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A SURVEY OF PARENTAL KNOWLEDGE OF AND ATTITUDES TOWARD COMPUTER USE: IMPLICATIONS FOR COMPUTER-ORIENTATION PROGRAMS FOR PARENTS

By

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ABSTRACT

A SURVEY OF PARENTAL KNOWLEDGE OF AND ATTITUDES TOWARD COMPUTER USE: IMPLICATIONS FOR COMPUTER-ORIENTATION PROGRAMS FOR PARENTS

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The purpose of this study was to identify characteristics of parents and their children that determine parental attitudes toward the use of computers in their children's school, as well as parents' knowledge of the actual use of computers in their children's school, to assist schools in developing parent computer-orientation programs and to encourage parental involvement in their children's computer education.

The population surveyed included parents of fifth graders in three private, independent American/International schools in Southeast Asia. Both parents were asked to complete a questionnaire developed by the researcher for this study.

Stepwise multiple regression analysis was conducted to determine whether there was a significant relationship (at the $p = .05$ level) between ten independent variables and four dependent variables. The results were as follows: Parental knowledge of the computer curriculum was determined by ownership of a home computer and two years or more of children's attendance at the current

school; parental attitude toward the use of computers in their children's instructional program was determined by ownership of a home computer; parental attitude toward their use of computers was determined by parents' computer competence and having been computer users for more than one year; parental attitude toward assisting their child in computer competence was determined by owning a home computer, sex of child (female), and child considered to be the family computer expert (negative relationship); and parental competence in computer use was determined by their having been computer users for more than one year, sex of parent (male), and parental level of education (bachelor's degree or higher).

The implications are that schools need to involve parents in computer education, consider parental characteristics when implementing parent computer-orientation programs, train parents to use computers and software that their children use in school, inform parents of the computer curriculum, advise parents about how to help their children gain computer competence, and provide computer access for families not owning a computer. Recommendations for further research include how computer use by children at home relates to the curriculum at school, and the effectiveness of parent computer-orientation programs.

To my parents,

Robert H. and Janette K. Rogers,

who have shown me so much

understanding, support, and love.

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CHAPTER I

STATEMENT OF THE PROBLEM

Background

There are many influences on the curriculum in our schools today. Students, teachers, administrators, and textbook publishers; federal, state, and local government bodies; and local communities, as society, are some of the many determinants of curriculum in schools (Inlow, 1966). Among the social groups that together form any local community in a society, one group that stands out as having been an important determinant of change in many curriculum areas in elementary education is the parents of children in the schools. By serving as members of parent-teacher associations, school committees, and school boards; by voicing their opinions in public forums; or by sending letters to their children's teachers and school administrators, they are able to have a direct influence on many aspects of the curriculum program.

However, the extent of the influence that parents have had on the computer curriculum currently in elementary schools is not clear. Their concern has been largely in supporting the increase of the number of computers in their schools, which reflects an attitude in society that knowledge of computers is essential in order to succeed in an increasingly computerized society (Kinzer, 1985;

Naisbitt, 1984). Among societal determinants of public opinion, the media have caused pressure to be placed on schools to implement computer education programs (Goldberg, 1985). Publishers of software and manufacturers of hardware have all contributed to this attitude through what has been referred to as media "hype" (Goldberg, 1985; McGhan, 1988). In an article entitled "Children and Microcomputers: A Critical Analysis," Karger (1988) cautioned against blind acceptance of introducing computers to young children. He stated:

> This frenzied attempt to introduce children to computers did not originate in a haphazard fashion: it was part of an overall strategy endorsed by computer operations. . . . [In the future], these computer suckled children will learn to embrace new technological achievements. (p. 9)

In another reference to the effect that the media have on society, Stone (1987) noted: "The educational world reacted with horror several years ago when a major microcomputer manufacturer implied in national advertisements that parents who didn't buy computers for their children were failures" (p. 54).

McGhan (1988) pointed out that among other concerns that parents have about their children's education, parents now also have to worry about their children and computers. He stated, "They wonder, 'Is my child going to learn what he or she needs in order to cope with a future filled with computers? Can I help my child along with some home computer experiences?'" (p. 208). These concerns have led to three important parental issues. First is the worry about their children and computers, second is a concern that their children will learn enough about computers to enable them to cope

with computers in the future, and the third issue is what parents can do now to help their children in computer education at home.

The first issue, the worry about their children and computers, is one reason parents have been interested in acquiring computers for their elementary schools. However, when evaluating a school's computer curriculum, the number of computers a school owns may be irrelevant if there an effective and quality curriculum program is not implemented for their use.

Without sufficient information from educators regarding computer education, parents may have judged the quality of their school's computer curriculum solely by the number of computers owned by the school (Kinzer, 1985; Roberts, 1986). Parents often have preconceived ideas about curriculum, largely from their own past experiences in school, and make judgments about their children's school curriculum based on their observations of the curriculum as well as their ideas about what the school ought to be doing for their children. Among the many ways in which parents are able to monitor the school curriculum and their children's progress in mastering curriculum skills are (a) evaluating the school work their children bring home, (b) written communication from teachers, (c) attending meetings with teachers and school officials, and (d) visiting the school and their children's classroom. Many parents feel comfortable in making judgments about how they think their children are progressing in subjects such as reading/language arts and mathematics, and often communicate these judgments to teachers

and administrators. However, when considering a school's computer curriculum, parents may have little or no personal computer experience in their own school background from which to form opinions about the quality of the computer curriculum.

Because parents often monitor other core curriculum areas, such as mathematics and reading instruction, Roberts (1986) advised parents also to monitor the computer education program in their children's schools. By taking an interest in monitoring the computer curriculum, parents may begin to answer the question in McGhan's second issue: Will their children learn enough about computers to enable them to cope with computers in the future?

If parents are expected to express this interest in the computer curriculum in order to discover whether their children are learning enough about computers, educators should be prepared to provide some form of orientation or in-service training to parents regarding their school's computer curriculum. The National Assessment of Educational Progress (NAEP) found that most students learn about using computers in school (Martinez & Mead, 1988). However, the NAEP also found that about one-third of the sample of students in grades 7 and 11 learned more about computers outside of school than inside, and that a significant percentage of students learned more about using computers from sources other than their teacher. The study also showed that students in grade 11 were more likely to learn about using computers from a friend than from their mother or father, but students in grade 7 were almost as likely to

learn about using computers from their mother or father as from a friend.

As parental influence is usually stronger than peer influence in the elementary grades, elementary students may be more likely to learn about using computers from their mother or father than a friend. With such results showing the significant amount of computer learning taking place in the home, educators should begin to take advantage of the potential for parental assistance in improving student computer skill competence in a curriculum designed through principles of curriculum development, rather than what is likely to be a haphazard approach, based on the particular knowledge, or lack of knowledge, of various parents in the community. This may be accomplished by establishing programs that will coordinate the use of home computers with the school computer curriculum (Stone, 1987). By offering orientation sessions to inform parents of the school's computer curriculum and workshops to show parents how to use computers and how to run educational software used in the school, parents can be informed as to how best to help their children improve their computer competence.

The consideration of parental attitudes toward and knowledge about the use of computers in education is too often missing in a program design for the implementation of a computer curriculum in elementary schools. If parents are informed as to the goals and objectives of a school's computer curriculum, they may have a more positive attitude toward their children's use of computers in school and become more involved in the learning of computers by their

children. This would address McGhan's third issue: What can parents do now to help their children in computer education at home?

School officials often seek parental assistance in the improvement of their children's learning in other academic areas, and studies have shown that parental involvement in their children's education positively affects their child's learning (Hulsebosch, 1988; Kleinstiver, 1988; Lant, 1989; O'Connor, 1988). Parental involvement in elementary education is crucial for their children's academic success. In two recent studies, significant increases in learning were exhibited by students when parents were trained or provided with special materials to inform them how best to assist their child (Lant, 1989; O'Connor, 1988).

Several years ago in their report A Nation at Risk, the National Commission on Excellence in Education (1983) called for computer competence to be added to the list of basic skills to be learned in school. Further, in his book Megatrends, Naisbitt (1984) wrote:

> In the new information society, being without computer skills is like wandering around a collection the size of the Library of Congress with all the books arranged at random with no Dewey Decimal system, no card catalog--and of course no friendly librarian to serve your information needs.
>
> . . . . . .
>
> Schools around the nation are beginning to realize that in the information society, the two required languages will be English and computer. (pp. 27, 29)

Clearly, computer education is seen as being an important aspect of the curriculum, and parents are an important source of assistance to their children in the improvement of computer

competence. If educators are to provide orientation programs to inform parents how they can best assist their children in attaining computer competencies, educators should assess parents in several areas of their knowledge in using computers and their attitude toward computers. Assessing parental knowledge of computers and their own competencies in using computers in their work or at home may permit schools to better plan and implement appropriate and efficient computer-orientation programs designed to meet the varying informational needs of parents.

When assessing parental knowledge of the use of computers in elementary schools, will educators discover certain common characteristics of parents who demonstrate a positive attitude toward many uses of computers in education and indicate a knowledgeable understanding of how software applications may be integrated into the elementary school curriculum? Conversely, will certain characteristics be discovered of those parents who demonstrate few or no competencies in their own use of computers and show little or no knowledge of how computers are being used in the elementary curriculum? Knowledge of these characteristics may facilitate the planning of effective computer-orientation programs to inform parents about how they may help their children in the school's computer curriculum.

Purpose of the Study

Curriculum development requires careful planning by each individual school or school district in determining the appropriate

curriculum program for the students in that school system. Parents' knowledge of and attitudes toward computer use in elementary schools and their involvement in the program of learning of their children should be considered in developing the computer curriculum to be implemented in elementary schools. Educators should collect baseline data when developing computer-orientation and in-service programs for parents designed to provide them with information regarding the school's computer curriculum so that they may discover whether their children are learning enough about computers to cope with computers in the future, and to enable parents to help their children with some home computer experiences. The purpose of this study was to collect such data.

Using a survey instrument developed for this research project, data were collected in four main categories:

1. Parental background information and descriptive information regarding ownership and use of a home computer.

2. Parental competence in their own use of computers.

3. Parental knowledge of the computer curriculum in their child's elementary school.

4. Parental attitudes toward the use of computers in their child's instructional program.

The main goal in this study was to use these data to determine (a) parental attitudes toward the use of computers in their child's school, (b) parental knowledge of actual use of computers in their child's school, and, thereby, (c) the need for computer-orientation programs for parents.

Significance of the Study

The data gathered in this study regarding parental attitudes toward and knowledge about the use of computers in elementary education supplement and build on the base of knowledge supplied by other studies. For example, the NAEP study reported data regarding the influence of ownership of home computers and parental involvement in middle schools and high schools (Martinez & Mead, 1988). In his study of parents' attitudes toward the use of computers in high school, Gilberstad (1987) recommended that research be conducted with parents with elementary-aged children.

This study provides information that will help educators assess parental needs regarding their knowledge of and attitudes toward the use of computers in education. If parents are to be encouraged to improve their child's computer competencies at home and are to be encouraged to monitor their child's development of computer competencies at school, they need to be informed as to how they can best accomplish these tasks. This encouragement and information from schools may also improve communication between school and home, helping the school gain parents' support for improving student computer competence as well as support for on-going development of the computer curriculum in their child's school.

Dependent and Independent Variables

The main goal of this study was to determine the need for computer-orientation programs for parents, as well as the appropriate content to be included in the orientation programs to

meet various informational needs of parents so they can help their children in the school's computer curriculum. To acquire knowledge about characteristics of parents and their children, five dependent variables were identified: (a) parental knowledge of the computer curriculum in their child's elementary school, (b) parental attitude toward the use of computers in their child's instructional program, (c) parental attitude toward their own use of computers, (d) parental competence in their own use of computers, and (e) parental attitude toward helping their child improve computer competence at home. This knowledge could be significant in the development of computer-orientation programs for parents. If these orientation programs are to be effective in improving parental involvement, they must be designed to meet the needs of parents with differing attitudes and levels of knowledge regarding the use of computers.

For the purpose of this study, the researcher selected ten independent variables involving parental characteristics and investigated their relationship to the four dependent variables. The independent variables are (a) sex of parent, (b) parental nationality, (c) sex of child, (d) whether parent had volunteered at child's school, (e) years child had attended current school, (f) parental level of education, (g) years parent had been a computer user, (h) ownership of a home computer, (i) parental competence in their own use of computers, and (j) family member considered to be the computer expert.

In addressing the research questions posed in Chapter III, the data were analyzed to discover which of these independent variables had a significant relationship with the dependent variables. The results were used in determining characteristics of parents that influence the development of computer-orientation programs for parents.

Generalizability

The study population comprised parents of fifth-grade students in three private, independent American/International schools in Southeast Asia. The random sample chosen for the study constituted one-third of this population, in accord with the general guidelines for sample size outlined in the literature (see discussion of the sample in Chapter III). The findings in this study can be directly generalized only to the identified population in this study. However, as these three schools are similar in many respects to other private, independent American/International schools in Asia, personnel in other such schools may examine the results of this study to determine the generalizability of the results to their own specific school situation. In addition, insight may be gained by any school or school district concerned with developing an elementary computer curriculum with maximum parental support.

Limitations

The primary limitation of this study is the narrow choice of schools, which limits the generalizability of the findings. However, as other schools in Asia have characteristics similar to

those of the three schools selected for this study, these findings may be valuable.

Because many parents in the population were not native speakers of English, there may have been a problem of accurate translation of the English questionnaire for some parents, which could thereby have caused a degree of inaccuracy in the survey results.

Parents may have been unfamiliar with computer hardware and software terminology used in the survey and may have responded inappropriately, causing a certain degree of inaccuracy in the survey results.

The survey included a time-ordered question, requiring parents to report feelings at the time of the purchase of their first home computer. Parents might not have accurately remembered these feelings if the time span had been several years.

Definitions of Terms

The following terms are defined as they were used within the parameters of this study.

Application programs. Computer software programs designed to use the computer as a tool for problem-solving activities and for carrying out tasks (see database, spreadsheet, and word-processing programs).

BASIC (Beginners' All-purpose Symbolic Instructional Code). A computer-programming language often used as an introduction to programming for students.

Computer-assisted instruction (CAI). Computer software designed to supplement classroom instruction, often in developing basic curriculum skills in mathematics and language arts.

Computer-as-a-tool. The use of a computer to facilitate the accomplishment of academic and creative goals in completing tasks and in problem solving, often by using application software such as database, spreadsheet, and word processing.

Computer programming. Designing, organizing, and writing a series of instructions in a computer code (programming language) to direct the computer to complete a series of tasks.

Database program. A computer application program designed to allow students to input, organize, retrieve, and manipulate a variety of data, often to investigate relationships and solve problems.

Drill-and-practice computer programs. A type of computer-assisted-instruction software that allows students to practice basic facts through drill lessons in specific skills, such as in basic mathematics facts.

Hardware. The component parts of a computer, such as the computer processing unit, monitor, keyboard, printer, disk drives, and modem.

Logo. A sophisticated, yet simple, programming language that allows students to control the computer and that was designed to encourage the development of problem-solving and procedural-thinking skills in young children.

Simulation computer programs. Programs that offer students open-ended and exploratory learning by creating learning situations through computer graphics that students may manipulate to simulate a real-life experience that may not otherwise be practical or safe to recreate in the classroom environment (such as science experiments in chemistry, physics, or electronics).

Software. The set of instructions in computer programs that direct computers in the performance and completion of various tasks.

Spreadsheet program. A computer application program that allows students to input, organize, retrieve, and manipulate a variety of data, particularly to quickly command the computer to perform mathematical calculations.

Telecommunication. Communication with computers through the use of telephone lines and satellite technology.

Word-processing program. A software application that allows one to use the computer as a writing tool. The advantage of a word-processing program is that it allows simplified drafting, revising, and editing of any text material on the computer monitor before printing on paper.

Organization of Subsequent Chapters

Chapter II contains a review of pertinent research and literature relating to the content of this study in three major sections: Parental Involvement in Education, Parental Computer Involvement, and Status Report of Use of Computers in the Elementary Computer Curriculum. In Chapter III, the design and methodology

used in the study are discussed in six sections: Overview of the Methodology, Development of the Questionnaire, Description of the Establishment of Variables, Population of Interest, Procedures, and Method of Reporting the Results. Results of the data analyses are presented in Chapter IV. Findings regarding the research questions, conclusions, and suggestions for future research are presented in Chapter V.

CHAPTER II

REVIEW OF THE RELATED LITERATURE

The literature concerning parental involvement in education is vast in scope. In this chapter, which is divided into three sections, some of the literature is reviewed pertaining to (a) parental involvement in education, (b) parental involvement specifically in computer education, and (c) current uses of computers in elementary school curricula, as related to items on the questionnaire completed by parents in the survey. Because parents should be included in the development of an elementary school program, consideration is first given to representative literature and research on parental involvement in education. The second section, dealing with parental involvement in computer education, is included because of the increase in the integration of computers in educational programs since the early 1980s (Hayes, 1988) and because of the potential benefit of parental involvement in promoting their children's computer skill development. As the use of computers in elementary schools has now become institutionalized (Gough, 1989), a review of the literature concerning the application of computer technology in elementary schools is presented in the third section. A summary of the literature review concludes this chapter.

Parental Involvement in Education

Because of the extensiveness of the literature concerning parental involvement in education, there was a need to organize the literature around various themes. For the purpose of this review, the following topics are discussed: (a) attitudes toward parental involvement in education, (b) goals of parental involvement, (c) home-school communication, (d) parents as volunteers, and (e) training programs for parental involvement.

Attitudes Toward Parental Involvement in Education

Much research has been reported on the attitudes of parents, teachers, and school administrators toward parental involvement in education. In a review of the literature on this subject, Moles (1987) wrote:

> Parent involvement in education is an idea whose time has come. Parent organizations, school officials, educators, and the U.S. Secretary of Education William Bennett all endorse the concept. Teachers support it overwhelmingly. In a recent nationwide poll, over 90% of teachers at all grade levels wanted more home-school interaction (National Education Association, 1981). Each group is saying that schools cannot educate children alone, and need the support if not the active collaboration of parents. (p. 137)

The philosophy that emphasizes collaboration between parents and schools has been greatly supported in the literature (Becher, 1985; Dye, 1989; Epstein, 1986). This collaboration may often take place in the form of teachers working to help parents understand the educational program and to provide opportunities to become involved in their children's learning. In two studies (Kleinstiver, 1988; Russell, 1989), teachers and principals showed positive attitudes

toward parental involvement in having teachers assist parents by providing ideas for working with their children at home, and by encouraging parents to serve as volunteers in the classroom, to become active participants in parent groups, and to become involved in school goal setting. Teachers and principals believed that parental involvement enhanced pupil success. Lareau and Benson (1984) emphasized the need for teachers to develop an attitude of mutual interdependence that will enable this educational partnership to flourish.

Despite the literature supporting the importance and effectiveness of parental involvement in the education process, some studies have demonstrated evidence of the need for schools to further encourage and support such involvement. Annual Gallup polls from 1975 to 1989 showed that although parents were willing to become involved, they did not believe they had the direction needed from schools and that educators need to put forth more effort to involve parents in their children's education (Becher,1985; Gallup & Elam, 1988, 1989; Truby, 1987).

Other studies have supported the findings of the Gallup polls (Becher, 1985; Becker & Epstein, 1982; Chavkin & Williams, 1987; Dye, 1989; Hoover-Dempsey, Bassler, & Brissie, 1987). In a major survey study involving parents of elementary school students throughout Maryland (Epstein, 1986), a majority of parents indicated that they rarely or never received requests from teachers to become more involved in their children's learning program at home, but

"overwhelmingly agreed that teachers should involve parents in learning activities at home" (p. 280). Parents also indicated that if they were shown how to work with their children in specific learning activities, they would spend more time helping their children at home. Dye (1989) cited three authors confirming that parents become involved in their children's educational program when opportunities become available through the school. Although there is a need for parent education programs to help parents know how to be more involved in education, not all schools provide parents with opportunities to become involved ("Parent Participation," 1985).

Some schools however, are taking steps to increase parental involvement. In Tennessee, $1 million was appropriated to design and implement a parent involvement program (Lueder, 1989). The purpose of this initiative was to "enhance or develop various parent involvement models in local school systems in order to demonstrate the benefits of a strong partnership between parents, students, and the school" (p. 15). The results of a parent survey after the program was implemented showed that 95% of parents who completed the survey form checked either "strongly agree" or "agree," indicating that they were more involved with their children's education as a result of the parent involvement program. The significance of this study was that it showed parental interest in becoming involved in education if invited by school officials.

The results of a survey of parents of elementary children, superintendents, and school board presidents in the six states included in the region covered by the Southwest Educational

Development Laboratory, as reported by Chavkin and Williams (1987), showed that parents expressed favorable attitudes toward parent involvement in the school program and indicated that they had an important influence on their children's success in school. Parents also indicated that teachers should give parents ideas for helping their children with academic skills at home. Chavkin and Williams cited literature indicating that parents are increasing their demands for greater participation and that school administrators should view this as a positive movement rather than a threat to their own administrative roles.

Walberg (1984) stated that parents viewed their participation in schools more favorably than did teachers and principals, particularly in areas such as parents serving as school committee members, as advocates before school boards, and as supporters for school programs. There was also a difference in attitudes among parents and school officials regarding parents' role in school policy issues. In a survey conducted by Chavkin and Williams (1987), 88% of the school superintendents and school board presidents were opposed to parental involvement in administrative decisions such as teacher selection or assignments, equipment purchases, and evaluating teacher or building principal performance. However, the parent survey indicated that 64% of the parents believed they were capable of helping make administrative decisions such as equipment purchases, and 71% of the parents believed that they should help evaluate teachers and principals. Although 45% of

the superintendents and even fewer school board presidents (29%) agreed that parents should be involved in curriculum and instruction decisions, 75% of the parent respondents expressed interest in sharing the responsibility in the decision-making process with the school officials in this area. Despite this expressed interest in becoming involved in the decision-making process, in another study parents reported a very low level of involvement in decision-making activities in the school (Stallworth & Williams, 1982).

One strategy to increase parental understanding of the roles of parents and administrators in the policy-decision-making process would be for administrators to invite parents to join school committees so that parents could provide input in goal setting, development/implementation, and assessment aspects of education (Chavkin & Williams, 1987). Parental involvement at this level has less direct effect on their children's skill improvement, but it may be effective in promoting parental feelings of ownership and commitment if these committees address issues that help build public confidence and support of the educational programs of the schools (Walberg, 1984). Administrators could use this form of involvement to demonstrate their administrative leadership abilities and to show parents that a school-home relationship shares a common ground for cooperative work in developing courses of action to improve education.

Another example of parental interest in becoming involved in education was a home-school partnership program at the Grant School in Chicago (Walberg, 1984). A survey of parents indicated that they

desired closer cooperation with the school. As a result, in a program called Operation Higher Achievement, a steering committee consisting of parents and school staff members was established to develop goals for improved parent awareness of school programs and improved parent-school relations. The results were an increase in parental support for implementing the established goals as well as an increase in actual parental involvement in the educational program of the school. These results demonstrate the effectiveness of collaboration between home and school.

In another study demonstrating the effectiveness of home-school collaboration, parents and school officials worked together to make important policy decisions that resulted in significant program improvement (Comer, 1988). Research has supported the need for collaboration between parents and schools in interpreting and developing common goals for parent involvement (Chavkin & Williams, 1987).

Goals of Parental Involvement

In taking a proactive approach, administrators may lead the process and implementation of parental involvement according to the needs and goals of the schools (Epstein, 1987). Among the goals cited by school officials for parental involvement, three goals often cited in the literature are (a) to promote school improvement, (b) to improve student achievement, and (c) to improve the home learning environment (Becker & Epstein, 1982; Epstein, 1986, 1987).

The first stated goal, school improvement, is often the cause for initiating parental involvement in schools. Chavkin and Williams (1987) stated, "Most of the recent calls for educational reform in our public schools have cited parent involvement as a key factor for success" (p. 165). Indeed, in A Nation At Risk: The Full Account, the National Commission on Excellence in Education (1984) recommended community involvement in education as important in the improvement of schools. Research has shown that although schools can improve their programs with parental involvement, schools can more easily improve their effectiveness when they involve parents in the educational process (Henderson, 1981). Henderson went on to state that "a partnership between home and school enhances and reinforces the school's educational program to the benefit of all involved" (p. 2).

An example of the effectiveness of a home-school partnership is a study conducted by Comer (1986), in which two inner-city schools in New Haven, Connecticut, implemented a program of parental involvement that focused on promoting the psychological development of students in order to encourage closer affiliation to the school. The establishment of Comer's model of program improvement emphasized positive interaction between parents and school staff in order to create in students a close bonding between family and school. Results in student achievement in reading and math in the project school moved the school's ranking in the city from the lowest of 33 schools to being tied for third place in achievement. Other indicators of school improvement were student behavior and

attendance of students and teachers. Although this study involved schools with economically disadvantaged children, the results may be important for other schools, particularly independent overseas American and international schools in which there are differences in the racial, cultural, religious, and educational backgrounds of families and in the educational orientation of the overseas schools. Comer (1988) cited the need to overcome these sociocultural differences in order to improve parental involvement and to promote educational development.

Comer's model demonstrated that increased academic skill achievement is one significant benefit to students of the close relationship between parents and schools. There exists the potential for an effective partnership between parents and teachers for improving schools, and studies have shown that, when this potential is maximized, students may significantly gain in academic achievement (Vernon-Jones, 1988).

The second goal often cited by school officials for parental involvement is improved student achievement. Many of the researchers cited in this section reported gains in student achievement as a result of increased parental involvement in their children's learning (Becher, 1985; Comer, 1988; Epstein, 1987; Henderson, 1987; Lueder, 1989; Walberg, 1984). In reviewing the literature in this area, Henderson (1987) found that parent involvement in almost any form improves student achievement. In an interview with Brandt (1989), Joyce Epstein stated, "Studies show

that when parents help their child at home in a particular subject, it's likely to increase the students' achievement in that subject" (p. 24).

Another study that supported this theory involved parents of four- and five-year-old children in an Outer London borough (Dye, 1989). Parents in the experimental group were recruited and trained to become involved in home and school activities that supported defined curriculum objectives. Children of these parents scored significantly higher on tests of mathematics skill development, language development, and basic concept development. The results of Dye's study supported those of other studies included in her review of the literature regarding parental involvement. These studies showed that student achievement may be improved if schools assist parents to become more involved in their children's education at home.

The third goal often cited by school officials for parental involvement is to improve the home learning environment. According to Walberg (1984), "School/parent partnership programs aimed at improving academic conditions in the home have an outstanding record of success in promoting achievement" (pp. 399-400). There are several strategies and activities for parents to use in helping their children improve educational skills at home.

Epstein (1986) categorized the home learning activities that were mentioned most frequently by parents in her Maryland survey: (a) activities that involve books and reading; (b) activities that encourage discussions between parents and children; (c) activities

based on informal activities and games that use common materials at home; (d) activities based on formal contracts and supervision among parents, teachers, and children; and (e) activities that involve tutoring and teaching the child in skills and drills. Some of the most commonly used activities that involved parents were giving spelling or math drills, reading to or listening to their children read, helping with worksheet or workbook lessons, and signing their children's homework. Among the activities mentioned above, the most prevalent was reading aloud or listening to the child read.

In a review of nearly 200 studies, some of which dealt with the effects of parent education programs on student achievement and the effects of parent involvement in education programs, Becher (1985) found that parent education programs had a positive effect on home learning environment and were effective in improving language use and test achievement as indicated by test scores.

Some researchers have suggested that because parents prefer to help their children at home rather than at school, teachers need to enhance the home learning experiences for students (Dye, 1989). Schools have an important role in working with parents to encourage their involvement at school and at home. A crucial aspect of this role is communication between school and home.

Home-School Communication

Schools have used several forms of communication to increase parental involvement in the school program. These forms of communication fall into two categories: school-to-home parent

information and two-way communication between home and school (Epstein, 1986). School-to-home communication is often in the form of letters or memos to parents from teachers regarding the classroom curriculum or informing parents of their children's progress and achievement in the curriculum. Other information may come from the school administration in the form of memos or newsletters regarding activities happening in the school and other general curriculum information.

Another form of school-to-home communication is in the form of "parent open house" or "parent night" sessions, when parents are invited to visit their children's classrooms to meet the teacher, view curriculum materials used in the learning program, and perhaps hear a brief presentation of the curriculum program. Parents may not have an opportunity to become actively involved in these programs, however, as the purpose of such programs is often simply to inform parents of the learning program in a large-group setting. Although school-to-home communication that keeps parents informed about what is going on in the classroom and the school is important, this alone does not necessarily encourage parent participation in the school program or in their children's academic achievement. Two-way communication between school and home, however, may increase parental involvement in the school program.

The telephone is one method of two-way communication between schools and parents, providing parents a convenient opportunity for direct interaction with teachers and administrators regarding their

children's educational program. Rather than simply receiving information from the school, parents can respond to information from school officials and provide valuable information regarding parental concerns or interests in the school program. However, in one survey, nearly two-thirds of the parent respondents did not communicate with a teacher by telephone during the school year (Epstein, 1987). Some public school districts are experimenting with home visits by teachers and school administrators as another form of two-way communication. Although parent involvement is enhanced when they visit the school, parents appreciate the teachers' effort to visit them at home (Caminiti, 1990).

Another common form of two-way communication that brings parents to the school is the teacher-parent conference. Schools establish various procedures for involving parents in parent conferences (Epstein, 1986). Some schools actively encourage all parents to attend the conferences and flexibly arrange these conferences according to the parents' work schedules. Other procedures followed by some schools include scheduling conferences only for those parents who request an appointment or inviting parents to a conference only if their children are experiencing problems in the learning program of the school. Although parent conferences bring parents into the school and provide two-way interaction between the parent and teacher, these conferences may occur infrequently in some schools, perhaps only once or twice during the school year. Indeed, Epstein's (1987) survey showed that

one-third of the parents had not even had one conference with the teacher during the year.

Parents may also be invited to observe the classroom during the instructional period of the day, particularly on business holidays for working parents, which are often different from school holidays (Epstein, 1987). Observing the classroom offers parents an insight into the curriculum content, and the teaching technique and style of the teacher. This insight may help the parent better understand the homework assignments and therefore enable parents to assist their children with their homework. Besides classroom observations, additional instruction and guidance from the school enable most parents to give their elementary-school-age children accurate and immediate feedback on completed homework, which often results in improved academic achievement (Lezotte, 1987; Mills, 1989; Stallworth & Williams, 1982). In his survey of teachers and principals regarding their attitudes toward parental involvement, Kleinstiver (1988) found that teachers and principals indicated that homework supervision was an area of great need for parental involvement.

Inviting parents to volunteer in the school is one strategy that schools may use to encourage parental involvement. This strategy provides parents an opportunity to learn more about the curriculum and thereby have a better understanding of homework assignments.

Parents as Volunteers

When parents are asked to volunteer in the instructional aspects of the classroom program, they become actively involved in the students' learning program. Parent volunteers learn much more about the instructional program through their active participation as a volunteer. While in the classroom, they become more aware of the curriculum and become more involved in their children's learning program at home (Becker & Epstein, 1982). Surveys have shown that parents have a more positive attitude toward the quality of their children's school program and toward their children's teachers and the school administrators when encouraged to participate in this way (Epstein, 1987).

Research has indicated that there are four common categories of parental assistance in the schools: (a) parents may assist by sharing with students their skills and expertise in arts, crafts, and hobbies, or developing recreational interests for students to pursue in their leisure time; (b) parents may share with students their occupational knowledge and experience, thus broadening students' perceptions of job options available to them in the future; (c) parents may be able to present aspects of different world cultures to students, including arts and crafts, food, customs, religion, and folklore; and (d) parents may be able to provide classroom assistance with clerical work, preparation of educational materials, and working with students (Dye, 1989; Heath, 1985; Hunter, 1989). By working in the classroom in some instructional capacity, parent volunteers may provide added

instruction and assistance to individuals or small groups of students and thereby increase the direct instructional attention to each student.

To be most effective in the classroom as well as in assisting their own children at home, parents should participate in training programs provided by the school. Studies have shown that parent training programs are needed if parents' skills in working with children in an instructional setting are to be improved.

Training Programs for Parental Involvement

Several researchers have cited the need for parent training and orientation programs (Becker & Epstein, 1982; Chavkin & Williams, 1987; Comer, 1988; Epstein, 1986; Hoover-Dempsey et al., 1987; Lueder, 1989; Russell, 1989; Walberg, 1984). Others have demonstrated the effectiveness of parent training programs, as well as the development of parent-involvement guides and handbooks.

One study involved the development of parent workshops to encourage parents to help their children with homework (Barber, 1987). The results were an increase in the completion and rate of return of their children's homework, as well as a general increase in parental attendance at parent-teacher conferences and participation in other school activities. In another study, Goodall (1987) found very positive effects as a result of a parent training program that included providing materials for parents to use at home to help their children, encouraging parent-child discussion and interaction at home, and developing parents'

evaluating techniques. Nearly 95% of the parents participated and reported success with these home activities.

In research directed toward parental involvement in specific subject areas, O'Connor (1988) examined the effects of a parent education program on parents' reading practices and those of their children. Parents in the treatment group attended workshops for training in the use of recommended practices for reading with children. The results indicated that a significant difference occurred between the control and treatment groups in the number of strategies used with the children, as reported by the parents and the children. Allen (1988) conducted a study that involved training parents in whole-language teaching strategies. He reported a high success rate in parents' understanding and in their ability to use the strategies at home.

Another study that examined parental involvement in mathematics reported increased homework completion and higher mathematics achievement scores after parents participated in training workshops (Mills, 1989). The parent workshops offered training in teaching time-management skills at home, suggestions for monitoring the completion of homework, assisting their children at home, and encouragement to increase on-going home-school communication.

Handbooks and parents' guides are another form of parent in-service programs that foster communication between home and school. Some handbooks have been developed to help administrators develop and implement effective parental involvement programs (Louisiana

State Department of Education, 1988) and to help parents strengthen parental involvement in schools (National Parent-Teacher Association, 1987). These guides offer home learning activities for parents and their children to complete together, suggestions for developing parent volunteers, and steps to increase parental involvement in school decision making. Handbooks have also been developed as course materials for parent-involvement workshops. One such handbook, Parent Learning to Assist Children in the Elementary School: A Workshop for Parents (P.L.A.C.E.S.), includes suggestions for working with children in problem solving and other learning activities at home, and working with teachers and administrators at school (Valentine, 1984). A parent evaluation of P.L.A.C.E.S. indicated strong parental support and high success in involving parents in the educational program (Darkenwald & Valentine, 1984).

Other handbooks have been developed to help parents work with their children at home on specific subjects. Information on reading resources for parents and activities for parents and children to work on together are included in one handbook that targets reading skills (Huyer, 1986). Mathematics is the subject of a handbook called Family Math, by Thompson and Kreinberg (1986). This handbook offers families techniques for helping their children in mathematics and informs parents of the importance of math in their children's future schooling and work, as well as a way to talk to their children about math. Another handbook stresses the use of calculators and computers in mathematics and science ("Get Into the Equation," 1987). Also included in the handbook are sections on

what parents should know about mathematics and science classes, parents' role in monitoring homework, suggestions for helping prepare children for tests, extra activities in mathematics and science, and projects for parents and younger children.

These handbooks complement parent orientation programs and foster increased communication between home and school. This increased communication may lead to improved parental involvement and a more effective program of learning for students. As Becher (1985) stated, "The current state of knowledge about parent involvement provides extremely strong support for the continued encouragement of such efforts" (p. 40). There exists a body of research that has shown an increased interest in and encouragement of parental involvement efforts specifically with home computer education.

Parental Involvement With Computers

With strong research evidence that parental involvement in schools is effective in promoting school improvement and student achievement, schools need to consider parental involvement in the computer education program in schools. It may be advisable to examine parents' attitudes toward the use of computers in their children's education before considering parental involvement with their children's computer education program.

Although one study reported parental concern that their children would spend too much time at the computer playing video games and would lose their thinking ability (Williams & Williams,

1984), other research studies have shown positive parental attitudes toward the use of computers in their children's education. In two studies that examined the attitudes of parents and teachers, parents perceived a greater need for further implementation of computer-assisted instruction in the schools (Cattaro, 1987; Harris, 1984).

McGhan (1988) and Goldberg (1985) saw media "hype" as being responsible for parents beginning to become concerned about their children learning enough about computers. Parents' reaction to this, initially through parent-teacher organizations, was to become actively involved in fund-raising activities to purchase what often was the first computer in their children's elementary school (Garrett, 1985; National School Boards Association, 1984; Williams & Williams, 1984).

During the years of initial implementation of computer education programs in elementary schools, reports of computer implementation programs in individual schools prepared by Williams and Williams (1984) showed that parent involvement created the impetus for and sometimes pushed schools into computer education. Because of this, it has been recommended that principals serve as buffers between parents and teachers, to allow teachers enough time for computer training when there is parental pressure to hurry the computer education process (Pantiel & Petersen, 1985).

In one report by Williams and Williams, a parent with a master's degree in computer science spearheaded a campaign to involve other parents in raising funds to purchase computer hardware

and develop a computer education program in their children's school. This expert volunteered to teach students and teachers how to program, and other parent volunteers monitored the computer lab during the school day and after school. Highly motivated parents in another school purchased computers through the parent-teacher association and volunteered to operate the computer room. The school developed a policy to allow parents to borrow the school computers during the summer and on weekends, during which time parents trained themselves in the use of the computer so they could better work with students in the school.

However, as educators began to examine effective designs for implementation of computer education programs, parents were often left out of the process. In a study of 62 school districts, only seven reported including parents on computer education program-development committees (Gleason, 1985). Five journal articles recommending guidelines for administrators in introducing computers into the curriculum and job descriptions for computer coordinators failed to include parents in the planning process and did not plan for the orientation or training of parents (Barbour, 1986; Steber, 1983; Vakos, 1986; Williams, Bank, & Thomas, 1984; Wilson, 1982). However, other authors are notable exceptions. Mojkowski (1983), Weller and Wolfe (1985), and Gleason and Reed (1985) recommended that schools gain community support for the computer program and that parents work with school officials on planning committees to develop computer education programs.

Because communication is important in parental involvement in schools, administrators should take the opportunity to provide parents with information regarding the computer curriculum through newsletters and parent-awareness sessions (Weller & Wolfe, 1985). If parents with computer knowledge were invited to volunteer in the school computer program, communication between home and school could improve, as could parents' support of the computer education program.

To increase communication and parental involvement, parent computer-orientation programs have been developed with a number of goals in mind. Initial computer-orientation programs for parents were established to increase their awareness of how computers were being used in the schools (Daggett, 1984). Other programs included workshops to provide parents with information regarding hardware, software, and general computer literacy, and to train parents in the use of computers involving both computer-assisted instructional software and programming (Doe et al., 1983). Through better communication between teachers and parents, the use of home computer software applications may more closely match the school's skill-development program (Kinzer et al., 1985).

Parent orientation and training programs designed to increase parents' involvement with home computers have the potential for improving students' computer skills (Martinez & Mead, 1988). In an important study conducted by the National Assessment of Educational Progress, students in the third, seventh, and eleventh grades throughout the United States were surveyed. Two major findings were

that access to a home computer was positively related to computer competence, and students who studied computers at school and had access to a computer at home were the most competent in computer skills. Although this study showed that most computer learning for seventh and eleventh graders took place in school, the home environment accounted for most of the computer learning that took place out of school. Of students in the seventh grade who owned a home computer, 58% reported that they learned most about computers at home. Fifty-three percent of the eleventh graders reported learning most about computers at home.

Four studies examined by Becher (1985) reported that parents, family, and home environment were more influential than the school environment in children's cognitive development and achievement, thus supporting the above findings. The potential exists for schools to direct this out-of-school learning through working with parents to inform them of the school computer curriculum skills and to train parents in these computer skills. Studies have shown that student achievement increased when parents were trained in how to help their children at home. Increased computer skill achievement could also take place if parents were informed about how to help their children use computers.

Schools should inform parents about the status of the computer education program and notify parents throughout the year as to the pace of students' skill development (Seefeldt, 1985). If parents have attended a computer-orientation program early in the school

year, a weekly newsletter from the school informing parents of the computer skills their children are learning will be much more meaningful to parents, and they may more easily become involved in working with their children on computer skills at home, or at least in discussing the computer skills if they do not own a home computer (Seefeldt, 1985).

Writers have suggested that parents should encourage their children to use application software at home for general skill development (Kinzer et al., 1985; McGhan, 1988) because such software is the easiest to integrate with school use. For example, word processing may be used for writing school reports, and computer-assisted instruction programs in drill and practice may be used for basic academic skill development.

To increase parental involvement and student access to computers, some schools have developed programs for parents to borrow computers to take home for periods of time. In one program in New York (Prenoveau, 1988), parents attend a workshop to learn to use the computer and software and may borrow the computer for two to three weeks, during which time they work with their children on four activity lessons to be completed by the time they return the computer to the school.

A unique program that is in only its second year of implementation is Indiana's Computer-in-the-Home Project. Several businesses formed a committee to investigate the use of technology in elementary education. As Summers, Bertsch, and Smith (1989) stated:

> The vision of this group was to put a computer in the home of each pupil entering the fourth grade and leave it there until the student graduated from high school. It was hoped that involving students in the world of technology would better prepare both them and their families for the business world. (p. 40)

The authors reported establishing their own classroom goals and objectives for the implementation of this computer-intensive program, which were: (a) to enhance students' creative writing skills; (b) to use telecommunications to expand their awareness of the world outside Terre Haute, Indiana; (c) to use on-line activities to improve their research skill; (d) to increase students' self-motivation; and (e) to create positive parent/student/teacher interaction. An extensive program of training included teachers, students, and parents. Parents attended workshops to learn basic computer care, assembly of the computer hardware components, and training in use of the software. Parent participation in workshop meetings was 100%. As parents became involved with their children's home computer skill development, they reported positive interaction between their fourth-grade child and other siblings in the home. Parents themselves began using the home computer for their own home management or business projects. One positive aspect of the Indiana project is its effectiveness in ensuring equal computer access to all students, which may help eliminate gender differences in attitudes toward using computers.

Several studies concerning the effect of gender on student use of computers in schools and home have reported inconsistent findings. In a survey of junior high school students and their

mothers, Clayborne (1988) found that the mothers had positive attitudes toward their children's use of computers; mothers expressed the view that computer knowledge was important to their children's future employment, regardless of the child's gender. In a study conducted by Edgar (1987), computer-assisted instruction in mathematics in grades 1 through 4 was shown to have a significant effect on achievement in mathematics; there was no significant difference between boys and girls except in grade 4.

In older students, male and female college undergraduates who were enrolled in various computer-based education courses did not differ significantly in overall use of computers (Koohang, 1989). However, there was a significant difference in attitude toward computer usefulness, in that males perceived computers to be more useful than did females. Another study of undergraduate students examined the effects of a microcomputer-intensive environment in a residence hall and explored the extent of differences of these effects on male and female students (Palmer, 1987). The results showed a significant overall sex difference; women demonstrated higher computer anxiety and lower ability and desire to use computers. As a result of this gender gap in college-age students, both Koohang and Palmer recommended that computer access and instruction in precollege education, from early childhood through high school, be more equal between males and females so that higher education and employment possibilities can offer equivalent probabilities of success, regardless of gender.

In exploring further the effect of gender on students' use of computers, Hubbard (1986) found that this gender gap began in the seventh grade. However, in a study of 489 male and 516 female seventh-grade students, O'Neal (1988) found no significant difference in students' attitudes toward computers according to gender. The discrepancy in the existence of gender gaps at various age levels may be explained by research that has shown that experience in using computers reduces anxiety and brings about positive attitudes toward computers. Williams and Williams (1984) reported that although elementary-school-age boys were more oriented toward the use of computers at the time of initial implementation of a computer education program in one elementary school, there was no difference in attitude toward computers between boys and girls after the third year of the computer program. Koohang (1989) found that subjects who had more computer experience indicated more positive attitudes toward computers. His results supported similar findings from previous research studies. Based on this evidence, gender differences might decrease as more elementary schools expand their computer education programs and provide equitable access without preconceptions regarding gender. There has already been an expansion in the scope of computer use and in numbers of computers in the schools in the 1980s.

Use of Computers in the Elementary School Computer Curriculum

In the 1980s, there was a steady increase in the number of computers in schools and improvement of software available to

schools (Naiman, 1987). According to a report by Quality Education Data (Hayes, 1988), between 1983-84 and 1987-88 the ratio of students to computers dropped from 127 students per computer to 32 students per computer. Although 95% of all elementary schools were using computers by the 1987-88 school year, the ratio of students to computers in elementary schools ranged from 1 student per computer to 90 or more students per computer. Research has shown that computer use by schools in all grades has continued to increase and that, far from being a passing fad, computers have become a permanent part of the day-to-day instruction in the schools (Gough, 1989; Hayes, 1988).

In addition to the increased use of computers in schools, computers have become an integral part of everyday life. Computers are used to design, build, and run automobiles and other modes of transportation; to purchase airline tickets; to keep people healthy and alive; and to make common banking transactions. It is difficult to avoid the interaction with computers in one form or another in day-to-day life. This makes it increasingly important for today's students to become knowledgeable about the use of computers and familiar with technology. In Megatrends, Naisbitt (1984) wrote, "The skills to maintain high-technology systems are becoming as important as the creative skills that design the systems" (p. 47).

As more jobs in the manufacturing sector involve the use of computer technology, workers are being retrained to prepare for the new high-technological job requirements, in order to stay in the

work force (DeBourcy, 1989). According to Arch (1986), "it has been estimated that by the year 2000, 90% of all jobs will require computer skills" (p. 4). As we approach the twenty-first century, we must prepare the future work force, whether agricultural, industrial, or informational, for careers using computer technology. This work force of tomorrow comprises the students of today, and students should begin their computer education at an early age to become familiar with computer technology and to develop positive attitudes toward computers (Koohang, 1989). Koohang's research showed that successful experience with using computers promotes positive attitudes toward computers and technology. Computers have been integrated into the schools and have provided students with the opportunity to become knowledgeable in their use of the technology, which has expanded the potential for positive changes in the learning environment for students.

In a view to the future possibilities that the computer holds as a medium for change in education, Papert (1980) stated:

> I believe that the computer presence will enable us to so modify the learning environment outside the classrooms that much if not all the knowledge schools presently try to teach with such pain and expense and such limited success will be learned, as the child learns to talk, painlessly, successfully, and without organized instruction. (p. 9)

Although this may seem a possibility only in the distant future, computers have already removed some of the pain from the school learning environment and provided a welcome incentive to students in their learning. As Lepper and Gurtner (1989) stated:

> . . . The computer is seen as offering a uniquely appropriate medium for the creation of more open-ended, exploratory

> learning environments--activities designed to encourage active, experiential learning of the sort hypothesized to underlie children's acquisition of speech in the absence of extensive direct instruction. (p. 171)

Computer software, such as computer simulations, offers this type of open-ended, exploratory learning environment. Computer simulations, as defined by Hallgren (1985), consist of "a subset of computer assisted instruction (CAI) that allows a student to study phenomena that could not otherwise be examined due to danger, expense, or lack of time" (p. 17).

Hallgren further pointed out that simulations may be used to promote educational goals from skill mastery to increasing student motivation in learning. Examples of simulation program activities range from experiments in chemistry, physics, and electronics to the process geologists use to determine the age of fossils (Trivisonno, 1987).

Simulation demonstrates the use of the computer as a tool in education to facilitate the accomplishment of academic and creative goals (Lepper & Gurtner, 1989). The computer as a tool enables the computer to be student directed, to be controlled and directed by the student to explore new educational ideas, rather than the computer being teacher directed and used only infrequently for less exploratory learning activities, such as drill-and-practice exercises (Neudecker, 1989). Neudecker stated that computers as tools involve software that functionally assists students in their learning tasks, such as recording, storing, retrieving, and manipulating data according to the direction of the user. Examples

of effective software applications that serve these functions are word processing, database, and spreadsheet programs (Lepper & Gurtner, 1989).

Word processing has been mentioned in the literature as an important computer application used to enhance communication skills. When asked what they thought was important for education in the 1990s, Senator Edward Kennedy and Bill Honig, Superintendent of the California State Department of Education, both emphasized the computer's importance in promoting written communication skills (Reed & Sautter, 1987). Through satellite telecommunication, students may communicate with other students around the world, by sending and receiving written information to share ideas, engaging in special learning activities, and sharing various and unique aspects of their cultural environment (Perry, 1990). In a project called "Computer Pals Across the World," students develop their reading and writing skills in a real learning environment by using a word processor to write and send messages through telecommunications to students in other countries (Beazley, 1989). This provides motivation in writing and reading when sending pieces of their writing to and then receiving responses from international partners.

Students often word-process their writing when communicating in this manner. The advantage of word processors in this type of communication was stated by Sandry (1989):

> In schools, one advantage often stated for the use of word processors as writing tools is that all students can then achieve a product that may be read by others, independent of the presentation variables of handwritten text. Word

> processors also encourage the process of redrafting to improve a piece of writing. (p. 623)

Research studies have shown that students who use word processing as a supplement to writing instruction have made significant improvements in their writing ability (Office of Technology Assessment, 1988). In one study of students in fourth and fifth grade, word processing was introduced as a writing tool (Moore, 1987). Moore found that students who word-processed their writing significantly improved their writing skills over students who did not use the word processor. Although students' attitudes toward writing were not significantly different between the two groups, students using the word processor made more meaningful revisions and wrote longer drafts. In another study of sixth-grade students, however, no significant difference was found in the writing between groups of students using the word processor and those not using the word processor (Beesley, 1986). One possible weakness of this study, however, was the short duration of the experiment--only four weeks. Students might not have mastered keyboard skills sufficiently to appreciate the effectiveness of word-processing their writing.

Development of skill in using the keyboard has been recommended for word processing as well as other computer applications that require input from the keyboard, such as various computer-assisted instructional software (Wetzel, 1985). The teaching of keyboard skills has been examined in research studies. In terms of learning keyboard skills on the computer versus traditional typing

instruction on typewriters, students using the computer had greater gains in speed and accuracy (Hauger, 1986; Perreault, 1983). In a study in which sixth-grade students were all taught keyboard skills on computers, students in one group were taught keyboard skills through a traditional teacher-directed approach, whereas the experimental group learned keyboard skills at their own pace with computer software designed to teach keyboard skills. The group using computer keyboard software achieved higher gains in speed and accuracy. Keyboard skills are important in software applications other than word processing, such as spreadsheets and databases, to enable students to spend more time on critical thinking than on finding the appropriate keys.

Another computer application that has been introduced into the curriculum as a tool for critical thinking and problem solving by students is the spreadsheet. In using spreadsheets in learning, students must determine the information necessary to solve a specific problem and then enter and manipulate data through the use of formulas. By allowing the computer to calculate the answer, students can spend less time on rote computation and more time on problem solving (Dickinson, 1986). One example of the use of computer spreadsheets in the curriculum is an activity in which students input, manipulate, and compute data regarding the costs associated with the upkeep of a pet. Another is in social studies, where students track population and immigration trends and develop socioeconomic models based on the data analyses.

Database computer applications are another example of programs that allow students to analyze data, to control the learning experience, and to develop critical-thinking skills. According to McLeod and Hunter (1987):

> Databases are frequently used to organize separate pieces of information.
>
> . . . . . .
>
> A database's ability to organize and quickly retrieve information according to many criteria, which its users can modify at will, is a legitimate, powerful tool with which students become familiar as early as possible. (pp. 28, 30)

Although published database activities are often an effective way for students to learn how to use a database, students should learn how to create their own databases to be more involved in the problem and understand more fully the information under study. As Hancock (1989) wrote:

> By using and creating databases, [students] define their topic of inquiry, determine the questions they want to answer, systematically collect the information, record it in a uniform way, form tentative generalizations by analyzing the data, then draw conclusions with support from their data. (p. 583)

When data analysis leads the students to make generalizations that they can verify, students themselves create new information, which heightens student interest. Examples of database activities include analyzing historical and geographical data about the 50 states in order to draw interesting conclusions about the states (Swett, 1983) and investigating African American scientists and inventors throughout history (Edwards, 1987). These activities require students continuously to ask questions, solve problems, and think analytically.

A computer activity that develops logical-thinking skills but is not integrated into the school curriculum as often as it is taught as an additional content area is programming computer languages, such as BASIC and Logo. Besides developing logical-thinking skills, programming instruction also promotes knowledge of the use of computers, serves as a context for traditional studies, and prepares students for careers in science (Marchionini, 1985).

Many of the software applications discussed thus far promote critical thinking. A classification of software that involves more rote learning, but has been shown to be an effective supplement to traditional classroom instruction, is drill-and-practice computer-assisted instructional software (Office of Technology Assessment, 1988). When students have used this type of software to practice their skills, they have made significant gains in achievement in various subject areas, including social studies (Bellows, 1986), mathematics (Archambeault, 1986), reading comprehension (Miller, 1985), and writing (Lê, 1989).

Chapter Summary

Parental involvement in elementary education is important in improving learning opportunities for children. Gallup polls have shown that parents have a positive attitude toward involvement in schools, but their actual level of involvement has not matched its potential. The fact that schools have done little to invite parents to become involved, or offered them ideas and training for helping

their children at school or at home, was a reason cited for this lack of involvement.

Researchers, however, have reported discrepancies in teachers' and administrators' attitudes toward involving parents in the schools. Administrators need to view parental involvement as a positive component of school improvement rather than as a threat to their administrative roles. The administration should demonstrate leadership in employing a collaborative model in which parents and school officials work together to develop parent-involvement goals for the school district.

Commonly stated goals for parental involvement include to promote school improvement, to improve student achievement, and to improve the home learning environment. If these goals are to be effective, communication between school and home is a crucial aspect of parent involvement. Two categories of communication are school-to-home and two-way communication between school and home. Types of communication in the school-to-home category include memos and letters from teachers or administrators and "parent open houses" or other visitation sessions that are designed to inform parents of aspects of the school program. As these types of communication are effective in keeping parents informed, two-way communication encourages increased parent participation. Types of two-way communication include parent-teacher conferences, classroom observations, and parents serving as volunteers in the school.

Parents who serve as volunteers should not do so in the absence of training. Research has demonstrated that parent orientation and

training programs are effective in achieving the three previously mentioned goals of parental involvement. Experimental training programs cited in this review reported success in achieving their respective purposes. Parent handbooks have been developed to complement the training programs as another source of communication from schools for parents to become involved in their children's program of learning.

With strong research evidence that parental involvement in schools is effective in promoting student achievement, schools need to consider encouraging parents to become involved in the computer education program in schools. Parents have already demonstrated interest in their children learning about computers, as shown by studies that indicated that parents perceived a greater need for further implementation of computer-assisted instruction in schools, as well. Parents were often responsible for beginning the integration of computers into the schools through fund-raising activities for the purchase of computer hardware.

When educators take a more active role in planning computer-implementation programs in their schools, parental involvement is often omitted. However, many authors have recommended that parents work with school officials on planning committees to develop computer education programs. By inviting parents to participate in the planning process, communication between schools and parents may be enhanced and support gained for the program. Parent orientation programs are recommended in order to increase parents' awareness of

the use of computers in schools and to encourage parents to become more actively involved in their children's computer skill development at home.

One study reported that students learn more about computers out of school than in school, and that much of the learning about computers out of school occurs in the home. Therefore, schools could influence the learning of computers at home by informing parents of the school's computer curriculum and by training parents in how to help their children develop computer competence at home. Some schools have developed programs that allow parents to borrow computers to take home for periods of time. Indiana's Computer-in-the-Home project is unique in that its goal is to put a computer in the home of each pupil entering the fourth grade and leave it there until the student graduates from high school. By providing a computer in the home for every fourth-grade student, this project may eliminate differences in attitudes toward computers attributable to gender by providing equal access to computers and by starting computer instruction at an early age. Because researchers have found a positive correlation between years of experience as a computer user and positive attitudes toward computers, computer instruction should be a permanent aspect of the school curriculum in elementary schools.

An awareness of computers and knowledge about the use of computers will be necessary for elementary students in their future. Computer education should be included in the curriculum of schools from early childhood through grade 12, as they offer a more

open-ended, exploratory learning environment. Simulation software is an example of computer activities that offer this type of learning environment and allow students to examine phenomena that might not otherwise be possible in the classroom setting.

Application software such as word processing, spreadsheet, and database promote critical-thinking-skill development and allow students to control the learning activity. The teaching of programming languages such as BASIC and Logo promotes logical-thinking skills but is not as easily integrated into subject areas of the curriculum as is the previously mentioned software. A classification of less student-directed types of software is drill-and-practice software. Studies have shown that drill-and-practice software has a positive effect on student achievement.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

The methodology used in conducting the study is described in this chapter. The initial section provides an overview of the methodology used in this research study. A description of the process used in developing the survey instrument is presented in section two. The dependent and independent variables are discussed in the third section. The fourth section contains a description of the population and sample. The general procedures followed in collecting the data are explained in the fifth section. Next, the method used to report the survey results is described. The study methodology is summarized in the concluding section of the chapter.

Overview of Methodology

The purpose of this study was to determine the need for computer orientation programs for parents, as well as the appropriate content to be included in the orientation programs to meet various needs of parents for computer information. To implement an effective computer-orientation program, school officials would benefit from knowing the characteristics of parents who are most likely to have positive attitudes concerning the implementation of computers in the elementary curriculum.

To obtain pertinent data necessary in developing computer workshops and orientation programs for parents, the researcher conducted a survey of parents of fifth-grade students in three selected sites, regarding those parents' attitudes toward and knowledge of the use of computers in elementary schools. According to Orlich (1978), "surveys are often undertaken to determine the state of the art of some trait, trend, or program. Usually questionnaires are a part of the data collecting systems for these . . . studies" (p. 3). In the case of this research study, the survey was undertaken to determine the current status of traits of parents in the following areas:

1. Parental background information and descriptive information regarding ownership and use of a home computer.

2. Parental knowledge of the computer curriculum in their child's elementary school.

3. Parental attitudes toward the use of computers in their child's instructional program.

4. Parental attitudes toward their own use of computers.

5. Parental competence in their own use of computers.

6. Parental attitudes toward helping their child improve computer competence at home.

These data were analyzed to determine parents' knowledge of and attitudes toward the use of computers in their child's school and the actual status of the use of computers in their child's school. The data were also used to determine parents' self-assessment of their competence in their own use of computers and thereby to

determine the need for and content of appropriate computer-orientation programs for parents.

A questionnaire format was chosen in collecting data for this survey because it has the following advantages (Orlich, 1978):

1. Many individuals may be contacted at the same time, usually through the mail technique.
2. A questionnaire is less expensive to administer than is using an interview technique.
3. Each selected respondent receives identical questions.
4. A written questionnaire provides a vehicle for expression without fear of embarrassment to the respondent.
5. Responses are easily tabulated (depending on the design of the instrument).
6. There is no need to select and train interviewers.
7. Interviewer biases are avoided. (p. 4)

These advantages prompted the researcher to choose a questionnaire format rather than an interview format. The process followed in constructing the questionnaire for this study is described in the next section.

Development of the Questionnaire

The researcher searched the literature for an existing questionnaire, but he was unsuccessful in identifying an instrument judged to be useful in collecting the data required for this study. Therefore, to gather the necessary data, a questionnaire had to be developed.

In addition to using questionnaires found in survey research as models of effective questionnaires (Anderson, 1979; Delfrate, 1987),

resource books dealing with survey-instrument construction were consulted for advice and criteria in constructing this questionnaire Borg & Gall, 1983; Kish, 1965; Orlich, 1978; Parten, 1950). For example, Orlich stated:

> Identifying the questionnaire format, then writing appropriate and carefully formulated questions for the instrument may be the single most important and time consuming task of conducting a survey. The construction of each item determines whether or not the survey will elicit the desired information. (p. 19)

Reinforcing Orlich's statement regarding the importance of designing the questionnaire format and writing appropriate questions in obtaining the desired information, Parten (1950) wrote, "Careful planning of the physical design of the [questionnaire] and careful selection and phrasing of the questions will affect not only the number of returns but also the meaning and accuracy of the findings" (p. 157).

In constructing the questionnaire, each item was analyzed and the overall format of the questionnaire was evaluated according to the following checklist of criteria for item design (Borg & Gall, 1983; Kish, 1965):

1. Check for clarity in language.
2. Make questions as concise as possible.
3. Avoid double-negative statements.
4. Avoid "double-barreled" items.
5. Avoid technical terms and jargon.
6. Avoid biased or leading questions.
7. Use inclusionary language to avoid sex bias.

8. Provide clear directions for each section.

9. Format questions in an uncluttered and attractive way, with an orderly presentation of items.

10. Ask general questions first; then, if necessary, follow with related questions.

11. Format the document so that it is easy to handle (avoid folding, special inserts, and cross-referencing).

12. Ensure that print quality is crisp and clean.

Another consideration in item construction was to include personal wording, using the terms "you" and "your" often in items when asking respondents to indicate an attitude or perception or to provide self-assessment of their own skill. These terms were used to encourage the respondents to identify more closely with the items and to provide an individual, personal response (Parten, 1950).

To (a) obtain exact data from the questionnaire, (b) simplify the process for respondents to complete the questionnaire, and (c) simplify the coding of the data in tabulation, careful attention must be paid to the types of scales used to collect the responses (Orlich, 1978). Nominal and interval scales were used on the questionnaire to collect much of the parental background information, as well as to obtain parental knowledge of their children's use of computers in school. Likert scales were used to obtain parental self-assessment of their own computer skill competence and their attitudes toward the use of computers in their children's academic program. In constructing the questionnaire, attention was paid to preplanning the tabulation and simplifying the

format of the items so that completion of the questionnaire by respondents and tabulation of the data by the researcher could be accomplished quickly and accurately.

The questionnaire was revised several times, using the previously stated questionnaire-construction criteria, in order to improve the clarity of language and format for ease in completing the survey form. To test the questionnaire further, a computer-programming instructor and an educational computer coordinator reviewed the questionnaire for clarity of language, particularly regarding computer terminology, and for the appropriateness of the content of each item. Twelve other educators completed the questionnaire and offered suggestions for minor changes in both content and format.

The questionnaire was then tested in a pilot study conducted by the researcher at the International School of Kuala Lumpur (ISKL). A random sample of 15 parents of students in grade 4 was identified from the population of all parents of students in grade 4 at ISKL. Parents in the sample were requested to complete and return the questionnaire. An analysis of their responses indicated that the structure and format of the questionnaire were effective for data collection regarding appearance, length, and ease of completion. After revising some of the items to better collect the precise information desired in this study, the questionnaire was further revised and reviewed by specialists in computer education.

The researcher carefully analyzed the survey for statistical accuracy and ease of data input into the computer, in consultation with a statistician whose specialty is testing and measurement. Three specialists in educational technology reviewed the revised version of the survey form. To test the questionnaire further, a few selected parents, including those whose first language was not English, also completed the revised form. The final revision of the questionnaire was completed, based on these tests. (The questionnaire may be found in Appendix A.)

Changes in the questionnaire were made as a result of statements from parents in the pilot study who indicated they experienced difficulty with a particular aspect of the questionnaire (see Appendix B). Some respondents made specific suggestions for changes, which, if appropriate, were incorporated into the revised questionnaire. Having the questionnaire tested by computer education specialists and parents was effective in attaining the goals of the revision process, as previously stated: to create a concise questionnaire that would yield exact data and would be easy for parents to complete. A concise questionnaire must comprise items that yield exact data that may be used to answer the research questions of the study.

Independent/Dependent Variables and Research Questions

The research questions in this study concerned the relationship of ten independent variables with each of the four dependent variables.

Independent Variables

The independent variables in this study were (a) sex of parent, (b) parental nationality, (c) sex of child, (d) whether parent had volunteered at child's school, (e) years child had attended current school, (f) parental level of education, (g) years parent had been a computer user, (h) ownership of a home computer, (i) parental competence in their own use of computers, and (j) family member considered to be the computer expert.

Dependent Variables

The dependent variables in this study were (a) parental knowledge of the computer curriculum in their child's elementary school, (b) parental attitudes toward the use of computers in their child's instructional program, (c) parental attitude toward their own use of computers, (d) parental competence in their own use of computers, and (e) parental attitude toward helping their child improve computer competence at home.

The first four research questions are stated in terms that relate each dependent variable with the ten independent variables. The fifth research question exists as the dependent variable, parental competence in their own use of computers, for the first four research questions. It is stated as a research question because of its relationship with the other nine independent variables. Results of the data analysis for each research question are presented in Chapter IV.

Research Questions

1. What is the relationship between the dependent variable, parental knowledge of the computer curriculum in their child's elementary school, and the ten independent variables?

2. What is the relationship between the dependent variable, parental attitudes toward the use of computers in their child's instructional program, and the ten independent variables?

3. What is the relationship between the dependent variable, parental attitude toward their own use of computers, and the ten independent variables?

4. What is the relationship between the dependent variable, parental attitude toward helping their child improve computer competence at home, and the ten independent variables?

5. What is the relationship between the dependent variable, parental competence in their own use of computers, and the nine independent variables listed below:

a. Sex of parent
b. Parental nationality
c. Sex of child
d. Whether parent had volunteered at child's school
e. Years child had attended current school
f. Parental level of education
g. Years parent had been a computer user
h. Ownership of a home computer
i. Family member considered to be the computer expert

The next section explains how questionnaire items were related to each of the variables in the research questions posed in this study.

Description of the Establishment of the Variables

This section describes how the variables were established for the data analysis in this study. According to Orlich (1978), it is important that all items relate to the purpose or objectives of the study and that any irrelevant items be deleted. Each of the questionnaire items, therefore, was cross-referenced with the variables in the refinement of the questionnaire so it would be as efficient and valid as possible in obtaining the desired data. There are two sets of variables in the research questions: five dependent variables and ten independent variables. The five dependent variables are:

1. Parental knowledge of the computer curriculum in their child's elementary school.

2. Parental attitude toward the use of computers in their child's instructional program.

3. Parental attitude toward their own use of computers.

4. Parental competence in their own use of computers.

5. Parental attitude toward helping their child improve computer skill competence at home.

These dependent variables are composite variables composed of numerous questionnaire items, all of which contributed to the single measurement of each variable. After the data collection was complete, each questionnaire item was examined through frequency distributions and transformed, when necessary, into a format appropriate for data analysis (for example, some ordinal variables

were transformed into dichotomous variables). The questionnaire items relating to each respective dependent variable were statistically investigated through Pearson correlation, by analyzing parent scores for each item in a correlation matrix. The questionnaire items that showed a positive and significant intercorrelation were chosen to be components of the respective dependent variable. These questionnaire items are presented in Table 3.1.

Table 3.1.--Relationship of survey questionnaire items to dependent variables.

Dependent Variable	Cronbach Alpha	Questionnaire Item
1. Parental knowledge of the computer curriculum in their child's elementary school	.82	10,14,19,20,21,22, 25a-25g,26a,26c-26g
2. Parental attitude toward the use of computers in their child's instructional program	.89	28a-28j,28m
3. Parental attitude toward their own use of computers	.26	11,12,28l,28n
4. Parental competence in their own use of computers	.97	15;27a.1-6,b.1-7, c.1-7,d.1-4,e.1-2
5. Parental attitude toward helping their child improve computer competence at home	.21	16,17,24

The following descriptions of each dependent variable include the number of questionnaire items that contribute to the measurement

of each variable, an overview of the content of the questionnaire items that relate to each variable, and the internal consistency reliability (stated in terms of the Cronbach coefficient alpha) for each variable.

Research on parental involvement has indicated that parents become more aware of their children's educational program when they become actively involved in schools and hence are able to better assist their children at home with academic skill development (Epstein, 1987). The first dependent variable, parental knowledge of the computer curriculum in their child's elementary school, attempted to determine how much knowledge parents possessed regarding the current use of computers in the curriculum of their child's learning program. Seventeen questionnaire items related to this variable. In these questions, parents were asked to indicate their knowledge of the type of computer hardware and software their children used at school, academic subjects that incorporated the use of computers, and their children's access to computers at school. Two questionnaire items did not show significance in the Pearson correlation analysis and were consequently deleted from the items included in the analysis for internal consistency. One item (#13) involved parental knowledge of the brand of computer used at school, and the other (#26.b) involved parental knowledge about the use of computers in their child's reading instruction. All of the questionnaire items for this variable were dichotomous, and the values of these items were added to obtain a total score for the

measurement of the composite variable. The internal consistency reliability (Cronbach coefficient alpha) for this composite variable was .82.

The second dependent variable, parental attitudes toward the use of computers in their child's instructional program, was measured with 25 questionnaire items. Parents were asked to indicate their attitude on a five-point Likert scale, by circling their response, from "Strongly Agree" to "Strongly Disagree," regarding aspects of computer literacy their children should learn in the computer curriculum at school. The content of these items included learning about the history of computers, how computers work, how computers affect society, the types of software programs that should be used, the academic subjects that should incorporate the use of computers, and the importance of computer skills for children's future job-related tasks. Item 23, which involved parental attitude toward the appropriateness of information from the school about the school's computer curriculum, did not show significance in the Pearson correlation analysis. This item was not included in the analysis for internal consistency. However, when Item 23 was included in the first statistical analysis, two different types of scales were used in measuring these values. Therefore, each item value was computed as a standard score. These standard scores were added, and the total score was used as a measurement of parental computer competence. When Item 23 was deleted, the internal consistency reliability (Cronbach coefficient alpha) for this composite variable was .89.

The next dependent variable, parental attitude toward their own use of computers, was measured with four questionnaire items. The format of these items asked parents to assess their attitude toward learning more about computers, how they viewed the utility of computers, and their level of intimidation by computers. Item 28.k, which involved parental attitude toward learning more about computers, and Item 28.o, which involved how parents viewed the utility of computers, did not show significance and were deleted from the analysis of internal consistency. As two different types of scales were used in measuring these values, each item score was computed as a standard score. These standard scores were added, and the total score was used as a measurement of parental computer competence. The internal consistency reliability statistic (Cronbach coefficient alpha) for this composite variable was .26.

Parents were requested to provide a self-assessment of their skill in using various software applications and programs on the computer as a measure of the fourth dependent variable, parental competence in their own use of computers. Skills in using computer software applications, which included word processing, spreadsheet, and database, were broken down into tasks such as creating new documents, editing existing documents, saving and printing documents, using formulas in spreadsheets, working with fields and records in databases, and designing and analyzing data in spreadsheets and databases. Also included were skill competencies in programming computer languages and operating published game or

educational software. Twenty-seven items related to this dependent variable, one of which was dichotomous. For the other 26 items, parents were asked to indicate their self-assessment of their computer competencies on a four-point Likert scale by circling their response, from "High Proficiency" to "Low Proficiency" (or "No Experience" if parents had never used a particular application), for each skill statement. Because two different types of scales were used in measuring these values, each item score was computed as a standard score. These standard scores were added, and the total score was used as a measurement of parental computer competence. The internal consistency reliability (Cronbach coefficient alpha) for this composite variable was .97.

The last dependent variable, parental attitude toward helping their child improve computer competence at home, was measured with three items. The content of these items involved the influence of the school's computer program on the parents' purchase of a home computer and parents' desire for assistance from the school to learn how to help their children improve computer competencies at home. All the questionnaire items for this variable were dichotomous, and the values of these items were added to obtain a total score for the measurement of the composite variable. The internal consistency reliability (Cronbach coefficient alpha) for this composite variable was .21.

The relationship of the remaining questionnaire items to the independent variables is presented in Table 3.2. These items

involved the collection of general background information; the scales used in these items were open-ended, dichotomous, or ordinal.

Table 3.2.--Relationship of survey questionnaire items to independent variables.

Independent Variable	Item No.
1. Sex of parent	1
2. Parental nationality	2
3. Sex of child	3
4. Whether parent had volunteered at child's school	4
5. Years child had attended current school	5
6. Parental level of education	6
7. Years parent had been a computer user	7,8
8. Ownership of a home computer	9
9. Parental competence in their own use of computers	27
10. Family member considered to be the computer expert	18

This analysis shows that every item on the questionnaire was directly related to the variables in this study, although a few questionnaire items were not shown to be significant as a result of the Pearson correlation analysis. Parents in the selected sample were not asked to respond to irrelevant items. The parent population and sample selected for this study are discussed in the following section.

The Population of Interest

The population of this study was the parents of fifth-grade students in three private, independent American/International schools in Southeast Asia: the International School of Bangkok, Bangkok, Thailand; the International School of Kuala Lumpur, Kuala

Lumpur, Malaysia; and the Singapore American School, Republic of Singapore. These schools were chosen because they belonged to the same regional organization and were in the same geographical region of Southeast Asia. These three schools operated an American-based, English-language curriculum for expatriate students in grades nursery or kindergarten through 12, with an enrollment range from 950 to 2,100 students. These schools had developed a curriculum largely based on the American model, but modified to meet the needs of their international clientele, as the schools enrolled students of 40 nationalities. The curricula in these three schools had been developed to prepare students for higher learning at the college and university level. Because the teachers and administrators of these schools often met in regional conferences and workshops, the schools shared a similar general curriculum, which included the use of computers.

The use of computers in the classroom curriculum was outlined in a general way by each school. Two of the three schools had a computer for each classroom in grade 5, whereas in the third school, fifth-grade teachers had to schedule the use of one of the four computers that were available to teachers throughout the elementary school on a check-out basis. In all three schools, students had access to one computer in the classroom on either a daily or a rotating basis. The general outline also included the use of word processing for student writing, and the use of drill-and-practice programs, particularly in mathematics and reading. The integration of the use of computers in the classrooms in these schools, however,

was still dependent on the computer competence of each classroom teacher.

Students' access to computers in the classroom was supplemented by their access to computer labs, where students each worked on their own computer. Two of the schools employed a computer teacher as a specialist who monitored the use of the computer lab and taught classes in the use of computers. Both specialists had developed a general sequence of computer skill objectives that included the use of application software (to a large extent, word processing) and programming in Logo. Computer-assisted instruction (CAI) software, including simulation and drill-and-practice software, was taught according to the needs of the classroom curriculum at each grade level. Classroom teachers also attended these special computer class lessons to become knowledgeable about the use of software so that individuals could continue to use it on the computer equipment in the regular classroom.

The Parents

The parent clientele of these schools largely comprised well-educated professionals working for companies that had investment interests in the country, and diplomats working at embassies in the respective city of each school. The largest nationality group of parents and students in all three schools was American; 39 other nationalities were also represented among parents in the schools. The total population of all fifth-grade students in the three schools was 340 children. Because both parents of each child in the

study were asked to compete a questionnaire, the potential population of individual parents was 680 adults.

The Sample

For this study, the researcher selected a representative sample of the parents identified in the target population. "Survey sampling, or population sampling, deals with methods of selecting and observing a part (sample) of the population in order to make inferences about the whole population" (Kish, 1965, p. 18). Various techniques can be used to derive a simple random sample "in which all the individuals in the defined population have an equal and independent chance of being selected as a member of the sample" (Borg & Gall, 1983, p. 244). The technique used to determine the sample of the target population for this study was systematic selection, which "denotes the selection of sampling units in sequences separated on lists by the interval of selection" (Kish, 1965, p. 21). In systematic selection, every nth member of the population is chosen.

The sample in this research study comprised parents of one-third of the fifth-grade students in the population. The names of all students in the fifth grade were obtained from each school, and separate lists of the names of all students were alphabetized for boys and for girls. For each sex, the lists of students were numbered, and every third student was selected from the alphabetized lists of students, separated first by school and then by sex. Starting at the midpoint of each list, then moving to the end of the

list, and then to the beginning of the list until returning to the midpoint, every third student was selected to participate in the study. A procedure was established to replace a student who might have withdrawn from the school after the sample had been selected. In this case, the student who had left school was removed from the sample. The student immediately following the student who had withdrawn was then selected to participate in the study.

The size of the total sample of fifth-grade students was 114 children, 63 boys and 51 girls. The numbers of boys and girls in the population and sample groups of each school and for all three schools combined are shown in Table 3.3. Because each parent was asked to complete an individual questionnaire, 228 questionnaires were sent to the sample students' families. As Orlich (1978) stated, "There are no absolute standards regarding the percentage of persons in a population who should be surveyed" (p. 88).

Upon reviewing the literature regarding survey sample size, Parten (1950) observed that one misconception that exists is that "sheer numbers of cases can serve as a guarantee of correct results" (p. 29). In considering an optimum sample size for efficiency, representativeness, reliability, and flexibility for this study, approximately one-third of the population was judged to be an appropriate sample size. The size of the sample (228), considering the target population in this study, was very close to the sample size (approximately 244 respondents) recommended by the National Education Association (Orlich, 1978).

Table 3.3.--Number of boys and girls in the population and sample.

	Bangkok			Kuala Lumpur			Singapore			All Schools		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Population	80	52	132	32	26	58	76	74	150	188	152	340
Sample	27	17	44	11	9	20	25	25	50	63	51	114

Thirty nationalities were represented by the parents in the sample. Table 3.4 shows the breakdown of numbers and percentages of parents to the nearest tenth in the following categories of nationalities: The United States and Canada, Asia (13 countries), Europe (9 countries), and Other (7 countries). A list of all countries represented in each category is shown in Appendix C.

Table 3.4.--Nationalities of parents in the sample.

	U.S. & Canada	Asia	Europe	Other	Total
Number	102	34	27	20	183
Percent	55.7%	18.6%	14.8%	10.9%	100%

Selecting the target population and the random sample was just one set of procedures followed in conducting the research study. In the next section, other details of the procedures are described.

Procedures

The researcher visited the head administrator of each of the three schools individually to explain the research proposal and to request permission to conduct the study at their respective schools. The purpose and procedures for conducting the study were described. During these meetings, all three administrators gave the researcher enthusiastic verbal approval to conduct the study at their schools. The researcher submitted an official letter of request to each head

administrator as a follow-up to the personal meetings. The researcher received formal letters of approval signed by each head administrator and school board chairperson from the respective schools.

The principal of each elementary school was then contacted by the researcher through facsimile transmittal of letters, as well as by telephone, to inform them of the study to be conducted. Assistance of school personnel needed by the researcher in conducting the survey in their schools was explained and requested of the elementary school principal. Assistance was requested from fifth-grade teachers in distributing the questionnaire packets to the students in their classrooms selected for the sample, giving those students a daily reminder to return the completed questionnaires, collecting the completed questionnaires, and presenting the students with a small gift provided by the researcher. Teachers were also requested to attend a brief meeting with the researcher to become aware of the research procedures and to provide the researcher with information regarding the computer curriculum in their school. Secretaries were asked to help in typing a letter of transmittal from the respective school administrators to be included in the questionnaire packets distributed to parents in the sample, and in collecting the completed questionnaires from the teachers and delivering the questionnaires to the researcher. School principals were asked to send complete lists of fifth-grade students to the researcher.

The letter of transmittal from the researcher to each parent selected for the sample was carefully developed so as to be informative but also concise (see Appendix D). "A well-written letter is a persuasive and motivating device and helps in the obtaining of a good return of the survey instrument" (Orlich, 1978, p. 91). The letter was written according to the following criteria recommended by Orlich:

1. Clearly state the purpose of the study.
2. Explain the value of the study.
3. Identify the sponsoring agency or institution.
4. Include the investigator's name and the name of the study's sponsor.
5. Give explicit directions for completing the questionnaire.
6. Assure the respondent that the data will be handled confidentially.
7. Date the letter.
8. Sign the letter personally.
9. Use an original or an extremely high-quality copy.

In addition to complying with the previously stated criteria, the letters of transmittal were easily personalized by computer. When personalizing letters of transmittal, addressing parents correctly was seen as important in instilling interest in the survey, thereby increasing the probability of receiving a high rate of return. Therefore, the names of parents were also obtained from school principals to determine any differences in titles other than Mr. and Mrs. (such as Doctor of a military rank), or any differences

in surnames of parents and their children, as in the case of step-parents.

A calendar of school holidays was obtained from each school to avoid vacation periods when students would not be in school. By conducting the study in March-April 1990, the busy months for schools (September, December, January, May, and June) were avoided because at those times administrators and teachers would have less time to provide assistance in a research project (Orlich, 1978).

During the time of the study, the researcher visited each school site to oversee the distribution and collection of the questionnaires. A meeting was scheduled with the principal to discuss the procedures for data collection. The researcher also scheduled a brief meeting with the fifth-grade teachers in each school. The purpose of these meetings was to explain to the teachers the purpose of the study in order to gain their support in the distribution and subsequent collection of the survey forms from the randomly selected sample of students in their classrooms. Teachers were asked to follow the procedures they used when collecting other important school documents from students during the school year, in order to emphasize to the students the importance of giving the questionnaires to their parents and returning the completed forms to the classroom teacher by the indicated deadline.

Each teacher was given a packet of questionnaires and transmittal letters addressed to each parent of the students selected for the sample in their classroom, a separate list of each

of the students in the sample from the teacher's classroom, and a key chain with a miniature globe of the world. The teachers were requested to cross off the names of students from the list as each student returned the completed questionnaire(s) from their parents and to give a key chain to the student as a token of appreciation from the researcher. The researcher also gave a small gift to each fifth-grade teacher, the computer teachers, the elementary principal, and appropriate office support staff in appreciation for the extra work required to assist in this study.

Borg and Gall (1983) stated that, in survey research, it is important to provide sufficient time to complete and return the questionnaire without inconveniencing the respondent, but also not to allow so much time that the questionnaire is likely to be set aside by the respondent to be completed later. The authors recommended one week or less as an appropriate amount of time to allow respondents to complete the questionnaire. As the questionnaire in this study was to be taken home by the students, and parents are often asked to return school forms or information in a short time, the researcher chose to allow less than one week for the return of the questionnaire. Parents were asked to complete and return the survey forms within two days. This short return period was established to stress to parents the importance of the research and to avoid the survey form being lost in other stacks of paper or forgotten at home.

On the day of the deadline for returning completed questionnaires, the researcher compiled a list of nonrespondents.

Researchers have suggested that personally telephoning nonrespondents is a very effective follow-up technique in obtaining high response rates in survey research (Borg & Gall, 1983). After the first response from each of the three schools was received (representing a survey form return rate of 71.5% from all three schools), the researcher contacted by telephone each of the families that had not returned at least one questionnaire. As a result, an additional ten forms were returned within one week, raising the total return rate to 75.8%. Without further contact to nonresponding parents, an additional ten forms were returned the following week, raising the final return rate to 80.3%. The final response rate of families, whether they returned one or both of the forms, was 92.9%.

Among the possible reasons for this high rate of return was parental interest in the topic of the questionnaire. Orlich (1978) indicated that interest in the topic affects the rate of return of completed questionnaires. On one item of the questionnaire regarding parental attitude toward learning more about computers, 89% of all respondents checked the "Agree" or "Strongly Agree" columns, indicating that the parents were interested in computers. For another item on the questionnaire, 92% of the parents checked the "Agree" or "Strongly Agree" columns, indicating strong interest in learning more about their child's computer education program at school. Interest in the topic of the survey may have been one reason for the high rate of return in this study.

Another technique that the researcher sees as effective in obtaining a high rate of return was providing token gifts to the

students whose parents participated in the study. Borg and Gall (1983) suggested that giving small gifts as a token of appreciation rather than as payment for the respondent's time has "consistently increased the response rate" (p. 428). The fifth-grade teachers at all three schools were unanimous in their opinion that the gift of the key chain to each student who returned at least one completed form was largely responsible for the high response rate from families selected for the sample because the students demonstrated much excitement about receiving the gift and looked forward with anticipation to receiving the gift. The students very likely urged their parents to complete the forms so that they would receive the gift, and this may have had an important influence on the high rate of return in this study. For a more detailed analysis of the rate of return for actual questionnaires and for families who returned either one or two questionnaires, see Appendix E.

Method of Reporting Results

The Statistical Package for the Social Sciences, Version X (SPSS-X), was used for statistical-analysis purposes. The research questions were inferential and pertained to the relationship between the five dependent variables and the independent variables.

Two statistical techniques, Pearson correlation analysis and multiple regression analysis, were employed to analyze the research questions. Pearson correlation provided the statistical information about the degree of linear relationship between each independent variable and each dependent variable. The multiple regression

analysis showed the unique effects of independent variables on each dependent variable, along with other independent (predictor) variables. The stepwise regression technique was used to arrive at the final multiple regression model for each dependent variable as outcome. The level of significance for all tests was set at alpha = .05.

The results of the final regression analysis are presented in Chapter IV. First, analysis of variance (ANOVA) tables are provided and explained. Second, the results of the statistical test on each regression coefficient are provided in table form. These tables contain the measured regression coefficient, the standard deviation of each regression coefficient, the t-statistic, and the significance level of the t-statistics across the regression coefficients. Third, the proportion of explained variation, R-square, is provided.

Chapter Summary

The methodology involved in conducting the study was described in this chapter. This survey research study incorporated the use of a questionnaire to collect data identified in the main research questions. The questionnaire was constructed following criteria suggested by authors of research texts, as well as using existing questionnaires in other studies of survey research, as models for format. The questionnaire was tested several times during its development for effectiveness in obtaining the desired data. The major changes made in the final version of the questionnaire were

described in this chapter. The research questions were stated, and their relationship to the questionnaire items was shown.

The population, consisting of parents of fifth-grade students attending three private, independent overseas schools in Southeast Asia, was described in detail. The sample-selection process and the selected sample were described. The general procedures followed in collecting the data were explained, followed by the methods for reporting the results.

In Chapter IV, the data collected in the surveying process are presented and analyzed in detail.

CHAPTER IV

RESULTS OF THE DATA ANALYSIS

Introduction

The purpose of this study was to determine the need for computer orientation programs for parents, as well as the appropriate content to be included in the orientation programs to meet various needs of parents for computer information. Characteristics of parents with positive attitudes regarding the dependent variables were sought for the effective development of computer-orientation programs for parents, in order to implement programs that meet the informational needs of the parents. As parents with different characteristics may differ in attitudes toward or knowledge about the dependent variables, a profile serving as a predictive device could be beneficial in developing a series of orientation programs offered to parents with different needs.

These characteristics, as ten independent variables investigated in this study, are shown in Figure 4.1. Included in the figure are the types of scales used to measure the variables on the questionnaire and the method of coding the data for statistical analysis. The statistical analysis of data related to each research question is presented in a consistent format for each question. The chapter concludes with a summary of the results.

INDEPENDENT VARIABLE	SCALE	CODE
1. Sex of Parent	N/D	1 = Mother; 2 = Father
2. Parent Nationality	O	Geographic Groupings
3. Sex of Child	N/D	0 = Son; 1 = Daughter
4. Parent Had Volunteered	N/D	0 = No; 1 = Yes
5. Years Child Had Attended Current School	I	1 = Less Than One Year 2 = One to Two Years 3 = Three to Four Years 4 = Five to Six Years
6. Parent Level of Education	O	1 = High School Diploma 2 = Bachelor's Degree 3 = Some Graduate Work 4 = Master's Degree 5 = Ph.D. or Beyond M.A.
7. Years Parent a Computer User	O	1 = Less Than One Year 2 = Less Than Two Years 3 = Less Than Four Years 4 = More Than Four Years
8. Ownership of a Home Computer	N/D	0 = No; 1 = Yes
9. Parent Computer Competence	L	1 = No Experience 2 = Low Proficiency 3 = Moderate Proficiency 4 = High Proficiency
10. Computer Expert in Family	N	1 = Father; 2 = Mother 3 = Child; 4 = No One

Key: N/D = Nominal Dichotomous, O = Open-Ended, I = Interval, L = Four-Point Likert, N = Nominal

Figure 4.1: Scale used to measure each independent variable on the questionnaire and method of coding the data for statistical analysis.

Research Questions and Statistical Analysis

The research questions and results of the statistical analyses are presented in a consistent format. First, the research question is stated, followed by the results of the statistical analysis for that question, including tables in two panels. Panel A contains the ANOVA data, including degrees of freedom (df), sum of squares (SS), mean square (MS), coefficients of determination (R^2), adjusted R^2 (R^2adj.), and the F- and p-values. Panel B contains the significant variables and includes the beta weight (B), standard error of beta (SE B), and the t-statistic and p-value. The level of significance for all tests in this study was set at $p = .05$.

Research Question 1

> What is the relationship between the dependent variable, parental knowledge of the computer curriculum in their child's elementary school, and the ten independent variables?

To answer Research Question 1, a series of multiple regression analyses was performed through a stepwise regression procedure to show the most significant relationship between a combination of independent variables and a dependent variable. The final results are shown in Table 4.1.

Panel A of Table 4.1 shows the ANOVA table of the regression analysis, and Panel B indicates which independent variables were included in the regression model of predicting this dependent variable, parental knowledge of the computer curriculum in their child's elementary school. Two variables, ownership of a home computer and years the child had attended the current school, were

identified as the predictors having significant effects on this dependent variable. Other independent variables did not show significant effects on the dependent variable due to low correlation with the dependent variable.

Table 4.1.--Regression analysis of the dependent variable, parental knowledge of the computer curriculum in their child's elementary school.

4.1A. ANOVA TABLE

	df	SS	MS		
Regression	2	217.181	108.590	R^2	= .097
Residual	166	2029.197	12.224	R^2adj.	= .086
				F = 8.88	p = .0002

4.1B. SIGNIFICANT VARIABLES

Variable	B	SE B	t	p
Ownership of a home computer	1.876	.655	2.865	.0047
Years of child's attendance at the current school	.720	.285	2.522	.0126
Constant	3.580	.799	4.478	.0001

The independent variable with the most significant relationship to parental knowledge of the computer curriculum in their child's elementary school was ownership of a home computer (p = .0047), as shown in Table 4.1B. In other words, parents who owned a home

computer had a higher level of knowledge of the computer curriculum in their children's schools, as much as a beta weight of 1.876, in comparison with the parents who did not own a home computer, as shown in Table 4.1B.

The second independent variable chosen in the multiple regression model was years of child's attendance at the current school. The positive regression weight (.720) indicated that parents whose children had attended their current school for a longer period of time had better knowledge of the computer curriculum in their children's schools than parents whose children had attended their current school for a shorter period.

These results collectively imply that parents who owned a home computer and whose children had attended their current school for a longer period had a better knowledge of the computer curriculum in their children's schools. Although these two variables were significant in the regression analysis, the variation in the dependent variable explained by the two variables was about 10%, as shown in Table 4.1A (R^2 = .097). The other 90% of the variation was not explained by the other eight independent variables, but rather was attributable to other unknown variables not investigated in this study.

The other eight independent variables were not significant at the p = .05 level. The Pearson correlation analysis with the dependent variable was low. The lowest of the insignificant independent variables was family member considered to be the

computer expert (r = .011), and the highest of the insignificant variables was sex of parent (r = -.140, indicating mother).

Research Question 2

> What is the relationship between the dependent variable, parental attitudes toward the use of computers in their child's instructional program of learning, and the ten independent variables?

To answer Research Question 2, a series of multiple regression analyses was performed through a stepwise regression procedure. The final results are shown in Table 4.2.

Panel A of Table 4.2 shows the ANOVA table of the regression analysis, and Panel B indicates which independent variables were included in the regression model of predicting this dependent variable, parental attitudes toward the use of computers in their child's instructional program. One variable, parental competence in their own use of computers, was identified as the predictor having a significant effect on this dependent variable (p = .0020). Other independent variables were not significant after having considered the parental-competence variable.

These results show that parents who were more competent in the use of computers had a more positive attitude toward the use of computers in their child's instructional program, as much as a beta weight of .145, in comparison with the other parents who did not own a home computer, as shown in Table 4.2B.

Table 4.2.--Regression analysis of the dependent variable, parental attitudes toward the use of computers in their child's instructional program.

A. ANOVA TABLE

	df	SS	MS		
Regression	1	1594.627	1594.627	R^2	= .056
Residual	167	27131.902	162.466	R^2adj.	= .050
				F = 91815	p = .0002

B. SIGNIFICANT VARIABLES

Variable	B	SE B	t	p
Parental competence in their own use of a computer	.145	.046	3.133	.0020
Constant	.054	.981	-.055	.9562

Although this variable had a significant effect on the dependent variable, the variation of the dependent variable explained by the parental competence variable in the regression analysis was about 6%, as shown in Table 4.2A (R^2 = .056). The other 95% of the variation was not explained by the other nine insignificant independent variables, but rather was attributable to unknown variables not investigated in this study.

The other nine independent variables were not significant at the p = .05 level. The Pearson correlation analysis with the dependent variable was low. The lowest of the insignificant

independent variables was parental nationality (European) (r = .012), and the highest of the insignificant variables was years parent had been a computer user (r = .171).

Research Question 3

> What is the relationship between the dependent variable, parental attitude toward their own use of computers, and the ten independent variables?

To answer Research Question 3, a series of multiple regression analyses was performed through a stepwise regression procedure. The final results are shown in Table 4.3.

Panel A of Table 4.3 shows the ANOVA table of the regression analysis, and Panel B indicates which independent variables were included in the regression model of predicting this dependent variable, parental attitude toward their own use of computers. It should be noted that the data measuring the dependent variable were coded in reverse. Hence the negative sign of each beta weight should be interpreted as a positive effect.

Two variables, parental competence in their own use of computers and the years the parent had been a computer user, were identified as the predictors having significant effects on this dependent variable. Other independent variables did not show significant effects on the dependent variable after these two variables were included in the regression model.

Table 4.3.--Regression analysis of the dependent variable, parental attitude toward their own use of computers.

A. ANOVA TABLE

	df	SS	MS		
Regression	2	131.133	65.567	R^2	= .184
Residual	166	583.318	3.514	R^2adj.	= .174
			F = 18.659	p =	.0001

B. SIGNIFICANT VARIABLES

Variable	B	SE B	t	p
Parental competence in their own use of computers	-.023	.009	-2.464	.0148
Years parent had been a computer user	-.297	.127	-2.348	.0201
Constant	.675	.339	1.989	.0483

The independent variable with the most significant relationship to the dependent variable, parental attitude toward their own use of computers, was parental competence in their own use of computers (p = .0148), as shown in Table 4.3B. These results show that parents who were competent in their use of computers had a positive attitude toward their own use of computers, as much as a beta weight of .023, in comparison with the other parents who were less competent with their use of computers, as shown in Table 4.3B.

The second independent variable chosen in the multiple regression model was years the parent had been a computer user. The negative regression weight (-.297), as the dependent variable was coded in reverse, indicated that parents who had used a computer for a longer time had a more positive attitude toward their own use of computers than parents who had used a computer for a shorter period. These results collectively imply that parents who were more competent in their own use of computers and had used computers for a longer period had more positive attitudes toward their own use of computers.

Although these two variables were significant in the regression analysis, the variation of the dependent variable explained by the two variables was about 18%, as shown in Table 4.3A (R^2 = .184). The other 82% of the variation was not explained by the other eight independent variables, but rather was attributable to unknown variables not investigated in this study.

The other eight independent variables were not significant at the p = .05 level. The Pearson correlation analysis with the dependent variable was low. The lowest of the insignificant independent variables was family member considered to be the computer expert (r = .038), and the highest of the insignificant variables was sex of parent (r = -.265, indicating mother).

Research Question 4

What is the relationship between the dependent variable, parental attitude toward helping their child improve computer competence at home, and the ten independent variables?

To answer Research Question 4, a series of multiple regression analyses was performed through a stepwise regression procedure. The final results are shown in Table 4.4.

Panel A of Table 4.4 shows the ANOVA table of the regression analysis, and Panel B indicates which independent variables were included in the regression model of predicting this dependent variable, parental attitude toward helping their child improve computer skill competence at home. The following independent variables were identified as the predictors having significant effects on this dependent variable: (a) ownership of a home computer, (b) sex of child, (c) child as the family member considered to be the computer expert, (d) mother as the family member considered to be the computer expert, and (e) father as the family member considered to be the computer expert. The last three predictors having significant effects on this dependent variable collective represented the one variable, family member considered to be the computer expert. Other independent variables did not show significant effects on the dependent variable after these variables were included in the regression model.

One notable aspect of the variables chosen in the regression model concerns the variable, parental competence in their own use of computers. The Pearson correlation matrix of the ten independent variables and the dependent variable, parental attitude toward

Table 4.4.--Regression analysis of the dependent variable, parental attitude toward helping their child improve computer competence at home.

A. ANOVA TABLE

	df	SS	MS		
Regression	5	248.301	49.660	R^2	= .806
Residual	163	59.876	.367	R^2adj.	= .800
			F = 135.190	p	= .0001

B. SIGNIFICANT VARIABLES

Variable	B	SE B	t	p
Ownership of a home computer	2.855	.117	24.489	.0001
Sex of child	.260	.094	2.770	.0062
Child as the family member considered to be the computer expert	-.331	.145	-2.277	.0241
Mother as the family member considered to be the computer expert	.208	.194	1.073	.2848
Father as the family member considered to be the computer expert	.028	.135	.206	.8368
Constant	1.204	.137	8.791	.0001

helping their child improve computer competence at home, showed that the variable, parental competence in their own use of computers, had a higher correlation (r = .197) than the independent variables, sex of child (r = .044) and child as the family member considered to be the computer expert (r = -.109). This indicates that the variable, parental competence in their own use of computers, as a single variable had more relationship with the dependent variable in this research question than did the other two independent variables in the model.

However, when a multiple regression analysis was performed through a stepwise regression procedure on the relationship of nine independent variables with parental computer competence as the dependent variable, the variables ownership of a home computer (r = .123) and child as the family member considered to be the computer expert (r = -.215) had relatively high correlations with the dependent variable of parental computer competence. This prevented parental computer competence as an independent variable from being included in the regression model and allowed the inclusion of the variable, sex of child, which showed no correlation with the other variables, ownership of a home computer and child as the family member considered to be the computer expert.

The independent variable with the most significant relationship to the dependent variable, parental attitude toward helping their child improve computer competence at home, was ownership of a home computer (p = .0001), as shown in Table 4.4B. These results show that parents who owned a home computer had positive attitudes toward

helping their child improve computer competence at home, as much as a beta weight of 2.855, in comparison with other parents who did not own a home computer, as shown in Table 4.4B. When considering the standard deviation of the dependent variable (1.3540), the effect size of the independent variable, ownership of a home computer (2.855), was larger than two standard deviations of the dependent variable.

The second independent variable in the multiple regression model was sex of child. The positive regression weight (.260), as shown in Table 4.4B, indicated that parents who had a daughter were more positive in their attitude toward helping their child improve computer competence at home than parents who had a son.

The third independent variable in the multiple regression model was child as the family member considered to be the computer expert. The negative regression weight (-.331), as shown in Table 4.4B, indicated that parents who considered their child the family member who was the computer expert did not have a positive attitude toward helping their child improve computer competence at home. A possible explanation for the negative effect of this independent variable may be that the more competent children are in the use of computers, the less they need assistance from their parents.

The fourth and fifth variables were included in the regression model, not because they were significant, but because these two variables and the third variable, child as the family member considered to be the computer expert, collectively represented one

independent variable, family member considered to be the computer expert.

These results collectively imply that parents who owned their own home computer and had a daughter were more likely to have a positive attitude toward helping their children improve computer competence at home. Parents who considered their child to be the computer expert in the family were not likely to have a positive attitude toward helping their child improve computer competence at home. An explanation for this might be that parents who considered their children to be the computer experts might not have thought their children needed help in computer competence, or parents might have lacked the competence to help their children.

These five variables were significant in the regression analysis and explained about 81% of the variation of the dependent variable, as shown in Table 4.4A (R^2 = .806).

Research Question 5

What is the relationship between the dependent variable, parental competence in their own use of computers, and the nine independent variables listed below:

a. Sex of parent
b. Parental nationality
c. Sex of child
d. Whether parent had volunteered at child's school
e. Years child had attended current school
f. Parental level of education
g. Years parent had been a computer user
h. Ownership of a home computer
i. Family member considered to be the computer expert

To answer Research Question 5, a series of multiple regression analyses was performed through a stepwise regression procedure. The final results are shown in Table 4.5.

Table 4.5.--Regression analysis of the dependent variable, parental competence in their own use of computers.

A. ANOVA TABLE

	df	SS	MS		
Regression	3	38739.904	12913.301	R^2	= .514
Residual	165	59.876	.367	R^2adj.	= .505
			F = 58.195	p =	.0001

B. SIGNIFICANT VARIABLES

Variable	B	SE B	t	p
Years parent had been a computer user	8.200	.787	10.415	.0001
Sex of parent	5.603	2.460	2.278	.0240
Parental level of education	1.637	.756	2.166	.0317
Constant	-33.384	3.857	-8.655	.0001

Panel A of Table 4.5 shows the ANOVA table of the regression analysis, and Panel B indicates which independent variables were included in the regression model of predicting this dependent variable, parental competence in their own use of computers. Three

independent variables were identified as the predictors having significant effects on this dependent variable: (a) years parent had been a computer user, (b) sex of parent, and (c) parental level of education. Other independent variables did not show significant effects on the dependent variable after these three independent variables were included in the model.

The independent variable with the most significant relationship to the dependent variable, parental competence in their own use of computers, was years parent had been a computer user ($p = .0001$), as shown in Table 4.5B. These results show that parents who had more years of experience using a computer had more competence in their own use of computers, as much as a beta weight of 8.200, in comparison with other parents who had fewer years of experience using a computer (see Table 4.5B).

The second independent variable in the multiple regression model was sex of parent. The positive regression weight (5.603), as shown in Table 4.5B, indicated that fathers had a higher level of competence in the use of computers than did mothers.

The third independent variable in the multiple regression model was parental level of education. The positive regression weight (1.637), as shown in Table 4.5B, indicated that parents with a higher level of education had a higher level of competence in their use of computers than did parents with less education.

These results collectively imply that parents who had more years of experience with a computer, who were the father, and who

had a higher level of education were more likely to have a higher level of competence in the use of computers.

These three independent variables were significant in the regression analysis and explained about 51% of the variation of the dependent variable, as shown in Table 4.5A (R^2 = .514). The other seven independent variables were not significant at the p = .05 level. The Pearson correlation analysis with the dependent variable was low. The lowest of the insignificant independent variables was sex of child (r = .024), and the highest of the insignificant variables was father as the family member considered to be the computer expert (r = .271).

Chapter Summary

To answer each research question, a series of multiple regression analyses was performed through a stepwise regression procedure. The independent variables that were significant at the .05 level were reported and discussed. Table 4.6 contains a summary of the independent variables that were significantly related to the dependent variables, as well as the respective levels of significance.

Parents who owned a home computer and whose children had attended their current school for a longer period had a better knowledge of the computer curriculum in their children's schools. Parents who were more competent in the use of computers had a more positive attitude toward the use of computers in their children's instructional program. Parents who were more competent in their own

Table 4.6.--Summary of significant relationships between the five dependent variables and the ten independent variables, including levels of significance.

Dependent Variable	Independent Variable									
	Sex of Parent	Parental Nationality	Sex of Child	Whether Parent Had Volunteered at Child's School	Years Child Had Attended Current School	Parental Level of Education	Years Parent Had Been a Computer User	Ownership of a Home Computer	Parental Competence in Their Own Use of Computers	Family Member Considered to Be the Computer Expert
Parental knowledge of computer curriculum in their child's school					p=.0126			p=.0047		
Parental attitude toward the use of computers in their child's instructional program									p=.0020	
Parental attitude toward their own use of computers							p=.0201		p=.0148	
Parental attitude toward helping their child improve computer competence at home			p=.0062					p=.0001		p=.0241
Parental competence in their own use of computers	p=.0240					p=.0317	p=.0001			

use of computers and had used computers for a longer time had a more positive attitude toward their own use of computers. Owning a home computer and having a daughter were indicative of parents' positive attitudes toward helping their children improve computer skills at home. Parents who considered their child to be the computer expert in the family were not likely to have a positive attitude toward helping their child improve computer competence at home. Those parents who had a higher level of competence in the use of computers were likely to be the father, to have had more years of experience with a computer, and to have a higher level of education.

These results are discussed in Chapter V in terms of their implications for developing computer-orientation programs for parents and increasing the level of parental involvement in their children's development of computer skills.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to determine the need for computer-orientation programs for parents, as well as the appropriate content to be included in the orientation programs to meet various needs of parents for computer information. To implement an effective computer-orientation program, school officials would benefit from knowing the characteristics of parents who are most likely to have positive attitudes concerning the implementation of computers in the elementary school curriculum. The characteristics of parents and students were investigated in this study as ten independent variables to determine their relationship to four dependent variables concerning parental attitudes toward and knowledge regarding the use of computers in their children's school.

A discussion of the major results of the study, implications of the findings, and recommendations for further research are presented in this chapter. Descriptive data regarding the independent variables are referred to in the discussion of the major results and are presented in Table 5.1. The table shows the response choices for each item as they appeared on the questionnaire and the number and percentage of parents who responded to each item.

Table 5.1.--Descriptive data regarding the independent variables.

Independent Variable	Number	Percent
Sex of parent		
Mother	95	51.9
Father	88	48.1
Parental nationality		
American	92	50.3
Other	91	49.7
Sex of child		
Male	99	54.1
Female	84	45.9
Whether parent had volunteered at child's school		
No	115	62.8
Yes	65	35.5
Years child had attended current school		
Less than one year	44	24.0
From one to two years	64	35.0
From three to four years	53	29.0
From five to six years	22	12.0
Parental level of education		
High school diploma	40	22.3
Bachelor's degree	56	31.3
Some graduate work	18	10.1
Master's	31	17.3
Ph.D. or graduate work beyond the master's	14	7.8
Years parent had been a computer user		
Less than one year	21	14.6
Less than two years	21	14.6
Less than four years	34	23.6
More than four years	68	47.2
Ownership of a home computer		
No	42	23.2
Yes	139	76.8
Family member considered to be computer expert		
Mother	17	9.6
Father	81	45.5
Child	49	27.5

Note: Some numbers will not total 183, nor will all percentages total 100.

Major Results and Discussion

This section is organized according to the results associated with the five research questions. The results are summarized under the heading of each major research question, followed by a discussion of the findings.

Research Question 1

> What is the relationship between the dependent variable, parental knowledge of the computer curriculum in their child's elementary school, and the ten independent variables?

Two independent variables were significantly related to parental knowledge of the computer curriculum in their child's elementary school. The first was ownership of a home computer, and the second was years the child had attended the current school. These results collectively imply that parents who owned a home computer and whose child had attended the same school from three to six years had more knowledge of the computer curriculum in their child's elementary school.

Although the level of significance for this study was set at $p = .05$, ownership of a home computer ($p = .0047$) was significant at the .01 level. The descriptive data showed that 76% of the parents in this study owned a home computer. The Cronbach alpha coefficient for internal reliability for this dependent variable was high (.82), contributing to the reliability of these results. Students whose parents own a home computer may be at an advantage over students whose parents do not own a home computer. Students who have a computer at home are likely to spend more time with the computer and

to become more aware of how it operates. Parents may be able to answer children's questions about operating software and learn through experience, whether with game and entertainment or application software. Students whose parents do not own a computer have much less opportunity to experience working with a computer or to practice what they learn in school.

Parents who own a home computer are likely to have more knowledge of the computer curriculum in their child's school and therefore are more likely to become involved in their child's development of computer competencies. Because research has shown that parental involvement in their children's education increases academic achievement, students whose parents own a home computer have the potential to develop higher computer competencies than students whose parents do not own a home computer. These findings support the efforts of some schools, as reported in the literature, to provide access to computers to parents and students at home.

The second significant independent variable was years the child had attended the current school. The descriptive data showed that students had attended their current schools for less than one year (24%), one to two years (35%), three to four years (29%), and five to six years (12%). One explanation for the significance of this variable might be the cumulative effect of knowledge that parents gain about school curriculum programs as their children progress through the grades at the same school. Parental involvement in their children's school may increase the longer their child attends a particular school. For example, the longer their child attends

one school, the more parents might become involved in parent-teacher associations, serve on school committees, attend school activities, and consequently increase their knowledge of the school's curriculum. Although the independent variable, whether parent had volunteered at child's school, was not significant, it had one of the higher correlations ($r = .139$) of the insignificant variables.

In addition, some of the independent variables that did not show a significant relationship provided interesting insights. The highest correlation among the insignificant variables was sex of parent ($r = .140$), indicating that mothers were more likely than fathers to have knowledge of the computer curriculum. This may be because mothers, while living overseas in a foreign country, are not able to work, as dependents of their husbands, and may therefore have more time to become involved in their children's educational programs. In the three Asian cities in which this study was conducted, parents of students in the international schools can afford domestic help, leaving nonworking mothers even more free time to become involved in their children's education at school and at home. Another reason may be that many of the fathers' occupations as heads of company offices or diplomats working at embassies in these foreign settings require frequent travel, leaving mothers solely responsible for monitoring their children's academic progress.

The independent variable, child as the family member considered to be the computer expert, did not show a significant relationship

to the dependent variable, but it was among the variables with a higher correlation (r = .133) with the dependent variable. The descriptive data showed that 27% of the parents indicated their child was the family computer expert. Although one might assume that parents who believe their child is the computer expert in the family might be content that the child is doing well in mastering computer competencies and not take an active interest in how the child is using computers in school, some parents may show interest in their child's computer education and make more of an effort to learn about the use of computers in the child's school. Some parents may also depend on their children for assistance in using computers at home, taking advantage of computer skills students have learned at school.

The implications of these findings for the development of computer-orientation programs and for the improvement of parental involvement in their children's computer education program may be that parents who own a home computer and have had their children enrolled at the same school for a longer period may not require as much information from schools in a computer-orientation program. Parents who do not own a home computer and who are relatively new to the school might need more detailed information about the uses of computers in education and opportunities to experience software that will be used in their child's educational program. These parents, however, may require orientation and training that emphasize other aspects of the computer curriculum regarding the dependent variables yet to be discussed.

Research Question 2

What is the relationship between the dependent variable, parental attitudes toward the use of computers in their child's instructional program, and the ten independent variables?

Only one independent variable was significantly related to parental attitudes toward the use of computers in their child's instructional program. This was parental competence in their own use of computers. Although the level of significance for this study was set at $p = .05$, parental competence in their own use of computers ($p = .0020$) was significant at the .01 level. The Cronbach alpha coefficient for internal reliability for this dependent variable was high (.89), contributing to the reliability of the results.

These results show that parents who are more competent in the use of computers have a more positive attitude toward the use of computers in their child's instructional program. It may be assumed that parents who are more competent in their own use of computers find the computer important in their own productivity, either at home or at work, and project that same importance to their children's learning of how to use the computer. These parents may be concerned that their children be prepared to use computers for their future in higher education and in their future professional careers. If higher parent competence in the use of computers determines a more positive attitude toward the use of computers in education, this may increase parental involvement in their child's computer education, thereby increasing students' competence.

The implications of these findings for the development of computer-orientation programs and for the improvement of parental involvement in their children's computer education program may be that parents who have a high level of competence in their own use of computers will need less training by schools in the use of computers but may need an orientation to the specific use of computers and the types of computer software used in their child's instructional program. Parents are often at a loss in knowing how to buy high-quality software for their children. Computer-orientation workshops for these parents might emphasize how to evaluate software, and provide parents with opportunities to view software used by the school as examples of effective applications. Parents who are less competent in their own use of computers, however, will need training in the use of computers, particularly in the types of applications used in their child's instructional program.

Research Question 3

> What is the relationship between the dependent variable, parental attitude toward their own use of computers, and the ten independent variables?

Two independent variables were significantly related to parental attitude toward their own use of computers. The first was parental competence in their own use of computers, and the second was the number of years the parents had been computer users. These results collectively imply that parents who are more competent in their own use of computers and have been a computer user for a

longer period will have a more positive attitude toward their own use of computers.

Parental competence in their own use of computers ($p = .0148$) and years parent had been a computer user ($p = .0201$) were significant at the .05 level. Although the Cronbach alpha coefficient for this dependent variable was low (.26), these findings may be useful as indicators of parental attitude toward their own use of computers.

These findings support research reviewed in the literature, which has shown that the longer one has used computers, the more positive that person's attitude becomes toward the use of computers. Computer competence should also increase as one continues to use computers over a period of years, thereby also contributing to more positive attitudes. These parents may be effective in serving as orientation-workshop instructors for parents who have less experience and less competence in the use of computers, offering an opportunity for parents to learn from each other. Highly competent parents could offer introductory courses in how computers operate and beginning levels of software applications, such as word processing. This would put less pressure on the schools to find teachers or other school personnel to teach all computer workshop sessions.

Two other independent variables that were not statistically significant deserve mention. Sex of child ($p = .0699$) and American nationality (.1006) had the highest correlations with the dependent variable ($r = -.265$ and $r = .211$, respectively) among the

insignificant independent variables. Sex of child is interesting (the negative correlation coefficient indicates female) because there is little reason to believe that sex of child would be a determinant of parental attitude toward their own use of computers. The correlation of American nationality to the dependent variable may be explained by the awareness gained through the media of the role computers play in determining success in higher education and in professional careers, as well as in many other facets of daily life in the United States.

The implications of these findings for the development of computer-orientation programs and for the improvement of parental involvement in their children's computer education program are that these parents may not need as much training in the use of computers and software applications being used in their child's computer curriculum as parents without as much experience in their own use of computers and with less competence in using computers. Parents with stronger computer competencies, however, may require computer orientation and training in certain computer-assisted-instruction software programs to gain a better understanding of how their children use computers in school.

Research Question 4

> What is the relationship between the dependent variable, parental attitude toward helping their child improve computer competence at home, and the ten independent variables?

Five independent variables were significantly related to parental attitude toward helping their child improve computer

competence at home. These were (a) ownership of a home computer, (b) sex of child, (c) child as the family member considered to be the computer expert, (d) mother as the family member considered to be the computer expert, and (e) father as the family member considered to be the computer expert. The last three variables of the predictors having significant effects on this dependent variable collectively represent the one variable, family member considered to be the computer expert. Although the level of significance for this study was set at .05, two of the independent variables, ownership of a home computer ($p = .0001$) and sex of child ($p = .0062$) were highly significant at the .01 level. These findings may be useful as indicators of parental attitude toward helping their child improve computer competence at home, despite the low Cronbach alpha coefficient (.21) for this dependent variable. These significant independent variables explain about 21% of the variation of the dependent variable.

The fact that the first independent variable, ownership of a home computer, was highly significant is logical because parents would be very limited in the amount of assistance they could give their children in the use of computers without access to a computer at home. This further supports the literature as well as the findings in the first research question, indicating that owning a home computer is important for students to develop computer competence. Students without a computer in the home will be at a distinct disadvantage in developing computer skills because they

will have only limited opportunities to use computers at school, or brief encounters with computers owned by their friends. Having fewer opportunities to use computers will limit students' potential to achieve computer competencies.

The second significant independent variable, sex of child, is important because this is the only indication in this study of the significant difference in gender regarding parental attitudes toward their children using computers. Although the positive correlation (indicating female) of this variable ($r = .044$) with the dependent variable could be considered low, its level of significance ($p = .0062$) is high (see discussion of Research Question 4 in Chapter IV).

Research has been inconsistent in showing "gender gaps" in the use of computers. The studies identifying gender differences, however, have indicated that this variable remains an important issue to consider in developing computer education programs in elementary schools. The positive correlation of this variable indicates that females have an advantage over males in their parents' attitudes toward helping them improve computer competence at home. One possible explanation for these results may be that this sample of parents were aware of the possible bias toward males in the use of computers and were interested in assisting their daughters at home, to help them overcome any disadvantages in their future educational and professional careers due to lack of knowledge about the use of computers.

Although the last three significant independent variables were treated as one variable, family member considered to be the computer expert, the variable, child as the family member considered to be the computer expert, showed a negative regression weight (-.331) indicating a negative correlation with the dependent variable. This indicates that if parents consider their child to be the computer expert in the family, they are not able or do not feel the need to assist their child with computer skills at home. These parents might not be as involved in their child's computer education at school as are other parents who have a positive attitude toward assisting their children.

The implications of these findings for the development of computer-orientation programs and for the improvement of parental involvement in their children's computer education program are important for educators to consider. Schools should attempt to make computers accessible to students and parents who do not own a home computer. Educators should also provide equitable computer access and maintain equitable expectations for boys and girls to develop computer skills. Computer-orientation sessions for parents should emphasize this concept so that parents understand that computer skill development is just as important for their daughters as for their sons. Parents who consider their child to be the family expert in the use of computers may benefit from computer training sessions to acquire knowledge and skills in computer software programs being used by their children at school. Computer workshops at this level could also advise and assist parents in

providing ideas about the type of software to purchase for their children to use, in order to maximize learning. This may improve parental involvement in their child's computer education program.

Research Question 5

> What is the relationship between the dependent variable, parental competence in their own use of computers, and the nine independent variables listed below:
>
> a. Sex of parent
> b. Parental nationality
> c. Sex of child
> d. Whether parent had volunteered at child's school
> e. Years child had attended current school
> f. Parental level of education
> g. Years parent had been a computer user
> h. Ownership of a home computer
> i. Family member considered to be the computer expert

Although the variable, parental competence in their own use of computers, was one of the ten independent variables in the statistical analyses of the first four research questions, a multiple regression analysis of this variable as the dependent variable was conducted to examine its relationship with the other nine independent variables.

Three independent variables were identified as having significant effects on the dependent variable, parental competence in their own use of computers: (a) years parent had been a computer user, (b) sex of parent, and (c) parental level of education. These results collectively imply that parents who have more years of experience with a computer, are the father, and have a higher level of education are likely to have a higher level of competence in the use of computers.

The Cronbach alpha coefficient for internal reliability for this dependent variable was high (.97), contributing to the reliability of these results. Although the level of significance for this study was set at p = .05, the variable, years parent had been a computer user (p = .0001), was significant at the .01 level. It is interesting that 47.2% of the parents responded that they had used computers for more than four years. It is logical that a highly significant relationship would be found between this independent variable and the dependent variable, parental computer competence, because more years of experience in using computers should yield higher competence in their use.

The second significant variable, sex of parent, is interesting because it indicated a difference in computer competencies based on gender. The descriptive data indicated that a similar number of males and females completed the questionnaires. The positive regression weight indicated, however, that males were more competent in the use of computers than were females. This may have been caused by fathers pursuing their career in the overseas setting of this study and using computers in their work, whereas mothers living overseas are generally not able to pursue a career and may have less opportunity and/or need to use a computer.

The third significant independent variable was parental level of education. About 67% of the parents in this study held an educational degree of bachelor's or higher. The high level of education of the parents in this study may indicate that their

educational degree work required computer training, that their professions required the use of computers, and/or that they were better able to afford home computers for their families than parents with less education.

The implications of these findings for the development of computer-orientation programs and for the improvement of parental involvement in their children's computer education program may be that parents who share the characteristics of these significant independent variables might not require training by schools in the use of computers. However, parents who have not used computers for a long time, are mothers, and have less formal education may benefit from computer training sessions, in order to improve their computer competencies and become more involved in their children's computer education program.

The results of the analyses of these five research questions showed that parents had very different levels of attitudes toward the use of computers, knowledge of the use of computers in their child's educational program, and competence in the use of computers. The findings have important implications for educators in providing computer-orientation and training sessions for parents, in order to improve parental involvement in their children's achievement of computer skills.

Implications of the Findings

As a principal of an overseas elementary school in Southeast Asia, the researcher now shares his reflections concerning the

implications for the development of computer-orientation programs for parents.

The findings of this study have many implications for the development of parent computer-orientation programs in schools. The data indicate that there are characteristics that may determine levels of parents' computer competence, as well as attitudes toward and knowledge of computer use in their children's school. Because parents will differ in varying degrees on such knowledge, attitudes, and competencies, computer-orientation workshops for parents must be developed to provide appropriate program content for these levels. According to the findings in this study, the researcher recommends the development of a computer-orientation program that schools may offer to parents, based on three levels of computer competence and knowledge of the school's computer education program. In this section each level of orientation program that schools should provide to parents is discussed, including characteristics of parents who could benefit from participating in the workshops, general course content, and anticipated outcomes of the workshops. This section is followed by important considerations in the implementation of a computer-orientation program for parents.

The first, introductory level is designed to develop conceptual understanding of how computers and computer hardware peripherals operate, and evaluation and selection of hardware and software. Parents for whom this level may be appropriate according to the findings in this study are those who might not own a home computer and have little or no experience with using computers. The findings

also showed that mothers were more likely than fathers to fit into this category.

The first concept, how computers and computer peripherals work, does not need to be highly technical. Rather, parents should be taught basic computer vocabulary in order to become sufficiently knowledgeable to evaluate and select hardware and software. Concepts in the content of these orientation sessions should include different computer models and their operating systems; memory space in computers; the various types of data-storage devices, monitors, and printers; and the use and purpose of other hardware peripherals. Different types of software applications, for parental use at home and/or student use at school and/or at home, should be explained and demonstrated. The purpose of each software application and its potential use for parents or students should be explained, with brief demonstrations of how the software can be used. Parents should then be provided hands-on experience with the computer, to be able to be introduced to software applications.

The goals of this program are to provide a basic knowledge of computer vocabulary, how computers and computer peripherals operate, and how to evaluate hardware and software so that parents will be able to make decisions when considering the purchase of these items. The goal of hands-on experience with computers is not necessarily mastery of the programs, but to provide parents with an introductory experience in using computers.

This level of parent computer orientation does not necessarily need a computer expert or teacher from the school to serve as the

instructor. Other parents who have competence and expertise in this area could easily teach these workshop sessions. As this is an introductory level, it would be advisable to encourage these parents to continue participation in succeeding workshops to gain higher levels of understanding and competence in the use of computers and software applications.

The second, intermediate level involves how and why computers are used in the instructional program in schools. This level assumes some experience in the use of computers. The findings in this study indicated that parents with the following characteristics are likely to be included in this intermediate level: parents who do not necessarily own a home computer, have children who have not attended their current school for more than two years, but have experience in the use of computers.

At this level in the suggested parent computer-orientation continuum, parents are provided an overview of why computers are important in their children's educational program and how computers are integrated into the curriculum. Types of software should be presented and described to parents, emphasizing computer-assisted-instruction software programs used in their children's instructional program, often in basic skills in mathematics and language arts, throughout the school year. The use of application software, such as word processing, spreadsheet, and database, should be presented. Computer-assisted-instruction software such as drill-and-practice and simulations, should also be demonstrated and presented. Parents

should be provided hands-on experience with these software programs. If parents at this level own a home computer, they should be given suggestions for purchasing specific software programs. This would be helpful to this group of parents because they are likely to lack knowledge of computer software appropriate for their children's or their own use.

One of the goals of this intermediate level is that parents should understand how these computer-assisted-instruction and application programs operate and how they may be integrated into the regular curriculum. Another goal is for parents to gain a beginning level of proficiency in the use of these software programs. Parents should be knowledgeable about the specific software programs their children will use and should be able to discuss these programs with their children at home throughout the school year, as students use the programs as part of their educational program. If they own a home computer, parents should attain a level of computer competence to be able to assist their children at home in the use of appropriate software. This level of orientation should be taught by an educator from the school in order to emphasize the educational aspects of the use of computers and software.

The third level of orientation programs for parents is advanced in nature. It could involve an overview of the specific software applications that their children would currently be using in the instructional program. According to the findings in this study, this level is appropriate for parents who have used computers for two or more years, are competent in the use of computers, may

already own a home computer, and have a higher level of formal education.

In this advanced level, parental computer competence is assumed; the focus is on a review of the software their children will use in school. The orientation program should emphasize the integration of computers into the curriculum by providing a description of the different types of computer-assisted-instruction software and an explanation of how application software is effective in promoting thinking skills and developing academic skills. Parents should be provided opportunities to run the software and examine the use of specific computer applications, and be offered advice on software to purchase for their children and for themselves. A computer vendor could be invited to participate in the presentation of software to offer expertise in this area.

The goals of this level are for parents to gain a better knowledge of the types of software their children will be using in school and to learn how to run this software. As parents in this group are considered to be competent in the use of computers, only brief directions or program guides should be sufficient in teaching them how to run specific educational software. They may, however, require more assistance in learning to operate certain application software programs. Although these parents are considered to be competent in the use of computers, they might not have a high level of competence in all applications.

This level should be taught by an educator from the school in order to emphasize the educational aspects of the use of computers

and software. A computer vendor could be asked to team-teach the course that educator, however, to provide more advanced and individualized instruction during the workshop. This group of parents should be considered as teachers of the first, introductory level of orientation programs. Parents from this group might also be interested in offering training programs over an extended period to members of the community who are interested in developing higher competencies in one or more of the application programs--word processing, spreadsheet, and database.

A summary of the goals, program content, and parent characteristics appropriate for each level of the parent computer-orientation model is presented in Table 5.2.

Several considerations are important in the development and implementation of computer-orientation workshops and training sessions for parents. Scheduling is among them. Every attempt should be made to offer flexible scheduling of workshops for working parents. Evenings and weekends are the most appropriate times for parent workshops. If children are involved in co-curricular activities on Saturday (a common occurrence in overseas schools), this may be a convenient time for parents, as children and parents are able to participate in their own activities at the same time. Workshops should be offered to parents according to their child's grade level because the software used may differ in each grade, particularly in the case of drill-and-practice software. In some schools, the same application software (especially word processing)

Table 5.2.--Parent computer-orientation program model.

Level	Goals	Content	Parent Characteristics
Introductory	Develop conceptual understanding of how computers, peripherals, and software operate	Computer vocabulary Evaluation of software Hands-on experience at beginner level with software applications	No ownership of a home computer Little or no experience using computers
Intermediate	Develop understanding of CAI and application software integration in the curriculum Gain computer proficiency	Overview of computer use in school Presentation of software used in school a. CAI drill-and-practice b. CAI simulation c. Applications Suggestions for parental purchase of hardware and software for child Hands-on instruction in use of software	No ownership of a home computer Child has not attended current school more than two years Have experience in use of computers
Advanced	Gain knowledge of software used in school Gain advanced competence in use of software applications	Presentation of software used at school Suggestions for software purchase for child Advanced hands-on use of software	Have used computers for two or more years High level of computer competence Ownership of a home computer

may be used at several grade levels. In this case, parents whose children are in different grades may be grouped together, perhaps in three groups: parents of children in kindergarten and grade one, parents of children in grades two and three, and parents of children in grades four and five.

Access to school computers should be provided for parents without a computer at home. This may be done by allowing parents to check out a computer, similar to a library system, on particular evenings, weekends, or other times when there is low student use of the computers for instructional purposes. Workshop sessions involving hands-on experience with computers need to be scheduled, with an appropriate ratio of parents to computers. In some cases, one-to-one may be most effective, although more workshops may need to be scheduled to allow all parents to participate. The workshops need to be flexible to allow parents to begin at their own level of ability and to progress at a comfortable rate. Training activities should be arranged in a sequence that gradually increases in complexity.

Handouts, course guides, and other course materials provided to parents must be carefully developed so that they are clear, concise, and easy to use. Materials with suggestions for home activities should be available for parents to take home with them for future reference. Periodic informational letters sent to parents from teachers and administrators throughout the year, which outline the current application of computers in their children's instructional

program, are helpful to parents in discussing computer use with their children at home. These newsletters should also contain suggested activities that fit into the instructional objectives of the learning program for students.

One finding in this study that was highly related to parental knowledge of and attitude toward the use of computers in school was ownership of a home computer. So that students who do not have access to a computer at home are not at a disadvantage in the achievement of computer skills, schools should attempt to provide them and their parents access to computers. Schools might open the school computer lab during flexible nonschool hours for parents and work with computer vendors to allow parents to purchase computers with educational discounts. Schools should also attempt to obtain the hardware necessary to allow students with different brands of computers, with different operating systems, to use the same diskette at home and school, in order to be able to progress on computer assignments at school and at home, regardless of the compatibility of the computers in school and at home.

The model of a computer-orientation program for parents as previously described may improve parental attitudes toward the use of computers in their children's school, improve their involvement in and attitude toward helping their children with computer competencies at home, and improve their own computer competence, with increased student achievement in computer skills being the ultimate goal.

A summary of the guidelines for the development of effective computer-orientation programs for parents and parental involvement in their children's computer education is presented in Table 5.3.

Table 5.3.--Guidelines for effective parental involvement in computer education.

1. Schedule parent computer workshops around parents' work schedules.
2. Group parents by grade level of child, according to software use.
3. Provide computer access to families that do not own a home computer.
4. Maintain an effective parent-to-computer ratio in workshops.
5. Allow parents to begin workshops at their appropriate ability level.
6. Develop a sequence of workshops to meet various needs of parents.
7. Develop effective, easy-to-use course materials and handouts.
8. Provide suggested home activities for parent-child interaction.
9. Send periodic computer-education newsletters home throughout the school year.

Recommendations for Further Research

Those who are leaders in educational curriculum and are responsible for the quality of education in schools must cooperate and continue to build the knowledge base for the integration of computer technology into the curriculum. Educational leaders, using every resource available, must improve student achievement in

computer skills and prepare students for their future academic and professional work. The following recommendations for further research are offered as a result of this study.

1. It is recommended that a replication of this study be conducted in another school setting, such as a public school system in the United States, to determine whether these results may be generalized to a broader base of schools.

2. The Indiana Computer-in-the-Home Project is a pilot program in four school districts in the state, designed to place a computer in the home of every fourth grader in the district. A study should be conducted to compare parental attitudes toward and knowledge of their children's computer education program as compared to those parents not involved in the project who already own a home computer and parents not involved in the project who do not own a home computer, to determine the level of parent involvement in their children's education program.

3. This study showed that parents who own a home computer have more knowledge of their children's use of computers at school. The literature review indicated that a considerable amount of computer skill is learned at home. A study should be conducted to investigate the extent of use of the home computer by children, to determine how closely the students' use of computers at home relates to the school's computer curriculum skill sequence.

4. The parent computer workshop model presented in this study should be implemented and tested for effectiveness in improving parents' knowledge of and attitudes toward the use of computers in

their children's education, and in improving students' computer competence.

5. Parent computer-orientation and training programs may be more effective in improving parental involvement in their children's computer education for those parents who own a home computer than those who do not own a computer. A study should be conducted to determine the effect of parent computer-orientation programs on computer skill achievement for students who have access to a home computer as compared to students who do not have access to a home computer.

6. This researcher examined the relationship between ten independent variables and the dependent variable, parental knowledge of the computer curriculum in their children's elementary school. The statistical analysis showed that two variables, ownership of a home computer and years child had attended the current school, explained about 10% of the variation of the dependent variable. As 90% of the variation was not explained, a study should be conducted to investigate other variables, such as the quantity and quality of communication from school to parents regarding the school's computer education program, which may determine parental knowledge of their child's use of computers in school.

Conclusions

It is clear that schools need to involve parents in the education of their children. To accomplish this, educators must realize that parent involvement increases communication between home

and school and has a positive effect on school improvement. Parental attitudes toward teachers and administrators improve as a result of the cooperation between home and school when schools take an active role in involving parents. Effective parent-involvement programs include parent training and orientation programs to help parents know how best to help their children. When these concepts are included in orientation programs, student achievement increases.

Student achievement in computer skills is becoming increasingly important as the use of computers becomes institutionalized in schools. As parental involvement has had positive effects in other core subject areas, such as reading, language arts, and mathematics, there is strong potential for improved student achievement in computer skills with increased parental involvement in their children's computer education program. Schools need to develop orientation and training programs for parents in order for parents to know how best to help their child at home or at school, wherever they have access to computers.

Parent computer-orientation programs should be developed, based on the informational and training needs of parents, according to their level of knowledge of computer use in their children's school, their level of computer competence (particularly in the software applications used by their children in school), and their attitude toward the use of computers in schools. The use of a parent survey in conducting a needs assessment will assist educators in developing a series of appropriate and effective parent computer-orientation

programs that provide parents with the information and training they require to become actively involved in their children's computer education program. Educators should be aware of characteristics that are related to parental attitudes toward and knowledge of the use of computers in education. These include ownership of a home computer, how long their child has attended the current school, the length of time parents have used computers, and their competence level. Computer education programs must reduce the effect of gender of children in their attitudes toward and use of computers in schools.

APPENDICES

APPENDIX A

SURVEY QUESTIONNAIRE

SURVEY OF PARENT KNOWLEDGE OF AND ATTITUDES TOWARD COMPUTER USAGE IN ELEMENTARY SCHOOLS

Please return this completed survey by *DATE*, to to your child's classroom teacher. You do not need to sign your name. I have enclosed two copies, and ask that both parents complete individual surveys. Please consider only your child in grade 5 when completing this survey. Thank you very much for your time and cooperation.

1. Please indicate which parent will complete this survey:

   a.___ Mother b.___ Father c.___ Guardian (___Male or ___Female?)

2. Please state your country of nationality:_____.

3. Please indicate the sex of your child: _____ Male _____ Female

4. Have your served as a Parent Volunteer in your child's school?

   _____ Yes _____ No

5. How many years has your child attended this school?

   ___ less than 1 year ___ three to four years
   ___ 1 to 2 years ___ five to six years

6. Please check your highest educational achievement:

   _____ a. High School Diploma or Equivalent
   _____ b. University Bachelor's Degree or Equivalent
   _____ c. Some Graduate Work
   _____ d. Master's Degree or Equivalent
   _____ e. Some Graduate Work Beyond the Masters
   _____ f. Other *(Please Specify)*_____

7. Have you ever used a computer? a. _____ Yes b. _____ No

8. If your answer to number 7 was 'YES', how many years have you used a computer?

   a. _____ Less than one (1) year c. _____ Less than four (4) years

   b. _____ Less than two (2) years d. _____ More than four (4) years

9. Do you own a home computer? a. _____ Yes b. _____No

10. If your answer to question number 9 was 'YES', please state the brand name of the computers you own. If your answer to question number 9 was 'NO', you do not need to answer questions 11 - 17, but go to question number 18.

---

11. Which of the following best describes your feelings at the time your family acquired your first home computer ? (please check one item)

_____ a. I was excited about owning a home computer
_____ b. I felt indifferent toward the purchase of our first computer
_____ c. I was opposed to the purchase of our first computer
_____ d. I felt fearful about owning a home computer

12. Which of the following best describes your feelings regarding your use of the computer at this time? (please check one item)

_____ a. I feel confident in the use of the home computer
_____ b. I feel indifferent toward the use of the home computer
_____ c. I feel hesitant toward using the home computer
_____ d. I feel fearful about using the home computer

Please check one column, 'Yes', 'No', or 'Don't Know' for each of the following:	Yes	No	Don't Know
13. Is the brand of your home computer the same as the computer that your child uses at school?			
14. Do you have software at home that your child also uses at school?			
15. Are you able to assist your child in using the computer at home?			
16. Did your interest in your children's education influence your purchase of a computer?			
17. Did you purchase your brand of computer in order to be compatible with computers used at school?			

18. Whom do you consider to be the computer expert in your home? (please check one or more)

_____ Mother _____ Child (Please state grade level): ____
_____ Father _____ No One

19. If you know the brand of the computer your child uses at school, please state:

Please check one column, 'Yes', 'No', or 'Don't Know' for each of the following:	Yes	No	Don't Know
20. Is computer use at home encouraged by teachers in the school?			
21. Does your child have access to a computer in the classroom (or main instructional area)?			
22. Does your child's class have access to a computer lab with enough computers for each child in the class?			
23. Do you currently receive appropriate information from your child's school regarding the school's computer curriculum program?			
24. Would you appreciate receiving information from the school regarding how you may assist your child in improving computer competencies at home?			

25. Please check one column for each to indicate which types of software (if any) your child uses at school:

Type of Software	Yes	No	Don't know
a) Word Processing			
b) Database			
c) Spreadsheet			
d) Computer Programming Languages			
e) Drill and Practice Skill Development			
f) Problem Solving Programs			
g) Simulation Programs			
h) Games or Entertainment Programs			

26. Please check the academic subjects in which your child uses a computer at school:

Academic Subjects	Yes	No	Don't know
a) Writing			
b) Reading			
c) Mathematics			
d) Social Studies			
e) Science			
f). Other:_____			

27. Please circle the code number that most accurately indicates the degree of your competency in working with computers in the following applications:

If you have never used a computer and have no experience in using the programs listed below, you may check the special "No Experience" box and go to page 5. ☐ No Experience In Any Software.

☐ No Experience In This Application

4 = High Proficiency
3 = Moderate Proficiency.
2 = Low Proficiency
1 = No Experience

a) Word processing applications: ☐ No Experience In This Application				
1) Ability to create a new document	4	3	2	1
2) Ability to edit errors in an existing document	4	3	2	1
3) Ability to move blocks of text in an existing document	4	3	2	1
4) Ability to insert tables of data within text documents	4	3	2	1
5) Ability to save documents for later revision	4	3	2	1
6) Ability to print a completed document	4	3	2	1
b) Spreadsheet applications ☐ No Experience In This Application				
1) Ability to read and use data from a spreadsheet	4	3	2	1
2) Ability to input data into an existing spreadsheet	4	3	2	1
3) Ability to revise data in an existing spreadsheet	4	3	2	1
4) Ability to design a computer spreadsheet	4	3	2	1
5) Ability to create a spreadsheet with formulas	4	3	2	1
6) Ability to analyze data by manipulation of data	4	3	2	1
7) Ability to create graphs or charts with data	4	3	2	1
c) Database applications ☐ No Experience In This Application				
1) Ability to read and use data in a computer database	4	3	2	1
2) Ability to input data into an existing database	4	3	2	1
3) Ability to revise data in an existing database	4	3	2	1
4) Ability to design a computer database	4	3	2	1
5) Ability to create a database with fields and records	4	3	2	1
6) Ability to analyze data by manipulation of data	4	3	2	1
7) Ability to create graphs or charts with data	4	3	2	1
d) Program a computer language ☐ No Experience In This Application				
1) Ability to modify an existing computer program	4	3	2	1
2) Ability to correct errors in a computer program	4	3	2	1
3) Ability to write computer programs	4	3	2	1
4) Ability to design flow charts for computer programs	4	3	2	1
e) Operate published game or educational software programs				
1) Ability to operate published programs if someone else loads the program into the computer	4	3	2	1
2) Ability to load published software programs	4	3	2	1

28. Please circle the code (one per item) which is your response for each item.

SA = Strongly Agree. NO = No Opinion. D = Disagree.
A = Agree. SD = Strongly Disagree

	SA	A	NO	D	SD
a) Computer courses should be required for elementary school students	SA	A	NO	D	SD
b) My child should learn about:					
1. How computers work	SA	A	NO	D	SD
2. How to run software on a computer	SA	A	NO	D	SD
3. History of computers	SA	A	NO	D	SD
4. Computers as they affect society	SA	A	NO	D	SD
c) My child should be using the following types of computer programs in the instructional curriculum areas at school:					
1. Word processing programs	SA	A	NO	D	SD
2. Spreadsheet programs	SA	A	NO	D	SD
3. Database programs	SA	A	NO	D	SD
4. Computer programming languages	SA	A	NO	D	SD
5. Drill and practice skill programs	SA	A	NO	D	SD
6. Problem solving programs	SA	A	NO	D	SD
7. Simulation programs	SA	A	NO	D	SD
d) My child should use the computer as a tool incorporated as part of the lessons in:					
1. Writing	SA	A	NO	D	SD
2. Reading	SA	A	NO	D	SD
3. Mathematics	SA	A	NO	D	SD
4. Social Studies	SA	A	NO	D	SD
5. Science	SA	A	NO	D	SD
6. Other	SA	A	NO	D	SD
e) My child's academic learning has been improved due to the use of computers:					
1. in school	SA	A	NO	D	SD
2. at home	SA	A	NO	D	SD

	SA	A	NO	D	SD
f) I would like to learn more about the computer curriculum in my child's classroom	SA	A	NO	D	SD
g) I would like to serve on the school's computer curriculum program committee	SA	A	NO	D	SD
h) The ability to use computers will benefit my child in the future to excel in life-long academic learning	SA	A	NO	D	SD
i) The ability to use computers will benefit my child in the future to serve well in job-related tasks	SA	A	NO	D	SD
j) The ability to use computers will benefit my child in the future to function effectively in society	SA	A	NO	D	SD
k) I would like to learn more about computers	SA	A	NO	D	SD
l) I feel intimidated by my child's ability in using computers	SA	A	NO	D	SD
m) I think there is too much emphasis on computers in school	SA	A	NO	D	SD
n) I view the computer as a toy to enjoy	SA	A	NO	D	SD
o) I view the computer as a tool to be used in order to complete various tasks more quickly, easily, and efficiently	SA	A	NO	D	SD

Please feel free to make any comments about topics covered in this survey:

_____

_____

_____

_____

I wish to thank you very much for your sincere efforts to assist me in this research project!

Please return this completed survey form by *DATE*, to your child's classroom teacher. Again, thank you.

Sincerely,

James R. Rogers
Elementary Principal
International School of Kuala Lumpur

APPENDIX B

DESCRIPTION OF CHANGES TO QUESTIONNAIRE ITEMS

Description of Changes to Questionnaire Items

During the process of revising the questionnaire, several changes were made in the format, organization, and content of the items. The revisions of the questionnaire were made to create a concise and efficient questionnaire that would yield exact data and be easy for parents to complete. Listed below are the questions that were eliminated or modified. In the case of modifications to a question, the number of the question is given.

1. The question "Please check the level of education you would like your child to attain" appeared on the original questionnaire. (Five forced-response choices were listed.) This question was deleted because parents found it difficult to answer. Many parents indicated to the researcher that they would like their children to continue their education beyond high school but were unsure of the exact level of education their children would either be able or desire to attain. Therefore, parents were unsure of how to answer this question.

2. Question 10 requested parents to write in the name of the computer(s) owned at home (if any). This question originally had been a forced-response checklist of possible brands of computer. The revised open-ended format allowed parents to write the brand name of their home computer because the test parents had indicated many different computer brands. A simple procedure for coding the computer brands written by respondents in this open-ended item was established for data analysis. Although Orlich (1978) cautioned

against overuse of open-ended questions because of difficulty in coding responses, this open-ended question and the others in the questionnaire were designed for easy coding of the responses.

3. Question 18 asked parents to indicate the family member considered to be the computer expert at home. In this forced-response format, if "child" was checked, a space was added to allow parents to write in the grade level of the child in the family considered to be the expert.

4. Question 27 requested parents to indicate their self-assessment of their own skill level on 26 items divided into subskills in five main categories of computer applications and use. The original question only requested parents to indicate their self-assessment on the five main categories, and not the subskills for each category. The addition of 26 subskill items provided more detailed information about the specific skill ability of parents in the use of computer applications. The additional number of items also increased the reliability of this variable.

Another change in Question 27 was in the response format. To simplify the completion of this question by parents who had no experience in any computer applications, "No Experience" check boxes were added to the final version.

5. Parents were requested to indicate their attitude toward the use of the computer by their child in core curriculum areas in Question 28.c.1. The term "Language Arts" was changed to the separate categories of "Writing" and "Reading" on the final version

of the questionnaire because the term "Language Arts" is not necessarily used universally among schools, and parents in the pilot study indicated they were unsure of the possible subjects that might be included in this broad subject classification.

6. The format of Questions 13 through 15 and 20 through 26 was modified to the current column format, and a third choice, "Don't Know," was added. The addition of the choice "Don't Know" was supported by Orlich (1978). He stated that it is important to consider the range of the respondents' knowledge of the topic and to allow a "Don't Know" or "No Opinion" response.

7. The natural option of choice had been "Don't Know" in the five-point Likert scale used in Question 28. This was changed on the final questionnaire to "No Opinion" because the latter statement would be less offensive or embarrassing to the respondents.

8. Format changes were made to maintain common categories of questions on separate pages for the final questionnaire. The directions for some sections of the questionnaire were slightly modified for clarity.

These changes were made as the result of statements from parents in the pilot study who indicated they experienced difficulty with a particular aspect of the questionnaire. Some respondents made specific suggestions for changes, which, if appropriate, were incorporated into the revised questionnaire. Having the questionnaire tested by computer education specialists and parents was effective in attaining the goals of the revision process, as previously stated: to create a concise questionnaire that would

yield exact data and would be easy for parents to complete. A concise questionnaire must comprise items that yield exact data that may be used to answer the research questions of the study.

APPENDIX C

LIST OF NATIONALITIES REPRESENTED IN THE SAMPLE

COUNTRY	NUMBER	PERCENT
United States	91	55.5 %
Canada	10	5.5 %
ASIA		
Singapore	1	0.6 %
Malaysia	5	2.7 %
Thailand	3	1.6 %
India	14	7.7 %
Bangladesh	1	0.6 %
Burma (Myanmar)	2	1.1 %
Philippines	2	1.1 %
Japan	2	1.1 %
Korea	1	0.6 %
Indonesia	2	1.1 %
Hong Kong	2	1.1 %
Taiwan	1	0.6 %
EUROPE		
Ireland	1	0.6 %
Great Britain	11	6.0 %
Holland	3	1.6 %
Belgium	1	0.6 %
Denmark	1	0.6 %
Sweden	2	1.1 %
Norway	3	1.6 %
Switzerland	1	0.6 %
OTHER		
Australia	10	5.5 %
New Zealand	3	1.6 %
Iran	1	0.6 %
Israel	2	1.1 %
Jamaica	1	0.6 %
Guyana	1	1.1 %
Argentina	2	1.1 %
TOTALS:	183	100.0 %

APPENDIX D

LETTER OF TRANSMITTAL TO PARENTS

JAMES R. ROGERS

Elementary Principal
International School of Kuala Lumpur

1568-J Spartan Village
Michigan State University
E. Lansing MI 48823, U.S.A.

Date

Dear *Parent*,

The enclosed survey form, concerned with the use of computers by students of grade 5 in school and at home, is part of a study I am conducting at Michigan State University. By providing information about *Child's* experience with computers at home and what you as a parent would like *Child* to learn about computers at school, you will be assisting educators in overseas American/International schools to develop effective computer education programs. I am particularly interested in obtaining your views, as computer use is rather prevalent at our schools in Southeast Asia.

I am asking for your assistance by completing the enclosed survey forms in order to assist me in this study. Anonymity and strict confidentiality will be observed, so you do not have to sign your name on the form. I ask that each parent complete his or her own survey form unless only one parent is available. The survey has been tested by many people and the average time to complete the form has been from 10 to 15 minutes.

I realize that you may not be familiar with some categories of software or other applications for computer usage mentioned in the survey. In such instances you may feel free to check the "No Opinion" or "Don't Know" columns.

Please complete and return these forms to *Child's* classroom teacher. If for any reason you choose not to participate in this research, simply keep the forms.

I very much appreciate your time and cooperation in completing these survey forms and assisting in the completion of this important study. *Child* will receive a small gift in appreciation for returning these forms to the classroom teacher.

Sincerely,

James R. Rogers
Elementary Principal
International School of Kuala Lumpur

APPENDIX E

NUMBER AND PERCENTAGE OF RETURNED QUESTIONNAIRES

PART A: Actual questionnaires returned shown cumulatively

	Kuala Lumpur		Singapore		Bangkok		All Schools	
	Raw	%	Raw	%	Raw	%	Raw	%
First Return	26	65%	77	77%	60	68	163	71.5%
Second Return	32	80%	77	77%	64	73	173	75.9%
Final Return	33	83%	77	77%	73	83	183	80.3%

PART B: Actual number of families represented in the study, shown cumulatively

	Kuala Lumpur		Singapore		Bangkok		All Schools	
	Raw	%	Raw	%	Raw	%	Raw	%
First Return	15	75%	45	90%	34	77%	94	82.5%
Second Return	18	90%	45	90%	37	84%	100	87.7%
Final Return	19	95%	45	90%	42	96%	106	92.9%

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