce continued writing in his journal. Then, he read his journal. He resumed his journal writing.

Bruce signed to himself while waiting for Hallie to complete her journal entry #1 task. He also fingerspelled to himself.

Bruce continued to write LOGO commands on the paper assignment #1.

After the facilitator’s discussion of the answer with group, Bruce checked his paper assignment #1.

Bruce kneeled on the floor to continue his journal writing. Then, he erased and resumed his writing.

Bruce paused and appeared to think. Then, he resumed his journal writing.

Bruce continued working paper assignment #2 task.

David continued writing in his journal while the facilitator was busy assisting Mary on her journal entry #1.

David resumed his journal writing after trying to get the facilitator's attention.

David continued writing his journal #1 entry and then checked Mike's journal.

After David read Mike's journal, he checked his journal and had a frustrated look on his face.

David continued explaining LOGO command, LEFT to Mary. He fingerspelled, "L-T." He typed on the keyboard and signed, "your choice doesn't matter." (This was in regard to the number to be used.)

David continued to write LOGO commands on the paper assignment #1 and then checked Mike's. He opened his folder and got the laminated orange paper with LOGO commands. Then, he resumed his task. After writing LOGO commands on his paper assignment #1, he put the orange paper back in his folder. Then, he resumed working on assignment #1. He again took the orange paper out of his folder and compared it against his work on his paper assignment #1. He then continued working on #1. He signed, "doesn't matter." (He appeared to be responding to Mary.) David then asked Mike by signing, "right?" Mike's eyebrow went up as he had not been paying attention to them. David explained to Mike again and signed again, "right?" Mike checked his assignment and appeared puzzled as he pointed with his finger to something on the paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment.

David continued writing on his paper assignment #2 and then looked at Mike's assignment.

Mike continued writing on his paper assignment #1 and quickly glanced at David's assignment. He resumed working on his task.

David continued to write LOGO commands on the paper assignment #1 and then checked Mike's. He opened his folder and got the laminated orange paper with LOGO commands. Then, he resumed his task. After writing LOGO commands on his paper assignment #1, he put the orange paper back in his folder. Then, he resumed working on assignment #1. He again took the orange paper out of his folder so that he could compare it against his work on paper assignment #1. He then continued working on it. He signed, "doesn't matter." (appeared to be informing Mary) David then asked Mike by signing, "right?" Mike's eyebrow went up. David explained to Mike again and signed again, "right?" Mike checked his assignment and appeared puzzled as he pointed with his finger on his paper. David picked up his pencil and appeared to think. He signed, "oh yes 90" and corrected his assignment.

After the spelling the words, "not here," Mary continued writing her journal and signed, "we are not", and resumed writing.

Mary wrote the word, "doctor" with assistance of the facilitator, who spelled each letter very slowly. Mary continued writing her journal.

Mary looked at the screen with Mike and David.

Session 3:

With only minor interruptions, all participants were busy dealing with tasks.

Session 4:

After some encouragement to continue the task, Hallie resumed gathering the sorted LEGO pieces from a small box with Mary and the facilitator. Later, without the facilitator's assistance, both Mary and Hallie continued to sort out pieces needed to build the car.

After the suggestion made by the facilitator, Hallie and Mary put the LEGO pieces in a smaller box to avoid the confusion.

Hallie and Mary continued to sort out the LEGO pieces.

Hallie and Mary teamed up to begin building the model car.

Hallie resumed her task after getting the facilitator's attention for Mary.

Hallie and Mary are teamed up to begin building the model car.

Mary and Hallie stayed on task finding certain LEGO pieces to build a car according to the picture.

Bruce continued constructing his model car.

After checking with the girls, Bruce resumed his task by continuing to build his car.

Bruce continued getting more pieces from the blue LEGO box. He was still building his car.

After showing off the wheel to the facilitator, Bruce put its wheel to his model car. Then, he immediately tested his car which ran on the floor. The facilitator tapped his shoulder and signed, "Finally! Good job!" The facilitator informed Bruce that she wanted to hold his car and wanted to put it away for safely. After the car was put away, the facilitator asked Bruce by signing, "finish what you do?" Bruce paused and then signed, "race?" The facilitator signed, "No. I meant that car finish." and Bruce interrupted and signed, "journal-writing what I do." The facilitator signed, "No. That is much later." "Now will u laid-back?" Bruce paused and appeared thinking. He nodded negatively as his head turned left to right to left meaning he will not lay back. The facilitator signed, "No? then what do you do?" Bruce paused and signed, "I-don't-know." The facilitator signed, "what group mean?" Bruce signed, "we-as-group." The facilitator signed, "Right. What group do?" Bruce then signed, "help." The facilitator then smiled. Bruce immediately asked Mike by signing, "help?" but Mike did not want any help. Bruce next asked David by signing, "help?" and David did not respond at all. The facilitator tapped Bruce's shoe, gave him a tiny hint to assist the girls, and smiled. Bruce asked Mary if she needed some help. And he moved over where the girls were. The facilitator waved for Bruce's attention and immediately decided to stay out by signing, "me-hand-off." Bruce went ahead to help fix Mary's stuff while Hallie was looking for LEGO pieces.

Both Bruce and Mary were still on task while Mary investigated the picture on the floor as Bruce tried to fix the model as shown in the picture.

Bruce continued writing his journal while the facilitator dealt with issues with Hallie about journal entry.

After watching Mary sign her journal entry, Bruce resumed his journal writing.

Bruce was very focused writing his journal while the facilitator dealt the videocamera position with David.

Bruce was still writing even after David left.

After the facilitator tapped Hallie's shoulder and inquired if she was done with her journal task, Bruce signed, "finish." He put his log book and pencil away on the computer table.

David continued fixing his model car and then got up getting the motorized interface box from the table. He plugged the wire into the interface box.

After watching the conversation between Bruce and Mike, David resumed his task by testing his car with the interface box.

David continued testing with his car.

David hooked up his car with motorized box. He continued figuring out how to plug the wires.

David continued working and figuring out how to make his car run by using the motorized battery box.

David fixed his motorized car and pushed the direction button. It FINALLY moved!! David held his hands up as he said, "yea!" The facilitator cheered with him and waved for the rest of group's attention. She had to tell Bruce to get Mary's attention and then informed them to watch David's car moving. David explained, "add one more" and then showed his moving car. It went forward, backward, forward, another forward. He then looked at the facilitator and explained something to her. He also asked her to get one more plugged wire. The facilitator got it and gave it to David. David tested by adding another plug into the direction box. He continued his task by testing it with different directions by pushing the buttons. David tapped the facilitator's shoulder to show his car turning. Finally, his car was turned into the directions. It was first turned left then right. The facilitator signed, "Congratulations! Good Job!" and asked him if he has done that before. David paused and still gave no response. The facilitator then signed, "first time?" David slightly nodded in agreement and the facilitator fingerspelled, "o-k." David then signed, "No. long time ago." David watched the conversation exchange between the facilitator and Bruce. The facilitator tapped David's shoulder after responding to Bruce. The facilitator signed, "you experience fix that before?" David did not response and the facilitator again signed, "or first time?" David signed, "No." The facilitator was confused momentarily and signed, "No? wait a minute doing that see that before? You don't see that before?" while her head shook negatively. David signed, "No." and the facilitator fingerspelled, "o-k." to affirm. David went back to his task by pushing different direction buttons. After informing Bruce to get pencils, the facilitator watched David's actions.

David was still on his task by pushing different directions for his car to move all directions. The facilitator informed him to stop. He agreed to stop by nodding his head. The facilitator signed, "I need you write what you do today? Understand me?" He understood me by nodding his head and got his log book and pencil. The facilitator fingerspelled, "o-k."

While the facilitator was dealing issues with Hallie and Mike, David was still writing his journal. He did tap on the floor for the facilitator's attention while she talked to Mary. David continued trying to get the facilitator's attention and the facilitator signed, "yes?" David signed, "finish?" The facilitator paused to think and signed, "you want spelling finish?" David slightly nodded his head and picked up his pencil from the floor. The facilitator fingerspelled, "F-", paused, "I", paused...

David just completed his journal writing.

Mike continued building his model car with LEGO pieces.

After talking to Bruce about needing more wheels, Mike resumed his task of fixing his car.

After trying the rubber band on the car, Mike continued working on building his car until he was satisfied with results.

Since Bruce offered his help, Mike continued working on his task with his car.

Mike was very focused on his car building task while the facilitator tried to his attention by tapping on the floor for four times.

Mike continued working on his car even though that was not the assigned task for that time.

While the facilitator was spelling words for the rest of group, Mike continued his car model task.

After checking Bruce's journal, Mike continued writing in his journal.

In between writing in his journal, Mike resumed his car model task.

After closing his log book, Mike resumed his car model task again. The facilitator walked over where Mike was and stood there watching him. He finally got up and left. He was the last person leaving for that session.

After the suggestion made by the facilitator, Hallie and Mary put the LEGO pieces in a smaller box to avoid the confusion.

Session 5:

Hallie continued writing her LOGO commands on the board.

Hallie resumed her task after Mary asked her if she remembered something.

After erasure, Hallie continued to complete her task.

After several verbal exchanges between Hallie and Mary, Hallie resumed trying to complete her assignment.

After long pause with the facilitator, she resumed her journal writing.

While the facilitator was busy dealing with others, Hallie continued her writing.

After showing her journal to the facilitator, Hallie resumed her journal writing.

Bruce resumed his task after checking the answers from David and Mike.

After Bruce's erasure, he continued adding more commands. He then paused and appeared thinking before he again continued to add some more commands.

Bruce continued his task by adding LEGO pieces to his model car and fixing it to run. He also continued getting more LEGO pieces for third time.

David continued writing LOGO commands on the white board while Hallie and Mary watched him.

David resumed his task of writing LOGO commands on the white board after checking the answers from Bruce.

David continued writing LOGO commands of square while Mary and Hallie exchanged information about LOGO commands.

After checking Bruce's answer on the board, David resumed his task by writing more LOGO commands.

David continued writing LOGO commands of square while Mike informed the facilitator that his task on writing LOGO commands of square was done.

David still worked on writing more LOGO commands of square though he paused and appeared to think several times. Then, David put the marker down and used his finger virtually drawing on the board as he double-checked his answers.

David continued writing his LOGO commands on the board after the facilitator's explanation of how to discuss and to agree with right or wrong answers of LOGO command assignment on the white board as a group.

Mary continued on her task by trying different direction buttons for next few minutes. Then, Mary fixed the model and gave it a run. Mary and David then exchanged conversation.

Mary resumed her task after asking the facilitator about the turn direction and continued testing the model car with David.

Both Mary and David shared the task together by trying different direction buttons for David's model car. Mary got the LEGO piece out by using her teeth to take it out. After David completed his journal entry, he helped Mary resume fixing the LEGO pieces on David's car. Mary got more LEGO pieces from the floor.

Mike continued writing LOGO commands on the white board while Hallie and Mary watched him.

Mike paused for a while and appeared to think what LOGO command to write next. Then, he wrote it.

Mike continued writing LOGO commands of square while Bruce looked at Mike's answer.

Mike continued typing his answers from the board while the facilitator discussed the better placement with the girls.

Mike was still typing the LEFT angle square while others were watching him. David tried to type to fix the error but Mike wouldn't allow him to do that.

After the conversation about LOGO commands between Mike and Hallie, Mike appeared to think before he resumed his task writing more LOGO commands on the board.

Mike continued on his task by trying different direction buttons for a few minutes. After helping Mary with the spelling of the word "computer," Mike resumed his journal writing.

Mary continued on her task by trying different direction buttons for next few minutes. Then, Mary fixed the model and gave it a run. Mary and David then exchanged conversation.

Mary resumed her task after asking the facilitator about the turn direction and continued testing the model car with David.

Mary continued writing in her journal until she sought the facilitator's attention to share her journal.

Mary resumed the previous task after putting her log book away.

Mary continued the same task with David after David paused from making his journal entry.

Both Mary and David shared the task by trying different direction buttons of David's model car. Mary took the LEGO piece out by using her teeth. After David completed his journal entry, he helped Mary to resume fixing the LEGO pieces on David's car. Mary got more LEGO pieces from the floor.

IV. Student(s) attempted/did not attempt to complete task

Session 1: (Mary absent)

Students did complete assignments.

Session 2:

Bruce completed his journal entry #1 and signed, “finish” to the facilitator.

Bruce finished signing his journal entry #1 to the facilitator and the rest of group who happened to watch him. Only Mike did not watch and chose to read or look at his journal instead.

Bruce again signed, “finish” to the facilitator indicating that he was done with his journal entry #1.

Mike appeared to complete his journal entry #2 task. As he was about to close his log book, he noticed something on the screen. He typed and signed, “finish” as he indicated for the computer stop acting up. The facilitator informed Mike to please leave the computer alone. He stopped and showed little expression as David watched the exchange. Mike returned to writing his journal entry #2 by picking up his pencil.

As Mike was ready to put his paper assignment in the folder, he stopped and wrote something on it. He put pencil down, tied his shoe, and resumed work.

Mary groomed her hair as she waited for the facilitator to spell the word, “absent.” Then, she started writing the word as the facilitator spelled it. A short time later, she patiently waited for the attention of the facilitator as the facilitator was busy spelling words for other participants. Mary requested that the facilitator again spell “absent.” Mary wrote each letter as she turned her head back and forth to see the each letter spelled by the facilitator.

After looking at the videocamera, Mary looked at her journal and signed to herself, “tomorrow for doctor” and then nodded with her shrugged shoulder. She then waved for the facilitator’s attention and waited. The facilitator was spelling for Mike. Mary tried to get the facilitator’s attention as she let her left hand go from the top of the computer. Her raise her eyebrows indicating that she wanted the attention of the facilitator right away. She then signed to the facilitator, “I was absent not here not here.” Mary had a frustrated look as the facilitator continued with another student. She fingerspelled, “n” and then looked at her journal and signed, “here” with a disappointed facial expression.

Session 3:

Bruce, Mike and David worked throughout the activity time to complete LEGO model tasks. They did not finish.

Both Mary and Hallie searched for LEGO pieces to start building LEGO model car according the picture. Hallie suggested to use the LEGO blue box, but Mary commented that blue box was messed up and confused. She preferred the LEGO individual box like the boys had.

Session 4:

Hallie went back to put other unnecessary LEGO pieces into the big blue box and let Mary and Bruce work together to build the car.

Hallie did not complete her journal writing and resumed her unnecessary organization task on the blue box.

Hallie wrote in her journal after asking the facilitator to spell the word, “thing.” The facilitator spelled “stuff” instead of “thing”. (Actually the sign for both words, stuff and thing, are the same.) Hallie wrote each letter as she looked back and forth.

After recording the spelling of the word “later,” Mike immediately closed his log book.

Mary closed her log book after the facilitator’s compliments.

After Bruce left for the day, Mary was the second person to leave the computer room and was informed to attend the Girl Scout party in the library.

Session 5:

After exchanging information with Mary and Mike, Hallie appeared to be thinking.

David came back to the computer table with more LEGO pieces that he got from the floor to continue building a better model car.

Mike was the first person to complete his LOGO command assignment and got the facilitator’s attention. Conversation was exchanged between the facilitator and Mike about his LOGO command assignment.

V. Student(s) experienced trial and error and trial and success

Session 1: (Mary absent)

Mike informed David on the floor exercise that he turned to wrong side and told him to turn to the other side.

Mike tried to fix the LOGO movement since he typed ahead of facilitator’s instruction.

Bruce checked to be sure Hallie typed correct commands and let her to do herself as per facilitator’s request.

Mike succeeded adding and typing two more LOGO commands to complete the square before the facilitator’s instruction.

Mike fixed his error to complete LOGO turtle drawing a rectangle without any help.

All had trials and errors and trials and success as they typed different LOGO commands of their choice.

Session 2:

David signed, ‘wrong’ and pointed on the screen, but Mike pulled his arm away while Mary continued typing. Both Bruce and Hallie watched this action.

After David informed that an error was on the screen while Mary typed, he continued to watch the screen with them.

Since the screen turtle went out of control, David pointed out the error on the screen as he informed Mike of the error.

After informing the facilitator of his error about using number 500 instead of 50 from the previous day’s assignment, David, with the rest of the group, watched the screen as Mike fixed the error.

While David wrote his journal entry #2, he erased something in his book.

After Mike's explanation from the laminated orange paper of LOGO command to Mary, David went back to write on his paper assignment #2. Perhaps, he was correcting it. Yes, he did erase it and then corrected it after checking Bruce's assignment and the activity on the screen.

David tapped on the computer table once and Mike responded to see what he wanted. David turned around and waited. After Mike put his assignment in the folder and closed it, David then informed Mike by signing, "yesterday I type one more 500", pointed his finger to the screen, signed, "I type 499." He showed the key to Mike and typed. He then signed, "not yet add one more." He explained to Mike the result of adding another zero: showed on the screen that it goes out of space diagonally. He continued explaining without showing on the screen and Mike signed, "I-know." Shortly after that, Mike tapped David's arm and informed him by signing, "if that way (vertically) will go around (vertically)" as he pointed on the screen vertically. David nodded in agreement and signed, 'mess up.' Both David and Mike discussed trials and errors. David continued explaining more to Mike.

After pointing out that he thought the screen was weird, David informed the facilitator by signing, "yesterday me wrong typed 500 went-out-of-space add one more 0 me wrong ...should be 50."

After attempting some runs, David finally looked at the picture to solve the problem. He then resumed making some runs. He conducted some trails without his car by pushing four different direction buttons. He then tried it with his car. He signed, "sick" as he tried to get the car to move by pushing the direction button. He finally attached the battery box with the direction button box and tried to figure out how it worked.

After Bruce began his turn to explain the LOGO command, FORWARD, Mike stopped him by pulling his arm and signed, "finish tell her" indicating that he already told her. Bruce apologized and continued to sign. Mike stopped him again and signed, "if prefer back" indicating for Bruce to sign LOGO command, BACK if he wishes to do so.

David signed, 'wrong' and pointed on the screen, but Mike pushed his arm away while Mary continued typing. Both Bruce and Hallie watched this action.

Session 3:

Mary worked with the battery box and had success. Both Hallie and Mike had trial and error, but did not have success. Mary did correct their errors by plugging wires into the boxes for them.

Session 4:

Both the facilitator and David exchanged conversation about the rod and how it works. The facilitator planned to assist David, but he wanted to do it alone. The facilitator got the picture to investigate.

David tried to make his car to be motorized. The facilitator tapped his shoulder, showed that the wire has to be plugged, and signed, "flip over, flip over." The facilitator had to help him flip over (David may not have understood the concept – flip over) and explained how the motor works.

Both the facilitator and David looked at the picture. The facilitator explained to David how it works according to the picture, helped him fix the motorized device and the rod, and then, let him complete fixing them. He paused for a while. The facilitator picked up the picture brochure and showed it to him. He investigated it.

David tried several trials with his car with motorized box.

David looked at the picture on the floor and signed, “me right! Right! Mess up.” The facilitator tapped his shoulder and signed, “what mess up?” He replied, “won’t run.” The facilitator examined his car and explained that the rod was too short and he needed a longer one. He then looked for one and got the right one. The facilitator had to crawl over to get another rod.

Shortly after Bruce resumed his task, he tried to fix something with his. He got up and went to box to get other parts.

After the facilitator questioned Mike about what to do if he were done with his task, Mike continued to test his car with the interface box several times. He appeared to be trying to figure out what the problem was.

Session 5:

After appearing to think, Hallie erased some commands on the board.

Hallie resumed her task after Mary inquired her if she remembered something. Hallie erased a command on the board.

After checking David’s and Mike’s answers and writing few commands, Bruce erased one of the commands. Then, he continued to write more commands.

After fixing his error, Bruce asked Mike about his corrected answer on the board.

Bruce fixed his error on the board after discussing with Mike.

After Mike and David fixed the error on the screen, the facilitator asked the group if that was opposite. Bruce replied, “opposite” and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group different questions by signing, “why think Bruce is right? Why it’s opposite?” Only David replied that it was opposite by using the LEFT command.

Bruce tried to figure out how to plug the wire into the battery box for his model car. He added some more LEGO pieces to his model car.

After checking what David was doing with his model car, Bruce kept trying to figure out how the battery box works.

Bruce tested his model car by running it with the battery box that has four different direction buttons.

After correction of the error on the screen by Mike and David, the facilitator asked the group if that was opposite. Bruce replied, “opposite” and virtually drew four lines of the square at the LEFT angle by 90 degrees. The facilitator asked the group the different questions by signing, “why think Bruce is right? Why it’s opposite?” Only David replied that it was opposite by using the LEFT command.

David pushed the enter key. Both Mike and David argued as who should type and fix the error. By pushing David’s hand away from the keyboard, Mike did not allow David to fix the error. David signed, “Finish!” and Mike signed, “See.” What David meant about signing finish was for the turtle going out of space on the computer screen to stop. And what Mike meant about signing, “see” was that Mike was indicating that David should not push the enter key. Mike fixed the error.

A few seconds later, he helped Mary fix the model car.

David tried several times to figure out how to plug the wire into the battery box for his model car. So did Bruce for his own model car.

After adding some more LEGO pieces to his model car, David ran a test.

David pushed the enter key. Mike and David argued about who would type and fix the error. By pushing David's hand away from the keyboard, Mike did not allow David to fix the error. David signed, "Finish!" and Mike signed, "See." By signing "finish," David meant for the turtle going out of space on the computer screen to stop. And what Mike meant about signing, "see" was that David should not push the enter key. Mike corrected the error.

Mike gave another try on his model and his model flew off accidentally hitting both Hallie's finger and Mary's arm. Hallie moved to the very end of the computer table past where Mary was. Mary did not move. Mike fixed the model car and then tested the car by pushing the turn direction button.

Mike was the first person who plugged the wire to the battery box so that his model car could run on the computer table. This gave the idea to both Bruce and David of what to do with theirs.

Mike wanted to know the real reason why it was not working properly and the facilitator signed, "L-O-G-O L-E-G-O not work don't know why I'm sorry."

Mary began to write some commands on the board and appeared unsure of what to do on the LOGO command board task. She watched her group members write commands. Then, she appeared think and decided to erase.

After appearing to think about what she wrote, Mary erased. And then, she looked at boys' assignment on the board.

After some conversation with Hallie, Mary erased some commands on the board. Then, she tapped Hallie's shoulder and asked if she remembered something about commands. Hallie nodded negatively. Mary then resumed her task.

After some discussion for clarification on commands with Hallie, Mary again erased some commands.

After Hallie's assistance, Mary erased one of LOGO command on the board.

VI. Student(s) completed/did not complete task

Session 1: (Mary absent)

All did complete their tasks on floor exercise, facilitator's exercise, and computer activities.

Session 2:

Hallie completed journal assignment.

Hallie completed explaining LOGO command to Mary.

Hallie completed paper assignment #1.

Bruce informed the facilitator that he was done with his paper assignment #2. He also double checked it.

Bruce finished signing his journal to the facilitator and looked at the clock on the wall. He informed her by signing, "Time!" as he indicated it was time to go.

After looking at Mike's journal, David closed his log book and put it in his folder. So did Mike.

David completed his journal entry #2 task by closing his log book.

After informing the facilitator that he was done with journal entry #2, David opened his folder so that he can put his log book in along with the laminated orange paper of LOGO commands. He held his paper assignment #2. Mike checked that and then, David put it in his folder and then, closed the folder.

David opened the folder to put the pencil in it. Then, he leaned on the computer table waiting. He signed, "raining" with a disapproved facial expression, then signed, "coat there", and smiled.

David informed the facilitator that he completed his journal entry #2 task by signing, "finish" and played with his log book cover while waiting.

Mike completed his journal entry #1, started to give the log book to the facilitator, but ended up putting it on the computer table.

After Bruce signed, "finish" indicating he finished signing his journal, Mike immediately raised his hand and signed, "two weeks?" He again signed, "two weeks?" He was asking the facilitator if the LEGO LOGO lasts two weeks. He again waved for the facilitator's attention and signed right away, "two weeks?"

When Mike completed his paper assignment #1 task, he asked the facilitator if he could show his assignment to the group.

Session 3:

Three of the participants, Hallie, Mary, and Mike completed their battery boxes task.

Mike, David, and Bruce did not complete their LEGO building model cars so they did not get to the battery box task.

Session 4:

David succeeded having his car motorized run and was very thrilled to show it to Mike. He signed to Mike, "Look," and showed him that it has different directions.

Hallie completed her journal at the very end session after David, Bruce, and Mary left.

The facilitator signed, "finish write (*writing*) write no more?" David stared at me. The facilitator then signed, "you don't-know?" David nodded his head negatively and signed, "short." The facilitator signed, "short. You enjoy this?" as she pointed his model car task. David pushed the direction button letting his car run. The facilitator waved for his attention and signed, "yes (*or*) no?" David signed, "yes." The facilitator signed, "yes. You like that" as she pointed back and forth on his car task and paused. She again signed, "fun?" David eagerly nodded as he agreed it was so fun. The facilitator signed, "make more?" and David again agreed that he did want to build more cars. The facilitator then checked the rest of the group.

Session 5:

While exchanging conversation with Mike, Hallie closed her log book.

David's LOGO command assignment on the board was completed and the facilitator informed him that was enough.

The facilitator checked David's journal and assisted him to write since he was playing with the model car with Mike. He then completed task.

Mike completed entering the data from the board: his answer to the assignment of LOGO command square.

Mike again completed another task by typing another square using the LEFT command.

Mike finished his journal writing and resumed his LEGO activity with his car.

Behaviors Related to Student Interaction and Reaction

I. Student(s) shared pertinent information with group members

Session 1: (Mary absent)

Bruce tapped David's shoulder telling him how the LOGO turtle went up and turned.

David and Mike exchanged conversation about what happened to the LOGO turtle when FD 500 was entered.

Hallie and Bruce exchanged conversation as to what Hallie did with her LOGO turtle.

Hallie and Bruce shared their experience and what to do next; Mike and David did the same.

David tapped Mike's shoulder and informed that he typed 2000 and the LOGO turtle went out of the loop vertically.

Hallie showed her work on the screen to Bruce and David showed his to Mike.

David tapped Mike and showed him the laminated, orange sheet and what he input into the computer.

After Mike informed David to type FORWARD, David appeared unsure.

Bruce showed his work on the screen to Hallie and informed her it's a big house.

Session 2:

Hallie explained LOGO term to Mary. Hallie moved her body in the wrong direction. Mike and David corrected Hallie. Hallie started to explain LEFT to Mary, but David and Mike interrupted since the command had been explained.

While Mike input LOGO command, RIGHT, from his paper, he explained it to Mary from the screen. Both Bruce and Hallie interacted by communicating with each other.

Hallie and Bruce shared information about assignment #1 as Mike entered information into the computer.

While waiting for Hallie to complete her journal entry #1 task, both Bruce and Mike exchanged conversation.

David checked on the screen and informed Mike by signing, “turtle head there” while Mike explained, “turtle...” to Mary.

David showed his paper assignment #2 to Mike while the facilitator wrote the questions on the white board. Mike typed and David assisted him to continue typing from his paper assignment #2. Mike was fixing the error as David assisted him by pointing on the screen. Mike continued typing, paused, appeared to think, and again typed. Mike checked to see if the facilitator was still writing the questions on the white board. Mike resumed typing. David, Bruce, and Mary watched the screen while Mike typed. Hallie was looking at the white board where the facilitator was writing.

While Bruce read what questions the facilitator wrote on the white board, both David and Mike share their thoughts and then Mike typed. (Mike had an excellent position to control the keyboard even though David wanted to type.)

David tapped on the computer table once and Mike responded to see what he wanted. David turned around and waited. After Mike put his assignment in the folder and closed it, David then informed Mike by signing, “yesterday I type one more 500”, pointed his finger to the screen, signed, “I type 499.” He showed the key to Mike and typed. He then signed, “not yet add one more.” He explained to Mike the result of adding another zero: showed on the screen that it goes out of space diagonally. He continued explaining without showing on the screen and Mike signed, “I-know.” Shortly after that, Mike tapped David’s arm and informed him by signing, “if that way (vertically) will go around (vertically)” as he pointed on the screen vertically. David nodded in agreement and signed, “mess up.” Both David and Mike discussed trials and errors. David continued explaining more to Mike.

David and Mike looked at each other’s journals.

Mike signed to David, “Can I show you something?” He spelled, “D-a-v-i-d.” Both of them looked at the screen.

Mike tapped Hallie’s shoulder while David signed, “finish” and Mike signed, “enough enough.” Hallie started to explain the LOGO command, LEFT, to Mary but David had already explained that command.

David showed his paper assignment #2 to Mike while the facilitator wrote the questions on the white board. Mike typed and David assisted him to continue typing from his paper assignment #2. Mike fixed the error as David assisted him by pointing on the screen. Mike continued typing, paused, appeared to think, and again typed. Mike checked to see if the facilitator was still writing the questions on the white board. Mike resumed typing. David, Bruce, and Mary watched the screen while Mike typed. Hallie looked at the white board where the facilitator wrote.

Mike explained about turtle movement to Mary. He then wrote on his paper assignment #2 and showed one of the LOGO commands from laminated, orange paper to Mary. With his interesting facial expression, he signed, “H-T means gone”. Mary nodded in agreement. He then signed, “S-T pops-up” with an open mouth facial expression and continued to sign. “H-T if H-T hide.” He was still signing, “S-T not hide none show” as he pointed on the screen. Mary looked at the screen. After reviewing the LOGO commands on the laminated orange paper, he tapped Mary and signed, “HOME.” Mary nodded in agreement. Mike typed HOME and showed Mary that on the screen the turtle returned home. He explained what HOME means. He then pointed on screen and asked Mary to watch the screen as he typed some commands and HOME. David interrupted Mike to tell him of the error, but Mike ignored him. Mike waved for the facilitator’s attention and tried to explain that the LOGO activity of square on the screen went the other way. He asked the facilitator to come to the screen. He signed, “square.” The rest of the group checked what was happening on the screen. The facilitator signed, “square see turtle went-out-of-space look” as she informed the group to look at the turtle on the screen. Mike signed, “see different well” and typed. Mike’s facial expression indicated “oh geez” as he put his forefinger on his mouth indicated that he did not tell the turtle follow that command Mike typed. He checked his orange paper to see what went wrong.

David tapped on the computer table once and Mike checked to determine what he wanted. David turned around and waited. After Mike put his assignment in the folder and closed it, David then informed Mike by signing, “Yesterday I type one more 500”, pointed his finger to the screen, signed, “I type 499.” He showed the key to Mike and typed. He then signed, “not yet add one more.” He explained to Mike what happened by adding another zero and showed what happened on the screen. He continued explaining without showing the screen and Mike signed, “I-know.” Shortly after that, Mike tapped David’s arm and informed him by signing, “If that way (vertically) will go around (vertically)” as he pointed on the screen vertically. David nodded in agreement and signed, ‘mess up.” Both David and Mike discussed their trials and errors. David continued explaining to Mike.

Session 3:

Mary shared information with Hallie and Mike about the directional boxes.

Session 4:

Hallie and Mary exchanged conversation about finding more of certain LEGO pieces and beginning to build the model car.

Both Hallie and Mary continued to exchange conversation while they put LEGO pieces together.

Bruce signed to Mike, “me too for that no wheel.”

After Mary showed Bruce the picture of the model she wanted to build, both Mary and Bruce exchanged conversation about putting LEGO pieces together. After a while Mary signed to Bruce, “me messed up” and Bruce fixed it. Mary again showed the picture to Bruce. Mary helped Bruce fix and then let him fix alone. Mary looked at the picture and put it on the floor for Bruce to look at it while fixing.

Mary waited for Bruce’s attention since she asked Hallie to get Bruce’s attention. Hallie used her pencil pointed Mary indicating to inform Bruce that Mary wanted him. Mary signed to Bruce, “spell name” Bruce began to spell his name, “B-”and then decided to show her his name on the log book cover for her to copy. Bruce leaned over and checked Mary’s journal to be sure that Mary spelled his name correctly. Bruce signed to Mary, “spell wrong.” Mary erased and Bruce corrected it.

David succeeded having his car motorized run and was very thrilled to show it to Mike. He signed to Mike, “Look,” and showed him that it has different directions.

After Mary showed Bruce the picture of the model she wanted to build, both Mary and Bruce exchanged conversation about putting LEGO pieces together. Afterwhile Mary signed to Bruce, “me messed up” and Bruce fixed it. Mary again showed the picture to Bruce. Mary helped Bruce fix and then let him fix alone. Mary was looking at the picture and put it on the floor for Bruce to see while fixing.

Session 5:

Hallie and Mary exchanged information on the board and then Hallie exchanged more information with Mike.

Again, Mary and Hallie conversed about their assignments on the board after Hallie made several changes. Then, Hallie helped Mary draw the line down on the board and wrote the command. They continued to exchange opinions with each other.

Since Hallie’s completed her assignment, Mary inquired about LOGO commands and Hallie explained what they were.

After Mary's erasure, Mary and Hallie again discussed about the assignment. There were some disagreements between them.

Hallie and Mary exchanged opinions. Hallie assisted Mary on her answers after Mary asked Hallie for assistance.

After explanation by the facilitator, Hallie discussed with Mary about agreeing and picking which one on the board to enter data into the computer.

After asking the group what was on the screen, Mike and Hallie exchanged information while Bruce was talking to the facilitator. Both Mike and Hallie then discussed it with the facilitator while others were watching on the screen. Mike continued to type and Hallie appeared discouraged since she wanted to type.

The facilitator informed Mike that he could stop moving his car alone and share it with the group. Mike let Hallie share the experience first and assisted her on how to do it. Hallie tried to push the button. The model which Mike held fell apart into the table. Hallie laughed about the incident and continued to laugh. After spelling word, computer, both Hallie and Mike exchanged conversation.

After Bruce's input about using the left angle square, Bruce and the facilitator exchanged comments about using the LEFT command while Mike and Hallie exchanged information. Both Mike and Hallie then discussed it with the facilitator while others were watching on the screen. Mike continued to type and Hallie appeared discouraged since she wanted to type.

The facilitator asked the group what was on the screen and they all replied, "square." Bruce explained each LOGO command of square as the facilitator walked on the floor while he virtually drew a square according to the LOGO commands from the screen that Mike entered.

After explaining the reason why Mike could not continue to type during a group discussion of squares being opposite, David explained why the two squares are mirror-like. The facilitator signed, "Yes" and then "same square or different?" by inquiring the group.

David signed, "Same!" to the facilitator when Mike completed typing the left angle square. That square was the opposite of other right angled square as they were like a mirror to each other.

David let Mary to try a run with his model car. Mary tried different directions of the model car by pushing different buttons while David watched that action. Both Mary and David exchanged conversation as David assisted her make some runs with his model car. After Mary's arm was hit by Mike's model, she continued giving David's model some runs by pushing different direction buttons.

Mary and Hallie exchanged information on the board and then again Hallie exchanged more information with Mike about LOGO command assignment.

Bruce tapped Mike's shoulder and signed, "I think you're right" indicating that Bruce agreed with Mike's answer on the board. Both Bruce and Mike exchanged conversations about their answers, especially Mike's. They were comparing their answers against each other and Bruce then corrected his error.

After Bruce corrected his error on LOGO commands of square on the board, both Bruce and Mike exchanged conversation. Mike mostly made comments about both Bruce's and Mike's answers. They compared their answers against each other.

After Bruce's input about using the left angle square, Bruce and the facilitator exchanged comments about using the LEFT command while Mike and Hallie exchanged information. Both Mike and Hallie then discussed it with the facilitator while others were watched on the screen. Mike continued to type using the

LEFT command instead RIGHT command drawing another square and Hallie appeared discouraged since she wanted to type.

The facilitator informed Mike that he had tried his car enough and that he should share it with the group. Mike let Hallie share the experience first before others. Mike explained how to do it to her and Hallie tried to push the button. The model which Mike held fell apart onto the table. Hallie laughed about the incident and continued to laugh.

After the spelling word, “computer,” both Hallie and Mike exchanged conversation.

II. Student(s) asked/did not ask group member about task

Session 1: (Mary absent)

Mike told David that he was turning wrong as the facilitator instructed during the floor exercise.

Session 2:

Bruce signed, “Hallie’s turn” after Mike said he would explain the second assignment. Mike tapped Bruce’s shoulder again, “me fine?” Bruce gave in and signed, “fine.”

David signed, “what to-do” and checked Mike’s paper assignment #1.

Hallie appeared puzzled as David explained to Mary.

Hallie was reminded by the facilitator to ask group members for help.

Hallie asked Bruce for help on assignment #1.

Session 3:

Hallie started to get LEGO blue box from the table. Mary inquired and told her not to get it.

Hallie signed, “mine?” as she tapped the table for Mary’s attention, but Mary was so focused investigating her LEGO task that she did not respond.

Mike told Bruce to go back on the floor task within seconds of when Bruce got up from the floor. Mike wanted the battery box and did not want others to take it away from him.

David tried to take Mary’s directional box, but Mary told him to move away. David then signed, “don’t have more” David went to get Mike’s box to check if there were more and Mike informed him to wait. Suddenly, Mike pushed David away. David ended up going back to his position on the floor.

David got up from the floor and went to the table to check the LEGO blue box for more directional buttons. He asked Mary about that. Mary replied, “no.” Then, David resumed to his position on the floor.

After getting Mike’s attention and waiting for him to respond, Mary asked Mike about her directional button display and Mike told her it was fine.

After Hallie tried to get Mike’s attention for help and Mike told her to wait, Hallie waited and then, tried to get his attention again. Mary, instead of Mike, went ahead to help her fix the battery box.

After questioning the facilitator, Mary was informed by the facilitator that she should ask Mike for help, Mary waved for Mike's attention and Mike told her to wait a minute. Mary waited again, but Mike never helped her.

Mary later noticed something that Mike couldn't fix on the battery box. She took it from him, and fixed it for him without questioning or being asked to do so.

Mary then tapped Hallie's shoulder and fixed her battery box.

After fixing the battery box for Hallie, Mary informed Mike that he did something wrong and plugged the wire into the box for him.

Then, Mary did same thing for Hallie and Hallie celebrated by dancing. Again, Mary fixed another thing for Mike. Mike signed, "thank you."

Mike took the LEGO picture booklet from Mary as she was looking at it. Mary found another pictured booklet on the table.

Mary tapped Hallie's shoulder and pointed to the picture on the booklet.

Hallie later tapped Mary's arm and asked her what to do next. Mary showed her how to attach the wire to the right output/input of the box.

Both Mary and Hallie exchanged conversation about building the car according to the picture. Hallie pointed the LEGO blue box as she indicated why not build the car from there (since all boys took the individual car set model boxes). A non participant student interrupted Hallie. Hallie lost Mary's attention and signed to the intruder, "shut you up. shut up." Hallie waved for Mary's attention and asked her what about LEGO blue box. Mary appeared frustrated and signed, "mess there." She indicated that it was confusing to get what she needed from the LEGO blue box as opposed to individual LEGO boxes that the boys took.

Session 4:

Hallie, teamed with Mary on the floor, discussed what model to build from the pictured brochure. Mary already picked the one she wanted to build and Hallie complained and did not want to help Mary to find LEGO pieces. She indicated that she wanted to organize new LEGO pieces into the big, plastic blue box. Mary disagreed. Mary convinced Hallie to find LEGO pieces according to the pictured model brochure.

Both Mary and Bruce tried to disassemble the LEGO pieces. Mary asked Bruce for help to disassemble the LEGO piece. When Bruce finally disassembled the piece, Mary signed, "Right! Right!" Mary then showed the picture to Bruce indicating that she wanted the same model as shown in the picture. Both Mary and Bruce exchanged conversation about putting LEGO pieces together.

Mike tapped on the floor for Bruce's attention. He appeared frustrated and signed, "me no for that (point to wheel)." Bruce signed, "me too for that no wheel." Mike signed, "not enough wheel need two more."

Mary already teamed with Hallie on the floor and discussed what model to build from the pictured brochure. Mary already picked the one she wanted to build. Hallie complained and did not want to help Mary to find LEGO pieces. Hallie indicated that she wanted to organize new LEGO pieces into the big, plastic blue box. Mary disagreed. She put her hand up toward Hallie's face while her face was turned to other side and ignored her complaint. Mary told Hallie to find LEGO pieces according to the pictured model brochure.

Both Mary and Bruce tried to disassemble the LEGO pieces. Mary asked Bruce for help to disassemble the LEGO piece. When Bruce finally disassembled the piece, Mary signed, "Right! Right!" Mary then showed the picture to Bruce indicating that she wanted the same model as shown in the picture.

Session 5:

Mary tapped Hallie's shoulder and asked her if she remembers something and Hallie indicated that she did not.

Before collecting the pencil from Mike, Hallie asked Mike if he was done using the pencil by signing, "finish?" as Mike was moving his model car.

III. Student(s) checked/watched others or the environment

Session 1: (Mary absent)

Both Bruce and David gasped, laughed heartily, and smiled as they watched each other's turtle movements on the computer screen.

Session 2:

Hallie watched conversation between volunteer and facilitator.

Hallie looked at white board and then the group.

Bruce watched the conversation between the volunteer and facilitator about the videorecorder placement.

Bruce looked at Hallie's journal.

Bruce continued scanning the environment of the room.

Bruce watched Mary and the facilitator while they conversed.

Bruce tapped Mike's shoulder and Mike informed him to pay attention to David who was explaining the LOGO command, LEFT, to Mary. Bruce quieted down and watched them.

Shortly afterwards, Bruce waved for the facilitator's attention during David's explanation.

Bruce mimicked what Mike did as Mike moved his hand to explain to Mary.

Bruce and Mike looked at me while Hallie was about ready to explain LOGO command to Mary.

Mary looked at David's paper assignment #2 while the facilitator was busy writing the questions on the white board.

Bruce followed the facilitator as she went to check the second videocamera.

After Hallie's attempted explanation, Bruce, along the group, looked at the facilitator.

Bruce checked something in his pocket and informed the facilitator that he forgot to give the hall pass that was in his pocket to his teacher. The facilitator asked him to give it to her. Bruce gave it to her and used chap stick on his lips.

Bruce watched the facilitator explain to Hallie how to seek group help. While Hallie sought help, the facilitator gave a hint to Bruce to help Hallie. Bruce then tapped Hallie's shoulder, explained what to do on paper assignment #1 to her, and showed his work. Hallie immediately started writing on her paper assignment #1.

After completing paper assignment #1, Bruce looked out the window at outdoor activity while waiting for others to complete their assignments.

Again, Bruce checked the room surrounding while waiting.

Bruce struggled to see the computer screen after Hallie moved, and he moved Hallie to a better, closer position.

Bruce, with Hallie, watched the screen as Mary tapped while Mike and David argued about the error.

Bruce checked as Mike and Mary were at the computer screen.

Bruce continued to watch Mike and Mary while communicating with the facilitator.

Hallie watched Bruce signing his journal entry to the facilitator then resumed her journal writing.

Hallie watched Mary and the facilitator while the facilitator fingerspelled a word for Mary and then resumed her journal writing.

Hallie noticed Bruce signing something (about her).

Hallie checked something on the white board and then resumed her journal writing.

Hallie left her position to join the group and had a puzzled look during the explanation by David to Mary.

Hallie watched Bruce sign his journal and sign to facilitator about LOGO activity.

Hallie watched Mary and the facilitator when the facilitator fingerspelled for Mary.

Hallie noticed Bruce signing something about her.

Hallie watched group activity then moved back to her former position.

Hallie followed the facilitator to the computer screen and looked at the screen while the other group members began gathering for paper assignment # 2 input.

After looking at Bruce's paper assignment #2, Hallie studied something on the white board and then checked the room surroundings to see what was going on. Then, she moved her material to a better position on the table and again watched the conversation about the two questions on the board along with Mike, David, and the facilitator.

Bruce checked the computer screen as soon as he put his paper assignment #2 down. After looking at the screen, he checked his paper assignment #2.

David looked at the volunteer videorecorder and looked around the room. Then, he looked at what Mary was doing. He licked his thumb and forefinger while waiting. He then watched the conversation between the facilitator and the volunteer videorecorder. He again put his thumb and forefinger in his mouth and ended up licking them. He continued watching the action between the facilitator and the volunteer

videorecorder while they discussed about the placement of videocameras. He continued licking his finger while leaning on the computer table and watching us. After Mike and Mary raised their hands for the facilitator's attention, David waved his.

David watched Hallie explain LOGO command to Mary. He told her to use the LOGO command, RIGHT. Hallie turned her body left instead of right. David, with an appropriate facial expression, pointed for her to turn right. Mike turned her shoulder. David kept pointing his right hand in the direction of right and signed, "sick." He then watched Hallie explain to Mary how the turtle moved.

As Hallie was about to explain another LOGO command, LEFT, David signed, "finish." It indicated that the command had already been explained. He then signed, "me left" as he meant that he did that explanation. He put his hand on his head indicating duh. David then looked at Mary. He told her to move for videotaping purpose.

David signed, "sick" while Mike explained to Mary about paper assignment #1 on the computer screen. He continued to watch them. He carefully watched Mary type R-T as if to check that she entered the right data.

David watched Bruce signing his journal entry to the facilitator then resumed his journal task.

After watching other participants' actions asking for the spelling of words or writing in journals, the facilitator did speak to David had asked for her attention earlier. Afterwards, he erased something in his journal entry #1.

David, Mary, and Hallie watched Bruce signing his journal entry #1 to the facilitator.

David, Bruce, and Mike watched Mary and the facilitator converse.

David continued watching the facilitator's actions with Mary.

David, Mike, Mary looked at the screen.

David looked at the facilitator and Bruce as Bruce made an inquiry.

David looked at Mike's signing to Mary during the explanation of LOGO commands. He continued watching as Mike explaining the LOGO command, FORWARD.

David checked his laminated orange paper of LOGO commands against the screen while Mike showed the laminated orange paper to Mary as he explained.

David signed, "Finish! Finish!" as the turtle on the screen went out of control.

David pointed on the screen and signed, "weird." He pointed on the screen again while rest of the participants watched him.

After informing the facilitator of his error about using number 500 instead of 50 from the previous day's assignment, David, with the rest of the group, watched the screen as Mike fixed the error.

As Mike continued typing after fixing the error, all three boys kept checking to see if the facilitator had finished writing questions on the white board.

David watched the conversation exchange between the facilitator and Mike about leaving the computer alone and continuing to write journal entry #2.

David checked the room and then checked on what Mike was doing.

David watched the conversation exchange between the facilitator and Mike about leaving the computer alone and continuing to write journal entry #2.

David checked the room and then checked on what Mike was doing.

David watched the conversation between Bruce and Mike.

Mike got up and started looking for the spelling of the word of LOGO and fingerspelled L-O-G-O twice before writing it in his journal entry #1.

Again, Mike signed, “turtle” twice as he tried to fingerspell it. He then looked at the facilitator and Mary. He spelled, “t-c-t-c-t.” He waved for the facilitator’s attention. He nodded in agreement when the facilitator asked him if he wanted the spelling of the word, “turtle.” She spelled it slowly so Mike can write it in his journal entry #1.

Mike looked at the volunteer videorecorder and looked around the room. Then, he looked at Mary and waved for the facilitator’s attention while playing with his log book cover. He continued to watch the conversation exchanged between the facilitator and the volunteer videorecorder. Then, Mike appeared to stare at the computer screen. He turned around and looked at what the volunteer videorecorder was doing. He continued to watch her while playing with his log book cover. He then raised his hand and waved for the facilitator’s attention. Mary quickly raised her hand as well. Mike signed, “me finish” to indicate that he was done with his journal entry #1. Mike fingerspelled his name from the log book cover. He waved for the facilitator’s attention again. He hand her as well. Mike signed, “me finish” to indicate that he was done with his journal entry #1. Mike fingerspelled his name from the log book cover. He waved for the facilitator’s attention again. He turned around and looked at the volunteer videorecorder and then raised his hand. He waved his right hand for the facilitator’s attention and put his left hand on the top of his head. Then, with his right hand, he signed, “finish.” A short time later after the facilitator dealt with David, Mike waved his log book at her. He then raised his eyebrow as if he was asking her to put the log book in his folder or not. The facilitator told him to leave it out.

Mike appeared to be very frustrated as he waited for Hallie to complete her journal and indicated that he wanted to move on.

Mike watched David explain the LOGO command, LEFT, to Mary.

Mike looked at the videocamera for few seconds.

Mike watched Bruce as he asked the facilitator for the date three times.

Mike watched David as David was about to complete his journal entry #2.

Mary turned her head looking at the videocamera for few seconds and then looked at her journal.

Mary watched the rest of participants as they continued their journal writing.

Mary looked at Mike and David as what they watched the volunteer. Then, she turned her head to look at Hallie and Bruce while they were writing their journals. Shortly after that, she watched the facilitator discuss videocamera positions with the volunteer. She again watched Mike who was looking at the volunteer after checking the computer screen. Mary quickly turned around and looked at the facilitator. After Mike waved for the facilitator’s attention, Mary immediately raised her hand. Then, she let her hand go down and groomed her ponytail instead. Mary spelled, “M-i-k-e M-i-k-e” by looking at his log book cover. She then spelled, “M-a-r-y M-a-r-y and spelled, “D-a-v-i-d D-a-v-i-d.” She raised her right hand as she looked at her journal. The facilitator was busy assisting others. Mary waved her right hand in an

attempt to get the facilitator's attention. After a while, she got the facilitator's attention and asked how to spell, "absent." Then, she appeared to be frustrated and signed, "not here." The facilitator spelled, "H-." Mary wrote each letter by looking back and forth as the facilitator spelled each letter very slowly for the word, "here." Then, she continued writing in her journal.

Mary watched the conversation between the facilitator and Bruce.

Mary raised her hand as Bruce began signing his journal entry to the facilitator. She put her hand down and continued watching Bruce sign. As soon as Bruce finished signing, Mary immediately raised her hand and asked for spelling word, "doctor."

Mary looked at Mike as he began explaining the LOGO command to her.

Mike began explaining the LOGO command, FORWARD, to Mary even though he did not inform the group that he would start his turn first. Mike signed, "FORWARD," then pointed on the white board, and fingerspelled, "F-O-R." He pointed the word, FORWARD on the white board. He signed, "know that?" and checked for Mary's understanding. Mary slightly nodded in agreement. He then explained what FORWARD meant by moving both of his hands together... and signed, "FORWARD FORWARD turtle move FORWARD." He then checked for Mary's understanding and waited for her reply. Mary gave no response. He signed, "well", checked with the facilitator as what to do next, and signed, "who next."

After Mike asked who was next to explain another LOGO command to Mary, Bruce immediately signed, "FORWARD means F-T" and shook his head indicating no. He then fingerspelled, "F" as Mike interrupted him saying that he had already taken care of it. Mike signed, "finish tell her." Bruce signed, "sorry anyway." He continued signing, "you will like" and moved both his hands maze-like. Mike again interrupted him and signed, "if prefer back." Bruce checked the white board and signed, "back" He continued signing, "anyway B-K means" as he moved his body backward and fingerspelled B-K simultaneously. He then signed, "for example b-k b-k", checked the board, and resumed signing, "50 means" as his finger drawing back 50 steps. He completed his task by signing, "well" and tapped David's shoulder to inform him it was his turn to explain to Mary as he signed, "explain her."

Mary looked at Mike's log book while Hallie explained the LOGO command to her.

Session 3:

Mike saw David settling his LEGO building task on the floor instead of the table; so Mike did the same thing.

Both Hallie and Mary watched David and Mike bickering about having the directional buttons.

David checked Mike's box to see if there were more directional buttons.

Bruce got up from the floor to check what others were doing.

All participants were interrupted by the student intruder at the door as Hallie signed, "shut you up shut up."

Mary checked on what the boys were doing on the floor.

Hallie appeared curious as the facilitator informed her what question to answer for the journal.

Session 4:

Hallie appeared curious as to what the boys were doing while building their model car and told the facilitator about Mike's task. Hallie was informed by the facilitator not to worry.

While ignoring the facilitator's question, Hallie checked on what Bruce was doing as he built his model car.

Hallie and Mary both watched conversation exchanged between David and the facilitator during the journal entry.

Bruce looked at the girls working.

Bruce checked on other boys as they were working.

Bruce watched the conversation exchanged between Mike and the facilitator about two different sizes of rods.

Bruce wanted Mike's attention, but he apparently changed his mind and resumed his journal writing.

Bruce watched the facilitator and Mary while Mary signed her journal entry.

David got up and went to the computer table. The facilitator reminded him about walking in front of the videocamera and signed, "be careful." He was already walking in front of it instead of going around it. He luckily got out of its way and smiled toward it. He then looked at another pictured brochure. He signed, "sick that" as he pointed the picture. He opened the next page, viewed both pages, and then turned another page. He showed the facilitator picture and signed, "sick that", pointing the picture, "better these-two", again pointing another picture, "better better", pointing different picture, "crazy." The facilitator asked him what is that and David signed, "paper move." The facilitator signed, "paper-lined-up-moving assembly like food put there place-cup-like place-cup-like place-cup-like assembly run-over assembly", pointed the picture, and again signed "understand?" David nodded slightly. The facilitator signed, "we will do more tomorrow o-k?" David fingerspelled, "o-k." The facilitator informed him that we will use either these two tomorrow and signed, "see-you tomorrow good night bye." David was the first person who got dismissed for the session.

While writing his journal Mike either checked the clock on the wall or the board.

Mary checked the conversation between the volunteer and the facilitator. Then, she looked at the facilitator and indicated that she needed the facilitator's help.

Mary looked at the videocamera for few seconds and smiled as if she were having her picture made.

Mary watched Bruce as the facilitator informed him to get log books from the computer table.

Mary watched the facilitator spelling the word, "stuff," to Hallie.

Session 5:

At the beginning of white board task assignment, Hallie watched three other boys writing their LOGO commands before she began hers.

After the boys went to the computer table, Hallie left the board area and stood at the other side of the computer at the corner of the table.

Hallie left the table to put her cochlear implant away and returned to her position.

Hallie and Mary watched what Mike was doing with his model car battery box on the computer table.

Mike gave another try on his model and his model surged forward hitting both Hallie's finger and Mary's arm. Hallie moved to the very end of the computer table past where Mary was.

After the incident, Hallie appeared curious as to what Mary was doing as she gathered more pieces with Bruce to fix his model.

Bruce watched the conversation exchanged between Mike and Hallie about agreeing to use Mike's answer to input into the computer since the boys agreed that Mike's answer was right.

Bruce watched the screen as Mike keyed his LOGO command from the white board into the computer.

Bruce watched with the group while both Mike and David argued about who would type and fix the error. Mike, by pushing David's hand away from the keyboard, did not allow David to fix the error.

Bruce, along Mary and Hallie, watched what Mike was doing with his model car into the battery box that ran on the computer table.

Shortly after Bruce resumed writing after the spelling of the word "board," Bruce looked at videocamera for few seconds. Then, he returned to his writing task.

After David was paused and appeared to think, he looked at Bruce's answer on the board.

David again checked Bruce's answer on the board and wrote more LOGO commands.

David, along the group, watched the conversation exchanged between Mike and Hallie about agreeing to use Mike's answer to input into the computer since the boys agreed that Mike's answer is right.

David and Bruce watched the screen as Mike keyed his LOGO command from the white board into the computer while both Hallie and Mary changed their placements.

David now became the fourth person positioned of the computer table because of Hallie's and Mary's new placement. Yet, David did not move much further from the keyboard and was able to key in if he needed to.

David looked at the screen while Mike keyed the LOGO commands from the white board.

Mike now became the second person positioned of the computer table because of Hallie's and Mary's new placement. Yet, Mike continued typing.

Mary watched the conversations between Bruce and the facilitator about using LEFT command instead of RIGHT when drawing a square and Mike and Hallie about using particular LOGO commands by pointing to them on the screen.

At the beginning of white board task assignment, Mary and Hallie watched the three boys write their LOGO commands before beginning theirs.

After erasing commands, Mary looked at boys' assignments.

Mary watched the conversations between Bruce and the facilitator about using LEFT command instead of RIGHT when drawing square and between Mike and Hallie about using particular LOGO commands by pointing to them on the screen.

Mary watched with the group while both Mike and David argued as who should type and fix the error. By pushing David's hand away from the keyboard, Mike did not allow David to fix the error.

Mary watched Mike assisting Hallie as he tried to get the model car running on the table.

IV. Student(s) got other's attention

Session 1: (Mary absent)

Mike asked the facilitator if he walked correctly on the floor exercise according to his own LOGO commands.

Mike asked the facilitator what L-T was and the facilitator told him to wait because he was ahead of the explanation.

Mike again asked the facilitator what L-T 30 was and the facilitator informed him to wait and let her explain the degrees according to the turtle's circle movement of degrees aid.

Bruce informed the facilitator that he did not understand the circle movement of degree aid before the facilitator had a chance to explain the purpose of using this circle movement aid.

Bruce got David's attention by tapping his shoulder to show his work on the screen.

David asked the facilitator. "Why 500?" as he meant 50 while he showed that turtle went out of the loop horizontally.

David tapped Mike's shoulder to look at his work on the screen.

Bruce raised his hand and asked the facilitator if it mattered if he used 50 as input, and the facilitator informed him it doesn't matter.

David tapped Mike's shoulder several times and gave up, and then Mike tapped David's shoulder and asked what he wanted.

Session 2:

Hallie waved for facilitator's attention while group members were explaining LOGO commands to Mary.

Hallie tapped Mary's shoulder when she was ready to explain LOGO command.

Hallie picked up and showed paper assignment #1 to facilitator.

Hallie tapped David's shoulder to get his attention to move so she could get in a better position to see.

Hallie tapped the facilitator's shoulder as the facilitator was saving information for the disk.

Hallie picked up her paper assignment #2 and showed the facilitator. The facilitator asked, "What is it?" Hallie replied, "House."

Hallie tried to get the facilitator's attention, appeared to change her mind, and continued writing in her journal.

Bruce waved for facilitator's attention and asked for the spelling word, LOGO. After spelling, he signed, "that all?"

Bruce signed what he wrote in his journal entry #1 to the facilitator. The rest of group, except Mike, watched him sign.

Bruce waved for the facilitator's attention and showed something on the white board. He then returned to his position.

Bruce tried to question the facilitator and signed the number as well. He waved for the facilitator's attention while she was busy watching Mike teach LOGO command, FORWARD, to Mary. In the middle of Mike's fingerspelling, F-O-R, Bruce interrupted and got the facilitator's attention by signing something. Then, he continued watching Mike teaching.

Bruce waved for the facilitator's attention and signed for few seconds. The facilitator told him to watch the group activity.

Bruce waved for the facilitator's attention and signed, "Right?" as he showed his paper assignment #1. The facilitator explained to Bruce that he had to have a group discussion to see if his assignment were right or not.

Bruce fingerspelled to the facilitator, "d-a-t-e" three times as he asked for today's date. The facilitator was busy.

After Bruce interacted with Hallie, he talked to the facilitator.

David waved for facilitator's attention and then, Mary immediately waved for facilitator's attention, too. David patted the table for the facilitator's attention and again waved (This disturbed Mike). Mike closed his log book.

After watching the action between the facilitator and the volunteer videorecorder, David waved for the facilitator's attention and still couldn't get her because she was busy assisting Mike and Mary. David, then checked his teeth.

Since the facilitator could not get Mike's attention, David volunteered to brush his laminated orange paper on Mike's arm. Mike's facial expression indicated that he did not want to be bothered as he signed, "WHAT!" He decided to ignore David and went on an unnecessary task of explaining to Mary. At this point, the facilitator lost all participants' attention. She tapped a little harder on the table to get Mike's attention and then rest of participants quickly responded to this strategy.

After the facilitator passed out the paper assignment #2, David looked at it and asked her by signing, "what-it-said?"

David informed the facilitator that he completed his journal entry #2 task by signing, "finish" and played with his log book cover while waiting.

Mike wanted to give his pencil and folder to the facilitator while she was signing to Mary.

After exchanging conversation with Bruce, Mike waved for the facilitator's attention and showed frustration since the facilitator was busy.

Bruce tapped Mike's arm and He told Bruce to pay attention David who was teaching LOGO command, LEFT to Mary.

Mike waved for the facilitator's attention and signed, "FORWARD F-D" and the facilitator tapped his arm and signed, "wait a minute" She then signed to Mary, "not understand ask-them (individually) to explain you." Mary slightly nodded in agreement. The facilitator checked to see if Mary really understood by signing, "if you do not understand what you do?" Mike immediately answered by signing, "help." Unfortunately, Mary didn't get a chance to reply. The facilitator signed, "help help help help (individually) understand discuss o-k?" and paused for a moment before she signed again, "now we stop."

Mike interrupted David's LOGO command explanation and waved for Mary's attention. He began signing, "turtle will move" as his hand showed Mary how it turned left while David watched and Bruce mimicked Mike's hand movement. Hallie moved closer to group. Then, both Mike and Bruce looked at the facilitator.

Mike moved Hallie's shoulder for videorecording purpose while she attempted to explain the LOGO command to Mary.

Mike waved for the facilitator's attention and signed, "show?" He was asking to see if he could go ahead to show his paper assignment #1 to the group. The facilitator told him to wait since the rest of group was not finished with their task.

Mary raised her hand for the facilitator's attention and asked for spelling the word, "absent."

After watching the other participants write in their journals, Mary waved for the facilitator's attention immediately after David waved for attention. Mary continued to raise her hand. She turned her head to watch the volunteer person as she raised her left hand. Then, she turned her head back and checked on the facilitator. She groomed her hair as she read David's journal. Then, she looked at the volunteer again.

Session 3:

Hallie asked the facilitator at the beginning of the session if she would make a car and the facilitator replied, "yes." She excitedly celebrated by dancing.

Mary raised her hand and explained to the facilitator by signing, "don't know fix mistake mistake need help?" as she indicated that she didn't know how to fix the mistake. She questioned if she could get help. The facilitator assured her she could get help. She should ask the group members for help.

David raised his hand and asked the facilitator why the disk was on the table by the computer and the facilitator asked him to give it to her. So, he did.

Hallie asked the facilitator what the battery box was as Mary took it and figured it out.

David got up from the floor and grabbed Mike's directional button. Mike took it back from him. Then, David took it back from Mike, moved away from Mike, and signed to Mike, "finish!" Mike got frustrated as he informed the facilitator that David took it. David argued, "I don't have and I need one." Mike signed, "MINE!" David signed, "one" as he indicated that he needed one. Mike signed, "not one must two!" Mike complained that David has that and Mary has that. David signed, "each one, one right?" The facilitator informed them to work as group and remember to cooperate. Mike then took the directional button back from David. Bruce got up from the floor and Mike told him to go back to the floor task as Mike tried to protect his items. David then tried to take Mary's box and Mary told him to move away. David signed, "don't have more?" and then checked Mike's box to see if there were any more of them. Mike told David to wait and then pushed him away.

Hallie tapped on the table for Mike's attention, but Mike appeared so focused on his task that he did not respond.

Mary waved for the facilitator's attention and Hallie then waved for the facilitator's attention as well.

Mary tapped the table for Mike's attention and asked for help. Mike told her to wait. She showed her work, and Mike assured her it was fine.

Hallie got Mike's attention, but he told her to wait. Mary went ahead to assist Hallie.

Mary asked the facilitator for help, but the facilitator told her to ask Mike for help.

Mary did ask Mike and he told her to wait. He then never helped her.

Mary tapped Hallie's shoulder and fixed same thing for Hallie as she did for Mike.

Mary later tapped Hallie's shoulder and showed her the picture from the booklet. She indicated that she wanted to build that model.

Mike got the facilitator's attention and asked her for more wires. The facilitator informed him to check the LEGO blue box.

Mary got the attention of the facilitator and showed her the picture in the booklet. The facilitator told her to build it if she wanted to.

Hallie tapped Mary's shoulder as she asked her what she can do.

After the interruption by the intruder, Hallie waved for Mary's attention and asked her what about starting building with the LEGO pieces from the LEGO blue box.

Mary waved for the facilitator's attention and asked for help to use the LEGO blue box. The facilitator ignored Mary, because she was busy writing and announced it was time for the journal.

Bruce asked the facilitator when the last day was.

Mary asked the facilitator for the spelling of drive.

Bruce asked the facilitator if he could keep his log book and the facilitator informed him by signing, "No. We can discuss that later."

Mary asked the facilitator for the spelling of button.

David asked the facilitator for the spelling of make.

Session 4:

As the facilitator conversed with Bruce about how to put the rubber on the wheel, Hallie interrupted and asked about a certain LEGO piece in comparison to the picture. The facilitator explained to Mary and Hallie how to understand the size of the rod piece and to notice the different sizes of rod pieces.

Mary asked Hallie to get the facilitator's attention which she did by tapping the facilitator's leg. Hallie informed the facilitator that Mary wanted her attention.

Hallie got Bruce's attention for Mary since Mary asked Hallie to get Bruce for her. Hallie used her pencil to point to Mary to inform Bruce that Mary wanted him.

Hallie waved for the facilitator's attention and asked for spelling of this word, "thing." (mistook for stuff)

Bruce talked to the facilitator about finding the certain piece and checking out the blue LEGO box. He got the motorized wheel box and again checked the pieces from the blue LEGO box.

Bruce got the facilitator's attention for Mike.

Mary asked Hallie to get the facilitator's attention by tapping the facilitator's leg and Hallie informed the facilitator that Mary wanted her. Mary informed the facilitator to look at the picture for a certain LEGO piece she needed.

Bruce interrupted the facilitator by tapping on her shoulder while the facilitator was communicating with David. The facilitator ignored Bruce and continued informing David of what to fix on his car. Bruce tapped the facilitator's shoulder again. He then shoved his LEGO piece toward the facilitator's face as he demanded for attention. **(WOW!)** The facilitator tapped Bruce's shoulder and signed, "**LOOK!** (*I'm*)talk(talking) thank you." Bruce immediately signed, "sorry." The facilitator smiled and signed "ok now what?" The facilitator had to delay Bruce for few seconds and check on David to be sure he understood what he was supposed to do. Then, the facilitator tapped Bruce's leg and signed, "now what?" Bruce indicated that he needed help with the rubber to be put on wheel. Both the facilitator and Bruce figured out how to put it on. Then, Bruce took it back without informing the facilitator and fixed it by himself.

While assisting Mary to find a certain LEGO piece shown in the picture, Bruce again shoved his wheel toward the facilitator's face. The facilitator fingerspelled with a disapproved facial look, "w-h-a-t?" and then realized that Bruce was just showing off that he succeeded putting the rubber to the wheel.

After Bruce completed his journal task, he asked the facilitator if she had done this before with group. The facilitator signed, "yes" and smiled. Bruce signed, "different state?" and the facilitator signed, "yes different state." He then signed, "cool." He was the second person to leave the session.

Following the conversation with David about how he liked the task, the facilitator checked on rest of group. David waved for facilitator's attention and signed, "computer." The facilitator signed, "computer tomorrow no time." as she pointed the clock on the wall. "Out, we try that," (pointing his model car) "hooked up there computer type see move," pointing table, "move." David indicated understood by nodding. The facilitator waved for his attention and signed, "if they cooperate, important." He signed, "me cooperate." The facilitator signed, "good."

Mike talked to the facilitator and then looked at David.

Mike signed to the facilitator, "need round." The facilitator asked him if that were tire or rod thing. He replied, "rod." The facilitator then signed, "have two sizes." The facilitator was ready to give Mike the rod piece, but he signed, "no", and showed what he needed on his car. He resumed signing, "running-around-wheel." The facilitator signed, "show-me picture." Mike then signed, "running-around-wheel" and the facilitator signed, "o-h you mean rubber band?" The facilitator got the rubber band and then signed, "this?" Mike slightly nodded and the facilitator signed, "this rubber band rubber band." She was informing him the word for that was rubber band. Mike appeared to understand. The facilitator waved for his attention and signed, "How many? 1 (*or*) 2?" Mike replied, "I think 2." The facilitator signed, "2 fine" and got another one. Mike informed the facilitator that he didn't need the second one since his car worked fine after putting one rubber band.

Shortly after his journal entry and model car task, Mike got the facilitator's attention by patting his hand on the floor and asked her for the spelling of the word, later. The facilitator fingerspelled, "L-a-t," paused, "e-r." Mike only checked spelling twice while writing.

Mary tapped the facilitator's shoulder and inquired why the videocamera was being used. The facilitator explained to her that it was for her research. Mary continued getting LEGO pieces. Mary smiled and signed 'yes.' She then resumed her task on LEGO pieces.

Mary tapped Hallie's hand several times as Mary was trying to get her attention. Finally, Hallie was asked to find the certain LEGO piece that Mary pointed to in the picture.

Mary tried to get the facilitator's attention by tapping the facilitator's knee, but the facilitator was busy talking to David about his experience.

Mary tapped the facilitator's shoulder and tried to sign "B-J" on her head. David tapped on the floor to get the facilitator's attention while the facilitator signed to Mary. The facilitator signed to Mary, "B-J B-J" on the right side of its forehead twice. "You want spelling his name?," the facilitator signed, "well you (*why don't*) ask-him?"

Mary waited for Bruce's to attend after she asked Hallie to get Bruce's attention. Hallie used her pencil and pointed to Mary indicating that Mary wanted him. Mary signed to Bruce, "spell name." Bruce began to spell his name, "B-" and then decided to show her his name on the log book cover for her to copy. Bruce leaned over and checked Mary's journal to be sure that Mary spelled his name correctly. Bruce signed to Mary, "spell wrong." Mary erased and Bruce corrected it.

While the facilitator was communicating with David, Mary tapped on the facilitator's shoulder. The facilitator continued communicating with David and Mary again tapped on the facilitator's arm. The facilitator signed to David, "good" and then turned her head to pay attention to Mary. Mary began to sign her journal and the facilitator signed, "say-again" Mary signed while reading from her log book. The facilitator signed, "good nice." Mary closed her log book.

After indicating that she was done with journal writing, Mary tapped Hallie's shoulder to show her journal as Hallie was opening her log book to resume her writing.

Session 5:

David tried to get Hallie's attention by banging his hand on the computer table several times and continued to tap his finger until he got her attention. Hallie was getting log books out of the folders so they can be ready for the group. She was not told to get them and she just volunteered by herself. Both David and Hallie exchanged conversation about his model. David went to get more pieces and Hallie resumed arranging the log books to be handed out.

Hallie stopped her journal writing and checked where the facilitator was. She took her log book and showed her journal to me. Then, she resumed to her task.

Hallie waved for the facilitator's attention and asked for the spelling of the word, computer. The facilitator started spelling, "C-" and was interrupted by Mike because he wanted to know why LEGO LOGO on computer was not working today. Hallie waited for the facilitator to spell more letters. The facilitator noticed the word, computer on Mike's journal and told Hallie to check the spelling from Mike's log and go ahead to copy. Mike disliked the idea and the facilitator told him it was okay to share that word! And just let her copy. Mike did volunteer without being told to spell this word, "c-o-m-p then signed "**put**" and then fingerspelled e-r." Mike then checked the spelling by looking at Hallie's journal to be sure it was spelled correctly.

Shortly after starting the journal writing, Hallie waved for the facilitator's attention, but the facilitator was busy dealing with Mike. A few minutes later, the facilitator signed to Hallie, "what?" and Hallie paused a long time. So, the facilitator suggested for her to write in her journal.

Bruce got the facilitator's attention to check his assignment on the board and informed her that he was done with it.

After talking to a volunteer videorecorder, Bruce immediately tapped the facilitator because he wanted the facilitator to look at his assignment on the board and informed the facilitator that he was done with it.

Shortly after the inquiry of a shape on the screen by the facilitator, Bruce tapped the facilitator's shoulder and explained that LEFT command can be used instead of right. He gave a floor exercise going opposite direction from the right angle square as shown on the computer screen.

Bruce waved for the facilitator's attention and then immediately signed his journal entry to the facilitator. He completed sharing this before the post interview started.

David tried to get Hallie's attention by banging his hand on the computer table several times and continued to tap his finger until he got her attention. Hallie appeared focused to get log books out of the folders so they can be ready for the group. She was not told to get them; she just volunteered herself. Both David and Hallie exchanged conversation about his model. David went to get more pieces from the floor and Hallie resumed arranging the log books to be handed out.

David tapped the facilitator's arm to ask for spelling help. The facilitator began to spell "th"rod, but decided to write on the board.

Mike tapped facilitator's arm while I was talking to a volunteer videorecorder. He immediately realized that I was busy and did not continue to try to get my attention.

Mary waved for the facilitator's attention and asked the facilitator if the turn direction button means it turns. The facilitator signed, "yes."

Mary raised her hand for the facilitator's attention and then shared her journal with the facilitator by signing. Bruce interrupted as Mary was about done. The facilitator informed Mary to put her log book away.

V. Student(s) checked other student's assignment

Session 1: (Mary absent)

When a task was being done or practiced together, students would watch other students such as when they did floor exercises.

Hallie looked at Bruce's paper assignment # 2 answers

Session 2:

Hallie moved from her position and looked at what Bruce was doing.

Hallie read entries from Mike on the screen as Mike completed paper assignment # 1.

Hallie looked at Bruce's journal and then resumed writing in her journal.

Both David and Mike looked at each other's journal.

Bruce looked at Mike's paper assignment #1 while he explained how the LOGO turtle turned to Mary.

David looked at Mary's journal and then looked at the white board.

David checked what Mike was doing and saw the facilitator. He signed, “help me” with a frustrated look face. He asked for the spelling word, “turtle.”

David looked at Mike’s journal possibly to get the spelling of the word, “turtle.” He then wrote his journal. Mike did offer to help David by starting to fingerspell; then, he let him to copy the word from his journal instead.

David looked at Mike’s paper assignment #2 and then discussed with Mike.

David looked at Mike’s journal – perhaps for the spelling of the word, “turtle.” He, then, wrote in his journal. Mike did offer to help David by fingerspelling first and then letting him copy the word from his journal instead.

Mike looked at Bruce’s journal #1 because he appeared to read it.

Mike checked back and forth between his journal and David’s to be sure he spelled the word, turtle, correctly. Both of them continued to check each other’s journal.

David looked at Mike’s journal – perhaps for the spelling of the word, “turtle.” He, then, wrote in his journal. Mike did offer to help David by fingerspelling first and then letting him copy the word from his journal instead.

Mike checked back and forth between his journal and David’s to be sure he spelled the word, turtle, correctly. Both of them continued to check each other’s journal.

While Bruce signed his journal entry #1, Mike read his instead of watching.

After watching Bruce signing his journal #1, David read Mike’s journal. Mike noticed David was reading his journal and closed his log book immediately. Mike realized that David was checking his journal and appeared to frustrate. Mike decided to open his log book to check what David needed.

David looked at Mike’s journal – perhaps for the spelling of the word, “turtle.” He, then, wrote in his journal. Mike did offer to help David by fingerspelling first and then letting him copy the word from his journal instead. Mike looked at Bruce’s journal #1 because he appeared to read it.

Session 3:

Mike checked on Mary’s fixture on the battery box and the directional buttons several times.

Mary checked for accuracy on Mike’s and Hallie’s work with the box.

Session 4:

While the facilitator watched Mike for few seconds, he viewed his model car in the air and rotated it.

Mike looked at Bruce’s journal and wanted to know what to write in his journal entry.

Session 5:

David checked Bruce’s answer while writing more LOGO commands on the board.

Bruce looked at David’s answer on the board and then Mike’s answer as well while he was trying to write the next LOGO command. After looking at Mike’s answer, Bruce checked answers against his. Then, Bruce again watched Mike writing his.

Mike watched Bruce writing his answer before he began his task writing LOGO commands of square.

Shortly after Mike began his task of writing LOGO commands on the white board, he looked at Hallie's answer. Then, he resumed writing.

After some time, Mike wrote LOGO commands on the board. He looked at Hallie's. Then, he continued writing more LOGO commands.

After checking Hallie's answer, Mike continued writing more commands.

Mary checked her answers on the board against Hallie's after the explanation from the facilitator about how to discuss and to agree with right or wrong answers.

VI. Student(s) reaction

Session 1: (Mary absent)

Hallie complained about the fake name written on the top of her folder and wanted to use her nickname instead. The facilitator ensured her that it was for her own purpose and kept information confidential.

Hallie signed, "I know that word" as the facilitator held the portable white board with written LOGO commands. She continued saying that she knew that word.

Both Bruce and David gasped and laughed heartily as they saw their turtle movements on the screen.

Hallie laughed as what her LOGO turtle did.

As the turtle went out of the loop, David signed, "finish!"

Only Bruce fingerspelled the word, square correctly.

All participants were not happy when the facilitator announced it was time for the journal, and Hallie begged for more time on LOGO task. The facilitator postponed the journal writing so the participants could continue LOGO activities. The participants cheered.

The facilitator had to tap each participant's shoulder gently several times to inform them that it was time to leave. They did not respond to the first or second time. Bruce did finally leave after he complained that the session was so short, and then Mike did same thing. David was very reluctant to leave until the facilitator put her hand on the keyboard twice. David left and Hallie was the last person to leave after the facilitator repeatedly tapped her shoulder gently.

Session 2:

Hallie laughed at her error.

Hallie returned to her former position after being ignored by the group during the clarification of LOGO commands to Mary.

Hallie raised her hand and replied that Mary was in her class. David disagreed and stated that Mary was not in her class. David volunteered to bring Mary to the next day's session. While the facilitator talked to

Hallie, David tapped on the table and the facilitator signed, “wait” to him. Then, she looked at David and signed, “what?” David signed, “I will”, paused, and then signed, “help.” Mary agreed.

After Bruce signed, “finish” indicating he finished signing his journal, Mike immediately raised his hand and signed, “two weeks?” He again signed, “two weeks?” He was asking the facilitator if the LEGO LOGO lasts two weeks. He again waved for the facilitator’s attention and signed right away, “two weeks?”

After Mike assisted Mary type the data from paper assignment#1, the facilitator signed, “good job wonderful.” The facilitator then saved the data into the disk while participants watched to learn how to save the data. The facilitator signed, “busy means saving now.” After saving the data, the facilitator used the escape key and signed, “me escape go back busy now saving.” Hallie tapped her arm to see if she saved her data from yesterday’s assignment and the facilitator told her that she did as well as others. Mike then tapped her shoulder and signed, “finish mine?” She signed, “yes all of yours don’t worry now we need wait a minute.” The facilitator realized that all of Mary’s data was not yet saved. The facilitator asked Mary if she understood. Mary was not sure and the facilitator signed, “if you do not understand what you do?” twice. When Mary did not respond, the facilitator mentioned to her that she needed to ask the group for the answer.

Hallie signed, “Me!” as she indicated it was her turn and David then signed, “me!” Mike grabbed his folder to rearrange and moved David’s log book. David patiently took his laminated orange paper and rearranged his paper assignment #1. Hallie tapped Mike’s shoulder but he ignored her. Without giving others a chance, Mike went ahead to explain to Mary. He took his laminated, orange paper out of his folder to show Mary. He pointed FORWARD with his finger on the orange paper to Mary. David, Bruce, and Hallie watched them. Mike explained by signing, “FORWARD F-D.”

Session 3:

Hallie danced as she found out that she could make a car.

Mary appeared frustrated as she tried to get a LEGO individual box. Unfortunately the boys took them all.

As both David and Mike were bickering about having the directional buttons, David informed Mike to finish first. Mike showed his frustration and complained to the facilitator. The facilitator informed them to work as the group and cooperate.

When the student intruder at the door disturbed the participants, Hallie signed, “shut you up shut up.”

Mike signed, “thank you” to Mary after she fixed Mike’s directional buttons.

Hallie watched Mary plug wires into the directional buttons and signed, “OIC.”

Hallie complained to Mary about her fake name on the folder as she wanted her nickname on it.

Session 4:

Hallie appeared upset after a suggestion from the facilitator.

Mary began helping Hallie but Hallie turned her head around as she appeared to be curious as to what the boys were doing.

Hallie did not reply when she was asked by the facilitator about what was wrong. Hallie just stared at the picture model car brochure. Mary informed the facilitator that Hallie did not want to do the task even though Mary encouraged her earlier. This was done few minutes after switching places between Mary and Hallie as Mary had suggested. It can be another reason that Hallie became unhappy. The facilitator reminded Mary that Hallie may not see it very well and suggested for her to help Hallie. Mary freely gave Hallie some assistance.

While she was organizing the LEGO pieces in the blue box, the facilitator asked Hallie what she was doing. Hallie did not respond and then, the facilitator asked the same question again. Still, there was no response. Then, the facilitator suggested for Hallie to watch what Mary and Bruce were doing (since it was Hallie's and Mary's car.). Hallie appeared not to want to follow the suggestion as she shrugged with her shoulder and ignored the facilitator. Hallie continued the unnecessary organization with new LEGO pieces for the blue box by herself.

Mary tapped Hallie's shoulder and attempted to show her journal, but Hallie had already opened her log book and resumed her journal writing.

Hallie appeared not to like Bruce disturbing the box to find pieces for his car.

While communicating with David about his experience with LEGO, the facilitator signed to Bruce, "do not throw o-k? be nice to-pass" (Bruce threw David's log book across the room).

Mike did not want any help from Bruce when Bruce offered.

The facilitator explained to Mike that he "can do that tomorrow let's do this." She indicated that Mike can finish his car task tomorrow and encouraged him to begin writing his journal. He refused to cooperate and wanted to complete his task. The facilitator put his log and pencil close to where he was.

The facilitator tapped on the floor to get Mike's attention and continued to tap at different area of the floor, closer to where Mike was. It took the facilitator four times before Mike finally responded. The facilitator signed, "please stop now please write what do today." Mike immediately chose not to pay attention and was very focused with his car building task.

After responding to Hallie for her journal task, the facilitator crawled over to tap for Mike's attention. This time he immediately looked at the facilitator. The facilitator signed, "please cooperate" and Mike looked away and chose to continue his car building task. The facilitator paused for a while and watched Mike's action. Then, she fingerspelled, "o-k" as she signed, "hands-back-off" and left Mike alone. (Mike did later write in the journal.)

Mary tapped Hallie's shoulder because Mary wanted to show her journal, but Hallie had already opened her log and resumed her journal writing.

Session 5:

No one paid attention to the facilitator when the facilitator flashed the light to indicate that it was time for journal entries. The light was again being flashed for second time. Hallie was busy passing out log books and pencils.

No one paid attention to the facilitator when the facilitator flashed the light to indicate it was time for journal entry. The light was again being flashed. Mike appeared unhappy when it was time for journal. Hallie was busy passing out log books and pencils. The facilitator had to tap each participant's shoulder and inform them to stop and to begin writing journal by signing to them, "what you do today? What you do with group?"

Mike was the only person who did not start journal until third time the facilitator talked with him. The facilitator made a deal with him to begin the journal since he was very persistent to continue his LEGO activity task. The facilitator was interrupted by Hallie and then resumed to deal with Mike's behavior. She noticed that Mike was watching David doing his LEGO activity. David had already started his journal writing and Mike did not. The facilitator encouraged Mike to begin writing. Shortly after Mike began his journal entry, the facilitator noticed David was watching Mike doing his LEGO activity task again. David

shared his experience with Mike by pushing the turn direction button. The facilitator was busy watching Mary signing her journal entry and assisting other students to spell words. Mike continued his LEGO activity task while the facilitator checked David's journal entry. After checking David's entry, the facilitator took Mike's model car away and put it a little farther from him on the computer table. The facilitator tried to encourage Mike to complete the journal and informed him of the second question. Mike chose not to look at the facilitator for the second question. However, he did write his journal. After minutes later, Mike interrupted by asking the facilitator about LEGO LOGO activity on the computer while Mary asked the facilitator for the spelling of the word.

Appendix G
Tally of Participant Actions in Second Ten Minutes of Each Session

Tally of Participant Actions in Second Ten Minutes of Each Session

Behavior	Session 1	Session 2	Session 3	Session 4	Session 5
Attentive to facilitator or others	Mike - 26 Hallie - 31 Mary-absent Bruce - 29 David - 26	Mike - 10 Hallie- 11 Mary- 12 Bruce- 9 David- 11	Mike - 0 Hallie- 1 Mary- 1 Bruce - 0 David- 0	Mike - 0 Hallie- 0 Mary- 0 Bruce- 0 David- 0	Mike - 15 Hallie- 10 Mary- 15 Bruce- 15 David- 15
Inattentive to facilitator or others	Mike - 6 Hallie - 4 Mary-absent Bruce - 1 David – 1	Mike – 2 Hallie- 2 Mary- 0 Bruce- 4 David- 1	Mike – 1 Hallie- 0 Mary- 0 Bruce- 0 David- 0	Mike – 0 Hallie- 0 Mary- 0 Bruce- 0 David- 0	Mike – 2 Hallie- 9 Mary- 3 Bruce- 1 David- 1
On-task discussion	Mike - 3 Hallie - 1 Mary-absent Bruce - 8 David – 5	Mike - 10 Hallie- 3 Mary- 8 Bruce- 4 David- 1	Mike - 0 Hallie- 0 Mary- 0 Bruce - 0 David- 1	Mike - 1 Hallie- 0 Mary- 1 Bruce- 0 David- 1	Mike - 5 Hallie- 1 Mary- 1 Bruce- 7 David- 2
On-task comment	Mike – 0 Hallie- 0 Mary-absent Bruce- 0 David- 1	Mike – 7 Hallie- 2 Mary- 0 Bruce- 1 David- 5	Mike – 3 Hallie- 0 Mary- 2 Bruce- 0 David- 1	Mike – 0 Hallie- 0 Mary- 1 Bruce- 0 David- 2	Mike – 4 Hallie- 0 Mary- 0 Bruce- 5 David- 5

Tally of Participant Actions in Second Ten Minutes of Each Session, Continued

Behavior	Session 1	Session 2	Session 3	Session 4	Session 5
On-task casual talk	Mike - 3 Hallie- 0 Mary-absent Bruce- 0 David- 3	Mike - 0 Hallie- 0 Mary- 0 Bruce- 0 David- 0	Mike - 1 Hallie- 1 Mary- 1 Bruce - 0 David- 0	Mike - 0 Hallie- 1 Mary- 3 Bruce- 3 David- 0	Mike - 0 Hallie- 2 Mary- 2 Bruce- 0 David- 0
On-task working without any verbal interaction or signing	Mike – 3 Hallie- 4 Mary-absent Bruce- 3 David- 3	Mike – 6 Hallie- 12 Mary- 11 Bruce- 12 David- 18	Mike – 27 Hallie- 19 Mary- 13 Bruce- 33 David- 32	Mike – 23 Hallie- 25 Mary- 20 Bruce- 12 David- 19	Mike – 18 Hallie- 22 Mary- 22 Bruce- 17 David- 21
Off-task with interactions	Mike - 0 Hallie- 0 Mary-absent Bruce- 0 David- 0	Mike - 0 Hallie- 0 Mary- 0 Bruce- 0 David- 0	Mike - 0 Hallie- 6 Mary- 11 Bruce - 1 David- 0	Mike - 3 Hallie- 0 Mary- 1 Bruce- 6 David- 3	Mike - 0 Hallie- 0 Mary- 0 Bruce- 0 David- 0
Off-task and no interactions	Mike – 0 Hallie- 0 Mary-absent Bruce- 0 David- 0	Mike – 1 Hallie- 5 Mary- 3 Bruce- 5 David- 0	Mike – 1 Hallie- 6 Mary- 6 Bruce- 0 David- 0	Mike – 0 Hallie- 1 Mary- 2 Bruce- 6 David- 1	Mike – 1 Hallie- 2 Mary- 3 Bruce- 0 David- 2

Appendix H

Charts of Interview Responses

Pre-Interview Questions and Responses

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Do you know what LOGO is? If so, please explain it to me.	Negatively nodded	NO	(NO) I don't know what that is L-O-G-O	Nodded negatively	Yes. Know-block (Facilitator showed him the word LOGO on the tablet). nodded negatively after looking the word, LOGO, on the tablet

Pre-Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Do you have experience with LEGO? If, so, please describe?	No reply (Facilitator wrote LEGO on the tablet for him to read after slowly fingerspelling it and signing "block" twice) After looking the tablet, he quickly replied, "I know" (Facilitator asked him to describe it.) He paused and signed, "I-don't-know" (The facilitator asked him if he knows blocks.) He replied by nodding. (Facilitator asked color of blocks.) He did not respond. (Facilitator signed, "know blocks red green yellow blue.") He did not reply. (Facilitator then signed, "block build move.") He signed, "I know I have it at home." (Facilitator signed, "build move fix that?") He slightly nodded indicating he does that.	She appeared unsure. (Facilitator rephrased by signing "blocks color green yellow" etc). Mary opened her mouth as if she gasped and then appeared unsure.	Yes! Me experience yes for example house/building-my friend, Mike, experience can fix movement-fix how to figure out how to move how to fix	She appeared unsure. (Facilitator showed the word, LEGO, written in big letters on tablet.) She didn't reply then. (Facilitator signed, "know blocks blue red green yellow block" and asked her to put the pencil aside since she was playing with it in her hands. Facilitator resumed signing, "will learn more Monday on that.")	He tried to fingerspell the word, block.* (Facilitator asked him what color of blocks.) His reply was: green, red, and yellow. He continued to sign, "wheels" He replied that he does have a lot of experience with LEGO. (Facilitator inquired if he enjoyed it.) He replied by shaking his head vigorously indicating that he did

Pre-Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Have you worked on a computer project/assignment by yourself?	Yes	Nodded in agreement. (Facilitator asked her to sign.) She signed, "yes."	Yes experienced Internet	Quickly responded by nodding in agreement. (Facilitator signed, "yes?") Hallie immediately signed, "yes!"	Yes doesn't like to work alone
Have you worked on a computer project/assignment with a group before?	Yes	Quickly signed, "yes."	Yes (he interrupted by saying yes before the facilitator signed group) them I-N-T-E-R-N-E-T (Facilitator then informed him that she had not finished asking him the question. Facilitator repeated question.) yes with group must practice typing free time do any if reading must do reading assignment depends on teacher's choice reading then computer free time	Quickly signed, "yes."	Prefer group (Facilitator asked him why.) His reply was "easier help." (Facilitator asked him if he meant help each other.) His reply was "yes."

Pre-Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Do you prefer to work on any projects alone or with group?	alone	Quickly replied, "prefer alone."	With group	She smiled and signed, "with group"	Group
Why?	For work (Facilitator asked him why work alone?) Because other student looked over my math problem/ answer while I typed. (Facilitator signed, "You meant cheating?") He replied, "Yes not me not cheat not me but the name signed was used"	Prefer because I learn continue to learn	Because help group attention doing what we need to	Because (paused) talk help talk help me computer	Easy help talk/discuss (Facilitator asked him to explain more.) He replied, "easy job."
How do you think working with a group helps you learn?	Yes. (Facilitator then signed, "Why help you learn?") His reply was, "to think about" as he indicated to think about what they learned/ did as a group.	She asked the facilitator to rephrase the question. Her reply was very unsure and then she signed, "yes maybe" as she appeared very unsure of her answer.	Yes if not understand maybe ask for help (Facilitator asked him if he thinks group help him learn.) He replied, "yes."	She didn't reply (So facilitator rephrased it in ASL since she first signed the question in PSE). Hallie replied, "yes."	Nodded in agreement

Pre-Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Why? (optional depending on the answer)		Her reply was "group learn." (Facilitator had to double check by signing, "you think group help-you-learn?") No reply from her.		So I know which one help me to decide what to do. (Facilitator asked her by signing, "so you think group help you learn something?") Her reply was yes.	Quickly replied, "easy." (Facilitator signed, "easy like what?") His reply was "friends can help me."
Notes	Since David did not respond to word LEGO for blocks, his experience may have been with DUPLO or similar blocks.	Mary's gasp when told color of blocks may have indicated no experience with LEGO. Mary appeared to either have limited exposure to group work or she did not know the word, group.	Bruce described LEGO beautifully-fingerspelled internet with ease.		* It was at this point that the school videocamera had automatically shut off necessitating a repeat of this and remaining parts of the interview with Mike. Mike may have modified his answers since he had a repeat interview the following day due to camera problem.

Post Interview Questions and Responses

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Which was your favorite LEGO project? Why?	Car, because work long (long? Fun?)LEGO (nodded)	Helicopter blades model that Mike built. Explained that blades go clockwise or counterclockwise on the table (blades upside down spinning on the table-because its cool!	The LEGO model hooked up with computer	Car because that is neat	First reply was LEGO (LEGO had been omitted in question so facilitator asked, "Which one?") electrical one (Facilitator pointing: "That?") motorized car hooked up with direction buttons box-because it's cool fixing
What you did learn during LEGO LOGO sessions?	Turtle and car movement both	With group (paused) help	I learned how to draw, write, hookup LEGO models with computer, how to work with Machine (transformer box), and fix/build LEGO models.	Car and turtle	LEGO and computer FD 50 RT etcetera
Did you enjoy working with group? Why or why not?	Yes! because fun	Yes-favorite group (fingerspelled) L-E-G-O L-O-G-O (facilitator asked: favorite, like what?) My favorite-help-learn with them stuff-like that	Yes, because I enjoyed it. It was fun activity.	Yes, because it's fun	Yes! Because it's a group

Post Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
In what ways does working with a group help you as opposed to working alone?	Help fixing car- don't know where to find pieces- I had to find it and found one.	Help work with Hallie	To understand how to fix better that right or wrong...	Working with Mary	The electrical- the light sensor- how it works
What are some things that you learn in a group that you cannot learn alone?	Better ideas/ways working with group	skipped	Writing something on the board- LOGO commands- type FD 50..opposite	Help (meaning getting help from others)	(long pause- appeared unsure to answer) like to do LOGO
What kind of questions do you ask group members to help you understand what to do?	How (paused, looked as if he were thinking- gave him: what, which, how)	(gave the question examples: how? why? what?)how car drive (meant how it works)	Prefer ask questions because I like to discuss how to solve problem	(gave examples- What? Why? How?-Which one as pointed to question words in interview questions) paused- appeared thinking-how?	(Inappropriate answer so rephrased and gave examples: What or which or how) quickly replied how)
Would you recommend more LEGO LOGO sessions with a group in the future? Why?	Yes! because I like more activity	Paused (Supplied options: Yes or no?) paused (asked her if she understood the question) reply tended to indicate yes (question rephrased with example) Yes! (With Group or alone?) group (Want more group activity) Yes!	YES! (didn't ask why)	Yes-because it's neat	No (Why?) different job (What do you mean different job) you know (prefer alone?) Yes! Alone! (doing things?) Yes!

Post Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
Notes	3 rd student interviewed	4 th student interviewed- When finished, Mary commented that she did her interview fast.	1 st student interviewed	5 th one interviewed- sign for neat and cool are same-lipreading used to determine which word she intended	2 nd student interviewed- Before starting, Mike signed to someone: I know that is cool! Facilitator planned for David to be next, but Mike came forward and signed, "Interview me." So facilitator told David he would be after Mike. Does he understand "group"?

Group Post Interview Questions and Responses

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
As a group, what do you think doing this LEGO LOGO? What you think? How do you feel?	fun	I think excited fun fine stuff- like-that	Fun feel excited Enjoy creative	Fun	Like to fix
You like work as group or alone? Which?	Group	Group	Group	Group	Group
Why do you like to work as a group?	For help work		Because it's fun help me fix help me understand OIC discuss right discuss ok figure out ok agreement		Work help how like-that
In a future LEGO LOGO session, what would you want to improve?			Want to improve fix creative more fix supplies movement		Don't want group prefer alone

Group Post Interview Questions and Responses, Continued

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
What about more time? Yes or no?		Asked if time for lunch			Informed Mary lunch is 11:15
(Rephrased question above- students probably confused about time) As a group, would you want more time? Yes or no?	yes	Yes	Yes, yes		YES! YES! YES!
Why would you want more time?	Fun	Fun	Fun	Fun	Fun
You would want extended time?			extended		
Notes	Blank cells indicate that no response was made by the student. At the end of the interview, the facilitator asked the group if they had any questions. No one replied. The facilitator signed, "No? Ask me. Come on. Am I a boring person?" Bruce gasped and the rest of the group smiled, then laughed. Bruce signed, "Not boring person there you go." With a chuckle, the facilitator signed, "Not tell me." All laughed. Bruce raised his hand, but the facilitator announced that the interview would be stopped since it was time for PE. They all had unhappy expressions, except Mary. Mary wanted to go to PE. The facilitator thought for a moment and, due to the flexibility the weather conditions had permitted on scheduling, the facilitator signed, "Or do you want more of that or got to PE." . All except Mary replied, "More." Mary signed, "PE." The facilitator signed, "You want more. You, Mary, PE fine." Mary convinced Hallie to change her mind and go to PE instead. The facilitator immediately informed the Elementary School Supervisor's office that the boys were staying with her. During this time, 45 minutes, David worked at the computer with LOGO. Bruce and Mike, individually, worked with LEGO LOGO and then competed some with their products.				

Appendix I
Chart of Journal Entries

Journal Session One – Monday, December 8th (written at the beginning of second session)

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
What did you learn yesterday?	Logo turtle		Yesterday logo I was in computer for logo My teacher help me type with right and right, Forward and backard I shock turtle move that cool.	I learn about The Turtle move forward, back, Left, Right.	Logo turtle move is cool.
(volunteered to write)		I will absent not here go to dr.			
NOTES:				LOGO commands were written on the white board for Mary's instruction.	

Journal Session Two – Tuesday, December 9th

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
What did you learn today?		Turtle	I learn how to be turtle walk shape name it.	about The Turtle move.	
How did you teach Mary to learn LOGO?			I Teach to mary how type backward mean walk back bk – 50 how long is it that why.	about The Turtle move around.	Fd 50 RT PO teach Mary
NOTES:	He left question mark and didn't even try to answer the questions				Drew how turtle being commanded as wrote Rt 90 fd 50

Journal Session Three – Wednesday, December 10th

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
How did you help your group to complete the assignment?	Car and make.	Make drive more and buttn.	Mike and I, We are team fix lego make car well soon to race car but time for stop because it 4:00 I need leave. To be tomorrow	We mak car move	I like group help!!! I fix Lego !! ~ The End

Journal Session Four – Thursday, December 11th

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
What you do today?	But I finish my car.	Day made car my help you bruce and Mary & Hallie.	I fix Lego car then I finish fix it, well my teacher save for tomorrow Logo. But she want me help two girl can't fix it. so I help Hallie, mary need it. she say to time stop 3:15 now.	I fix The Car stuff to put in the box Hallie & bruce and Mary Make The Car	I like fix Lego. I fix but not work. I will fix later

Journal Session Five – Friday, December 12th

Questions	David's Responses	Mary's Responses	Bruce's Responses	Hallie's Responses	Mike's Responses
What you do today?	I have a light for my car?	I you do you hallie of make works. Car.	David and I help with Mike. Fix of Lego rise machine. So I write Wall borad with Logo command. But Mike type with memory Fd-50 and Rt-90 square. Lego of the Rise machine match with computer so I ask my teacher match light with Lego of the rise machine. Light on bright teacher saw. The End	We learn about the car and Tutle move in the computer	I like lego Write logo comoands computer !! I cool Lego fix Bye !! ~
NOTES:			Bruce was the only person who wrote the question in his journal. The question wasn't written on the board but signed by the facilitator.		

Appendix J
Photographs Taken during Sessions



Figure J-1. Battery Illustration



Figure J-2. LEGO Box



Figure J-3. Completed Model



Figure J-4. Direction Module

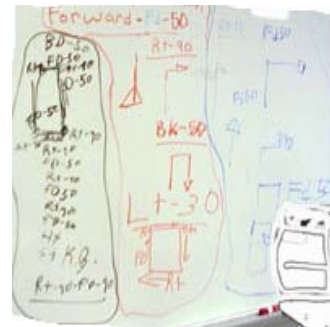


Figure J-5. LOGO Commands:
Sample of Student Work

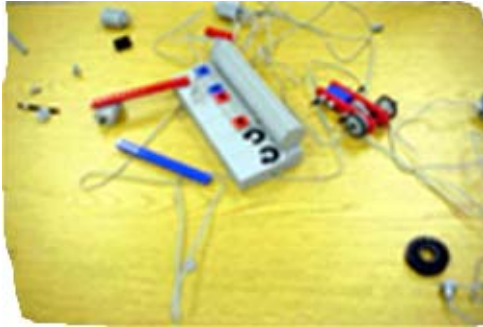


Figure J-6. Model Ready for Action

VITA

Amy Rebecca McDaniel was born in Moncks Corner, South Carolina on October 7, 1964. She attended a speech school in Atlanta, Georgia, and elementary and middle schools in Marietta, Georgia. She graduated with honors from Joseph Wheeler High School in Marietta, Georgia in June, 1983. In September 1983, she entered the University of Georgia in Athens, Georgia. In January, 1985, she transferred to Maryville College in Maryville, Tennessee. In fall of 1986, she returned to the University of Georgia where she received a Bachelor of Science Degree in Mathematics Education in August, 1988. In this same month, she began study at the University of Tennessee toward a Master of Science degree in Special Education, with an emphasis in Deaf Education. She completed this degree in May 1990. Being a deaf teacher for three years at Missouri School for the deaf and seven years at Cobb County Public Schools and having experiences in both settings of residential and public schools, she had desires to interweave technological aspects within the education for deaf students. Returning to the campus of University of Tennessee- Knoxville in winter of 2000, she began her studies in Instructional Technology Curriculum Evaluation for a doctoral degree.

The author is a member of Kappa Delta Pi and Council of American Instructors of the Deaf.