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ABSTRACT

This study investigated the collaborative interactions of junior high school boys (N=36) with learning disabilities while engaged in writing stories using a word processor. Half the subjects were of Anglo-American background and half of Mexican-American background. Each subject worked in two dyads, ethnically homogeneous and ethnically heterogeneous. The writing process for each dyad was videotaped. Results indicated that individual characteristics such as writing achievement scores, keyboard proficiency, and ethnicity did not predict the levels of involvement in such writing processes as idea generation, goal monitoring, or editing. Nor did these characteristics predict writing quality. Stories written during draft sessions were generally shorter in length, but equivalent in quality to stories after editing sessions. There was an interaction effect between dyad type and instructional condition (either traditional or contextualized). Specifically, homogeneous Mexican-American and heterogeneous dyads tended to produce more modifier propositions under contextualized instructions, while homogeneous Anglo-American dyads produced more modifier propositions under the traditional instruction. (Approximately 110 references) (DB)

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Comparison of Writing Instructional Methods on Computer-Based Cooperative Learning for Mild Learning Disabled, Linguistic Minority and Non-Minority Junior High School Students

U.S. Department of Education Grant Project

GOO8730281

FINAL REPORT

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April 1, 1989

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ABSTRACT

Comparison of Writing Instructional Approaches on Microcomputer-based Collaborative Writing by Learning Disabled, Linguistic Minority and Non-Minority Junior High School Students

This study investigated the collaborative interactions of junior high school boys with learning disabilities while engaged in writing stories using a word processor. Throughout a twelve week period, each of 36 boys, 18 of Anglo-American background and 18 of Mexican-American background, worked with two different partners comprising 18 ethnically homogeneous and 18 ethnically heterogeneous dyads whose productivity and writing process interactions were studied. All dyads were instructed to write newspaper format stories in response to two types of instructions representing traditional writing instruction and contextualized writing instruction. A sequence of 24 writing sessions for each dyad were videotaped for purposes of collecting writing process data and stories were printed for purposes of collecting writing product data. Results indicated that individual characteristics such as writing achievement scores, keyboard proficiency, and ethnicity did not predict the levels of involvement in writing processes such as, idea generation, goal monitoring, typing, or editing behaviors. Nor did these characteristics predict quality of written products. Stories written during draft sessions were generally shorter in length, but equivalent in quality in comparison to stories after editing sessions.

Attempts to differentiate effects of types of instructions did not result in quantitative differences, although improved spelling was evidenced under the traditional condition of instruction. There was an interaction effect, however, between dyad type and instructional condition. Specifically, homogeneous Mexican-American and heterogeneous dyads tended to produce more modifier propositions under contextualized instructions, while homogeneous Anglo-American dyads produced more modifier propositions under the traditional instructions. This would suggest that when Hispanic students are permitted to select their own topics, they are more willing to use language which is beyond their mechanical abilities and that Anglo-American students experience this freedom in use of language within a more structured, defined context. The implications of the study are discussed in terms of writing instructional needs of LD students and the potential of collaborative writing with microcomputers.

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Chapter 1

Introduction

Of growing concern in the area of special education, is the disproportionate numbers of children from linguistic minority backgrounds. Being a relatively new field, "Bilingual Special Education" researchers seek to understand the interactional effects of being both learning disabled (LD) and having limited English proficiency (LEP) (or one who speaks and/or hears a language other than English in the home). It cannot be expected that a mere summation of LD characteristics and characteristics of second language learning and/or cross-cultural school and family descriptions will sufficiently guide instruction for these pupils. Indeed there is an interactional effect not only within the individual as a result of his/her unique cognitive and linguistic development, but also among students who are similarly classified as "bilingual" and "LD" by their teachers. This latter interaction results from joint effects of individual students' cognitive, linguistic, and social characteristics and those of his/her peers and teachers. Teachers continually use each student's written and oral demonstrations of language facility as approximate indicators of learning ability to formulate both ongoing evaluations and instructional plans. However, teachers often are less aware of potential effects on performance that result from differences in instructional context.

Educational anthropologists offer numerous descriptions of the subtleties involved in daily student-teacher and student-student social interaction and the (hypothesized) implications of these for successful learning. However, few researchers have actually observed these cross-cultural interactional effects in the special education context and documented their outcome in terms of academic gains.

Cooperative learning research, for example provides a general orientation for understanding the effects of context on social interactions as well as cognitive development in academic settings. To date, the majority of cooperative learning studies, have involved comparisons of cooperative and "traditional" class structures in terms of attitudinal changes and academic achievement measures during periods of several days to several weeks (e.g., Johnson & Johnson, 1985). Others have noted the effects of specific types of social responses on achievement during cooperative work. For example, Webb (1985) found postive effects for giving and receiving explanations and negative effects of receiving terminal responses or no responses.

The ability to explain or write information on a particular theme or topic is crucial for both elementary and junior high school children not only because it influences teacher judgements, but also because writing is a critical tool for learning. But before writing becomes a useful tool, students not only need to know conventions of spacing, spelling, and syntax, they also must develop sensitivity to appropriate text structures, leading to accurate and efficient prediction or organization of textual propositions on the basis of each student's unique knowledge of and interest in the topic (Thomas, Englert, & Gregg, 1987).

Traditionally writing was seen as an ability which students acquired as their language skills developed. Writing was perceived as requiring no specific instruction beyond the presenting of models of written products which were to guide the student in completing assignments; it was generally assumed that this was sufficient instruction and written products were then evaluated relative to the model. Teachers of writing therefore were not guided by a theory of writing processes, but rather looked upon writing as an expressive extension of language development. Having but the written products as a base for evaluation, instruction has been centered around correcting the mechanical aspects of the students' writing. As deficiencies were noted in the area of spelling, syntax, and punctuation, these became the emphasis of writing instruction and indeed the writing curriculum. With the reduction of the writing into its parts, sight of the "whole" writing process as a means of communicating, has been lost. In the last two decades, the field of writing research and instruction has received increasing amounts of attention, particularly for poorly achieving students. Moreover, there has been a steady movement away from a product-oriented curriculum to greater emphasis on the processes involved in writing.

Through the use of think-aloud protocol analyses during the composing process, researchers have uncovered underlying cognitive processes which may guide writing (eg. Hayes & Flower, 1980; Bereiter & Scardamalia, 1984). Concurrently, practitioners (eg., Graves, 1978) have developed techniques for improving composition skills by emphasizing the importance of pre-writing idea generation and involvement of students in the editing aspects, all contributing to further de-emphasis on the mechanics as the core of instruction.

Special education has also seen a parallel increase of emphasis on writing research (Poplin, 1983) and researchers have begun to look more carefully at the effects of LD students' characteristics on their apparent writing difficulties. In general, LD children have been described as less fluent and less competent in written communication and in their awareness of the social purpose of writing, and specifically, deficient in generation of ideas and knowledge of text structures, and highly dependent on external monitoring of their writing (Englert, Raphael, Anderson, Anthony, Fear, & Gregg, 1988). Still, more research is needed to identify effective means of delivering instruction to LD students with these performance characteristics.

The use of wordprocessors facilitates cooperative writing because of the shared learning environment in which students are able to jointly participate in the writing activity. Moreover, microcomputers allow segmentation of the writing process into discrete compontents which are useful for experimental measure.

There are unique characteristics of students who are both bilingual or LEP and have learning disabilites. The effects of these characteristics on patterns of interaction both among and between students and their teachers are hypothesized to effect both the processes and products of learning and how these are perceived and evaluated by teachers. As students advance through their academic careers, their abilities to comprehend and produce written text become increasingly important. Therefore, understanding these learning processes in the context of producing written text is crucial to our development of more effective instructional methods.

In the present study, cross-cultural social interaction is examined among learning disabled students of Anglo and Hispanic backgrounds in the context of a collaborative writing task. Social interaction pertaining to writing processes as well as writing products are examined for evidence of fluency, mechanical accuracy, and coherence. The relationship between process and product variables are explored to determine if particular patterns of sharing or dividing of subtasks are more likely than others to result in written text that is qualitatively and quantitatively better.

Definitions

1. "Anglo" is used in referring to Anglo-American (white) students. These students' first language is English, they are therefore fluent English, not only for basic interpersonal communication, but also in their cognitive and academic domains (Cummins, 1984).

2. "Hispanic" in this study, refers to students who are Mexican-American (white) and whose first language is Spanish. Often, Spanish is the language spoken in their homes and their parents were born in Mexico. Although all of the participants in this study have been "tested" and found to be "fluent English proficient" (FEP), degrees of fluency and bilinguality are not equivalent among the individuals. It is also possible that not all of these students are fluent English in cognitive and academic domains.

3. For purposes of maintaining the schools anonymous, they have been designated as schools B, C, G, L, M, and S.

Delimitations

1. The study did not compare the use of microcomputers to any other mode of writing.

2. A comparison of individual and dyad performance was not conducted.

3. Learning Disabled students were not compared to non-LD students.

4. Only boys were included in the study due to availability of students.

5. Social interaction was observed only in terms of writing processes.

Chapter Two

Review of Related Literature

Cross cultural instruction and student interaction

Some researchers have observed that there is often a noticeable discrepancy between school-based experiences and everyday experiences for language minority students and that this often causes difficulties at school. For example, Au & Jordan (1981) have described how cultural discourse conventions of native Hawaiian children conflict with the norms of "standard" public school talk. Also, Phillips (1972) has documented the discrepancy between "standard" teaching practices and the accepted norms of out-of-school teaching and learning of native American children. For example, knowledge is acquired by silent observation of a more competent adult, and that knowledge is demonstrated only when the child feels mastery. It is clear that these and other examples point to a lack of unity between the in-school and out-of-school experiences for many students.

Recently, theoretical developments related to both teaching and learning have begun to take into account the important connection between the learner's perspective, or subjective understanding of a given task or problem, and the successful learning. Specifically, increasing attention is being paid to the necessity of making learning activities and experiences individually "meaningful" in order for learning to occur. This is especially encouraging in the case of language minority students with learning handicaps, given the observations noted above and seems to be a logical use for cooperative learning structures.

Those who have observed students teaching students have found that peers make suggestions, model, and demonstrate activities which have been previously presented by the teacher (e.g., Steinberg & Cazden, 1979; Riel, 1982). Contrary to popular belief, the students do move beyond off-task socializing to the cognitive task. Pairs of students involved in creating stories with interactive software turned their emphasis from negotiating turn-taking to negotiating story content after only three stories (Mehan, Moll, Riel, 1985). Thus, after establishing a working relationship, they were able to concentrate on the cognitive demands of the situation and focus on creating the story. These are illustrations of how particular dimensions of the learning task in the classroom are defined by the teacher and strongly influence the behavior of the students and their consequent performance on cognitive and academic tasks (also see Mohatt & Erickson, 1981; Au & Jordan, 1981; Van Ness, 1981).

Cooperative Education

Cooperative instruction has been researched extensively. Research focusing on academic outcomes of cooperative learning and LD children however, is very limited (Lloyd, Crowley, Kohler, & Strain, 1988). An overview of those findings provides a broad basis for understanding what might occur in a cooperative microcomputer-based writing session. In this subsection, a brief review of cooperative learning research is presented including popular hypotheses that describe the relationship between underlying characteristics of cooperative learning structures and the positive results which are reported in the majority of the studies.

Cooperative learning strategies that divide an entire class of students into small teams of interdependent members have been found to be consistently more successful than individual learning strategies for improving academic achievement, interethnic relations, and prosocial development (Webb, 1982; Kagan, Zahn, Widaman, Schwarewold, & Tyrrell, 1985; Slavin, 1980).

In a meta-analysis of 122 studies conducted between 1924 and 1981, Johnson, Maruyama, Johnson, Nelson, and Skon (1981) found that cooperative learning experiences tend to promote higher achievement than do competitive and individualistic learning experiences. They reported that the average individual working in a cooperative learning situation achieved at the 80th percentile when compared to the students working in competitive or individualistic settings. These findings were consistent across all age levels and subject areas. Interpersonal attraction among students homogeneously achieving, of different ethnicity groups, and between handicapped and non-handicapped students was the subject of a similar study by Johnson, Johnson, and Maruyama (1983). Based on a meta-analysis of 98 studies conducted between 1944 and 1982, the authors found support for the proposition that cooperative learning promotes greater interpersonal attraction among these groups when compared to the more traditional competitive or individualistic structures.

Johnson & Johnson (1985) described a 10 year program of research which they have systematically developed with their colleagues in trying to identify the variables which produce positive outcomes in cooperative learning groups. Their research consists of "well-controlled", "field-experimental studies in actual classrooms and schools" where variables are carefully controlled, for example, by providing teacher training in cooperative learning, using the same curriculum for all comparison groups, and defining the conditions precisely. Of 26 studies that included achievement data, in 21 of these, cooperative learning promoted higher achievement, 2 had mixed results, and 3 showed no differences among the structural conditions. Thirteen studies which measured the academic achievement of "academically handicapped" students were reviewed. Cooperative learning structures were found to produce higher levels of achievement when compared to the other conditions in 12 of these studies; 1 study resulted in no differences. Finally, of 37 studies in which interpersonal attraction data was collected, 35 demonstrated positive effects for working in cooperative settings while 2 of the studies had mixed results.

After extensive study of cooperative, competitive, and individualistic motives in children (e.g. Kagan, 1977), researchers have focussed on modifying reward and task structures to accommodate preferences. In a recent study, Kagan and his colleagues (Kagan, et al., 1985) describe the structural bias that is inherent in most classrooms' task and reward structures by various individuals and ethnic groups such that they are not actually receiving the same "reward" for their achievement. According to the structural bias hypothesis, for example, if achievement is synonymous to "winning" in a competitive social comparison situation, those who place the higher value on this type of reward structure, i.e., winning, will be more motivated to achieve (Kagan, 1980).

The Riverside Cooperative Learning Project is a program that involved training teachers in cooperative learning theory and techniques, and evaluated the impact of the training on the teachers and students (Kagan, et al., 1985). The study involved 900 elementary school children (66% Anglo, 20% Mexican-American, and 13% Black) who were taught spelling for 1 hour daily for a period of 6 weeks under either a cooperative, competitive or an individualistic learning structure. A second group consisted of 250 high school students (60% Anglo, 25% Black, and 15% Mexican-American). Measures were taken on variables including academic achievement, cross-race social relations, self-esteem, prosocial development, and attitudes toward cooperative, competitive, and individualistic work.

The investigators reported overall support for the structural bias hypothesis. In the area of academic achievement, ethnic group X classroom structure effects were observed. While Black students performed optimally in the cooperative learning structure, the Anglo students had larger gains in the competitive structure. Mexican-American students were also included in the study. According to the attitude measures used to assess cooperative, competitive, and individualistic motives, however, they were not found to be more cooperative than the Anglo students. The authors attribute these effects to the subjects' level of acculturation, which has been shown to vary with cooperative/competitive motives in previous research (Knight & Kagan, 1977).

Kagan and his colleagues conclude that contrary to traditional beliefs that achievement lags of Black and Mexican-American students are due to intelligence or linguistic factors, their study provides strong evidence to a "context-bound explanation of the dynamics of underachievement" and offer that a transformation of the social organization of the classroom can overcome some of the differences in achievement gains. That is, because the use of intensely competitive elements can have negative effects on achievement, classroom climate, self-concept, and race relations, students coming into the schools with a variety of social values, should be taught within a variety of reward and task structures.

Other studies have demonstrated that Black and Mexican-American students perform significantly better within a cooperative classroom structure than in the traditional classroom method. Briefly, Aronson, Blaney, Stephan, Siker, and Snapp (1978) found that the Anglo students achieved equally well in competitive and cooperative classrooms, while Black and Mexican-American students performed much better in cooperative settings. Slavin and Oickle (1981) investigated treatment X race interactions in ten integrated English classes which consisted of 34% Black and 66% Anglo students. Four of the classrooms used cooperative learning groups while the other six used the traditional methods. There was a slight gain in both settings by the Anglo students. However, the Black students, who showed nonsignificant gains in the traditional setting, showed approximately twice the gains of any other group in the cooperative setting. In the light of such findings, Johnson and Johnson (1985) allude that perhaps cooperative goal structures are most appropriate given that the research documents that all children do as well or better under these conditions.

Reasons for the effectiveness of cooperative learning reward and task structures remain varied and inconclusive. Several possible explanations for the apparent effectiveness of cooperative learning have been proposed (Johnson & Johnson, 1985; Kagan, et al., 1985). It has been proposed by some that positive results are due to increased time on task (e.g., Kagan, et al., 1985). In their review, Johnson and Johnson (1985) reported that of 6 studies that were identified for having collected time on task data, 2 reported more under the cooperative setting and 4 showed no differences. Simple measuring of time on task without specifically assessing the quality of that time and/or amounts of time spent interacting (e.g., Johnson, 1979) however, has been noted to be a probable cause for these mixed findings (Webb, 1985). Kagan also notes, in very general terms, that "increased amounts of comprehensible input and output" among students during interactions may contribute to the positive effects of cooperative structures. Johnson and Johnson (1985) have suggested, among other reasons, that the feelings of peer support and encouragement may lead to these positive results.

Some have attempted to gain a clearer understanding of the types of interaction in which the children participate by defining the giving and receiving of information during small group work (Peterson & Janicki, 1979; Peterson, Janicki, & Swing, 1981). These researchers have distinguished the giving and receiving of conceptual sequencing explanations, directions, and terminal answers. Some positive relations have been found between the giving and receiving of explanations and achievement (Swing & Peterson, 1982) however, findings are inconsistent across ability levels with low ability students tending to benefit most from giving explanations.

In the light of this research, Webb (1985) reviewed findings through a series of studies with junior and senior high school students in math, each for a duration of 1 to 3 weeks. After collecting achievement, intelligence, and personality data on each of the students, the students were observed by means of direct observation in 2 of the studies and with use of video taping in the remaining 3 studies. In all 5 studies, measures of non-specific interactions were not related to measures of achievement while the giving of explanations consistently and positively related to achievement. The giving of terminal responses tended not to be related to achievement while the receiving of terminal responses was negatively related to achievement.

Webb (1985) concludes that previous studies which assessed amounts of nonspecific interaction were actually measuring a combination of the positive effects of giving and receiving explanation and the negative effects of receiving terminal or no responses. She describes the student interaction patterns that affect learning as having three components: input (individual and group characteristics), process (interaction), and outcome (achievement). Webb notes that in most cooperative learning research specific measures of student interaction have not been used; typically opting for measures of isolated behaviors rather than sequences of interaction among students and suggests that without the use of videotape observation, it is very difficult to capture the sequences of interaction among group members, especially when a request and its response are separated by time or by other interaction.

During the peer interaction that occurs in a learning task, a cooperative structure is likely to produce more oral rehearsal of information (Johnson & Johnson, 1985) and indeed, "teaching" to one another. The benefits of these and of receiving instruction from peers have not been adequately explained. The value of this type of co-teaching and learning, is congruent with Piaget's (1954) notion that the act of verbalizing leads to cognitive restructuring on the part of those involved. Incorporation of different understandings or interpretations of a particular topic causes cognitive conflict which in turn is resolved by considering the others' interpretation (accommodation) and reconstructing one's own understanding (assimilation). Students who are instructed to learn material for the purpose of teaching others have been noted to learn more than those instructed to learn the material for themselves (Bargh & Schul, 1980).

A more cognitively-based interpretation for the positive effects of social interaction is needed in order to fully understand the effects of the socially-defined context of the learning which is occurring. If students are given the responsibility for the mastery of given facts, concepts or procedures by themselves and by those in his/her group, (the typical cooperative education scenario), it is likely that a transferring of information from an interpsychological to an intrapsychological plane (see Vygotsky, 1962) will only be more clearly evident. That is, if social interaction is viewed as a problem-solving activity in a cooperative educational context, students are permitted access to alternative modes of comprehending what is being presented beyond the teacher's "lecture". Students, though not necessarily consciously, are perhaps more likely to assess one another's level of mastery, particularly if the group member needing further assistance is willing and able to openly acknowledge this need.

The disparity of evidence between the cooperative strategies and the positive outcomes begs for a closer analysis of the actual processes of learning which are apparently being affected by the interactions.

Writing theory and intervention

In reviewing theoretical and intervention research in the subject area of writing, two general orientations emerge under which the majority of these may be subsumed. One views the writing process as transcription while another views the process as composition. Composition refers to the act of writing for purposes of communicating and, to varying degrees, takes into consideration the audience to which it is directed. Transcription is more concerned with the "mechanics" of writing including the psycho-motor actions involved, punctuation and spelling rule applications, and use of appropriate syntax. While both composition and transcription are vital components of successful writing, classroom instruction has historically emphasized transcription (Sherwin, 1969). Research and instruction generally follow these two orientations with corresponding emphasis on the writing processes or on the writing products, respectively.

Models of writing processes generally consist of prewriting, writing, and postwriting phases (Isaacson, 1987). For many years, special education researchers believed that the ability to write followed the development of oral language and reading (Poplin, 1983). This theory, originally developed by Myklebust, is outlined in the following figure:

Development of Language

	Age
Inner Language (integration of word and experience)	2 yrs.
Auditory Receptive Language	2+

(comprehension)	4 yrs.
Auditory Expressive Language (utterance)	5 yrs.
	5+
Visual Receptive Language (reading)	6 yrs.
Visual Expressive Language (writing)	7 yrs.
	8 yrs.

(Myklebust, 1973)

This theory has been severely criticized in the last several years by developmental theorists and by writing researchers (Poplin, 1983) who have begun to demonstrate that oral language, reading and writing develop in an overlapping, simultaneous manner and that these abilities reinforce each other as they emerge.

Through the use of protocol analysis, Hayes and Flower (1980) generated a model to describe the writing process. Their model is not a stage model that views writing as a linear process (e.g. Myers, 1978), but rather a model that describes an overlapping and recursive set of subprocesses consisting of planning, translating and reviewing (Hayes & Flower, 1980). Planning consists of generating ideas, organizing and grouping ideas, and setting goals for presentation. Translating entails the subprocesses of taking material from memory under the writing plan and transforming it into acceptable sentences. Vygotsky (1962) described this as a phase of translating "sense-saturated," subjectless meanings into explicit, elaborated written language. Hayes & Flower (1980) assume that information is stored as propositions; i.e., concepts, relations, attributes, and images that must be transformed into sentences that are mechanically correct and understood by the reader. Reviewing consists of editing to detect and correct violations in writing conventions and inaccuracies of meaning and to evaluate materials with respect to the writing goals.

Flower and Hayes (1980) describe the writing process as a "juggling" of the demands on attention and on the constraints of what can be done similar to the way a switchboard operator might function. This control is orchestrated by metacognitive functions such as self-instructions, choosing of alternative strategies, monitoring performance, and modifying or correcting performance; all within the limits of the short term memory. While acknowledging the limits of protocol analysis in capturing the full range of the mental processes which transpire within the task environment (the writer's long term memory and knowledge of the writing process), the authors suggest that this model may serve as a guide to the diagnosis of writing difficulties and provide a framework for planning instruction.

Others such as Smith (1982) have described the writing process as the coordination of functions between the "secretary" and "author" within each individual. The author takes charge of generating ideas, setting goals and evaluating and monitoring those goals while the secretary assures that spelling, punctuation, spacing and syntax conventions are adhered to. His analogy emphasizes the range of cognitive tasks that are necessary for effective writing.

In their examination of poor writing, Bereiter and Scardamalia (1984) concluded that at least two chunks of information must be maintained in the short term memory to prevent redundant and unclear compositions: the structure and intent of the whole text and the previous sentence.

While each of the above articulate the writing process in different terms, they all concur that the writing process entails managing several subprocesses within the short term memory and that writing is not a procedure divided into discrete stages, but rather a recursive process.

Assessment and nature of writing problems of LD students

Until 1978, the Picture Story Language Test (PSLT) (1965) was the only formal test available for assessing the written language abilities of LD children. Using a picture of a young playing child as a stimulus for writing a story, the PSLT provided measures of productivity, syntax, and abstractness. Poteet (1978) compared the stories elicited by the PSLT to those produced in response to alternative stimuli and found that a teacher-chosen picture elicited more words than any of the other stimuli.

The Test of Written Language (TOWL) (1983) was developed by Hammill and Larsen for measuring written language performance. Measures of vocabulary and thematic maturity are provided in addition to the measures of syntax, spelling, productivity, handwriting, punctuation, and capitalization. The test is designed to elicit responses and writing samples both by means of contrived and spontaneous formats. For the subtest of vocabulary, thematic maturity, and handwriting, the student is given an answer booklet containing three "space-theme" pictures. The examinee is instructed to write a story using all three pictures. While the PSLT has been heavily criticized for its outdated stimulus picture (Poteet, 1978) and for significant reliability and validity deficiencies (Anastosiow, 1972; Wallace and Larsen, 1978), the TOWL as a formal test of written expression, satisfies the criteria for standardization, reliability, and validity (Salvia & Ysseldyke, 1981).

Prior to the development of research which actually described the written communication skills of children with learning disabilities, several studies compared the writing of LD and non-LD students. Perhaps the first of these were reported by Myklebust (1973). Using the PSLT, which he had designed to "study the development and disorders of written language", Myklebust compared the stories of LD and non-LD children. Significantly lower scores were obtained by the LD children in syntax, ideation, total number of words, and in number of words per sentence. Those children judged as moderately disabled demonstrated the highest degree of difference on measures of syntax, while those considered severely disabled were most deficient in ideation. "Dyslexic" children differed primarily on productivity measures (number of sentences and words) and no differences were found on measures of ideation.

Poteet (1978) described the characteristics of LD and non-LD children using the PSLT. Both oral and written language samples were collected from 85 LD and 124 non-LD students. LD children spoke a median level of 56 words, 6 1/2 sentences and used 3 times as many words orally as they did when they wrote; they also used more words per sentence orally. Syntax errors by the LD children were generally additions in oral language and omissions in written language. On the other hand, non-LD students wrote over twice as many words and sentences as the LD students, but had similar percentages of types of errors with the exception of more punctuation errors by the LD students.

While maintaining the comparative format in their study, Poplin, Gray, Larsen, Banikowski, and Mehring (1980) more systematically compared 99 LD children to 99 non-LD children in grades 3-4, 5-6, and 7-8 using the TCWL (Hammill and Larsen, 1978) Results of comparisons indicated significantly lower written expression skills by the LD children. More specifically, as the grades of the students increased, the differences became greater: in the 3-4 group there were differences on all subtest scores except the vocabulary and thematic maturity; in the 5-6 group differences were in all except the vocabulary; and among the 7-8 students, there were significant differences in all of the subtest scores. It was also noted that for all grades, the LD students were within 1 S.D. of the mean of the respective norming group on both vocabulary and thematic maturity and were at least 1 S.D. below their norm group mean in spelling. Finally, the LD students, as a whole, performed better on the subtests which utilized the spontaneous than the contrived format.

Spelling was the only distinguishing variable between LD and low-achieving students in a study completed by Moran (1981). Using a paragraph writing task and scoring for adherence to conventions such as syntax, punctuation, and spelling, and by counting the mean morphemes per thought unit (MMTU), Moran compared 26 LD to 26 low achieving seventh through tenth grade students. The low achieving students performed significantly better than the LD students only on spelling and while they scored better on the percentage of correct use of conventions, these differences were not statistically significant.

Among the first studies conducted to describe the characteristics of and the problems which LD childrer encounter in written language, was a study by Wong and Wilson (1984). By presenting 28 LD and 18 non-LD, 5th, 6th, and 7th grade children with organized and disorganized written passages (organized first) and asking them to recall what they had read, Wong and Wilson were able to obtain a more qualitative understanding of the problems encountered by LD students when reading and writing paragraphs. Upon completion of the disorganized passage recall task, the students were asked to describe how the two passages differed in the form of prompts which suggested differences in the way the passages were organized. Each was also asked to identify which passage was most difficult and to explain the choice. Although both groups tended to focus on aspects such as sentence length, decoding, and vocabulary difficulty as determinants of passage difficulty, when asked to organize a disorganized passage in the second phase of the study, LD children had more difficulties than the non-LD children. Based on these findings, the investigators concluded that LD children are much less aware of what constitutes an organized paragraph and require specific remediation in this area. Given this lack of understanding of passage organization, Thomas, Englert, and Gregg have suggested that the "writing process must appear chaotic, and driven by an associative, knowledge-telling process" (pg. 21) which results in a tendency to write in an associative, sequential manner instead of a goal motivated, related order (Bereiter & Scardamalia, 1984).

Based on these findings and Bereiter and Scardamalia's (1984) contention that successful writing requires holding in memory the structure and intent of the text and the previous sentence, Thomas, Englert, and Gregg (1987) conducted a study to examine the types of errors committed and the strategies utilized by two age groups of LD and non-LD students engaged in expository composition. Three groups of 36 students each (LD, LD matched on I.Q. and reading ability, and normally achieving) were provided with paragraph stems of 2 sentences each and asked to complete the paragraph. The paragraph stems were representative of four distinct types of text structures: enumeration, comparison/contrast, sequence, and description. Students' paragraphs were scored as correct or incorrect according to the content and format of the production. Results demonstrated greater numbers of redundancies, early terminations, mechanical errors, and irrelevancies in text produced by the LD and LD-matched groups. They experienced most difficulties with the comparison/contrast text structure and the enumeration structure was the least difficult. Although the LD children did tend to use knowledge-telling strategies, they lacked goal related planning and relied heavily on serial production. The authors concur with Bereiter and Scardamalia's contention that these deficiencies are due to the LD child's use of the knowledge-telling strategy (1983). It was also noted that the majority of the older LD students' errors were attributable to the use of fragment sentences as they seemed to approach writing as a question/answer exercise. One can infer that this is due to the methods by which writing is taught in the classroom.

In another study, Gregg, Raphael, and Englert (1987) tested the effects of knowledge of text structure on comprehension and composition of text. Low achieving, normally achieving, and LD fourth and fifth grade students were compared on their ability to recall a comparison/contrast and an explanation passage as a measure of reading comprehension. To assess their writing composition, they were asked to compose a comparison/contrast and an explanation paper. As predicted, LD students produced more poorly organized compositions and were weaker in abilities to recall and summarize text previously read when compared to low achieving and normally achieving students. In writing, their difficulties seemed to center around the construction of a well organized set of ideas and in sustaining the expository writing. The researchers attribute the problems to deficiencies in metacognitive skills which are needed to impose and to use organizational frameworks in generating ideas and monitoring the text.

Others have begun to explore approaches in teaching and remediating the writing skills of LD children. The use of self-instructional strategies training (Harris & Graham, 1985; Graham & Harris, 1986; Graham & MacArthur, 1986) has proven to be promising in the improvement of the composition skills of 5th and 6th grade LD students. Based on the CBM training (Meichenbaum, 1977), self-regulation and metacognitive training (Brown, Campione, & Day, 1981), and on the learning strategies model (Deshler, Alley, Warner, & Schumaker, 1981), students were taught a series of self-directed prompts for planning and promoting the generation of elements in short stories (e.g., main character, setting, goals, outcome, reaction to consequences) (Graham & Harris, 1986). Results were an increase in the number and variety of story elements.

In another study (Graham & MacArthur, 1986) students were taught a strategy for revising essays which were composed with wordprocessors. This strategy consisted of a series of self-directed prompts for revising. Use of these strategies resulted in 2 to 5 times as many revisions and essays twice as long as what had been previously observed. The key to the success of this program was attributed to the emphasis on the teaching of task-specific skills and metacognitive strategies (Graham & Harris, 1987).

In summary, LD students' writing skills can be characterized as lacking in use of appropriate text structures for prescribed formats, though they fare better when asked to perform in a spontaneous writing format. Generally they are deficient in the metacognitive skills needed for monitoring of the subprocesses involved in producing coherent text and consequently tend to write in a linear and associative manner. Finally, although younger LD children as a group do not apparently differ substantially from their non-LD cohorts, except for in spelling, by the time that they reach junior high school, they lag in all areas of mechanics and use of text structures.

Writing Instruction

Although writing is one of the more complex cognitive processes for mildly handicapped students to master, insufficient attention is given to writing in the curriculum. According to a study conducted in 1980, Learning Disabled (LD) students spend less than one half hour per day writing and 75% of that time is spent copying (Cooley, 1980) This is thought to be largely due to the misconception that writing does not need to be taught directly and that it should be taught only after reading has been mastered.

Language arts specialists disagree on the benefits of these "indirect" approaches to teaching writing skills through reading, grammar, and oral language development. There is little to support the contention that teaching grammar rules significantly effects oral or written language development and in fact, students in programs emphasizing mechanics and grammar make lower quality gains in writing than do students receiving instruction in which mechanics and grammar are considered irrelevant (Hillocks, 1984). More "direct" approaches have been suggested by others such as Graves (1978) who proposes a "think it, write it" approach. He emphasizes the idea generation subprocesses which are involved in prewriting and writing, with minimal attention directed toward the mechanics and editing during the initial draft. He is also an advocate of letting children select their own topics. Graves' work is predominantly based on his personal experiences in the classroom and in training of language arts teachers and although quite extensive, his work has not been empirically documented.

Instructional practices, particularly in special education settings, have been dominated for some time by: "bottom-up" part-to-whole methods; "transmission from teacher to child" method of instruction (Cummins, 1986); and reliance on teacher-defined activities which often come from commercially developed standardized curriculum packages (LCHC, 1982). Writing activities, particularly for the handicapped student are predominantly assigned by the teacher either in the form of exercises or topic sentences for essay writing with little or no student participation in defining the goals and purpose of the composition or in the editing process. Given this type of instructional approach, many handicapped students become lost in the mechanics and required content and experience great difficulty in realizing the purpose of writing as a meaningful, communicative activity. The student's understanding of the activity given these types of practices is often manifested as a goal to complete the task for reasons other than the intent of the teacher and they are observed to be "spelling words correctly for teacher approval" or "making the letters correctly" (LCHC, 1982). Thus, they tend to write within "safe" limits of their vocabulary, spelling, and structure knowledge.

Recent work on writing has begun to focus on the active involvement of the learner and especially on incorporating the student's perspective of what is "meaningful" in writing activities (Edelsky, Draper, and Smith, 1983; Mehan, Moll, & Riel, 1985; Shuy, 1981). This is particularly important for handicapped students who often lack motivation to engage in teacher-defined tasks.

One approach to make writing a "meaningful" activity for handicapped students has been to incorporate an old idea (Johnson, 1967; Nelson, 1965) of allowing children to select their own topics. This makes it easier for the child to establish a connection between the current writing activity and their personal experiences. Riel (1985) has focused on creating "functional learning environments" where there is a clear purpose for writing, i.e., communicating with other classrooms through computer links or creating local newspapers. These have been met with very positive results in terms of the children's writing skills and their standardized test scores in the language arts area. Recently, Rueda (1986) described the use of dialogue journals with LD students and teachers communicating through use of microcomputers. The teachers tended not to request academic information, give directives, or evaluate, instead opting for "personalization" of input, more characteristic of everyday communicative settings. This type of personalization was correlated with student responses that extended the "topic chain", sequences of interaction around a single topic.

In summary, writing has historically been ignored as a vital part of the curriculum and when it has been taught, generally it has been reduced to a series of exercises which emphasize transcription aspects of writing. Students, especially those in special education classrooms, are not usually instructed in pre-writing and post-writing activities. Recent trends emphasize the providing of students with opportunities to define their own topics and are encouraging them to write for particular audiences. It is expected that giving students the opportunity to define topics promotes the idea generation by facilitating the connection between the writing activity and the child's previous knowledge base. Finally, and more basic, LD students must be given the time to write. If such an important skill for future success in school and in the community as writing is to be taught, it must occur through instruction directed to writing and editing .

Use of microcomputers for writing instruction

Although microcomputer instruction has been observed to be a highly motivating vehicle for imparting instruction with handicapped students (Cosden, Gerber, Semmel, Goldman, & Semmel, 1987) current use of microcomputers largely for drill and practice does not utilize the full potential of technology for education of the handicapped. In particular, mildly handicapped students in special education settings have been found to have less variety to their instructional experiences than their peers in the mainstream (Cosden, et al., 1987, Cosden & Semmel, 1987). In spite of the disparate use, there have been many promises made, especially with respect to the potential of using word processing for increasing writing skills; almost none of which have been clearly documented.

Several research teams have begun to investigate the use of word processing with LD and low achieving students. Ellis and Sabornie (1986) have suggested that the use of word processing tools do not necessarily improve writing skills especially if the basic mechanics have not been learned. They concur with Torgensen (1986) in that these transcription conventions may best be taught through direct instruction by the teacher and reinforced by computer-based drill and practice in efforts to automatize those skills prior to using word processing programs.

Others have begun to investigate the logistics of teaching LD children the use of word processing and how these may effect the development of writing skills (Morocco & Neuman, 1986). Because memory problems are often experienced by LD students, successful application of software may be impeded by the overloading of the short term memory by keyboard manipulation tasks which have not become automatized (Degnan, 1985) along with the other set of subprocesses which the student is having to monitor. MacArthur and Shneiderman (1984) observed LD children using word processing and noted inefficient cursor movements. For example, the children tended to use the left and right arrow keys to move across entire lines of text or delete backwards, erasing text until reaching the detected mistake rather than moving the cursor directly to the source of the error.

In a study comparing handwriting, word processing, and dictation modes of story production, dictation was found to be superior with no differences between the word processed and handwritten stories (MacArthur, Graham, & Skavold, 1986). It was also noted that proficiency in typing correlated highly with the length and quality of the stories written. It seems apparent that as the individual's need to share his/her attention with the mechanical aspects of writing is relieved, more attention is effectively dedicated toward producing longer and more coherent stories. MacArthur, et al. (1986) also suggest that students may be more willing to make editing changes when recopying is not necessary.

In another study, Neuman, Morocco, Bullock, Cushman, Neale, Packard, and Traversi (1985) observed that students tended to focus more on the editing process because of the ease involved in using word processing, and produced documents that were technically of good quality, but were of shallow ideas. So while the ease of editing when rewriting may encourage those students who normally would be reluctant to edit (MacArthur, Graham, & Skarvold, 1986) students apparently need to be specifically instructed in other aspects of writing.

Morocco and Neuman have completed a series of observational and intervention studies which look at the use of word processing for writing instruction. They observed that teachers primarily use three approaches to writing instruction when using word processing (Morocco , & Neuman, 1985). The first is for reinforcement of specific writing subskills. Guided writing is a second approach whereby the teacher guides and assists the students in generating and organizing ideas through the use of prompts and cues; this is facilitated by the easy insertion and deletion features of the word processor. A third approach is that of strategy instruction. Students are taught processes of planning, organizing, reviewing, and revising while using microcomputers to write. The guided writing approach was noted to be the most "natural" use for a microcomputer learning environment because of its "permeability"; a result of the public character of the word processor by the visible monitor which facilitates teacher intervention (Morocco & Neuman, 1986). Teachers were able to intervene by questioning and prompting thus modeling self-questioning which it was expected would be internalized by the students as they began to forsee the informational needs of the reader. In some instances however, it was noted that teachers tended to be more demanding in terms of using correct mechanics and even "intrusive" in terms of suggesting ideas. The effects of this type of intervention have not been empirically investigated.

Another variable which needs to be taken into consideration in use of microcomputers for instruction is that research indicates that limited microcomputer resources in the schools have increased the probability that students will work in groups at the computer rather than alone (Lieber & Semmel, 1986; Cosden & Lieber, 1986, Cosden, 1989). According to these studies, 65% of the handicapped learners observed in mainstream classrooms worked with at least one other student while at the microcomputer. There are data which also indicate that these children generate more positive feelings about the task and one another when performing instructional tasks in groups rather than individually (Lieber & Semmel, 1986).

It can be expected that this type of "collaborative" work with microcomputers will also be seen in writing instruction. The advantages of collaborative writing in regular education settings have been well documented (Gere & Abbott, 1985). Among these are the students' development of a sense for the audience, exposure to a variety of writing styles, and an increased motivation to revise one's own writing. It has been suggested that in order to talk about an idea or experience one must analyze it sufficiently to cast it into words and because of varying skills levels in group work, students have the opportunity to learn from voiced objection (Dickinson, 1986). Furthermore, in expressing ideas orally prior to writing, a type of explicit planning occurs and participants, more so than in other academic content areas, are forced into negotiating their "response" which in this context, is the text which will be produced.

Recently, Goldman, Cosden, and Hine conducted research in which they compared the stories written by LD students alone and in dyads (Cosden, Goldman, Hine, 1989; Goldman, Cosden, Hine, 1988; Hine, Goldman, Cosden, in press). They found that the stories written by the dyads were reflective of the average writing proficiency of the two dyad partners. In mixed ability dyads, the story was better (in terms of numbers of errors) than that of the lower performing member, but not as good as that of the higher performing member when they wrote separately. By analyzing the dyad interaction, support was found for three possible explanations. In some cases, the higher performing dyad partner dominated the writing process and thus improved the story. In other cases, both of the students self-monitored and requested assistance from each other. Finally, in some of the dyads, both members monitored the input of each other and offered assistance to one another. This is one of the few, if not the only study, which has analyzed the behavior interaction patterns of LD students while using word processing to compose stories in dyads.

In summary, the use of microcomputers, and word processing software in particular, for writing instruction is still at an exploratory stage of development. Although LD and low achieving students have been noted to experience keyboarding difficulties, it is unclear to what extent these difficulties are variant from those of a normally achieving student. Teaching of these skills has also not been systematically documented although some have made recommendations for methods of instructing children in keyboard skills (e.g., Morocco & Neuman, 1985). Promises of increased involvement in editing and consequent improvement in finished products is precisely that at this time, an unfulfilled promise. Perhaps the most encouraging research is that of Morocco, Neuman, and their colleagues. Their observations of the use of word processing as a component of a permeable learning environment seems to offer a plausible means of instructing children in the use of strategies for writing more effectively. This in combination with a process oriented writing curriculum, which emphasizes collaborative writing, may afford students learning environments in which the microcomputer acts as a clean visible buffer for the combination of ideas which are being generated in an agreed upon format. Furthermore, the findings of Cosden, et al. (1989) are basic to our understanding of the participation of LD students while engaged in a collaborative writing task.

Proposed study

Some of the relevant research in cooperative learning has been reviewed, describing the demonstrated benefits of incorporating these structures in our classrooms as a means of improving not only academic achievement but interpersonal relations as well. Given the need for alternative structures in classrooms with high student-teacher ratios, understanding the critical factors which affect the success or failure of cooperative education becomes crucial. In particular, the resulting socio-linguistic interaction which occurs seems to bear heavily on what the outcome for the individuals will be. Writing is an area which can particularly benefit from a cooperative structure (Gere & Abbott, 1985) in that the subprocesses involved in pre-writing, transcribing, and editing are all relatively negotiable. Use of word processors for writing provides a shared learning environment by which students may jointly participate in a writing activity and by which teachers may observe a student's writing as it is being produced.

The proposed study was designed to investigate the patterns of interaction among pairs of students which are most conducive to learning within a cooperative learning mode while engaged in a task of collaborative writing using microcomputers. These were developed through the use of cooperative learning methods which took into consideration that children with learning disabilities from diverse cultural backgrounds may have different perspectives on a given task or problem which provides their framework and motivation for learning.

To explore these conjectures, the present study investigated the social interaction patterns of Anglo and Hispanic adolescent boys with learning disabilities working in dyads as they relate to writing process theory and to the consequent written products. By alternating between two partners: one of similar ethnic background and one of dissimilar ethnic background, the purported benefits for Hispanic children were explored. Students were instructed to write stories together according to 2 different instructional conditions: one representing the more traditional method of assigning a topic sentence and one reflecting the major dimensions of a context which conveys a purpose and provides meaningfulness to the task of writing. In both conditions microcomputers were used for word processing. Sessions were videotaped for detailed analysis of their interaction. Because the writing subprocesses which normally occur within a child (thus invisible to the observer) were dealt with on a social plane between the 2 students, the "problem-solving" task of writing was visible to the observer.

Social interaction patterns were described from a writing theory perspective. In particular the roles taken by each dyad member were described and their relation to writing achievement scores, ethnicity, and typing proficiency were assessed.

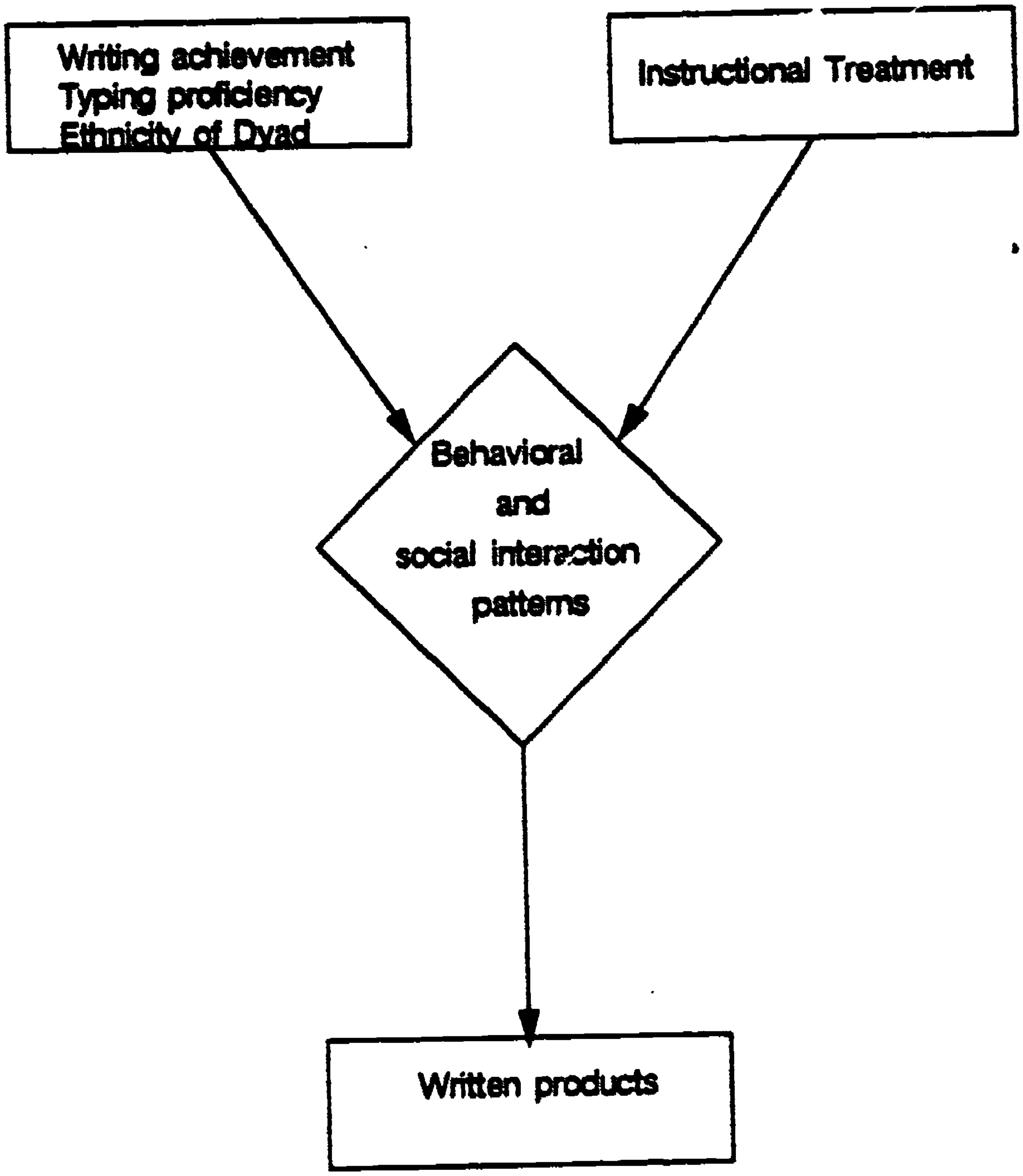
A model is proposed as a basis for describing the effects of individual characteristics on the behavioral interaction between students working together on a writing task and the effects of these on the written products. Figure 1 illustrates this model.

Insert Figure 1 about here

In the following chapter, specific hypotheses are outlined as a further elaboration of this model.

Figure 1.

Model of effects of student characteristics and instructional treatment on social interaction and on consequent written products.


Writing achievement
Typing proficiency
Ethnicity of Dyad
Instructional Treatment
Behavioral and social interaction patterns
Written products

Chapter Three

Hypotheses

In this section, specific hypotheses are described which relate to the purpose of the study. These concern first, the effects of individual student characteristics and effects of using different methods of instruction on the behavior of students working in dyads. Secondly, the consequent effect of individuals' behaviors on the behaviors of his dyad partner, and thirdly, the effect of these interaction patterns on academic performance.

Individual Characteristics and Role Taking Patterns

Although the treatment conditions vary the role of the students topic generation opportunities and vary on purposes and audiences for the students' stories, it was hypothesized that patterns of social interaction would develop based on individual characteristics, including writing and typing skills and ethnicity, and that these variances would have an effect on the dyad interactions.

Hypothesis 1a: Ethnically homogeneously paired students define writing process roles for one another sooner than do the heterogeneously paired students.

The interaction patterns established during the first 5 minutes of the 25 minute session will be more similar to the patterns during the last 5 minutes of the 25 minute session for the homogeneously paired students than for the heterogeneously paired students. Kagan and his colleagues (1985) have completed extensive research which suggests that Hispanic students work better under a collaborative, cooperative structure than under a more competitive structure. Although the dyanamics of cooperative task structures have not been researched in detail, Kagan postulates that Hispanic students have a more cooperative social orientation and therefore enter into a cooperative structure with more ease than when working under a cooperative structure. Patterns of communication have been researched by educational anthropologists in an effort to more fully understand the effects of cultural linguistic background on classroom learning (eg. Au & Jordan, 1981; Weisner, Gallimore, Jordan, 1988; Phillips, 1972). They have found differences between the family socialization patterns which these children experience at home and the teaching patterns in the classroom. Projects such as the Kamehameha Early Education Project (KEEP) have successfully incorporated those characteristics of the home environment which were conducive to maximum linguistic and cognitive productivity into the structure of instruction. Similarly, it can be expected that when students of similar cultural-linguistic background are permitted to work together and negotiate task content and task division that the common background will facilitate the social interaction.

Hypothesis 1b: In dyads where the writing achievement of both students is at levels more than one year apart, the roles related to idea generation and monitoring will occur more frequently by the higher achieving member.

Successful writing involves the management of a series of subprocesses including those which have been defined in this study. Because poor writers tend to concentrate on the mechanics of writing (in terms of transcription and punctuation rules, etc.), it was expected that the student with higher writing skills (as assessed by a standardized test) would be more prepared and consequently would assume those tasks which required generation and monitoring of ideas for the story which was being written.

Hypothesis 1c: More typing monitoring (mechanics, etc.) occurs in ethnic heterogenous dyads than in ethnic homogeneous dyads because of differential levels of language proficiency.

It can be expected that those students who are more fluent in the English language will participate in a more complete sense than will those who are not so proficient. This is due in part to the student's actual abilities and also to self-perceptions of that ability. In dyads where the students are at different levels of language proficiency, as is the case in the heterogeneous dyads, the willingness on the part of the less proficient to correct or challenge his partner may be decreased by his perceived awareness of his lower English language skills. It was hypothesized therefore, that the majority of this monitoring would be demonstrated by the Anglo partner because of his higher English proficiency.

Instructional Method Treatment

The two treatment conditions were characterized by variance on a set of conditions: audience definition, purpose definition, and source of topic choice. Under the Traditional instructions, students were not told for whom they were writing, no purpose was defined other than writing the story with their respective partners, and the "topic" was selected for them in the form of a leading idea. Students under the Contextualized instructions were informed of the readers for whom they were writing. It was explained that they could communicate and share experiences and stories and that they were free to choose the topic. All stories were written in a newspaper story format so as to permit comparison.

Hypothesis 2a: A larger percentage of time during the

writing session is spent on idea generation and goal monitoring when students are working under the contextualized instructional treatment than under the traditional treatment.

In the contextualized treatment condition, students are given the opportunity (and indeed required) to select their topic. Because there is no common topic provided, negotiation in the form of idea generation and goal monitoring is expected to occur to a greater degree than under the traditional treatment.

Hypothesis 2b: As a consequence of 2a, stories written under the traditional writing instructional method contain more words, but not more propositions.

Because the students are being provided with a leading idea, a format with which they are familiar (see Graves, 1983), it can be expected that not much negotiating of ideas will occur and that the students will begin generating sentences in an associative manner characteristic of LD students' writing. With less time being spent on idea generation, there may be more typing of words and sentences, but not as much negotiating of ideas necessary for a story which has more ideas represented.

Social Interaction Patterns and Written Products

Independent of the writing instruction method treatment, distinct and recognizable patterns of role taking emerge during the writing process which reflect the cognitive and metacognitive subprocesses involved in writing. Writing subprocesses such as idea generation, planning, transcribing, and editing (Flower & Hayes, 1980; Hayes & Flower, 1980) are normally unseen and indeed very difficult to assess. Use of protocol analysis represents an important step in gaining insight on these cognitive and metacognitive subprocesses which normally occur in the mind of the individual. In a situation where two students are physically constrained to using a common writing tool (the microcomputer), what gets punched on the keyboard becomes a product of what the two individuals are able to negotiate between them. This negotiation occurs in a social realm and thus is more visible to the observer.

Hypothsis 3a: As a result of establishing a working pattern with respect to role-taking and social interaction, stories will be quantitatively and qualitatively improved across sessions.

Mehan, Maroules, & Drale, (1985) noted that the pattern in which students divided the writing task was established by the time that they had written 3 stories together. Because they were working with a program which prompted the composing process, this occurred within a 25 minute session. While initially dividing the task into small units such as keystrokes, to larger turn-taking units which involved assuming responsibility for particular tasks such as typing or monitoring. In the present study, it can be expected that having established a working pattern, the students will be able to concentrate more on the components of story writing.

Hypothesis 3b: Editing session stories contain less spelling errors than Initial session stories across both conditions.

It has been noted that poor writers generally do not edit spontaneously and make only minor changes in punctuation and spelling when asked to revise text (MacArthur & Graham, 1987). However, students are most often not provided with the opportunity to edit their own or their peer's writing. It has been suggested that children are better at detecting errors in another child's writing than in their own (Bartlett, 1982, 1984). Working in dyads may facilitate the editing of each other's writing; while one is involved in generating ideas, typing, or some other aspect of the writing process, which is typically contained within the single writer's short-term memory, the partner may be "free" to monitor the overall plan and locate errors. Morocco & Neuman (1986) have suggested that the use of microcomputers for writing activities will provide the ease in editing which is not normally afforded by a paper and pencil mode. In particular, having a "clean", readable copy which is not affected by the handwriting, erasures, scribbles, or small print insertions may provide text which is more readily proofread because of its similarity to the typical type-written printed word which the students are accustomed to reading. In addition, the ease with which deletions and insertions can be made with a word processor may be less avoided by students than the idea of having to rewrite the entire text (MacArthur, Graham, & Skarvold, 1986). It was hypothesized, therefore, that given the opportunity (a second, editing session), instructions which prompted them to edit (nonspecific in nature), a partner with whom to write, and the facilities of the microcomputer word processing, that students would engage in significant amounts of editing.

Hypothesis 3c: Homogeneous Hispanic dyads will produce stories which contain more propositions (reflecting an expression of a richer base of ideas) under the contextualized treatment than those stories which they produced under the traditional treatment condition.

Because the contextualized treatment condition lends itself to negotiation of ideas, the hypothesized cooperative nature of homogeneous Hispanic dyads will be complimented under this treatment, thus more ideas will be included in the stories.

Hypothesis 3d: The amount of goal monitoring present during the writing sessions will be highly correlated with the level of coherence of the written story.

Flower & Hayes (1980) have described the management of the subprocesses involved in writing as a "juggling of constraints ... like a very busy switchboard operator , trying to juggle a number of demands on her attention and constraints on what she can do" (p. 33). Associative idea generation is characteristic of LD students writing. This is reflective of a deficiency in monitoring the overall goals which needs to be accomplished simultaneously with conforming to conventions of usage and rules of grammar and with consideration of purpose and audience. Trying to satisfy all of these constraints places extreme demands on the individual's attention and short term memory (Collins & Gentner, 1980). Coherence is dependent on the linking of one sentence to the next through co-referencing so that the reader can understand (Nodine, Barenbaum, Newcomer, 1985). It was hypothesized therefore, that "more" goal monitoring (defined as "keeping track of the overall plan which may have been previously agreed upon") demonstrated by a particular dyad would be reflected in a "more" coherent written product.

Chapter Four

Method

Subjects

Thirty-six Learning Handicapped (LH) students identified as having writing difficulties were selected to participate in this study from Resource Specialist Programs (RSP) in five junior high and one kindergarten through eighth grade schools. In California, the designation "Learning Handicapped" is used for a broad range of students with "mild" handicaps such as those who might be considered to have a learning disability or mild mental retardation. Students not requiring a self-contained classroom are mainstreamed for the majority of the school day and attend an RSP special education class one to three periods per day to receive instruction in specific academic areas. Four to eight 7th and 8th grade boys were selected from each RSP by the students' respective special education teacher and by the experimenter.

Subjects were selected on the basis of (1) cultural-linguistic characteristics determined by home language survey information and available language test scores and (2) writing skills assessed on the basis of available standardized test scores and writing samples from the students' existing work. The study included only boys, to control for previously demonstrated effects of sex in social interactions (Webb, 1984; Cosden, Pearl, & Bryan, 1985). Boys were selected over girls because they are more representative of the population of LH students. Half of the total 36 subjects were of Hispanic, Spanish/English language background and the other half were of Anglo, English language background.

Home Language Survey information is regularly collected by the schools from all of the parents of enrolled students. Of the Hispanic students for whom data was available (16 of 18), 94% reported Spanish as the child's first language, 72% reported that Spanish was the most frequently spoken language, and 87% indicated that Spanish was the language most frequently used by the adults in these students homes.

The average age of the students was 14 years, ranging from 12 years, 4 months to 16 years, 6 months. No difference was noted between the Anglo and Hispanic mean age scores, though the Hispanic students had slightly more variance in their ages (S.D. 1.14 and S.D. .84). More 7th grade students (n=20) than 8th grade students (n=16) participated in the study.

Aptitude information was available for 29 of the 36 students. The mean WISC-R scores were as follows:

	Verbal	Performance	Full Scale
Anglo (n=13)	97.4 (13.4)	109.2 (13.3)	101.8 (14.2)
Hispanic (n=16)	83.7 (12.8)	101.6 (11.2)	91.3 (10.9)
All (n=29)	90.3 (14.6)	105.0 (12.6)	96.3 (13.4)

It should be noted that although all of the participating Hispanic students have been assessed as fluent English proficient (FEP) through use of standardized language tests, as a group, they still lag almost one standard deviation in the verbal subscale of the WISC-R and about two-thirds standard deviation on the full scale. These differences were considered to be a direct result of the psychometric characteristics of the WISC-R and not reflective of the students' aptitudes.

Setting

Participating schools were selected on the basis of their representativeness on a range of characteristics such as ongoing writing programs, and previous microcomputer use on the part of the students. Each of the schools are located within the city limits of cities located in the south central coast of California. None of the junior high schools had over 1000 students. On an average, the Anglo students comprised 37% to 66% of the student population while Hispanic students made up 19% to 56% of the student group.

In an effort to maximize social validity, the study was conducted in the RSP classrooms at the various school sites during regular instruction hours. The Apple lle microcomputers in the classrooms were used. Where an Apple lle was not available or where more than one was needed, one was provided by the UCSB Special Education Research Laboratory (SERL) for this study. The RSP teachers, although not directly involved during the writing sessions, agreed to enforce regular classroom rules in terms of permissible levels of noise, activity, and disruption as it affected the rest of the class. Additionally, there arose a need for 2 of the teachers to intervene with a reminder of what "themes" and "language" were appropriate in academic activities in the classroom.

Prior computer use. With the exception of one school, students had previously been using the microcomputer at least once per week in the RSP classroom for a variety of purposes ranging from writing final drafts of writing assignments to playing with video games during earned "free time". The students who did not use microcomputers in the RSP class, had previous or ongoing computer instruction during the regular education portion of their curriculum.

Prior writing instruction. Current instruction in composition in the RSP classrooms varied across schools. In general terms, all students in this study (except the 4 students in school S) had been receiving versions of what may be termed "traditional" writing instruction consisting of writing prompts and varying degrees of pre-writing guidelines. In all cases, students were not given a purpose for writing and the audience was not defined beyond for completion of an assignment to be read by the teacher. Students were not involved in editing of their own or each other's writing and usually were required to rewrite their assignments after the teacher had edited.

At school B, the teacher involved the students in writing using a set of commercially developed worksheets which consisted of pairs of sketches depicting a sequence of events. Students were instructed to "tell about the pictures" and were provided with blank lines on which to write. The teacher edited and returned stories for final revisions.

At school C, the program basically consisted of tutorial teaching. The teacher supported the students in their mainstream coursework and provided structure for written assignments from other classes such as book report outlines. Edited first drafts were returned to the students for recopying.

Students at school G had all been briefly exposed to "power writing" in their regular education classes, a program designed to provide instruction in paragraph organization. In the RSP, students were required to write book reports following guidelines consisting of a series of questions. Additionally, each student was involved in writing a "mini-research paper" which had as its main objective the learning of basic library-use skills.

Another modification of a traditional program was used in school L. Students were given picture prompts and a topic sentence and instructed to write an accompanying story. The teacher then edited the students' initial drafts and returned them for final rewriting and finally, typing using word processing.

The Hispanic students at school M had been receiving SRA Expressive Writing I instruction (a program focusing on mechanics, sentence and paragraph writing, and editing) while the Anglo students had been receiving the Sentence Writing Strategy Curriculum (Schumaker & Sheldon, 1985) for 1 semester prior to the study. Choice of instructional program for the students by the teacher was based on their current standardized group test scores.

Finally, the students in school S were involved in a "writing and thinking" program which the teacher referred to as a process approach to writing and language textbook program involving reading comprehension and grammar exercises. In addition to this, the students were all required to write for the first 5 to 10 minutes of each class period in a journal which the teacher responded to on a daily basis.

Sources of Data

Several standardized and non-standardized measures were used for this study, including:

(1) Test of Written Language (TOWL) (Hammill & Larsen, 1978). The TOWL is an easily administered measure of written expression which provides percentiles and standard scores for students in grades two through seven. It requires approximately one hour of time for administration and yields subscores in vocabulary, thematic maturity, spelling, word usage, style, and handwriting, in addition to a total Written Language Quotient. (See Appendix 1).

(2) Timed Typing Test. A typing tutor program containing a timed typing test was used for the purpose of obtaining information on the students' initial levels of proficiency on keyboarding skills. A paragraph, selected

from a 5th grade reader was used as the text which the students were required to type during a 3 minute period. Upon completion of the allotted time, each student's performance was evaluated by the program, yielding number of words, number of incorrect keys pressed, and the difference between the 2 measures (number of words - number of mistakes). This information was recorded by a research assistant.

(3) Social Orientation Choice Cards (SOCC). A variation of social behavior scales (Knight & Kagan, 1977), the SOCC is one of the most commonly used methods of comparing motives that has been used in cross-cultural research (Kagan, 1985). Each child is offered a series of choices from three to four alternatives, each alternative representing a reward for himself and a reward for some "other" child, not present. Points are "acquired" depending on the alternative chosen. The version used for this study may be found in Appendix 2. (See Appendix 2).

(4) Informal Post-Writing Interview. In order to assess the participating students' awareness of the 2 treatment conditions, a structured interview was developed consisting of two parts. One part began by reminding the student of the traditional writing instructions (e.g., when he was given a picture caption) and then asked

questions concerning the student's opinion or feelings about having been given a topic, writing with a partner, and whether he would have preferred writing alone. A second part consisted of paralleled questions but with respect to the contextualized writing instructions. These were also conducted on an individual basis. (See Appendix 3).

(5) Site Report Form. This form was developed for the purpose of documenting relevant, subjective information from the Field Assistants during and at the end of each video taping session. The checklist was purposefully designed to require no more than a 2-3 minutes to completed. Although the questions to which the research assistant responded appear to be quite detailed (see Appendix 4), they were not intended to be used as data, but rather as "double checks" for possible unexplained occurrences during the writing session. The specificity of the questions served to focus the observations on the part of the Field Assistants so that a more accurate and consistent report on "how the session went" could be delivered.

Materials and Equipment

Writing instructions were scripted and typed to standardize the Field Assistants verbal interaction with the participating students. A more detailed description of these is outlined in the "treatment" section and in Appendix 5 (See Appendix 5). Students were provided with pencils and with notepads.

Hardware. As previously mentioned, the students used Apple lle microcomputers. Each had one disk drive and a black & white monitor, with the exception of one of the microcomputers at school C which had a color monitor.

Software. FrEd Writer, a public domain word processing program was used. This choice was based on several reasons including the low cost, previous use by a portion of the participating students, and because the program had the basic features required in a simple format that would not require extensive training.

Video Equipment. Video-tape equipment was utilized to record the students' interactions during the writing sessions. Video cameras were set up on tripods positioned near the microcomputers and attached to portable video cassette recorders. A small condenser microphone with omnidirectional sound pickup was attached to each of the cameras and placed between the microcomputer and the disk drive to insure optimal audio quality during the students' conversations.

Experimental Design

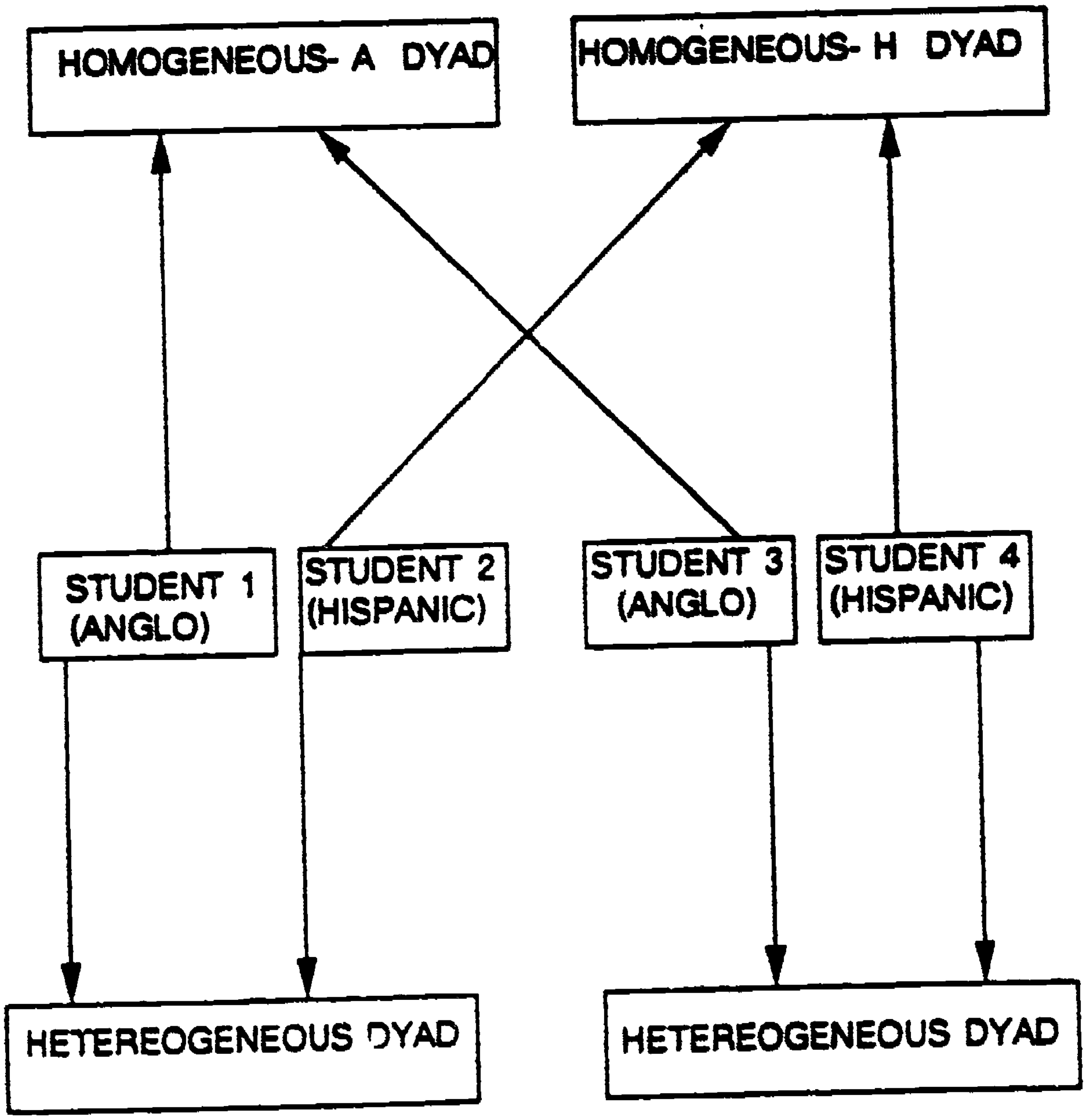
A within-subjects, counter-balanced alternate treatment, repeated measures design was used. Four to eight students from each RSP classroom were nominated by the teacher based on their identified deficits in writing. (half Hispanic students; half Anglo students.) As illustrated in Figure 2, each group of 4 students were randomly assigned to a dyad to form 2 homogeneous dyads of similar cultural/language background and 2 heterogeneous dyads of dissimilar background. (See Figure 2). All dyads experienced each of the two instructional treatments, with the order of presentation interchanged for half of the dyads. Writing samples and social interaction data were collected repeatedly throughout the study.

Insert Figure 2 about here

Independent Variables The independent variables in this study consisted of the two Writing Instructional treatments (described below) and Dyad Grouping, the ethnic/linguistic homogeneous and heterogeneous pairing of the students. In addition, data were collected on typing and writing proficiency and used as a basis of

Figure 2.

Assignment of students to ethnically homogeneous and hetereogeneous dyads.


HOMOGENEOUS- A DYAD
HOMOGENEOUS- H DYAD
STUDENT 1 (ANGLO)
STUDENT 2 (HISPANIC)
STUDENT 3 (ANGLO)
STUDENT 4 (HISPANIC)
HETEREOGENEOUS DYAD
HETEREOGENEOUS DYAD

assigning each student a relatively low and high ability rank within each of his dyads.

Dependent Variables. The dependent variables were several scores derived from the written products including number of sentences, words per sentence, percent bigrams correct, number of propositions, number of predicate propositions, number of modifier propositions, number of conjunction propositions, and a measure of coherence. A second body of data based on the video taping of the students' writing yielded percentages of time that the students were involved in idea generation, goal monitoring, typing, typing monitoring, on task, and percentages of time that they demonstrated positive affect.

Instructional Treatment. The study employed two instructional treatment conditions. These were designed to represent only the most salient of those characteristics which would distinguish a product-oriented from a process oriented approach to teaching writing. As illustrated in Figure 3, the contextualized instructional treatment condition consisted of communicating with students in other junior high school classrooms who were also participating in the study, thus providing an audience and purpose. These students were also permitted to select their own topics. Beginning with the second week of the study under this treatment, students received a copy of the newspaper containing all the texts produced on the previous week by all the contextualized condition dyads. The newspaper was typed and edited for mechanical errors by one of the project research assistants and was 1 to 3 pages in length.

Insert Figure 3 about here

When working under the **traditional** learning treatment condition, field assistants typed a sentence into the computer and asked students to imagine that it was a caption under a picture in a newspaper and instructed them to write an accompanying article to go with the (imagined) picture. In this case, students were given topics and not advised as to whom would be reading their stories or the purpose for their writing.

For the second session under both conditions, that is, the editing sessions, the text that had been generated during the first session was loaded into the microcomputer so as to be viewed on the monitor and hard copies were distributed in the form of printed text. They were instructed to make any corrections, changes, or additions and then to enter such modifications on the computer.

Figure 3

Distinguishing Characteristics of the Contextualized and Traditional Writing Instruction Treatments.

	Instructional Paradigm	
Variables	Traditional	Contextualized
Audience defined	no (teacher)	yes (other J.H. students)
Purpose defined	no (grade)	yes (communicate & share)
Topic choice	no (experimenter)	yes (student)
Writing format	newspaper story	

In both treatment conditions, trained Field Assistants followed scripted instructions which they read to the participating students at the beginning of each session (see Appendix 5). Instructions varied in as much as the contextualized and traditional treatments' basic characteristics differed. However, instructions pertaining to the newspaper story format, writing of stories as a cooperative effort, and the optional use of paper and pencil were worded identically in both sets of instructions. Incentive rewards which were issued every 2 weeks, were common across all students regardless of treatment condition.

Counterbalanced order of sessions. Each dyad engaged in two 25 minute writing sessions per week, a drafting and an editing session and produced an initial and final product. The effects of order of treatments were controlled by assigning half of the dyads, to the contextualized learning treatment and the other half of the dyads to the traditional treatment during the first six weeks. During the second six weeks, treatments were reversed. (See Figure 4). No control group was incorporated into the design of the study because of the inherent difficulty of matching two groups of students with both learning handicaps and limited English proficiency due to the extreme variation of characteristics. The use of a within-subjects design, however, provides for each child to be his own control since each received both treatments

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Insert Figure 4 about here

All writing was done with the microcomputer and written products were saved on diskettes. Hard copies were made and kept in a file. Because of the novelty of using word-processing for writing among many of the students, it was hypothesized that they would not be as fluent in composing with a microcomputer as they might be using paper and pencil. Previous observation and personal experience suggests that even with adults who have several years of experience writing with a word processor, writing does not "flow" as well without a pencil and paper when the topic involves writing beyond routine description; such as, composing a story or transcribing of a newly formulated idea. Hass (1988) reports that this writing phase of planning may be negatively affected by use of word processing. In attempts to counter or alleviate these effects, participating students were provided with paper and pencil for initial drafts of ideas or other notes which they felt might facilitate the writing

Figure 4.

Treatment schedule for both groups in each classroom.

Week #	Group 1		Group 2	
	Contextualized Writing Treatment		Traditional Writing Treatment	
1	HomA	HomB	HetC	HetD
2	HetA	HetB	HomC	HomD
3	HomA	HomB	HetC	HetD
4	HetA	HetB	HomC	HomD
5	HomA	HomB	HetC	HetD
6	HetA	HetB	HomC	HomD
	Traditional Writing Treatment		Contextualized Writing Treatment	
7	HomA	HomB	HetC	HetD
8	HetA	HetB	HomC	HomD
9	HomA	HomB	HetC	HetD
10	HetA	HetB	HomC	HomD
11	HomA	HomB	HetC	HetD
12	HetA	HetB	HomC	HomD

process. In this way the word processing features which facilitate the editing process would be optimized without losing content quality.

Data Collection

Pre-experimental Phase. Pre-measures were used for purposes of obtaining independent variable levels in several critically related areas: the students writing skills (TOWL), proficiency with keyboard (typing test), and social orientation toward competitive, individualistic, and cooperative motives (Kagan Social Orientation Choice Cards).

Training. Field Assistants were trained in use of FrEd Writer, and video taping during four 2-hour sessions with individualized follow-up assistance when requested. An overview of the study was provided with examples of the instructions which they would be reading to the participating students at the beginning of each writing session. Due to previous experience, minimal microcomputer training was required with the participating students. Basic skills were taught and then each student was assessed for levels of independent use of each skill (See Appendix 6 for an outline of training procedures and criterion assessment). The minimal skills assessed were: use of the cursor to make accurate insertion and deletion of text, use of the word processing wrap-around feature, and use of the space bar and return key. Procedures including booting of the program disk, saving, and printing were left to the Field Assistants who would be present to videotape the sessions.

Experimental Phase. At prescheduled times, Field assistants traveled to the participating schools and set up the videotaping equipment for each session. Three of the six schools had one computer in the classroom, so sessions were scheduled 4 days a week with the fifth day available for make-up sessions (in cases of absences). Dyads in each class alternated within each week: one dyad worked on Monday and Wednesday, the second dyad on Tuesday and Thursday. For the three schools having two computers in the classroom, sessions were scheduled similarly with the exception that 2 Field assistants with 2 sets of equipment traveled to those schools for each session of 2 dyads working separately, but simultaneously.

Field assistants were outfitted with videotape equipment and the word processing program (along with printed instructions for use of both), a data disk for storing written products, and notebook paper and pencils for student use. In addition, they received a set of student instructions appropriate for that session and a Site Report Form for recording session characteristics (both described in Materials section; samples in Appendices 4 and 5). Equipment set-up was completed before class began. Taping began as students approached the computer and continued for the full 25 minutes of the session. Field assistants were instructed to read the printed instructions and to limit further involvement to that prescribed in the instructions. They were also instructed to direct any questions regarding appropriateness of behavior or text content to the classroom teacher who was allowed to enforce regular classroom limits if necessary. A time-warning was given to the students 5 minutes before the end of the session. If students completed their work before the 25 minutes was over they were prompted once to continue working but permitted to end the session early if both students agreed that they were finished. At the end of the session, Field assistants saved the text on the data disk, printed a hard copy, and packed up the equipment.

Hard copies of written products (initial and final drafts) were collected after each 25 minute session. A total of 3 initial and 3 final writing samples, per treatment, were obtained from each different dyad.

Post-experimental Phase. Finally upon completion of the study, each student was interviewed to obtain information relative to their awareness of the differences between the 2 treatment characteristics based on what they experienced. The interview questions revolved around three main themes: their awareness of audience, their preferences for choosing or having a topic assigned, and their opinions about working with a partner.

Data Reduction Procedures

Pre-measures were scored according to instructions prescribed for the TOWL and the timed typing test. Based on the typing scores, the student with the higher score was assigned "high" ability while his partner was assigned "low" ability. The TOWL scores were similarly compared and ability levels assigned with the modification that if students were not at least on half of a standard deviation (as per TOWL scores) different, then they were both assigned a status of "same".

SOCC responses were assigned a score based on the ratio between the amount of "points" which each chose for himself divided by the amount of points which he chose for the "other person". These ranged from .98 to 5.0. Based on these ratio scores, each student was assigned a motive status of cooperative (.98 to 1.5), individualistic (1.5 to 3.5), or individualistic (3.5 to 6.0). The rational for these designations was as follows: If amounts were equal or almost equal for the self and other, then the person was assigned as cooperative; if the person chose larger amounts available for himself without concern for what each of his choices implied for the other person, then the student was assigned an individualistic status; and if the choices , evidenced that the chooser was concerned with the choice which resulted in the greatest discrepancies between his and the other's points, the student was considered competitive. Using these, a Chi-square test was performed to see if there were differences accountable by the students' ethnicity. As can be seen on Table 1, there was no differentiation of social motives based on the ethnicity of the students. These data were not used for any further analysis.

Insert Table 1 about here

Results of the writing interview were tallied. These are reported in the Results section.

Writing samples were scored using two methods to

Table 1.

Frequency and Percentage of Cooperative Individualistic, and Cooperative Orientation in Students of Hispanic and Anglo Ethnic Background.

	Anglo		Hispanic	
	f	%	f	%
Cooperative	8	47	7	41
Individualistic	8	47	3	41
Competitive	1	6	3	18

Chi-Square 1.33,
non-significant.

obtain both a quantitative and a qualitative measure. First, "decision rules" were used to assess the structural qualities (number of words, sentences, misspelled words, and average words and misspelled words per sentence) of each written product (see Appendix 7). Reliability for this scoring procedure was assessed for 15% of the stories and yielded an agreement level average of 91% with a range of 82% to 100% agreement. This percentage as derived by dividing the number of agreements by the sum of the number of agreements and disagreements.

A modified version of propositional analysis (Turner & Greene, 1977) was developed and used as a means of obtaining a more qualitative assessment of the written products. Propositions consist of 2 or more abstract word concepts such that one is the connection or relation to the other(s). Propositions were classified into three classes, based on the type of relation they contained: Predication, Modification, and Connection. Predicate propositions express ideas of actions or states including nominal and reference propositions and the relations are usually verbs. Modifier propositions restrict or limit a concept, thus changing it, by means of another concept. Negation is included as a type of modification. Connective propositions (referred to Conjunction in this study) relate facts of propositions of text to each other and are important for providing a text with cohesion.

Some examples of predicate propositions are: "they said [hello]", "he feels [sick]", "she is [president]". Modifier propositions are those such as: "five tickets", "all of us", "long time", and "[he does] not play [the piano]." Conjunction propositions often include two other propositions as arguments (subparts). In addition to the more obvious conjunctions (e.g., "and", "but"), also included are relationships of purpose, causality, contrast, and condition or circumstance.

Reliability checks for this procedure was similarly evaluated in terms of number of agreements divided by number of agreements plus disagreements on 15% of the stories. Results of these were 93.5% agreement for Predicate propositions, 93.0% agreement on Modifier propositions and 91.6% agreement on Conjunction propositions.

Each story was evaluated and scored to determine logic and clarity. Based on the recent work of Newcomer, Barenbaum, and Nodine (1988), the criterion used for measuring cohesion yielded four levels of coherence. A coherent story was one that was easily understood and was causally oriented. An unclear referent story was one where the pronouns were unclear or when reference was made to a previous word in an unclear fashion. Stories were rated as confusing if comprehension was difficult but not to the point of making it incoherent. Finally, stories were considered to be incoherent if events were unrelated to one another and/or if the reader was not given enough information to make inferences about the intended meaning. (More detailed descriptions and examples may be found in Appendix 8). Reliability of this procedure was similarly evaluated by two independent raters on 25% of the stories and a 91.4% agreement was reached.

Videotape recordings were transcribed including both verbal and relevant non-verbal behaviors. The first and last 5 minutes of each session were transcribed and marked at 30 second intervals, beginning at the point when the Field assistant finished reading the instructions to the students. All speech acts were transcribed and accompanying actions were included in brackets. The actions of interest included those relating to orientation to the computer, access to the keyboard, and social interaction such as smiles, pushing, or reaching behaviors. Due to mechanical and personnel difficulties in videotaping which manifested themselves as unclear picture or sound recording, 38% of the sessions could not be transcribed. Careful record keeping revealed no patterns in terms of loss of tapes and it was therefore assumed that the representation of "lost" sessions was random. A total of 262 first-five-minute sessions and 262 last-five-minute sessions were transcribed. Pilot study results indicated that the first and last five minutes were representative of the entire session in terms of proportions of particular behaviors.

For purposes of summarizing the interaction in terms of writing process, a video coding procedure was developed (see appendix 9). Research assistants, after reviewing the transcript for a particular session, viewed the videotape, pausing at 30 second intervals to record the presence or evidence of the following actions by each of the dyad members:

Idea Generation (IG) referred to the subprocesses described as prewriting such as content suggestions, setting goals for the entire theme of the story, organizing ideas into groups of ideas or paragraphs.

Goal Monitoring (GM) was demonstrated by verbal behavior (including self-verbalization) which had as its purpose, keeping track of the overall plan which may have been previously agreed upon in terms of that generated earlier. Examples were dictation related to content, disagreement about something written which was contrary to previous agreement, or a "what are we going to write next" question.

Typing (TY) described the behaviors related to the actual operation of the computer and the transcribing of the ideas or words into acceptable sentences.

Typing Monitoring (TM) was recorded when a student, either through self-verbalizations while typing or by by giving instructions to his dyad partner, made corrections related to spelling, punctuation, or in the use of the microcomputer.

On Task (OT) was noted when the the student was engaged in any of the four previously described behaviors or in appeared to be attending to the task as by looking at the monitor, partner, or keyboard.

Positive Affect (PA) referred to the general feeling between the students while they worked together. While the previous five behaviors were recorded in terms of their presence or non-presence during a particular 30-second interval, affect was recorded in three different .egories. Negative affect was noted when the students were antagonistic toward one another; this could involve use of physical or verbal abuse. Neutral affect was recorded when the students appeared to be indifferent to one another; with no apparent like or dislike of each other demonstrated. Finally, positive affect was recorded when the students appeared to be enjoying working together.

Reliability data was collected on the basis of 20% of these coded sessions from research assistants who were compared to the coding by an expert coder as recommended in Frick and Semmel (1978). The results of this criterion-related agreement averaged 82% agreement with a range of 80% to 87%. Because there were six categories and data were recorded separately for each dyad partner on all but the affective measure and because there was a "fairly equal representation of categories" (Frick & Semmel, 1978), it was decided that statistical correction for chance would not be necessary.

Post-Experimental writing interview responses (Post-Writing Interviews) were also tallied and these are reported in the following section.

controlled independent variables and the resulting Story characteristics, some patterns began to emerge.

Insert Tables 3 and 4 about here

Percent bigrams correct was significantly different for the dyad grouping factor only during the first Story of Phase 1 (F=4.02, p=.03), thus those differences between dyads (Hom-H having the lowest mean percent bigrams correct) were overcome during the course of Phase 1 and did not reoccur throughout Phase 2. As may be recalled the Het dyads with which the Hom-H dyads were compared to, were composed of individuals from the Hom-H and Hom-A dyads, thus it appears that the influence of the Anglo partner with respect to spelling, had positive effects. By Story 3 of Phase 1, although the mean-percent bigrams correct had improved for each of the dyad groupings (Hom-A: 96.8, Hom-H: 95.9, Het: 97.6 to 97.9, 96.8, and 97.8, respectively), improvement for the Hom-H dyads was sufficient to statistically erase the differences.

Additionally, percent bigrams correct varied significantly between the traditional and the contextualized instructional treatment conditions during

Table 3.

Results of 2X3 ANOVA on Phase 1, Stories 1 and 3: Tests for Effects of Instructional Treatment and Dyad Grouping.

Dependent Variables	Story 1	Story 2
No. Sentences	—	—
Words/Sentence	—	—
Percent Bigrams Correct	dyad* (Hom-H <)@	Instruc.* (trad. >)#
No. Propositions	—	—
No. Predicate Props.	—	—
No. Modifier Props.	—	Instruct.* (Contex. >)‾
No. Conjuntion Props.	—	—

* significant at .05 level
@ Hom. Hispanic had lowest percent bigrams correct
# Higher percent correct under traditional instruction
‾ Greater number of conj. props. under contextualized

Table 4.

Results of 2 X 3 ANOVA on Phase 2, Stories 1 and 3: Test for Effects of Instructional Treatment and Dyad Grouping.

Dependent Variable	Story 1	Story 3
No. Sentences	–	interaction*
Words/Sentence	–	–
Percent Bigrams Correct	–	–
No. Propositions	–	interaction*
No. Predicate Props.	–	dyad* (Het<) instruc.* (trad>) interaction**
No. Modifier Props.	interaction*	interaction*
No. Conjunction Props.	–	–

* significant at .05 level
**.significant at .01 level

Story 3 of Phase 1 (F=7.55, p=.02). These differences favoring the traditional over the contextualized instructions were not statistically evident throughout Phase 2.

By way of contrast, the number of modifier propositions was greater for the contextualized instruction group by Story 3 of Phase 1 (F=5.30, p=.04) while these differences had not been apparent during Story 1. Moreover, during Phase 2, the interaction effects apparent in Story 1 were exactly reversed by Story 3. Viewing the incidence tables of mean number of modifier propositions provides evidence for this statement. Non-statistical comparison of the mean number of modifier propositions on the 2 X 3 ANOVA incidence tables may be summarized as having the following positive (+) effects:

Phase 2, Story 1

	Hom-A	Hom-H	Het
Contextualized		+	+
Traditional	+		

Phase 2, Story 3

	Hom-A	Hom-H	Het
Contextualized	+		
Traditional			+

Considering from the point of view of actual groups of students, performance by the half which was working under the contextualized instructions during Phase 1, is represented by data in the traditional treatment during Phase 2. As noted above, the contextualized instructional treatment group dyads performed better than their cohorts under the traditional instruction during Phase 1. It is noteworthy that the Hom-A dyads maintained the high performance on this variable during story 1 of Phase 2, even though they were now working with traditional instruction. By Story 3 however, those effects had diminished considerably. In contrast, the Hom-H and the Het dyads appeared to immediately react to the traditional instructions by performing relatively low on measures of modifier propositions. By story 3 however, the Het dyads showed relative improvement.

Story 3 of Phase 2 revealed some interaction effects between instructional treatment and dyad grouping on number of sentences, total number of propositions, and number of predicate propositions, all in a similar pattern. By means of a comparison of means from the interaction incidence tables, the following positive effects were apparent: the contextualized instructions had positive effects for the Hom-A dyads, while the traditional instructions had positive effects for the Hom-H dyads on these variables.

In conclusion, while there were differential effects of instructional treatments to dyads, overall, there were no patterns which would support the hypothesis that there were effects for order of presentation. For the remaining analyses in this section, Phases were collapsed. Thus, for example, a combination of Stories 1, 2, and 3 written under contextualized instructions during the first 6 weeks of he study and Stories 1, 2, and 3 also written under the contextualized instructions were compared to the respective stories written under the traditional instructional treatment.

School B excluded: Phases collapsed.

Proceeding to test for the effects of instructional treatments and dyad groupings, a 2 X 3 ANOVA was completed. Results are summarized on Table 5 and described in the following.

ERIC
Full Text Provided by ERIC

Insert Table 5 about here

The percent of bigrams that were correct in Story 1 was significantly different between the dyad groupings (F=3.61, p=.03) with mean percents of 97.39, 96.63, and 95.64 for the Het, Hom-A, and Hom-H dyads, respectively. These differences however, were not apparent beyond Story 1.

Interaction effects were found based on the number of predicate propositions in Story 3 (F=4.60, p=.02). Specifically, there was a higher number of predicate propositions for the Hom-A group under the contextualized instruction and for the Hom-H group under the traditional instruction. There was also a tendency for better Het performance under the traditional instruction.

Working under the contextualized instruction produced a greater number of modifier propositions than did the traditional instructions (F=4.32, p=.04).

A replication of the Story Sequence treatment analysis yielded similar results to when school B data was included. No effects for order of stories was noted.

Table 5.

Results of 2 X 3 ANOVA on Stories 1 and 3 Across Phases: Test for Effects of Instructional Treatment and Dyad Grouping.

Dependent Variable	Story 1	Story 3
No. Sentences	–	–
Words/Sentence	–	–
Percent Bigrams Correct	dyad* (Het>Hom-A>Hom-H)	–
No. Propositions	–	–
No. Predicate Props.	–	interaction*
No. Modifier Props.	–	instruc.* (contex.>)
No. Conjunction Props.	–	–

* significant at .05 level

II. Process Data Analyses Results

In the Method (Data reduction procedures) section, the video tape transcribing procedure was described. Only those cases with at least 2 stories written were considered in this phase of analysis. It was judged that these would best provide a representative sample of the behaviors of each dyad considering that at least two stories of 2 sessions each would be minimally sufficient exposure to an instructional treatment for effects to be noticeable. Furthermore, only data from the second story was used for the current analyses. A total of 5 of the 36 dyads were dropped from this portion of the analyses due to insufficient data for those dyads. There was no pattern of loss relative to dyad composition or instructional treatment noted, thus random mortality of subjects was assumed.

To test for the main effects of instructional treatments and dyad grouping, a 2 X 3 ANOVA was completed with each of the dependent measures or writing behaviors (idea generation, goal monitoring, typing, typing monitoring, on-task behavior, and positive affect); using data for the first five minutes and then using data for the last five minutes of each session. Results showed a significant difference in the amounts of goal monitoring during the first 5 minutes of the writing sessions between dyad types (F=3.28, p=.05) with the Het dyads demonstrating more goal monitoring behaviors than both of the homogeneous dyad types. Although not statistically significant, comparison of mean percentages of goal monitoring behaviors showed that the Hom-H engaged in more goal monitoring under the contextualized condition (67% vs. 37%) and the Hom-A engaged in more goal monitoring under the traditional instructions (67% vs. 32%).

Also there were interactional effects of the instructions and dyad with the Hom-A dyads' tendency to remain "on task" more under the contextualized than under the traditional instructions (interaction F=4.85, p=.01). This effect was present only during the last five minutes.

Analysis of main effects of the independent variables did not provide sufficient descriptions or understandings of the social interactions among dyad members, and the effects of these on the stories which they wrote, therefore more detailed analyses, guided by specific hypotheses, were conducted. These findings are reported in Part III of the Results.

Post-writing interview results. Upon completion of the experimental phase, each student was interviewed with a Post-Writing Interview designed for this study. As described in the Method section, the interview was divided into 2 sections corresponding to the two instructional treatments. With respect to preference for choosing of their own topics in the contextualized treatment, approximately 83% of the students responded that they preferred choosing their own topic. Some of the reasons cited were that it was "easier" to write about a topic that they chose, that it was "more fun", and that writing about "boring topics" was avoided. The other 17% stated a preference to not choose their own topic indicating that it was difficult to choose a topic.

However, in the section referring to the traditional instruction format, when students were asked if they liked having the topic chosen for them, approximately 75% responded favorably. These stated that it was "easier" because you "didn't have to think so hard to find a topic" and that it was usually a better topic than what they would have thought of themselves.

With respect to awareness of audience and purpose for writing, as part of the Post-Writing Interview, students were asked whom they thought would be reading their stories. In almost all cases, the students responded different combinations of "other students", "newspaper reporters", and "people at UCSB" as probable readers; again no differentiation between the two instructional treatments was noted. It is unclear whether the students actually made no distinctions during the interventions or if their retrospectively stated opinions did not accurately represent the differences which they might have actually experienced.

As part of the Post-Writing Interview, students were also asked their opinions about working with their partners and whether they would have preferred working alone. Over 80% responded that they enjoyed working with their partner and that they found him to be very helpful for reasons which included that it was "more fun", he provided "more ideas," and that he helped with spelling and punctuation. Those that responded negatively, cited reasons such as their partner being "uncooperative," "difficult," "dumb," "no enthusiasm," and "boring". However when asked whether they would have preferred to work alone, over half of them responded favorably citing reasons such as feelings that they "would get more accomplished" and a desire to "express my own ideas".

III. Response to Specific Hypotheses

Individual Characteristics and Role Taking Patterns.

Hypothesis 1a stated that there would be more similarity between the first and last five minutes of the writing sessions when the homogeneous dyads were involved, reflecting that the behavioral interaction pattern which was present at the end of the session, had been established almost immediately at the onset of the session.

A series of paired t-tests were performed to compare the first and last five minutes in terms of amounts of idea generation, goal monitoring, typing, typing monitoring, on task, and positive affect for each of the separate dyad groups (Hom-A, Hom-H, Het). The amounts for each dyad were based on the sum of the behaviors of the two students which were members of the dyad.

In the Het dyads, there was more idea generation and goal monitoring occurring during the first five minutes than during the last five minutes ($t=3.33$, $p=.003$; $t=2.44$, $p=.02$, respectively). The percentage of time involved in typing monitoring increased ($t=-2.05$, $p=.05$) from the first to the last 5 minutes. Overall it appears as if students engaged in the idea generation and goal monitoring during the first part of their writing sessions and then shifted to emphasis on editing. Typing monitoring entailed those behaviors such as correcting punctuation and spelling in the text either by self-correcting or by instructing the dyad partner.

The only behavior in which the Hom-A differed from the first to the last five minutes was idea generation (F=2.36, p=.04) with less occurring in the last 5 minutes. A similar decrease was noted in the Hom-H although it was not statistically significant.

It appears that there was more consistency in the pattern of behavioral interaction throughout a session among students of the same ethnic background as hypothesized, with changes noted only by a decrease in amounts of idea generation.

Hypothesis 1b predicted more involvement in idea generation and goal monitoring by the more proficient writer. Each student was assigned a relative status of "high", "low," or "equal" within each of his two dyads (one homogeneous and one heterogeneous) based on his score on the TOWL. This status was used as the independent variable in a 1-way ANOVA with each of the percentages of writing behaviors as dependent variables.

Results were not significant on any of these analyses. Thus, the roles taken by each dyad partner in the writing process did not seem to be affected by his relative proficiency and may have been defined by random daily circumstances.

(It should be noted that there was no relationship between level of writing proficiency (i.e., high or low relative status) and ethnicity, nor was there a relationship between typing skills and ethnicity of the students in the heterogeneous dyads. Also, being assigned the "high" writer did not increase the likelihood of being assigned "high" in terms of typing proficiency.)

Hypothesis 1c also was not confirmed by the ANOVA; there were not larger percentages of time spent on typing monitoring in the heterogeneous dyads than in the homogeneous dyads. Comparison of the mean amounts of this behavior however, reveals a tendency for more typing monitoring during the last five minutes of the writing session for the Het dyads. Though not statistically different from the amounts produced by the Hom dyads these data do provide evidence for the hypothesis that unequal levels of language proficiency may lead to unbalanced amounts of mechanical corrections. Since the data did not differenciate between self- and other- monitoring however, the source of the monitoring cannot be ascertained.

Instructional Method Treatment.

Hypothesis 2a called for a similar comparison of amounts of goal monitoring and idea generation between instructional treatments. Based on a 1-way ANOVA with instructional treatment as its independent variable, there were no statistically significant differences in the amounts of idea generation or goal monitoring between the contextualized and the traditional instruction treatments; neither during the first or the last five minutes. This hypothesis was not supported.

Hypothesis 2b predicted that based on the differential effects of the instructional treatments on the writing behaviors of the students, that the stories would vary in amounts of words and propositions with the traditional treatment producing longer stories but not as many distinct thought units. There were no differences between the instructional treatments in terms of total numbers of words, sentences, or total number of propositions.

Social Interaction Patterns and Written Products.

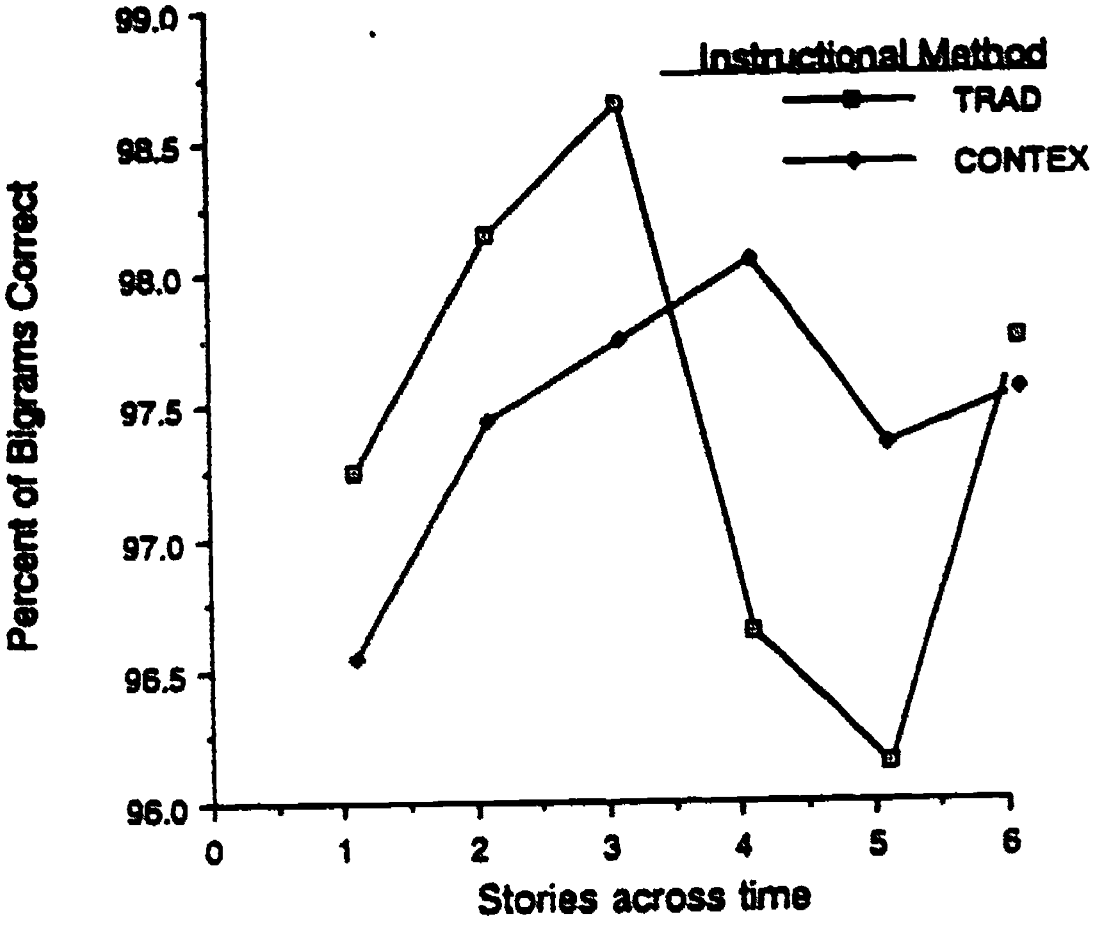
Hypothesis 3a predicted that irrespective of (or in addition to) the effects due to dyad grouping and instructional treatment, that as a result of each of these dyads collaboratively composing 6 stories, a working relationship would develop that would lead to the production of stories which improved both qualitatively and quantitatively across time. Stories 1, 2, and 3 from Phase 2 were renumbered as Stories 4, 5, and 6. Thus Stories 1 through 6 reflected the order in which they were actually written.

As previously reported, there were no main effects for story order. To further assess the effects of story order, 2-way ANOVA were performed to explore interaction effects with dyad grouping and with instructional treatment. Interaction effects were present for story by instructional treatment in terms of percent bigrams correct (F=5.69, p=.0001). This interaction is represented in Figure 5. When this analysis was repeated, excluding school B from the data sample, the results reflected similar trends (F=4.22, p=.001).

Insert Figure 5 about here

Hypothesis 3b was based on the assumption that students would utilize the editing sessions to "change,

Figure 5.
Percent Bigrams Correct for Instructional Treatments across Stories.



correct, or add" to the text which had been produced during the drafting sessions. By viewing Table 2 (presented earlier), it is apparent that there is a tendency for improvement on measures of fluency, demonstrating that more was being "added." However, on measures of spelling and words per sentence, which would be reflective of editing behaviors, no increases were noted.

Hypothesis 3c which predicted an interaction effect between dyad grouping and instructional treatment, was supported by the results of a 2 X 3 ANOVA reported earlier. While there were no main effects in terms of the total number of propositions, there was an interaction effect noted for the number of modifier propositions (F=3.79, p=.04). The Hom-H and the Het dyads produced greater numbers of modifier propositions while working under the contextualized instructions while the Hom-A tended to produce more modifier propositions under the traditional instructions. Mean numbers of modifier propositions were as follows:

	Instructional Treatment	
	Traditional	Contextualized
Hom-A	21.5	8.0
Hom-H	8.0	18.2
Het	9.9	15.3

Thus, there was not an overall increase of propositions under the contextualized instructions for the Hispanic dyads as had been hypothesized.

Hypothesis 3d predicted that the amount of goal monitoring present during a session would be correlated with the coherence score for the corresponding story. Results of correlational analysis between the two variables yielded very low correlation coefficients (-.02 to -.12). Thus no relationship between the presence of goal monitoring behaviors behaviors and the coherence of the final products was apparent.

In the following section, the Results are discussed in terms of their implications for the present study and for future research.

Chapter Six

Discussion

In this section, the results of the present study are discussed relative to previous related research and in terms of their implications for future investigations.

The present study investigated collaborative writing of LD junior high school boys from differing ethnic backgrounds while using microcomputers. Extensive bodies of research related to cooperative learning classroom structures have provided evidence that cooperative learning has positive effects on achievement gains made during the intervention periods. Research of the written expression skills of LD children has repeatedly documented the deficiencies in the written products and differences in levels of knowledge and management of those cognitive subprocesses involved in writing. Still another body of research describes the cross-cultural effects on knowledge acquisition in classrooms. Until now, no study has attempted to document the reality for a growing number of LD students, of linguistic minority background, who have writing difficulties and who are being instructed in small groups.

This study was designed to characterize the influence of student characteristics (such as ethnicity, writing achievement, and typing skills) on individual students' behaviors and on their role in dyadic social interaction. As the writing task completion required negotiation and sharing of ideas, knowledge, and equipment, it was assumed that the written product was a direct result of this social negotiation.

Three specific questions were addressed. The first is whether Hispanic students with learning disabilities engage in writing subprocesses similarly to their LD peers who did not acquire English as a second language. Would the written products also differ significantly? Second, do children engaged in a collaborative academic task divide the subprocesses in a particular manner which can be predicted by their relative proficiency in writing and typing and does this impede or enhance the quality of their written products? What role does the microcomputer play in these tasks?. Third, in addition to the effects of LD or ethnicity characteristics, would variations in the task instructions, designed to alter the "context," affect the outcome?

Effects of Ethnicity

Whether the ethnic composition of the dyads would effect the social interaction pattern and whether such differences would effect the written products was a major question which was addressed. Based on inter-ethnic cooperative learning and other cross-cultural anthropological research, it was expected that Anglo-American children dyads would be more competitive than Mexican-American children (Kagan & Madsen, 1971, 1972; Madsen, 1971) resulting in writing products that were qualitatively and quantitatively different in terms of number of words, spelling accuracy and types of idea units (propositions). It was also expected that the writing process of the Hispanic students would reflect a cooperative division of the writing subprocesses. This was not supported. There were no differences between the Hispanic (all Mexican-American) and the Anglo students in terms of levels of competitiveness, individualism, or cooperativeness. However, this is not entirely inconsistent with Kagan's research considering that the mean number of years that the Hispanic students had lived in California was 10.3 (3.46 S.D.), representing a major portion of their lives (Knight & Kagan, 1977).

In spite of the apparent similarities in terms of "social orientation", there were other differences noted; namely those of the students' first language. Based on data from "Home Language Surveys" data for 16 of the 18 Hispanic students: for 94% (n=15) of the students, Spanish was the student's first language, 72% (n=13) reported Spanish as being the most frequently spoken language in the home, and 87% (n=14) indicated that Spanish was the language most frequently used by the adults in the home. While it was expected that differences in oral language would bear on the social interaction of the dyads and that either through use of a common language (e.g., English or Spanish) or common cultural and linguistic patterns (e.g., pragmatics) that the cognitive activity embedded in their social interaction would be affected, little evidence was obtained to support this expectation.

For example, it was hypothesized that homogeneous dyads would more quickly establish a "working" relationship. Indeed, it was noted that there was more consistency in the pattern of behaviors through the first and last five minutes for homogeneous dyads. The key question was whether this consistency is more associated with academic productivity. In the two types of homogeneous dyads, there was an observed difference in the amount of idea generation from the first to the last five minutes of the writing session as might be expected; frequency of the other classes of behavior were equivalent in both the first and the last observations. Students in the heterogeneous dyads, however, showed a tendency to decrease the percentage of their time spent in goal monitoring as well as idea generation and to increase their engagement in typing and typing monitoring. However, although dyads did enter into different patterns of writing behavior as a function of homogeneity, analysis of writing products failed to reveal differences in final stories. Thus, different patterns of behavior during the writing process were equally conducive to productivity.

There were some differences noted in the initial analysis of the stories due to the dyad grouping. During the first story, the Hom-H dyads showed a lower percentage of bigrams correct (95.9) with the Het and Hom-A dyads producing similar levels of spelling accuracy (97.6 and 96.8, respectively). However, by the third story, these differences were not statistically significant primarily because of the improvement by the Hom-H dyads. It is interesting to speculate that the interaction with the more proficient partner during the heterogeneous grouping (which occurred on alternate weeks) affected the Hispanic students' awareness of correct spelling during their writing when working in the Hom-H dyads, resulting in improved spelling performance. This has positive implications for the use of cooperative learning structures for writing instruction. Furthermore, as the amounts of type monitoring were not different among the dyad types and since among the Hom-H dyads there was not an increase during the sessions, it appears that the increased emphasis on spelling accuracy was manifested in the initial typing of the stories and not as a result of increased editing.

Cooperative learning

The division of the word-processing sub-processes were used to indicate effects of cooperative learning in the context of a writing assignment. Students with better typing and writing achievement skills than their dyad partners did not show a tendency to dominate keyboard typing or goal monitoring, respectively. This finding contradicts other research (Lieber and Semmel,1986) showing that work roles in LD/Non-LD dyads tend to be defined according to the competence each perceives in the other. However, in the present study, Non-LD students were not observed; all students were LD and only ethnicity and personal characteristics were the basis for allocating roles according to perceived competence for the task. Obviously, there are many other variables which come into play here including each of the LD student's prior experiences with writing, with word processing, and with working cooperatively. In addition, prior friendships, or negative impressions of dyad partners may have influenced social interaction although over 90% of interactions were positive or neutral. Overall, however, there was no apparent effect.

Cooperative learning is a-theoretical for structuring learning though many claims are made for its effectiveness for handicapped students; an understanding of the complex dynamics of inter-student and intra-student cognitive characteristics and behavior has not emerged. Moreover, the overwhelming majority of cultural studies have confounded rural-urban factors with cross-cultural differences. Cooperative learning structures, as they are presented in current research, do not provide a basis for manipulating how students should interact during academic tasks. It is not reasonable, therefore, to expect that mere opportunity to cooperate will produce an optimal pattern of interaction for a given academic task.

It is proposed that social interaction be viewed as the establishing of a common cognitive plane in which problem-solving can occur between two persons; in a sense the two identify a "zone of proximal development" (Wertsch, 1984) and through language are able to communicate and develop cognitively. In other words, when students are permitted to interact during instructional tasks, they are being allowed access to alternative or supplemental modes of comprehending, beyond that which the teacher is able to provide. Students from non-majority groups may generally benefit from such an instructional mode because they require more opportunity to establish meaning and motivation to perform in unfamiliar contexts. This may, in part, be why past comparative classroom studies have repeatedly shown positive effects for students from Mexican-American and Black cultural groups.

The fact that student characteristics such as ethnicity, typing proficiency, and prior writing achievement did not predict role-taking in this study can be interpreted to suggest that the organization of work was defined by variables local to the specific dyad which have no generalized characterization across groups of dyads. Other variables need to be explored such as the effects of social and task constraints and, in the present case, tool constraints. Additionally, the present study, although spanning nearly a 4 month period, may not have been a long enough period to allow observable patterns to emerge.

Aside from the outcomes, it is quite evident that microcomputer-based writing as an instructional context has great potential for further exploration and development of cooperative writing. The dyad partner not engaged in composing at a particular point, very often is involved in reading, thus representing an "audience". This audience role serves as a guide to missing or unclear information and/or violations of mechanical standards. In essence, the cognitive subtasks entailed in writing are divided among those involved and are often interchanged, such that each has the opportunity to "practice" different subtasks at different times.

This ability to segment components of the process has implications for instruction in writing, particularly for the composition process. Children working in dyads might be explicitly instructed to engage in one "role" at a time. Since the written product which is being produced is a common product which must be negotiated, the two are obligated to communicate to one another, disagreements, suggestions, and inconsistencies which may be noted from the perspective which is being taken (defined by the assigned role). The voice of the partner could model metacognitive processes which might subsequently be internalized.

Writing Instruction

In general the students utilized their editing (2nd) sessions for lengthening their stories but not for improving spelling or sentence structure. The final stories usually consisted of unmodified versions of the text produced during the drafting session plus added text, with a new set of spelling errors. It is quite logical, from the standpoint of previous research with LD students, that if students have not been instructed to edit, that the mere occasion to do so (i.e., as in the present where they were instructed, "make any changes, additions, and corrections") will not necessarily cause them to review what has been written, identify violations of writing conventions, or know how to correct them. Thus, the associative writing style displayed by these students' stories appears in part to be a consequence of not receiving adequate, specific editing instructions. Obviously, more specific instruction is needed by these students if they are to engage in editing that improves overall quality of writing.

In the present study, the students were exposed to two types of instructions: one was intended to promote a more "traditional" orientation by not designating an audience or purpose for the writing; a "contextualized" orientation was meant to provide some guidance for the writer in visualizing a reader's and their needs for comprehending what was being written. Empathy for the reader is a key characteristic of what is called the "process approach" to writing. Furthermore, a critical component of the present fro those working in a "contextualized" treatment, were instructions to select their own topics.

It is important to emphasize that the two instructional treatments were differentiated on only these 3 characteristics (audience, purpose, topic choice) and that the instructions which the field assistants delivered were scripted for the purpose of assessing the effects of these variables which are predominant in writing research as descriptors of process-oriented writing. Students were not provided with interactive (i.e., teacher-student) instructions which would have been much richer in terms of quality of instruction; again to reduce confounding influences on the effects of the three characteristics that differentiated the two instructional treatments.

It was hypothesized that as a result of giving students a choice of topic that there would be greater amounts of idea generation and associated monitoring of the decided-upon goals. This hypothesis was not confirmed.

As reported earlier, results for the Post-Writing Interviews indicated that students failed to distinguish instructional treatments in terms of potential readers. A majority of students also responded as favorably to having the "topic" provided for them as to being given the freedom to select their own topic in the contextualized condition.

Possible reasons for the failure to find evidence of effect for contextualized instructions are varied and complex. First of all, it could be that the students were not able to make a clear distinction in their memories between the two instructional conditions during the interview, such that their responses failed to discriminate treatments, but instead reflected their general opinions about having an interesting topic. It should be noted that the topics selected for this study were derived from a list of themes which had been previously found to stimulate the interest of junior high school students. Furthermore, it has been previously documented that LD students indeed have difficulties generating ideas, thus they often require some pre-writing activities to generate ideas. In the case of the present study, a "picture caption" was typed and appeared at the top of their monitor upon starting each story.

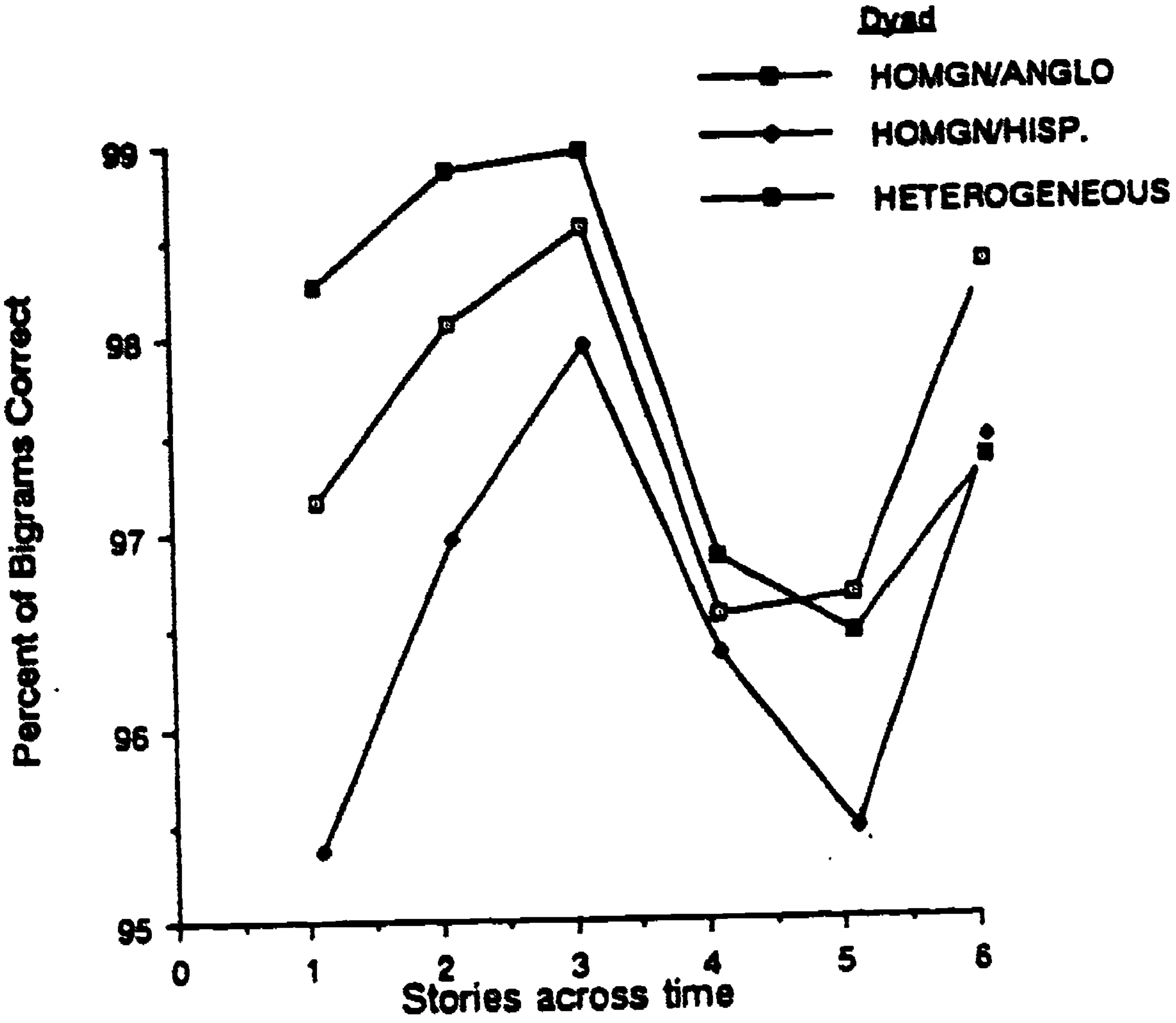
The combinatorial effects of choosing a topic and knowing to whom and for what reason they were writing were expected to ultimately manifest themselves as the stories were written. Specifically, it was hypothesized that the traditional instructions which provided a picture caption would stimulate _less_ idea generating by setting constraints on relevant ideas. This was expected to lead to more immediate typing, possibly a longer story, but not necessarily one with more distinct ideas. Main effects for type of instructions, however, were not apparent for any of the dependent variables. However there were consistent suggestions of effects which, although not statistically significant, might hint at differences related to the two kinds of instructions.

For example, the data for percent bigrams correct leads to speculation that provides some information for some interesting hypotheses about the nature of the effects the instructional treatments. As presented in Figure 6, percent bigrams correct under the traditional instructions show a steady increase by all of the dyads until the fourth story. Noting that the data represented for students working under the traditional instructions, as of the fourth story, is a product of dyads which were working under the contextualized instructions during the first three stories, suggests a possible explanation for the sudden decrease.

Insert Figure 6 about here

It seems plausible from these data that there were characteristics of the traditional instructions which were more conducive to students' editing of their spelling. Results show that this increase was not due to higher levels of typing monitoring which was the only measure that permitted estimation of changes in spelling

Figure 6.
Percent Bigrams Correct under Traditional Instructions



revision processes. Perhaps by providing a "topic" and no defined audience or purpose, students experienced the intended constraint on their ability to generate or use relevant knowledge. In other words, by writing a story "for the teacher" students may have believed that they should restrict writing words suggested by the guiding sentence; thus more attention was given to the mechanical aspects such as spelling.

By way of contrast, the trends in numbers of modifier propositions appear to favor the contextualized instructions. It may be that when students are permitted to choose their own topic and/or are aware of the purpose and audience for which they are writing, that they choose a topic which is generated from their own experiences and which they suppose that others of similar background (audience) would be interested in. Thus, being from their own memory of experiences, more descriptive expression is stimulated. Furthermore, since the students were afforded the opportunity to decide on the topic, they may have experienced a willingness to use language beyond their mechanical abilities (e.g., spelling proficiency).

Finally, the use of a microcomputer which presented a clean, neat story, may have distracted the students from seeking to edit. While it has been proposed by some that the ease of editing may encourage LD students to make changes, the neat, printed story may in fact disguise the need for editing as an appearance of a finished product is apparent to the reader/writer.

Summary

Several complex issues were addressed in the present study in an unprecedented manner by combining the use of collaborative writing with microcomputers by cross-ethnic dyads. The present study did not seek to replicate previous research findings which describe differences between LD and non-LD students. Indeed, these differences have been documented and LD students writing is characterized as being associative (reflecting a lack of text structure knowledge and/or an inability to manage the writing subprocesses), deficient in mechanical aspects (such as spelling and punctuation) and generally less fluent (as measured by number of words or idea units). Students in the present study may be considered comparable as they were selected to participate on the basis of the local school criteria for LD placement and in addition, all had low writing achievement scores.

Within the group of children with learning disabilities, there are disproportionately high numbers of children of Spanish-speaking backgrounds. Comparisons in the present study were based on the ethnicity of the students (Anglo or Hispanic), on relative writing achievement (high and low TOWL scores relative to dyad partner), and relative typing speed (high and low typing test scores relative to dyad partner). The study failed to support the hypothesis that these variables affect the resultant written product. The Hispanic students were not new immigrants, all having received their entire formal education in this country. If ethnicity is a durable variable, it was outweighed in the present study by the local circumstances; and by the specific social histories of these particular students.

Most cooperative learning research has been conducted by placing a group of students in a classroom which is using cooperative learning techniques while another comparable group remains in a classroom with a traditional structure. Data collection usually involves measures of achievement and attitudes which are typically collected prior to and upon completion of the intervention for purposes of comparison. Students in the present study worked with each of their 2 dyad partners for over 12 weeks (alternate weeks), twice weekly, and data was collected on a daily basis in the form of written products and social interaction processes.

Participants were, in a sense, "forced" to engage in cooperative efforts by being instructed to write collaboratively. In other words, the choice of working together was almost completely controlled by the situation, giving more validity to the assumption that the final product was a result of collaborative work. Concurrently, the processes which were being observed could also be assumed to be collaborative in nature. Clear patterns of role-division were not apparent, though visual observation of the videotape recordings revealed clear division of subtasks. The coding instrument helped to detect the presence of total behaviors but, future investigations may need to measure more molecular sequences of behaviors.

Use of microcomputers for collaborative writing further induced the participants to work cooperatively, not only in managing the logistics of sharing a keyboard, but more importantly, by sharing the responsibility for certain subprocesses at various points during the story production such as idea generating and editing. In other words, these LD students, typically characterized as metacognitively deficient, were engaged in a task whereby the metacognitive processes were shared. Thus, the use of microcomputers for writing in dyads has positive instructional implications, particularly for LD students.

Finally, two modes of writing instructions were compared. As hypothesized, stories after the editing session were longer, but the hypothesized qualitative improvement from the initial draft to the edited story was not confirmed. There was a clear trend which indicated that the students working under the "traditional" instructions produced stories with more accurate levels of spelling. There was also evidence of higher levels of modifier units under the "contextualized" instructions. Interaction was limited (to the extent possible) to that within students, with teachers and field assistants intervening only on non-writing task issues. The present study reinforces the current emphasis on process, in terms of the students' needs to be involved in the generation of ideas and themes and in the editing of their written text, but also emphasizes the need for specific instruction in the mechanical aspects of editing and revising initial drafts of text. Future research needs to more specifically address those characteristics which are necessary for effective instruction in planning, transcribing, and revising in composition.

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