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Effects of methods of teaching computerized family budgeting to literate and non-literate women in Puerto Rico

Andrades-Garay, Carmen T., Ph.D.

The Ohio State University, 1994

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EFFECTS OF METHODS OF TEACHING COMPUTERIZED FAMILY
BUDGETING TO LITERATE AND NON-LITERATE WOMEN IN
PUERTO RICO

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the
Degree Doctor of Philosophy in the Graduate School
of The Ohio State University

by

Carmen T. Andrades-Garay

*****

The Ohio State University

1994

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Adviser
College of Human Ecology
Home Economics Education
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1994
DEDICATION

To my dear daughter Margarita Hernandez Andrades; my dear son, Victor J. Hernandez Andrades; my beloved husband, Victor Hernandez; my wonderful mother, Emilia Garay; my father, Martin Andrades, deceased; my brother, Jorge Andrades; to my advisor, Joan E. Gritzmanner; to all my family members, professors and friends who supported and encouraged me during this investigation.

"No bird soars too high, if he soars with his own wings (Blake, 1983)."
ACKNOWLEDGEMENTS

Life is great when we live with love, hope and faith!

I cannot possibly recognize here all the wonderful persons who by their help, friendship or care have contributed to my completing this research project. Specially my dear, FATHER, GOD, who never leaves me alone.

To my beloved, Margarita and Victor Julian, our children, they were my motivation and stimulus to start the graduate program and finish it. A big hug and thanks for them to forgiving me for being away from them. To my special mother, Emilia Garay, who never lost the faith, thanks for being there.

To my dear and special husband, Victor Hernandez Vicens, who deserves special recognition for his unconditional love and support during these four years. I will never forget all the sacrifice that moving to Ohio mean to you. Thanks my love, for your love and support.

First and foremost, special thanks and appreciation is expressed to Joan E. Gritzmercher, my major advisor, for her persistent support, guidance and encouragement during all of my doctoral studies. I deeply appreciate her insight, patience and understanding. Dr. G.! you are an unique role model and wonderful human being! Thanks for believing in my potential!

Appreciation is expressed to Puerto Rico Extension Service and the Kellogg Foundation for the Kellogg Fellowship awarded to this researcher. To
Rodriguez, Extension Associate Dean, for his support for this research. Also appreciation is expressed to the College of Human Ecology and Professor Anita McCormick for the fellowship awarded to this student at the beginning of the research process. My gratitude is also expressed to the faculty and staff in the Department of Home Economics Education and for my selection to receive the Julia I. Dalrymple Research Award. Thanks is also expressed to the faculty and staff of Department of Family Resource Management, especially Dr. Sherman Hanna and Eva Bradshaw.

Special thanks to Catalina Camacho, for her friendship and professional support through the programming of the Budgeting Computer Assisted Instruction (BCAI). I know that the programming of the BCAI gave new meaning to the word 'sacrifice' to you. Thanks Caty, for all the time and energy devoted to it, beyond the usual work day.

I am also very grateful, to professor Sharon Seiling for her assistance in the development of the BCAI and this research. Thanks Dr. Seiling to being there. I also acknowledge the assistance of Professor Jo Jones for her support during my graduate studies.

To my very special friend Dr. Ruben Nieto for his research counselling and your support throughout my graduate studies. Thanks Ruben, for your friendship, for listening to me during frustration times and giving me support.
Thanks is expressed, to a very special person, Fred Ruland, for his statistical counselling. His positive attitudes toward life and his faith in student potential provided support for me in the last stages of this research. Excellent!

I wish to thank, Ruth Lebron Rivera, Maunabo Extension Home Economist, for her friendship, for her faith in me and positive attitudes toward life and professional competence, that make this research possible. I also appreciate the Maunabo Agricultural Extension Service office staff, Carmen Amaro and Oscar Hernandez, for their support. I am particularly indebted and grateful to Maunabo Extension Home Economics program clientele who participated in this investigation. Thanks to Lolin Pinero for her support in proposing renting computers.

To my dear brother, Zonny, for his support in our travelling each summer to work on this investigation. To Dorothy Brandon, Usha Kulkani, Herendida Otello, friends and colleagues, for sharing times of laughter, frustration and accomplishment. To Zaida Figueroa, for her friendship and support in the data collection. To my friends Blanca Rivera, Alba Rodriguez, Pricila Colon, Ana Elba Falcon and their families for the 'good times' we shared in our stay in Columbus.

Thanks is expressed to Professor Janet Henderson, for being supportive of students and for serving as translation expert. To Lilliam Davila for helping in the translation of the research instruments. To Blanca Rivera and Pricila Colon for helping in the edition of the BCAI.
To all the Puerto Rico Agricultural Extension Service and O.S.U. faculty, staff and students who supported me through this search project,

Very Special Blessings and Grateful Thanks to all of you!
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Fields of Study

Major Field: Human Ecology

Major Areas of Emphasis: Home Economics Education

TABLE OF CONTENTS

DEDICATION ............................................................................................................... ii
ACKNOWLEDGMENTS ........................................................................................................ iii
VITA ............................................................................................................................. vii
LIST OF TABLES ...................................................................................................... xi
LIST OF FIGURES ................................................................................................... xvi

CHAPTER PAGE

<table>
<thead>
<tr>
<th>CHAPTER</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Background of the Study</td>
<td>2</td>
</tr>
<tr>
<td>Need For The Study</td>
<td>12</td>
</tr>
<tr>
<td>Problem Statement</td>
<td>13</td>
</tr>
<tr>
<td>Purpose in this Study</td>
<td>13</td>
</tr>
<tr>
<td>Research Questions</td>
<td>14</td>
</tr>
<tr>
<td>Research Hypotheses</td>
<td>14</td>
</tr>
<tr>
<td>Assumptions</td>
<td>16</td>
</tr>
<tr>
<td>Limitations</td>
<td>17</td>
</tr>
<tr>
<td>Definitions</td>
<td>18</td>
</tr>
<tr>
<td>II. REVIEW OF LITERATURE</td>
<td>21</td>
</tr>
<tr>
<td>Introduction</td>
<td>21</td>
</tr>
<tr>
<td>Section</td>
<td>Page</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Treatment</td>
<td>124</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>139</td>
</tr>
<tr>
<td>Data Collection Procedures</td>
<td>150</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>156</td>
</tr>
<tr>
<td>IV. FINDINGS AND DISCUSSION</td>
<td>161</td>
</tr>
<tr>
<td>Research Question 1</td>
<td>163</td>
</tr>
<tr>
<td>Perceived Alternatives after Loss a Job</td>
<td>163</td>
</tr>
<tr>
<td>Perceived Alternatives after Divorce</td>
<td>163</td>
</tr>
<tr>
<td>Perceived Alternatives after an Accident</td>
<td>163</td>
</tr>
<tr>
<td>Perceived Alternatives when Confronted with Illness</td>
<td>167</td>
</tr>
<tr>
<td>Perceived Alternatives when Confronted with Death</td>
<td>167</td>
</tr>
<tr>
<td>Participants' Perception of Money Management and the Role of</td>
<td></td>
</tr>
<tr>
<td>Research Question 2</td>
<td>167</td>
</tr>
<tr>
<td>Hypotheses Testing</td>
<td>177</td>
</tr>
<tr>
<td>Null Hypothesis 1</td>
<td>177</td>
</tr>
<tr>
<td>Null Hypothesis 2</td>
<td>194</td>
</tr>
<tr>
<td>Null Hypothesis 3</td>
<td>197</td>
</tr>
<tr>
<td>Null Hypothesis 4</td>
<td>200</td>
</tr>
<tr>
<td>Null Hypothesis 5</td>
<td>206</td>
</tr>
<tr>
<td>Null Hypothesis 6</td>
<td>214</td>
</tr>
<tr>
<td>Null Hypothesis 7</td>
<td>218</td>
</tr>
<tr>
<td>Summary of the Chapter</td>
<td>223</td>
</tr>
</tbody>
</table>
V. SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS ........................................... 228
  Summary ......................................................................................................... 228
  Conclusions .................................................................................................... 239
  Implications .................................................................................................... 242
  Recommendations ......................................................................................... 245
VI. BIBLIOGRAPHY ......................................................................................... 249
VII. APPENDICES .......................................................... 265
  A. Research Package ..................................................................... 266
  B. BCAI Panel of Experts Letters .............................................. 288
  C. Letter of Appreciation to the Panel of Experts ............ 302
  D. Budgeting Test ................................................................. 307
  E. Attitudes Toward Budgeting Computer Assisted Instruction ............................................. 317
  F. Demographic Characteristics Instrument ................. 325
  G. Letter with Instructions ......................................................... 331
  H. Letter for the Test-Retest ..................................................... 334
  I. Analysis of the Instruments .................................................. 336
  J. Human Subjects Review Committee ................................. 342
  K. Home Economics Instruction Manual .......................... 348
  L. Letter For Participants ........................................................... 355
  M. Correlational Matrix .............................................................. 359

xi
# LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Median Years of Education</td>
<td>8</td>
</tr>
<tr>
<td>2. Effective Color Combinations</td>
<td>73</td>
</tr>
<tr>
<td>3. Color Coding for Appropriate Association</td>
<td>75</td>
</tr>
<tr>
<td>4. Sample Budgeting Classifications</td>
<td>107</td>
</tr>
<tr>
<td>5. Variables in this Study and their Scale of Measurement</td>
<td>117</td>
</tr>
<tr>
<td>6. Percentages for Recommended Expenses</td>
<td>137</td>
</tr>
<tr>
<td>7. Research Question, Hypotheses and Data Analysis and Data Analysis Techniques</td>
<td>159</td>
</tr>
<tr>
<td>8. Perceived Alternatives after Loss of a Job</td>
<td>164</td>
</tr>
<tr>
<td>9. Perceived Alternatives after Divorce</td>
<td>165</td>
</tr>
<tr>
<td>10. Perceived Alternatives after an Accident</td>
<td>166</td>
</tr>
<tr>
<td>11. Perceived Alternatives When Confronted with Illness</td>
<td>168</td>
</tr>
<tr>
<td>12. Perceived Alternative when Confronted with a Death in the Family</td>
<td>169</td>
</tr>
<tr>
<td>13. Frequency Distribution of Perceptions of Participants’ Importance of Budgeting in Money Management</td>
<td>170</td>
</tr>
<tr>
<td>14. Frequency Distribution of Participants’ Feelings About Family Economic Situation</td>
<td>172</td>
</tr>
</tbody>
</table>
15. Frequency Distribution of Participants' Expectations of Achieving Family Needs, Desires, Goals and Wants in a Short Period of Time ........................................... 173

16. Frequency Distribution of Participants' Perception of the Role of Budgeting to Help Family Meet Needs, Goals and Desires .................................................. 174

17. Frequency Distribution of Participants' Perception of the Role of Savings in Money Management ............................... 175

18. Frequency Distribution of Participants' Expectations About Savings ....................................................................................... 176

19. Frequency Distribution of Rural or Urban Place of Residence ................................................................................................ 178

20. Frequency Distribution of Participants' Age Ranges .............. 180

21. Frequency Distribution of Participants' Literacy Status ......... 181

22. Frequency Distribution of Marital Status ................................. 182

23. Frequency Distribution of Number of Children Living at Home with Participants ................................................................. 184

24. Frequency Distribution of Number of Persons Living at Participants' Home ................................................................. 186

25. Frequency Distribution of Participants' Employment Status ................................................................. 187

26. Workplace for Women Working Outside the Home ............... 188

27. Workplace for Women Working Outside the Home ............... 190

28. Frequency Distribution of Personal Income Status ................ 191

29. Frequency Distribution of Family Income Status .................. 193

30. Frequency Distribution of Number of Dependents Supported by Participants' Income .............................. 195
31. Means and Standard Deviations of Participants' General Attitudes Toward BCAI, Toward BCAI Voice and BCAI Graphics .............................................................. 196

32. Relationships Between Pretest Budgeting Knowledge and Independent Variables ............................................................... 198

33. Analysis of Covariance: Pretest with Literacy, Marital Status, Age, Place of Residence, and Number of Children as Covariates ......................................................... 199

34. Analysis of Covariance: Budgeting Knowledge Pretest Scores with Literacy as Covariates ............................................................... 201

35. Regression Values Pretest Budgeting Knowledge Scores .................. 204

36. Analysis of Covariance: Posttest Budgeting Knowledge Scores with Pretest Budgeting Knowledge Scores as Covariates ............................................................... 207

37. Regression Analysis: Posttest Budgeting Knowledge Scores with Pretest Budgeting Knowledge Scores as Covariates in the Three Groups ......................................................... 210

38. Pretest and Posttest Mean Budgeting Knowledge Scores ............................................................... 211

39. Means and Standard Deviations of Participant's Budgeting Knowledge Scores on Pretest and Posttest by Treatment and Control Groups ................................................. 213

40. Multiple Regression: Posttest Budgeting Knowledge Scores with as General Attitudes Toward BCAI of Participants who Received the BCAI with Voice and Graphics ............................................................... 216

41. Multiple Regression: Posttest Budgeting Knowledge Scores with General Attitudes Toward BCAI of Participants who Received BCAI with Text Only ................................................. 217

42. Multiple Regression: Posttest Budgeting Knowledge Scores with Attitudes Toward Graphics of Participants who Received the BCAI with Voice and Graphics ............................................................... 219
43. Multiple Regression: Posttest Budgeting Knowledge Scores with Attitudes Toward Voice of Participants who Received the BCAI with Voice and Graphics ............. 222

44. Percent of Agreement Between Respondents Answers on Budgeting Knowledge in the Test-retest ......................... 337

45. Percent of Agreement Between Respondents Answers on Attitudes Toward Computer in the Test-retest ........................................ 338

46. Index of Discrimination of Budgeting Knowledge ................. 340
LIST OF FIGURES

FIGURES   PAGE

1. Conceptual Framework ......................................................... 23
2. Components of the Budgeting Computer Assisted Instruction ........ 24
3. Budgeting Computer Assisted Instruction Design Phases ............... 60
4. Managerial Model ................................................................. 86
5. Puerto Rico and the Caribbean Island ........................................ 118
6. Municipalities of Puerto Rico .................................................. 119
7. Municipalities with High Illiteracy Rate .................................... 120
8. Maunabo Municipality ............................................................ 122
10. Categorization of Family Financial Situations ............................. 131
11. Plot of Literacy Level of Participants ........................................ 202
12. Standardized Scatterplot ......................................................... 203
13. Plot of Posttest Budgeting Knowledge with Pretest Budgeting
    Knowledge Scores ............................................................... 205
14. Plot of Pre Budgeting and Post Budgeting ................................ 208
15. Plot of Posttest Budgeting and Attitudes Toward Graphics .............. 221
CHAPTER I
INTRODUCTION

The quality of life of Puerto Rican families has been affected by rapid economic and social changes over the last 50 years. Economic and social changes must be understood in the context of Puerto Rico's historical relationship with the United States. Puerto Rico (P.R.) is economically, politically, and socially dependent on the U.S.A., and that dependence has contributed to the development of special social problems (Longres, Diaz, & Francis, 1987).

Family members have been dealing with new technological, economic, and social changes. New challenges have emerged as family members are confronted with different working patterns, family structures, and family member responsibilities and roles.

Women are especially affected since increasing numbers of women are in the labor force and are household heads; they have longer life expectancy, and educational opportunities are available. Acosta (1989) pointed out that "literacy and education for women in Latin America are increasingly viewed as necessary steps for enhancing their status and as prerequisites for better employment opportunities" (p. 120).
Background

The proportion of women in the Puerto Rican population has been increasing during the last three decades compared to the total population. According to the Bureau of Census, in 1990, the population consisted of approximately 3,522,037 persons. Census data showed that during the decades 1970-90, the population of Puerto Rican women grew from 1,382,084 to 1,816,395, more than one-half of the population (52%). One important element that has affected these trends has been women's increased life expectancy. As indicated by the Women Affairs Commission, women's life expectancy in P.R. is 79 years compared to 72 years for men.

During the last decade in P.R., social concern about the impact consumerism has had on the family as an economic and social unit has been growing. The Department of Social Services (1988) conducted research that showed that 84% of Puerto Rican families are in debt and that 25% of these families believed that economic problems are a major cause of family stress. Also, the study showed that 25% of these families related happiness to economic success and well-being. The major basic needs identified by these families were cars (14.5%), jobs (14.5%), furniture (14%), housing (12.4%), education (7%), health (7%), and money (6%).

Another indicator of the consumer and family economic struggle has been the high incidence of bankruptcy. In the last 3 years, significant growth in bankruptcy filing has occurred at all economic levels. According to the Federal
Court in P.R., bankruptcy increased 50.6% in 1989, when compared to 1988. Data showed that 5,958 bankruptcy petitions were presented, of which 4,105 were personal bankruptcy as compared with 2,525 in 1988.

According to recent data, Puerto Rican married women constitute the least-likely demographic category to be in poverty (Census, 1980); widowed and divorced women experienced higher poverty rates than married women of all ages. Morgan (1989) indicated that divorced women and widows experienced detrimental changes in their economic status following the end of their marriages.

Family structures in P.R. have undergone some rapid changes. The increase in single-parent households has accounted for a large proportion of these changes. Consequently, social concern about the impact of separation and divorce on the family has been rising. In 1988, the P.R. Planning Board reported 32,339 marriages; however, P.R. Island has the highest divorce rate in the world. In P.R., in 1980 for every 100 marriages, 47 divorces occurred, as indicated by the P.R. Women Affairs Commission (1990) and by Vazquez Calzada (1987).

According to this Commission (1990) and Morales del Valle, Carnivahi & Vazquez (1984), 98% of the women divorced in 1980 obtained custody of their children. This means that those women have the responsibility to nurture, care for, and provide for the economic well-being of their children.

Female householders' income has not been maintained at levels as high as those of their ex-husbands. The female householder's earnings represent the difference between falling into poverty or staying above that threshold.
Consequently, the Commission pointed out that female households have serious economic problems because of their responsibilities and because of their low income.

The 1990 Census indicated that there were 886,339 families in P.R., of which 205,508 were headed by a female with no husband present. This represents 23% of the total population. Census (1980) data showed that 21% of all Puerto Rican families had a women as head, in contrast to 16% in 1970. In rural areas, only 16% of families had women as heads, in contrast to 23% in urban areas (Census, 1980). The preceding data support the contention that the structure of the family has changed, with an increasing number of women becoming household heads. Therefore, the family authority pattern, the line of authority, and the identity of the Puerto Rican decision maker have changed in contemporary society.

A household unit depends on a number of resources for its standard of living. Resources include wages and other benefits associated with employment, services from the state, and non-monetary income from household production. One important question is how Puerto Rican households use their economic resources to achieve their well-being.

According to the Summary of the Social, Economic, and Housing Characteristics Report (1990), the family median income was $9,988. Median household income, as indicated in this report, was $8,895 for those households living on the Island. In 1990, about 55% (492,025 families) of the families had
incomes below the poverty level (Census, 1990). Puerto Rican families averaged 4.28 persons, but this varied by place of residence. In 1980, rural families had a median family size of 4.3, in contrast to 3.9 members per families in urban areas and 3.7 members for those families living in cities.

According to the P.R. Social Service Department (1987), 372,373 families lived under the poverty threshold, with an average monthly income of $500. About 417,800 families participated in the nutritional assistance program, and 89.1% of these families lived in extreme poverty.

Women are one of the most affected population groups. In 1984 approximately 50% of the women did not receive income and about 50% received some source of income (Census, 1984). However, a household with no husband present had a median income of $3,589. Making the situation worse is the decline in the purchasing power of the dollar. The purchasing power of the dollar was only 36 cents in 1990 as compared to 100 cents in 1968. This means that households need more economic resources to meet their basic needs.

According to Acosta (1989, p. 110):

P.R. as [others] Latin American countries achieve higher degrees of industrialization and modernization, develop a large middle class and create the necessary conditions that lead to increasing involvement of women in education.

However, this does not necessarily translate into better employment or income.

The participation of women in the work force in P.R. grew in a relatively short period of time. In 1980, there were about 143,023 female heads of
household in the labor force. According to the Census Bureau, in 1985 approximately 65% of women were in the labor force. The highest rate of participation was among women aged 25 to 54.

In P.R., women have been represented in a variety of fields and occupations. They have contributed to the economic growth of the Island; however, they still earn low salaries. In 1980, women constituted 44% of managerial and professional occupations. As shown by the Bureau Census (1980), 65% of administrative-support occupations were filled by women. A study by the Public Health Department (1980) pointed out that while women were employed in a variety of occupations in 1983, they still were predominantly employed in low-paying categories.

However, the increased participation of women in all areas of the Puerto Rican economy has illustrated that most women still face the limitation imposed by the patriarchal tradition and sexist culture that circumscribe women's choices of profession, their employment opportunities and salaries, their role within the families and their control of their own well-being (Acosta, 1989, p. 120).

Acosta (1989) stated that women still account for an estimated two-thirds of the world's illiterate population. P.R. and Cuba have made considerable progress in comparison to other Caribbean Islands. Puerto Ricans have increased their average educational level, and substantial enrollment of women in
elementary and secondary school systems and institutions of higher education has occurred.

Education has been the area in which Puerto Rican women have participated in the largest numbers throughout this century (Acosta, 1989). According to Vazquez Calzada (1988), mean years of education for women was 9.4. Table 1 presents the median educational level for those women between 20 and 44 years of age.

Educational opportunities continued to grow in the 1980s. About 11.5% of the population cannot read and write in any language (Census, 1980). As reported by Vazquez Calzada (1988), P.R. has approximately 140,676 non-literate women, and they constitute 8% of the female population. According to the Census Bureau (1980), 39.5% of women 25 years old and over have a high school diploma and 9.4% have completed four or more years of college.
Table 1

**Median Years of Education Completed by Women in Puerto Rico in 1980**

<table>
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<tr>
<th>Median Age</th>
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</tr>
</thead>
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<tr>
<td>20-24</td>
<td>12.6</td>
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<tr>
<td>25-29</td>
<td>12.5</td>
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<tr>
<td>30-34</td>
<td>12.0</td>
</tr>
<tr>
<td>35-39</td>
<td>11.0</td>
</tr>
<tr>
<td>40-44</td>
<td>10.1</td>
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</tbody>
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Source: Vazquez Calzada, 1988, p. 76.

According to the P.R. Department of Education, in 1978 7% of the population aged 18 to 44 years could neither read nor write. Non-literate persons were concentrated in the center of the Island. According to the Puerto Rico Department of Education (1990) regional divisions, 16.4% of the population of Arecibo region, were non-literate as compared to 7.5% in the San Juan region. Caguas region had a 13.8% non-literacy rate among the population 18 years or older.

Non-literacy problems were concentrated in Arecibo region in the specific municipalities: Ciales (21.2%), Utuado (21.7%), and Lares (21.7%). In Caguas region, Cidra municipality had a 23.2% non-literacy rate.

Careers in P.R. still stereotype women, who constitute a cheap source of educated labor. From the degrees granted by institutions of higher education in
1988, the following were granted to women as compared to men in each career: 98.1% in commercial science; 87.5% in nursing; 80.9% in social welfare; 80.2% in education; 53.3% in math and science; 28.5% in technology; and 47.9% in computer science. As can be seen, women are segregated in disadvantaged job positions and lower paying service jobs, while males dominate the better paying jobs.

The preceding illustrates that women with limited or no economic resources, especially those living in extreme poverty, are likely to have literacy problems and to be divorced or widowed. These women face difficult struggles when they try to achieve a better quality of life and be successful in their lives.

In the twenty-first century, families will be challenged by the effects of technological advances and sophisticated market strategies. New approaches in the promotion of goods and services designed by the industrial society will seek to drive family decision making by creating needs and influencing values. In this way, families will likely perceive new needs for many kinds of goods and services. Many consumers do not have the skills and knowledge needed to recognize and reject the marketing and promotion pressures. Therefore, their quality of life in economic terms would be affected.

Institutional, economic, social, and technological changes require that individuals have some basic competencies to achieve a better quality of life. Rivera, Lauria, and Rodriquez (1977) pointed out that functional competencies do not consist of single skills or even sets of skills. They pointed out that the use of
a set of tools and process skills is needed as the result of requirements imposed upon members of a society. They also stated that adult functional competency must be measured using performance appropriate for adult life.

Rivera et al. (1977, p. 117) define the competencies required for Puerto Ricans as those skills needed by adults to deal competently with their life situation. They recognize 13 basic domains of adult competency:

1. manual/motor skills
2. communication skills reading, listening, and viewing
   writing, speaking, and non-verbal communication
3. computation add, subtract, multiply, and divide
4. data manipulation, data interpretation and data integration
5. critical analysis, problem solving, and decision making
6. interpersonal (interaction) skills, including group dynamics and organizing skills
7. self-expression, self-development, and self-integration
8. the maintenance of health
9. consciousness of man-nature relations
10. skills related to production, work, and employment
11. consciousness and effectiveness as a consumer
12. awareness of community-the community as a system of resources;
   shared instrumentalities and time/space
13. consciousness of the needs of societal development.
However society imposes basic competencies, the Puerto Rican economic system has been incapable of developing the infrastructure needed to develop jobs and promote basic educational competencies that allow individuals to achieve a better standard of living (U.P.R., 1987).

Families as economic units are in a constant process of interchange with the macroeconomic system to satisfy their needs and wants. The family is a consumption unit; therefore, its members need to develop skills and competencies to deal effectively in the market place and handle their finances in intelligent ways. This is especially important in Puerto Rico, where conspicuous consumption is highly valued as a means of success and prestige. This trend has grown in the last 40 years (Andrades, 1979 and U.P.R., 1987).

Household managers need to develop their managerial skills to achieve family goals and meet their needs as a function of economic well-being. Family financial planning is a needed basic skill for developing an effective household financial plan. Budgeting is recognized as one of the adult competencies in the consumer economic domain.

Need For The Study

Even with the economic situation of families and households, only three formal adult consumer education programs in financial management have been implemented in Puerto Rico. A literature review showed no evidence of valid
educational computerized budget programs. This educational technique can help women to use their economic resources more effectively.

Balakrishnan, Firebaugh, and Stafford (1986) indicated the need for research in family resource management in underdeveloped countries. Thus, while for low income consumers a research agenda might emphasize special problems, for Hispanics, the needs are much more basic: one is virtually starting from zero (Andreasen, 1982).

The Limited Resources Audiences Committee of the Federal Extension Service (1991) recommended the development of low-literacy and culturally-appropriate resources materials in the areas of nutrition and health, money management and also recommended the involvement of this clientele in the development and pretesting of the material.

Hanna (1990) recommended that academic researchers should be involved in the development of an expert system for consumers, especially those designed for low and moderate consumers who have less access to commercial software. Shiau (1989) also recommended further research to explore the benefit of using sound with computer programs.

Problem Statement

The situation of women in Puerto Rico is complex. Women perform multiple roles as mother, wife, worker, and citizen, to name some. The economic
situation of women in Puerto Rico is difficult, especially for less educated, divorced, and widowed women.

It is important for Puerto Rican women to learn managerial skills in family finance to use their resources effectively. When Puerto Rican women start making budgets and setting priorities to manage their economic resources they will obtain the desired satisfaction (Agostini, 1991).

Special programs and reliable educational methods are needed to improve women's household managerial knowledge and skills to increase or optimize their effectiveness in handling their economic resources. Budgeting computer software is one of the technologically innovative resources available to help women to improve their own and their families' economic well-being.

Purpose in this Study

The purpose in this study is to investigate the effect of two computerized methods of teaching on knowledge of budgeting for literate and non-literate women in Puerto Rico. The two pieces of budgeting computer software, one with text only and one with special graphics and voice enhancements, were used as methods of teaching family budgeting to non-literate and literate women in Puerto Rico.

The research was designed to validate a computerized budget program that can be used by both literate and non-literate women. This computer program could be used as an educational method to help women to become better...
administrators of their families' economic resources, especially Puerto Rican women who have been confronted with multiple economic problems.

Research Questions

The following research questions were stated for this research:

Research Question 1:

What are the women's perceived alternatives for life situations that create financial crises?

Research Question 2:

How do the women perceive the role of money management in meeting family needs, goals and desires?

Research Hypotheses

The following hypotheses were stated for this research:

Research Hypothesis 1:

There are significant differences among the demographic variables for the women in each of the three groups.

Research Hypothesis 2:

There are relationships between the pretest budgeting knowledge scores and the independent variables of 1) age, 2) number of children, 3) literacy, 4) attitudes toward computer and 4) residence.
Research Hypothesis 3:

Literacy, marital status, age, place of residence, and number of children explain a significant proportion of the variability in the pretest budgeting knowledge scores.

Research Hypothesis 4:

Pretest budgeting knowledge scores explain a significant proportion of the variance in the budgeting posttest scores.

Research Hypothesis 5:

Those women in the two groups using the Budgeting Computer Assisted Instruction (i.e., voice and graphics, and text only) have significantly higher posttest budgeting knowledge scores than those women in the control group after controlling for pretest budgeting knowledge.

Research Hypothesis 6:

Attitudes about the computer and the Budgeting Computer Assisted Instruction explain the variability of posttest budgeting knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the two groups using the Budgeting Computer Assisted Instruction.

Research Hypothesis 7:

Computer attitudes in regard to voice and graphics explain variability in the posttest budgeting scores, over and above the
variability explained by the pretest budgeting knowledge scores in the group using the Budgeting Computer Assisted Instruction.

Assumptions

The following assumptions are made for this research:

1. Married women in general do not know their husbands' real income.

2. Married women make their budgets with the allowances that their husbands give them.

3. The women participating in this research have had the identified income for at least 6 months.

4. There is some relationship between visual system and reading and visualization.

5. For the purpose of developing the Budgeting Computer Assisted Instruction (BCAI), it is assumed that consumers want to maximize their resources.

6. For the design of the Budgeting Computer Assisted Instruction, it is assumed that consumers make rational decisions to fulfill their basic needs first.

7. The women are honest and accurate in their responses.
Limitations

Several limitations to this study are recognized, including:

1. The computer program was designed for low-literate families or individuals.

2. The computer program was designed as a tutorial, but future professional intervention for follow-up and financial counselling is expected.

3. The computer program takes into account only 1 month of income and expenditures, while users set their short term goals for 6 months. The time frame expected for implementing the counselling program is 6 months.

4. The literacy level of the sample was not tested, as the researcher did not find a Spanish standardized test for adults that measured literacy at this level.

5. This program was designed for women who:
   a. have no savings or a limited amount of money available to fulfill their goals;
   b. have limited reading skills.
   c. have an educational level of fewer than 6 years of schooling.
Definitions

The following definitions were used in this study:

Literate women:

Ability of women to read and write with understanding a short, simple statement as indicated by having completed at least grade 9.

Graphics:

A representational or pictorial display produced for computer representation (Meadows, Gordon & Singleton, 1984).

Budgeting Computer Assisted Instruction with text only:

Computer software with text only designed to allow a consumer to set up a family budget.

Budgeting Computer Assisted Instruction with voice and graphics:

Computer software, enhanced with graphics and voice, designed to allow consumers to set up a family budget.

Household:

A household consists of all the persons who occupy a housing unit (Census Bureau, 1990).

Householder:

The person in whose name the home is owned, being bought, or rented (Census Bureau, 1990).
Budgeting:

A plan for the use of income, expenses, and savings to achieve the goals that individuals and the family want to achieve (Garman & Forgue, 1991; and Davis, 1989).

Marital status:

The term refers to the classification of the following categories: single, never married, now married, separated, consensually married, widowed, and divorced as self reported (Census Bureau, 1990).

Rural residence:

All rural residents living on farms and in areas with fewer than 2,500 inhabitants (Census Bureau, 1980).

Urban residence:

Persons living in urbanized areas and in areas of 2,500 or more inhabitants outside urbanized areas (Census Bureau, 1980).

Number of children:

The number of children in a household, as son and daughter, including stepchildren and adopted children of the householder.

Budgeting Knowledge:

A structure of concepts and relationships built by reflective thought based on information about budgeting that will allow individuals and families to plan the use of income, expenses, and savings to achieve the goals they want to achieve in a specified order or series of steps.
Attitudes Toward Budgeting Computer Assisted Instruction (BCAI):

Affect for or against, evaluation of, like or dislike of, positiveness or negativeness, agreement or disagreement toward computer assisted instruction on budgeting enhanced with voice, text, and graphics.
CHAPTER II
REVIEW OF LITERATURE

Introduction

Teaching methods are essential tools for delivering educational processes effectively. In our contemporary society, diversified educational teaching methods have been developed. As a result of technological innovations, computers have been used as educational tools. Literature published during the last 12 years indicates that computer applications are spread across a broad scope of educational fields and disciplines. Research related to computers as a method of teaching has been found in fields such as science, mathematics, arts, psychology, and home economics.

The purpose of the researcher in this chapter is to: (a) reveal literacy issues and their implications for adults’ learning, testing, and computer program design; (b) review the cash flow management approach to budgeting; (c) provide criteria for software design and evaluation; and examine studies that investigate the use of graphics and voice in Computer Assisted Instruction (CAI).

Research completed over the last 12 years indicates that literate learners can perform better using appropriate teaching methods. In the study reported in this dissertation, Computer Assisted Instruction (CAI) was used to test the
effectiveness of the computer as a method of teaching family budgeting; two forms of a computer program: 1) text only and 2) enhanced with voice and graphics, as well as a control group with no treatment.

In order to organize this chapter, a conceptual framework was developed to show the relationship of independent and dependent variables in this study (see Figure 1). Using literature as a base, some demographic characteristics such as marital status, number of children, income, age, and place of residence were selected as independent variables. Additional independent variables included literacy and attitude toward BCAI. The two methods of teaching computer programs were the treatment, and budgeting knowledge was the dependent variable. An experimental design was developed to investigate the effect of the two methods of teaching on posttest budgeting knowledge scores.

Rambally’s (1986) approach was used to design the Computer Assisted Instruction (CAI) and to describe the components of the Budgeting CAI. The Rambally approach includes four components of knowledge necessary for teaching using computer assisted instruction: expert module, student model module, students interface module, and the tutorial module (Figure 2).

The student module focuses on knowledge, skills, errors, and misconceptions. The student model module is used to predict students’ level of understanding, recognize their particular learning, and identify the kinds of material to be used. In this research, the selected audience was low literate adult
Figure 1. Conceptual Framework of the Relationship of Independent Variables and Dependent Variable, Budgeting Knowledge
Figure 2. Components of the Budgeting Computer Assisted Instruction

Student Module
women; therefore, the next section describes issues related to literacy.

**Literacy: a World Issue**

Literacy is a fundamental right of human beings and a means to development (Harman, 1987; UNESCO, 1981). Regardless of what planners, educational researchers, economists, and academics say or find through study and analysis, political leaders around the world view literacy as a political right. Therefore, literacy is directly in the political domain (Harman, 1987).

Literacy is one of the major problems of contemporary world society. According to UNESCO (1981), millions of human beings throughout the world are unable to read, write, or compute and are therefore not equipped to play an effective role in society. As reported by UNESCO (1990), about 666 million individuals around the world are non-literate. The highest rates, about two-thirds of non-literate persons, are commonly found in rural areas, where most of the time people live in extreme poverty (Hamadache & Martin, 1986).

According to Hamadache and Martin (1986), the illiteracy rate throughout the world creates enormous disparities between different regions, different countries in the same region, within a given country between rural and urban zones, and between men and women.

However, the problem is not confined to undeveloped countries; developed countries also confront illiteracy. In developed countries, the problem is not limited to school dropouts and the disadvantaged groups in the societies.
Statistics on social problems around the world show a high relationship between illiteracy and social problems such as unemployment, crime, and teenage pregnancy. In contrast, higher rates of literacy are generally correlated with higher social status and development (Gadsden, 1988). Research shows that poverty and the power structure of the society are more responsible for low levels of literacy than the reverse (Carman & David, 1988).

As found in the literature, world leaders have major concerns about illiteracy eradication. World leaders have set the goal of reducing the problem of illiteracy by the year 2,000 (U.S. Department of Education, 1991). The United Nations declared 1990 as International Literacy Year and set as a goal the eradication of illiteracy by the end of the century or by the year 2,000 (Department of Education, 1990; Wagner, 1987; UNESCO, 1981). UNESCO members want to cut down illiteracy in industrialized nations as well as that in the developing world (Wagner, 1987 cited in Gadsden, 1988).

As a result, in the United States a resurgence of interest in adult literacy has been growing (Crandall & Imel, 1991). Literacy is one of the six U.S.A. national goals of education (Department of Education, 1990). The President and Governors have set a goal for adult literacy and lifelong learning by the year 2,000. The U.S.A. goal for literacy is that "every adult will be literate and will possess the skills necessary to compete in a global economy and exercise the rights and responsibilities of citizenship" (Manno, 1990, p. 1).
The 1991 National Literacy Act points out that literacy problems are intergenerational, closely associated with poverty, and pose a major threat to the economic well-being of the United States (Congress, 1991).

The purpose of the Adult Education program in the U.S.A. is to expand educational opportunity for adults age 16 and over, dropouts, and those with low literacy levels (U.S Department of Education, 1990). According to Harman (1987), this is not a single task of either formal schools or adult programs. This requires coordinated efforts of formal and adult programs.

Puerto Rico has been following the United States' educational literacy program model and goals. In 1985, the Puerto Rico Department of Education reorganized the Division of Extended Education to consolidate programs and provide better educational services for dropouts or illiterate youths and adults with socioeconomic and culturally limiting conditions (Department of Education, 1990; Rivera et al., 1977).

**Literacy Definition**

To deal with concerns about literacy programs and methods, it is essential to define the concept of literacy in the context of a specific society, region, or group. According to Harman (1987), it becomes necessary to determine priorities and to plan the course of action to secure maximum effectiveness.

Harman (1987) states that literacy is a highly complex concept that derives its definition from different conditions among different groups at different times.
The traditional view of literacy is related to purely educational or schooling terms. However, literature shows that literacy is also a socioeconomic and cultural phenomena (Hamadache, & Martin, 1986; Harman, 1987; and Neijs, 1961).

Literacy has been viewed by scholars as a value and not merely as a set of skills or cumulative knowledge. Some societies place an important value on being literate, and in other societies literacy is viewed as a less important value (Harman, 1987). In a given country literacy could have different values. Literacy can have social, economic, and personal values for the individual and for the society (Gadsden, 1988).

The value of literacy is related to the definition of the concept. Literacy concepts lack a universal definition. This problem is a result in part of the variety of differing points of view on the issue brought by education researchers and practitioners, policymakers, the private sector, and other concerned groups (U.S.D.E., 1990).

Different definitions of literacy are needed for different situations (Harman, 1987). The definitions of the concept depend on the culture, subculture, needs, purposes, and uses of literacy (Gadsden, 1988). The definitions of the concept depend on how the skills associated with it are used and the contexts in which it is applied (Levine, 1986).

Literacy has historically been interpreted in many ways, largely as a result of a variety of referents attached to the concept (Gadsden, 1988). Literacy means information, skills, or abilities needed to function effectively in a society. Also,
literacy can mean faith, moral strength, job security, career advancement, humanity, expansion, learning, understanding, appreciation, expression, communication, mobility, autonomy, development, freedom, flow of information, and well-being, to name some of the possible approaches to defining the concept.

Literacy requirements and literacy levels cannot be determined by a universal standard (UNESCO, 1981). Across time, the definition has been changing for different societies and cultures. As pointed out by Gadsden (1988), each definition is in many ways unique to one period of history or another. However, each has persisted over time as a valid indicator of literacy among different groups and cultures.

Literature shows that literacy is one of the first and indispensable steps to development, both for the individual and for the community (Hamadache & Martin, 1986; Harman, 1987; and Neijs, 1961). They point out that literacy can help individuals to: (1) improve their economic condition; (2) understand cultural meaning and literature; (3) create self-respect, a feeling of confidence, and a desire of self-betterment; (4) reach basic and highest level of knowledge; (5) increase religious participation; (6) become more autonomous and less circumscribed by the conditions of social class, sex, and ethnicity into which one is born; (7) increase job performance; (8) increase citizenship participation; (9) attain better standard of living; (10) fulfill basic needs of individual well-being; and (11) promote better communication for essential needs, either for thought or for action.
The Census Bureau (1940, 1950, 1960) has also defined literacy in different ways across time. The Bureau established the first literacy rate in 1840. At that time, literacy was viewed as the ability to read and write simple messages in English. In 1950, the Census Bureau defined an illiterate as any one with less than a fifth grade education. In 1960, completion of sixth grade was established as a determinant of literacy. According to the U.S. Department of Education (1990), over the past 60 years of testing, the criterion for judging adequate levels of reading skills has risen from a third grade to an eighth grade level. The U.S. Department of Education in 1982 defined literacy as completion of 8 years of formal schooling (Jensen, 1982).

Literature shows that there is no definite agreement on the practical meaning of literacy. If a literate person is one who can read and write and is probably good at both, does that not mean that the person is good at a task. But being good at a task does not necessarily indicate that the person understands the task (Calfee, 1988).

The most common parameter used to define literacy is reading skills (Sticht, 1978). Literature shows that an effort has been made to define literacy using reading as a basic starting point to become literate. Robson, DeVirgilio & DeBults (1990) argue that reading is the first step in becoming functionally literate.

Reading is the process of constructing meaning from the dynamic interaction of the reader's existing knowledge and the information suggested by
the written language and the context of the reading situation (Robson, et al., 1990). A similar definition was developed by Sticht (1978), who views reading as a substitute for listening to spoken language, including the knowledge of general vocabulary and concepts, and the learning of skills for obtaining information from graphic displays. Reading, according to Winterowd (1989), is a necessary skill to interpret visual information meaningfully. As shown, confusion exists regarding reading and literacy (Sticht, 1973).

The developmental model of literacy skills helps to explain literacy as a process of development, since reading and writing are used as parameters to becoming literate (Sticht, 1978). This model restricts literacy to the use of written language by reading and writing. Calfee points out that "reading should be part of an integrated language program" (1988, p. 3). This approach to literacy differentiates the stage of development where individuals develop reading and writing skills.

Literacy is not simply ability to read and write (Harman, 1987). In economic terms, literacy is sometimes referred to as an investment in human capital (Wagner, 1987, cited in Gadsden, 1988). Wagner stated that literacy leads to economic growth in countries which are able to make a sufficient investment.

For the purpose in this research, the Census definition will be used. This is the official definition used by the Department of Education in Puerto Rico. The definition of literacy states that a literate person is one who has completed at least Grade 9.
Types of Literacy Approaches

Literature shows different types or approaches to the definition of literacy, such as: traditional approaches that include basic literacy, and school-based literacy and the competency-based approaches that include functional literacy, workforce literacy, and family literacy (Carman & David, 1988; Gadsden, 1988; and U.S.D.E., 1990). Traditional approaches use reading and writing as measures of literacy. In this context, literacy is synonymous with knowledge.

Basic Literacy: Basic literacy is the ability to read a few words and to sign one's name (Carman & David, 1988). Basic literacy is equal to Grade 7 or 8 of formal schooling. The U.S.A. Department of Defense needed qualified enlisted volunteers. Consequently, the different military branches set up their own standards for recruitment. Since the military used new and advanced technological equipment, volunteers needed to have literacy skills in order to handle their roles in the service (Quade, 1990). The military branches wrote their safety and technological manuals at the literacy levels of their volunteers.

UNESCO has been defining literacy across time. In 1950, a literate person was defined as one who could, with understanding, both read and write a short, simple statement on his everyday life (Robson, et al. 1990). The Division of Adult Education of the U.S. Department of Education (1970) views literacy as the ability to read, write, and compute with the functional competence needed for meeting the requirements of adult living. In 1988, the Adult Education
Amendments incorporated the definition used by the 1985 National Assessment of Educational Progress.

The National Assessment of Educational Progress (NAEP) has been periodically testing U.S.A. students to obtain a portrait of student achievement. The National Assessment of Educational Progress (NAEP) is the major source of information about the status of literacy in the U.S.. The NAEP defines literacy as the ability to perform reading and writing tasks needed to function adequately in everyday life (filling out a driver’s license application, reading a train schedule, writing a check, applying for a job, or reading an article in the newspaper) (U.S. Department of Education, 1990; Winterowd, 1989).

In a 1985 study, three areas of adult literacy were measured: prose literacy, document literacy, and quantitative literacy. NAEP researchers reported on the literacy skills of young adults on three scales representing distinct aspects of literacy:

Prose literacy: reading and understanding books, newspapers, and magazines.

Document literacy: identifying and using information in bus schedules, job applications, tables, forms, and maps.

Quantitative literacy: using arithmetic functions for such daily needs as balancing check books, calculating tips, and figuring interest on loans.
School-based Literacy: School-based literacy is a set of specific skills and competencies related to occupational and social mobility, developed in school contexts. This conception was a result of economic and social changes in the United States and developed countries. Cross (1981) viewed school-based literacy as a means of insuring equal opportunity to post-secondary education, employment, and a variety of personal and societal options. The school-based definition is useful to policy makers because it provides both a criterion against which success can be measured and one with which to garner public support (Gadsden, 1988). Researchers and educators around the U.S.A. also use this approach to measure educational outcomes.

Competency-based Literacy: As seen in the literature, literacy has been defined as the ability to read and write a simple message or function at the fifth grade level. However, the definition has been broadened. New definitions include the completion of secondary education or its equivalent. The latter definition highlights the belief that functional competencies are needed to perform adequately in adult life. These competencies refer to certain applied skills that adults must demonstrate in their lives.

The investigators in the Adult Performance Level Study (APL) of the U.S. Department of Education view functional literacy as composed of communication skills (reading, writing, speaking, listening, computation, problem-solving, and interpersonal relations) applied to knowledge of occupations, consumer economics, community resources, government and law, and health. The APL
Study defined 65 requirements for adult living and measured success by income, job status and education. This study established three levels for classifying functional adult literacy, as follows: level 1, adults who are functionally incompetent; level 2, adults who function but are not proficient; and level 3, adults who are competent. The Department of Education does not restrict the term to traditional skills of reading and writing. This definition includes skills and knowledge.

**Functional Literacy:** Adult functional literacy has been a concern of educational researchers and policy makers. In this context, functional literacy is defined by Hunter and Harman (1979) as the ability to read, write, and compute with competence for meeting requirements of adult living.

The term functional literacy was defined by UNESCO (1956) as gain of knowledge and skill in reading and writing which enables a person to engage in all those activities in which literacy is normally assumed in his culture or group. UNESCO (1978) adds to this definition that a person is literate when acquired attainments in reading, writing, and arithmetic make it possible for him to continue to use these skills toward his own and his community's development (1978).

Carman and David (1988) argue that functional literacy is an outgrowth of liberal social thought. Educators argue that individuals need more than reading and writing skills (Smith, 1986). Functional literacy as a term is an attempt to describe literacy problems in quantifiable terms related to functional life skills.
rather than to school-based content. The concept of functional literacy takes into account other elements of the human personality and the complexity and variety of people's interest, aspirations, expectations, or rejections (Rush, Moe, & Storlie, 1986).

Functional literacy implies adaptability to a given cultural context (Wagner, 1987). In this sense, UNESCO (1978) points out that functional literacy programs are variable, flexible, and take immediate objectives and specific situations into account.

More recently, the U.S. Department of Education (1991) defined functional literacy as a process to demonstrate mastery of basic skills necessary for the individual to function proficiently in society.

**Workplace Literacy:** All these ongoing changes in defining literacy are related to development of the national workplace. Corporations in the U.S.A. have been interested in the literacy issue. There is rising concern in the corporate environment about consumer literacy, quality products, services that meet consumers' real needs, and the environment.

Hemus (1990) recognizes literacy as a consumer information/satisfaction issue. Non-literate consumers will be in a disadvantaged position in today's complex marketplace. In this sense, nonliterate consumers cannot read or understand labels, booklets, signs, or advertising. As defined by Hemus, a literate consumer is someone who has the knowledge and skills to make appropriate decisions in a complex marketplace full of choices. Reading printed material is
vital to consumer awareness and to the exercising of consumer rights (Thompson, 1990). Hemus defines a literate consumer as someone who knows enough about product qualities, uses, and guarantees to get the best value for his/her money.

The National Commission on Working of Wider Opportunity for Women (1991) stated that the linkage of literacy classes to employment and training programs can be a significant factor in improving women's education skills.

Corporations and policy makers need to make the most of national human resources. Policymakers have been trying to raise national literacy through three major acts: the Adult Education Act, the Training Partnership Act, and the Carl Perkins Vocational Education Act. Consequently, policy makers need to measure the effectiveness of literacy programs to show the appropriate use of public funds (Bailey & Fosheim, 1983). Corporations need skilled workers to increase efficient productivity in a technological work environment.

The Literacy Approaches

Different views of literacy as a continuum were found, in a range from illiteracy, pre-literacy, basic literacy, literacy, work or career literacy, to post-literacy.

**Illiteracy:** The Census Bureau (1950 & 1960) defines illiteracy as the inability to read and write English or any other language.

**Pre-literacy:** In the pre-literacy stage, individuals have completed the equivalent of Grade 4 or have a reading age of 8 to 9. Individuals in pre-literacy stages have some basic reading and writing skills, but these skills are not stable
and can disappear over time. Pre-literacy is a motivational stage that can involve non-literate persons in the educational process. Hamadache and Martin (1986) view pre-literacy as aiming to gather certain societal educational needs in such a way as to create a climate favorable to literacy.

There are four basic approaches to dealing with the pre-literacy stage: the sensitization approach, the demonstrative approach, the consciousness-raising approach, and a combination of all the three previous approaches. The sensitization approach has been used extensively by UNESCO around the world. This strategy combines the native leaders’ motivation in small group meetings with mass media promotion through radio, pamphlets, posters, etc. This effort contributes by informing and educating listeners but also by arousing an interest in literacy (Hamadache & Martin, 1986).

The consciousness-raising approach institutes an authentic dialogue to enable the illiterate within society to participate actively rather than passively in the process of becoming literate (Freire, 1970). This can be done because literacy creates the conditions for acquisition of a critical consciousness of the contradictions in society in which individuals live. Literacy also stimulates initiatives and participation in the creation of projects capable of transforming the living conditions and the person him/herself. Freire used group debate or meetings, with the ‘culture circle’ or with the consciousness approach, to clarify situations or contradictions to seek action arising from the clarification debate.
Literacy Indicators and Assessment Tools

Adult literacy is a national priority, and efforts have been made to describe the dimensions of the literacy problem in objective and quantitative terms (Carman & David, 1988). In the 1980s, measurement of literacy in an increasingly accountable way became one of the national priorities, in terms of metacognition. Calfee (1988) argues that literacy must be viewed in a metacognitive way, which means state of knowing what to know, knowing how to use the knowledge, and knowing how to express this knowledge.

Functional literacy and literacy are used interchangeably and cause many misapprehensions and unfounded claims (Carman & David, 1988). Literacy is inadequately defined for measurement purposes because it is based on norms of a given society, and adequate norms are difficult to establish (Wagner, 1987, cited in Gadsden, 1988). Literacy measurement becomes a matter of concern in different sectors of U.S. society. Policymakers, educators, military and civic leaders, as well the private sector and individuals are concerned about established standards to measure literacy (Calfee, 1988; and Quade, 1990).

Literacy indicators should be chosen to assess things that are related to literacy itself and the construct that individuals want to be measured (Calfee, 1988). According to Calfee (1988, p. 1), "the value of an indicator system depends on how well it represents the construct and on the ability of the observer to make sense of the information."
In the educational arena, different measurements of literacy have been developed and used. School boards throughout the United States attempt to evaluate the performance of their students on the basis of standardized achievement tests (Calfee, 1988). Standardized achievement tests meet the following requirements: efficient (cheap), standardized (to eliminate bias), simple (easy to read), and generalized (to cover different districts).

Educational leaders have often been measuring literacy across time. Educational tests are the most often used means to measure literacy. According to the Department of Education (1990, p. 5), in the early literacy testing time "attempts were made to establish a criterion for literacy based on grade-level scores on reading tests." As technology advanced and the workplace became more complex, functionality was introduced as a criterion to measure literacy.

Another institution that is concerned about literacy measurement is the U.S. Labor Department. This institution designed a measurement method for assessing literacy by levels needed for a broad range of jobs (U.S. Department of Labor, 1982; Quade, 1990). A scale of 1 to 6 to assess math, reading, writing, and vocabulary skills was formulated. The levels are defined as:

**Level 1.** Reading vocabulary of 2,500 words, reading rate of 95-125 words per minute, and the ability to write simple sentences.

**Level 2.** Reading vocabulary of 2,500-6,000 words, reading rate of 190-215 words per minute, can
write compound sentences.

Level 3. Can read journals and manuals, write business letters and reports.

Level 4. Can read scientific/technical journals and financial reports, write journal articles and speeches.

Level 5. Same skills as level 5, but more advanced.

In adult literacy programs, formal assessment is used to evaluate students’ progress in a program as a way to measure accountability. However, scholars in adult education have concerns related to the appropriateness of the measures that have been used (Guthrie & Kirch, 1984; Jones & Parker, 1989; Lytte, Belzer, Schultz & Vannozzi, 1989; Venezky, 1990).

Reading and writing scores were used to measure basic skills. Reading is viewed as a low-level skill. Measurement of reading level has caused confusion as a result of the varying levels of the reading mastery standard. Some standards focus on the inability of students to pass minimum competency tests, whereas others are concerned with students who have learned to read and write but have not attained higher order compression skills and cannot write complete sentences (Smith, Balian, Brennan, Jackson, & Thone, 1986).

As indicated by Guthrie and Kirch (1984), it is not easy to categorize individuals as literate or illiterate using reading as the parameter, due to different
types of reading demands. Reading demands are associated with different sets of cognitive strategies and reading behaviors.

Specialists in adult literacy recognize that transferring primary school reading age as a criterion for adult literacy is inappropriate and potentially harmful (Guthrie & Kirch, 1984; Jones & Parker, 1989; Lytte, Belzer, Schultz & Vannozzi 1989; Venezky 1990). Normal children's reading age rises year by year of chronological age. However, for adults this prediction cannot be made. Adult education scholars point out that standardized tests for children are inappropriate for adults. Tests for children's reading age are indexed not only by reading ability but by language development. Therefore, to develop an index of language, it would be necessary to find some equivalent for adults. This index would be applied to each individual to assess her/his reading and writing against it.

U.S.D.E. (1990) points out that the use of reading grade level as an indicator of literacy problems among adults has serious limitations. Grade-level scores are typically determined from the average performance of an in-school norm sample on multiple-choice questions covering particular sets of school-relevant reading passages. As pointed out by the U.S.D.E.,

research has shown that the literacy material adults generally encounter in everyday experience goes beyond the types of material associated with school-based standardized test. As a result, performance on this school-based test is often not a good predictor of performance in literacy tasks associated with non-school settings. (1990, p.5)
Members of the International Reading Association concluded in their 1987 symposium that the definition of literacy based upon school-based norms, such as grade level scores or elementary school material, is insupportable and counterproductive to effective adult education (U.S.D.E., 1990).

As indicated by Venezky (1987), in the International Reading Association literacy denotes a collection of abilities within specific ability zones can be designed for practical ends. At the lower levels of these abilities there may exist (but evidence is not complete) a universal set of reading and writing skills necessary for self-sustained literacy growth. This zone represents a minimal level of functioning ability that is inadequate for many demands of an industrialized society. (U.S.D.E., 1990, p.12)

It is also necessary to measure variables that affect learning. As viewed by Calfee (1988), there are other predictors of student performance. Some factors that correlate with learning are socioeconomic status, language indices, and gender.

The process of locating, selecting, and evaluating an appropriate Spanish basic-skills standardized test for adults was time consuming and difficult (Educational Testing Service, 1988, 89, 90, 91, 92; Fabiano, 1981; Ebel, 1977). The researcher was trying to find a test that had the following characteristics: (1) classify the sample by grade level K to grade 9; (2) be a short-length test; (3) be administrable in a short time; (4) cost little or nothing; (5) be designed for adults. Different sources of information were used to search for tests, as follows:
Puerto Rico: The researcher visited the Puerto Rico Department of Education Adult Education Office in Summer 1991, and a formal letter to the Secretary of Education was sent in October of the same year. The Puerto Rico Department of Education Adult Education Office shared with the researcher three Adult Basic Skills Tests. These instruments measured reading, writing, arithmetic, and English as a second language in the eighth grade (Puerto Rico Department of Education, 1990).

The Puerto Rico Adult Education Office administered a test with three levels. Each level has specific objectives. Level I and II measure reading, writing, and mathematics ability. Level III measures mathematics, Spanish, and English. The tests are used for placement, achievement, and promotion of adult learners. According to the score obtained, the learner is placed in a particular grade within the level or promoted to another level by taking a promotion test.

According to Rivera et al. (1977), this test has been developed by groups of specialists and educators from Puerto Rico and by technicians from the Educational Testing Service. However, the tests cannot be used for this research because they are too long and take too much time to administer and cannot classify the subjects by literacy level.

United States: In the U.S.A., eight standardized tests in English were found in the literature: Adult Basic Learning Examination (ABLE), Basic Skills Test (BEST), Adult Life Skills-Reading (CASAS); Adult Skills-Listening (CASAS); English as a Second Language Oral Assessment (ESLOA); Official
Practice Test (GED); Reading Evaluation Adult Diagnosis (Read); and Test of Adult Basic Education (TABE). However, only one Spanish basic skills test for adults was found: ABLE, Screening Battery Spanish Edition (1989, for adults). This test does not provide an adequate measure of literacy and does not classify learners by reading level. This presents a problem in that learners in a group have reading levels ranging from grade 5 to 8.

Instructional Theories in Adult Education

A variety of learning theories influence instructional methods, such as behavioral, social, cognitive, developmental, and humanistic theories. The budgeting CAI was designed using cognitive learning theories which focus on the development of cognitive skills. Cognitive theories also emphasize motivation, intellectual skills, and strategies for remembering.

One important consideration in this research is the taxonomy level. As pointed out by Chamberlain and Garnett (1986), "understanding the domains and levels of learning is important in developing, evaluating, and using a software effectively" (p. 51).

Bloom (1956) classified objectives in three taxonomies as cognitive, affective, and psychomotor domains. Cognitive domain objectives are concerned with rational learning. Bloom's taxonomy of educational objectives classified the cognitive domain into six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.
The cognitive objectives can be used for recall or recognition of knowledge as well to developed intellectual skills and abilities. According to Chamberlain and Garnett (1986), knowledge-level learning limits learners to such behaviors as defining, identifying, listing, labeling, and naming.

Other domains of interest are the affective and the psychomotor domains. The affective domain deals with emotions, feelings, and attitudes of learners. Learners' attitudes toward the computer are one major concern of educational programmers. The psychomotor domain of learning is concerned with the development of physical skills. When using a computer to reach objectives in the psychomotor domain, the focus is on manual dexterity (Chamberlain & Garnett, 1986). For the purpose in this research, two domains, cognitive and affective, were included in the objectives.

Literature shows that adult education has been seen by scholars as a function of growth and aging (Cross, 1981; Gardner, 1966). Developmental growth is related to physical, emotional, and psychological changes in adults. Developmental theories of adult education have increased, since additional flexibility is required by adults to live in today's rapidly changing society and because an increased life span is anticipated (Whiting, Gulielmino & Burricheter, 1988). Developmental theories deal with cognitive and social growth of learners. However, other approaches can been used to understand learners' individual differences, such as those of Erikson (1968) and Kohlberg (1966). A variety of
theories about adult development is stated in terms of phases or stages of development or in terms of hierarchies or relationship to age.

Scholars in adult education have been trying to distinguish between the learning styles of children and adults. Learning styles of both groups are completely different. Andragogy (Knowles, 1980) is defined as the art and science of helping adults learn (Knowles, 1980; Whiting, Gulielmino & Burricheter, 1988). Knowles promoted the use of the concepts of andragogy; his theory rests on four basic assumptions (Cranton, 1989; Knowles, 1984; Whiting, Gulielmino & Burricheter, 1988):

1. As individuals mature they become less dependent and more self-directed. This process occurs differently for each individual, at different rates, and at different stages of life.

2. Experiences serve as bases for adults to learn and are related to the developmental task of their social role. Adults give meaning to the learning process according to their experience.

3. Adults' readiness to learn depends on their need to cope with real-life tasks or problems.

4. Educators act as facilitators, provide guidance, co-inquirers, catalysts, or resource persons on the learning process. They should create conditions, and provide tools and procedures for helping learners to discover their learning needs.
Cranton (1989) stated some implications of these assumptions for adult educators. In this sense, adult educators should:

1. Motivate, encourage, and nurture adult learners in their process of independence.
2. Use educational methods that involve learners in the learning process.
3. Use learner-centered approaches.
4. Promote a psychological environment of respect, acceptance, and support.
5. Develop diagnostic tools to help learners to diagnose their learning needs.
6. Use individualized instruction.
7. Appreciate and treat adults as adults.

**Adult Learning Theories and Adult Learners' Characteristics**

In most cultures, individual differences in ability to learn are an important cause of variability in the lives people lead. Researchers have been doing extensive study on learner differences, with special emphasis on intellectual differences among learners. Broad categories of research have been conducted to compare normal and mentally retarded learners, learners from different social classes, men and women, and literate and low-literate learners (Howe, 1980). Research in relation to differences associated with intelligence as an indication of
ability to learn, genetic and heredity factors, and social class has provided evidence of individual variability in learning. Other approaches to understanding learner characteristics have emerged as developmental (social and moral development); humanistic, behavioral, cultural diversity, and gender equity approaches.

Gagne (1977) developed a hierarchical model of learning for individuals of all ages. According to Gagne, the learner can experience seven types of learning. Mezirow (1981) proposed a model of adult learning when crisis, disharmony, or dilemma is experienced. Through this model, he hypothesized that adults learn when their perception of reality is not in harmony with their experience, such as divorce, loss of job, job promotion, moving, illness, etc. (Cranton, 1980). The Mezirow model describes 10 steps in the learning cycle: (1) disorientation dilemma, (2) self-examination, (3) critical assessment and sense of alienation, (4) relating discontent to experiences of others, (5) exploring options, (6) building confidence in new ways of behaving, (7) planning a course of action, (8) acquiring knowledge in order to implement a plan, and (9) reintegrating into society.

To develop effective educational software, it is important to be aware of learner characteristics, especially as these characteristics relate to using computer software (Shiau, 1989). Learners' characteristics help to determine the level of content, sequencing of instruction, and methods and techniques to be used.
The adult education literature describes some general characteristics of adult learners (Beck, 1990; Cranton, 1989; Cross, 1981; Freire, 1970; Gardner, 1966; Knowles, 1981). These scholars have developed different frameworks to classify adult learners' characteristics.

Freire (1970) believes that lack of education is a form of oppression. The role of an educator in this approach is to understand and become a part of the learner's culture, to stimulate learning, and hence to free or empower the individual. This approach to adult literacy and education has the following implications for educators:

1. The educator becomes a learner, listening to understand the needs of individual learners.
2. Learners participate actively in the learning process, through dialogue with the educator or co-learner.
3. Educator and learner are mutually responsible for the teaching and learning process.

Cranton (1989) described four categories of adult learners: intellectual, affective, personality, and perceptual/motor characteristics. Cranton pointed out that other considerations should be used to determine learner characteristics, such as: gender, sex, educational background, language, educational level, prior knowledge and experience, and academic achievement. On the other hand, Cross (1981) developed a model with an andragogy approach, while elucidating
differences between adults and children as learners. Using Cross' approach, adult learner characteristics can be classified as situational and personal characteristics.

Beck (1990) developed a guide to design instructional strategies for literacy and employment training programs for women. This scholar distinguished seven characteristics that affect the attitudes that women can bring to the learning situation.

The following list contains some of the characteristics that have implications for teaching of adult learners (Beck, 1990; Cranton, 1989; Cross, 1981; Gardner, 1966; Knowles, 1981):

1. Have self-concept as a major concern.
2. Bring real-life experiences to the educational situation.
3. Can be affected by problems and stresses of their lives outside the learning environment.
4. Are pragmatic about learning.
5. Are selective in what they want to learn.
6. Are concerned about psychological and physical comfort.
7. Are aware of their own learning needs.
8. Prefer educational methods that stimulate several senses.
9. Prefer educational techniques that promote practice, repetition, review, and reinforcement of concepts.
10. Need an educational environment that is informal, permissible, and flexible.
11. Learn with peer interaction and group participation.
12. Prefer comfortable, lighted, pleasant physical facilities.
13. Learn at their own pace.
14. Are impatient learners, while they want to learn quickly and in an easy route.
15. Prefer self evaluation and like recognition of their progress.
16. Need a variety of motivation techniques.

Computer-Assisted Instruction as a Method of Teaching Adult Learners

The purpose in this part of the literature review is to present some insights about computer-assisted instructional software designed for adult education. The discussion is focused on the effectiveness of computer use in adult education.

Computers have revolutionized the processing and transmission of information. Computer technology possesses versatility and capabilities far more sophisticated than other media (Clark, 1984; Cunningham, 1988). Cunningham points out that "computers never have been and may never be parallel to other forms of instructional media" (p. 9). Others see the computer not merely as an instructional aid but as a major tool of work (Rodenstein & Lambert, 1982).
The use of Computer Assisted Instruction (CAI) has been increasing. In the U.S.A., use of CAI for the remediation of basic skills problems, in job training programs, and in different educational settings has increased as a consequence of the National Educational Goals related to literacy. The increasing use of the CAI is also a consequence of the declining cost of computers and technical advances in software and hardware design (Charleston, Villagomez & Shaffer, 1989).

Computer assisted instruction (CAI) refers to an individualized instruction concept that utilizes a computer as the teaching instrument (Cunningham, 1988). In the literature, the term CAI is used interchangeably with the terms computerized based instruction (CBI), computer management instruction (CMI), intelligent tutorial system (ITS), on-line instruction, computerized instruction (CI), computer based training (CBT), computer aided learning (CAL), expert system (CES); computer-assisted learning (CAL); computer-integrated instruction (CII); and teaching and learning with computer (TCL) (Cunningham, 1988; Fernandez-Valdamayor & Fernandez, 1992; Goodrich, 1990; Shiau, 1989).

Educational researchers recognize computers as learning tools (Charleston, Villagomez & Shaffer, 1989; Cunningham, 1988; Goodrich, 1990; and Rodenstein & Lambert, 1982). Canada and Brusca (1990) indicated that computers have applications for all fields of study. Computer applications have affected the home economics field for the last 20 years (Burkart, Muller, & O'Neil, 1985). The field of Home Economics Education is moving toward addressing and maximizing the potential impact of computers (Crawford, 1985).
According to Morton (1984), Home Economics historically has assisted families in meeting their needs. The needs of families have moved from production to consumption as a result of technological innovations. Therefore, home economics programs must prepare their clients for the electronic home of the future. Conclusions from this study include the need to integrate computer applications into Home Economics curricula (Morton, 1984).

According to Askov and Clark (1991), computers offer adult students a new way to learn. Across the literature a variety of studies was found related to the advantages and disadvantages of computer-based instruction for adult learners. Some advantages of computer-based instruction were identified (Askov & Clark, 1991; Caldwell, 1982; Cranton, 1989) as offering privacy to the learning process and as helping educators to individualize instruction to learners' needs and provide immediate feedback. Also, learners can make better than average gains through the use of technology (Caldwell, 1982). Computers allow low-literate learners to feel that they can have more control over their own lives by taking control of the learning situation as they become familiar with the computer (Askov & Clark, 1991). Other advantages that computer-assisted instruction provided were discussed by Askov and Clark: flexibility in scheduling, an open exit schedule, and an opportunity to upgrade learners to use technological innovations. Computer-assisted instruction releases teachers from the need to be constantly motivating students to master various materials Mevarech & Richy, 1985).

Thomas (cited in Goodrich, 1990) states that learners achieved mastery level in
considerably less time than students using traditional approaches and usually attained higher scores on standardized tests than those using traditional approaches to teaching. In conclusion, studies that compared traditional with computer methods "supported the hypothesis that computer adds significantly to the learning process and learning does occur through the use of computer-assisted instruction" (Goodrich, 1990, p. 2), and that learners appear to be favorably impressed by the computer as a medium of instruction (Shiau, 1989).

Research findings by Shiau (1989) indicate that CAI was an effective teaching method when used to supplement traditional instruction but not when used as a replacement for it. CAI results in equal or better achievement in less time and with more positive learner attitudes than traditional instruction, and programs designed for drill and practice improve learners' computation skills, especially for low-ability students.

Studies that compared traditional methods of teaching with CAI have contradictory results. The use of CAI in CETA programs showed that the CAI was not significantly more effective than the regular program (Caldwell, 1984). Studies that found computers to be ineffective educational tools gave evidence of lack of planning and lack of personnel training on the part of the researchers (Charleston, et al., 1989; Cunningham, 1988).

The use of CAI is increasing with low-literate adult learners (Charleston, Villagomez & Shaffer, 1989). A study by Caldwell and Held (1984) indicates that computer-assisted instruction made reading easier.
Functionally illiterate workers are less likely to qualify for job training programs and to participate in traditional basic skills programs (Charleston, et al., 1989). According to Bixler and Askow (1988, in Charleston, et al., 1988), functionally illiterate workers need to develop basic and computer skills to ensure competitiveness in the marketplace. Consequently, Bixler and Askow point out that the use of computers to teach basic skills will help learners to gain computer skills as well. Charleston, et al. (1989) conclude that "CAI material must integrate the job skills, life skills, and basic skills to make the learning important and relevant to life" (p. 11).

Charleston, et al., (1989) indicate that computer-assisted programs offer a great opportunity to provide educational experiences across gender and economic lines. The term "technological gender gap is related to the idea that females and males have different technology-related attitudes, behaviors, and skills" (Canada & Brusca, 1990, p.43). According to Charleston, Villagomez, and Shaffer (1989), "females tend to have limited exposure to computers because of the perception that computers are largely tools used in math and science courses" (p. 15). Traditionally, women are under represented in computer classes. Studies found that CAI programs offer the opportunity to females to be exposed to computers (Canada & Brusca, 1990; Sian, Macleod, Glissov, & Durndell, 1990).

In Cooperative Extension Service, computer teaching applications increased dramatically during the 1980s (Smith & Kotrlik, 1990). A study by McClelland (1986) shows that the computer can be used in Extension programming in three
different ways: (1) analysis of clients' data, (2) computer-assisted instruction, and (3) production of educational materials. McClelland concluded that a long-term benefit of computer use in Extension programming will be serving clients better, serving different clients, and serving clients in different ways.

**Computer-Assisted Instruction Design**

The effectiveness of educational software depends on the principles utilized for its design. In this section, some guidelines are provided for designing CAI since the researcher is designing the budgeting CAI. The discussion is focused on four parts: (a) computer assisted instruction design model, (b) frame design for adult learners, (c) research on graphics, voice and other enhancements in computer program design, and (d) subject matter: cash flow management.

To meet the needs of the learners in this study, a CAI budgeting program in Spanish was designed. The following discussion focuses on literature and research recommendations that were used in designing the CAI. The purpose in this section is to provide an understanding of current criteria for software design.

**Computer-Assisted Instruction Design Model**

Effective computer software is based on an appropriate design and on the implementation process. An effective software design permits the curriculum content to be delivered in an appropriate manner for the specific learners (Charleston, et al., 1989). On the other hand, poorly designed software can create frustration and can interfere with the learning process.
Different approaches to computer software design were found in the literature (Overbaught, 1991; Shiau, 1989; Rodenstein & Lambert, 1982). According to Overbaught, courseware development of computer-based learning products is a three-stage process: (1) instructional design, (2) pre-programming development, and (3) programming. Shiau indicates three phases for CAI design that include: phase 1, needs assessment; phase 2, design; and phase 3, development and implementation.

For the purpose in this research, a combination of the Overbaught (1991) and the Wiig (1990) models was used to design the Budgeting CAI. Overbaught recognized content as one of the important components of software design. Content, or subject matter, refers to the abstractness of the concept. There are four types of content categories: facts, concepts, principles, and procedures. Facts include a classification of objects, events, or states using verbal description or definitions. Facts are related to the identification of the concept in the selected examples or to discrimination between stimuli. The second content category, concept, is related to the process of demonstrating the application of the particular rule. Procedure and principles require that the user synthesize and discover rules for problem solving, principles, and theories about the subject matter respectively.

For the purpose in this research, the following phases were used to design the Budgeting CAI: Phase 1: Instructional design: (1) Needs assessment; (2) Identified content, objectives, sequence, task analysis, learners characteristics,
activities, and curriculum development; (3) Creating storyboard; (4) Software features; Phase 2: Pre Programming: (1) Programming storyboard; (2) Prototyping Phase 3: Programming: (1) Training; (2) Testing; (3) Evaluation.

Figure 3 shows the Budgeting Computer Assisted Instruction design phases. The first phase is the instructional design. This phase involves the process of needs assessment, the development of the curriculum, designing the story board, and selecting the software features (Refer to Figure 3).

In terms of a knowledge-based program or expert system, five stages are recognized in the literature (Martin & Oxman, 1990; Wiig, 1990): concept formulation, initial development, prototyping, final implementation, and operation and maintenance. As indicated by Fernandez-Valdamayor & Fernandez (1992), expert systems have four components: the learners' model, the expert's model, the pedagogical module, and the interface with learners.

An expert system refers to a knowledge-based computer program that uses expert domain knowledge, facts, and reasoning techniques about objects, events, situations, and courses of action to solve problems by emulating the reasoning process that normally requires the abilities of human experts in a particular domain (Wiig, 1990; Martin & Oxman, 1988; Siegel, 1986). Hanna (1992) defines "expert system as a computer program designed to duplicate part of the decision-making expertise of human experts" (p. 1).

A knowledge-based computer program as an expert system is used mostly in industry. As indicated by Wiig (1990), a knowledge-based computer program is
Figure 3. Budgeting Computer Assisted Instruction Design Phases
a form of expert system that has been used successfully, among other sites, in financial services. The financial service sector uses it in personal financial planning, such as cash flow prediction, and planning and budgeting (Wiig, 1990).

The expert system approach to computer program design for personal finance has the benefit of advising the client through the use of a computer as a financial counselor. The design of the Budgeting CAI as an expert system can be beneficial, and the program uses the Godwin (1990) cash flow management approach for budgeting. Also, budgeting for low-literate consumers requires advice from experts in this area.

An expert system is designed to be a substitute for human experts, who are most of the time unavailable, to provide the expertise required for the specific task. As pointed out by Siegel (1986), an expert system makes it possible for the client to access expert knowledge to obtain advice about a specific problem. The computer becomes a personal consultant for the client in the specific subject matter.

The curriculum design is a major factor in stimulating and guiding learners' educational gain. Therefore, in a CAI program it is important to evaluate not only technical merits in terms of software design and implementation options but also the curriculum design (Charleston, et al. (1989).

Curriculum development includes all aspects of the learning task that can be identified and planned, in four stages: (a) needs assessment, (b) determining the purpose of the CAI, identification of instructional content, objectives,
determining sequence, and conducting task analysis; (c) learners' characteristics and activities; and (d) creating the storyboard. According to Rodenstein and Lambert (1982), the storyboard is a technique to show graphically what is to occur, screen by screen, on the computer.

In the preprogramming stages, software features or enhancements were considered as important factors that can affect the interaction of the user. Charleston, et al., (1989) recognized some software features, such as graphics, voice, color, text, image size, animation, complexity, and recognition. All of these characteristics were considered in the design of the budgeting software. Also in the pre-programming and programming stages the Cooperative Extension art specialist and computer programmer designed the art and did the programming with the researcher guiding them in these two phases.

The last phases, the programming phases, include programming, training, testing, and evaluation. Training for the home economists who will help to implement the program was done by the researcher. Also, the researcher was directly involved in assessing the validity and reliability of the instruments and testing the program. A pilot test was conducted to test for reliability and usability of the instruments.

**Design Feature of the Program**

Computer Assisted Instruction can be classified by the purpose for which it is developed and intended to be used. According to Charleston et al. (1989), purposes of CAI can be classified into general categories: drill and practice;
supplemental instruction; tutorial; primary instruction; and simulation and application. Charleston et al. state that primary instruction CAI must be designed to introduce and teach a concept without requiring other supporting instruction. Therefore, the budgeting CAI is a tutorial program providing primary instruction. The budgeting CAI was designed to be used by Cooperative Extension clients as primary instruction for individualized education. The program was planned so that it can be used alone by the clients.

**Screen Design:** Screen or frame design is a process of organizing and synthesizing content, graphics, text, and all the information needed to fulfill the objectives of the software. Frame organization involves the process of organizing software material in small segments that can be presented on the screen. Screen or frame design is the process of organizing content and interactive materials into a single display screen (Shiau, 1989).

According to Merrill (1982), printed material and computer video have some common principles. However, there are some significant differences between them. In screen design five major principles should be considered: screen format, paging, user friendliness or ease of use, interaction, and formative evaluation.

Screen design should meet the needs of learners. Therefore, all the material displayed on the screen should be adapted to the learner's needs, interests, abilities, characteristics, and perception. Nine basic principles must be considered in the screen design: (1) size of the elements, (2) quantity or number
of elements, (3) position of elements, (4) brightness and color contrast, (5) speed of visual material displayed on the screen, comprehension, or amount of the material to be understood, (6) consistency in size, color, and shade of elements, (7) type of lettering, (8) emphasis, (9) arrangement of visual information, (10) quality of text and graphics, (11) levels of interaction, and (12) levels of user control (Shiau, 1989; Goodrich, 1990).

There are different types of screen design. Shiau (1989) discusses three types of screen design: transitional frames, instructional frames, and question frames. Transitional frames provide information that facilitates the transition from one topic to another. Transitional frames can serve as:

1. a bridge between presentation concepts and practices.
2. an alert device for learners in relation to changes that will come in the next screen.
3. an orientation vehicle.
4. a channel to inform learners about objectives, expectations, and performance.
5. a device to present directions in relation to options, features, and formats of the lesson.

The third type of screen, according to Shiau (1989), is the question screen. The purpose of the question screen is to focus learners' attention. This type of screen requires that learners respond to questions related to the content or subject matter of the CAI. Different types of questioning techniques can be used,
such as (a) true-false, (b) multiple choice, (c) short answers, (d) yes/no, and (e) open-ended questions.

Screen format can affect readability of the display (Merrill, 1982). Some important considerations about screen format are quantity of graphics and text, blank space, and spacing. Cluttered screens or screens full of text are difficult to read; therefore, for low-literate learners, it is essential to avoid screens that are too cluttered with text and graphics. Spacing is essential to allow users to read the content of the screen easily. Double spacing lines of text, spacing between paragraphs, and blank spaces help to increase user readability.

Eye movement of the user must be considered in screen design. Eye movement can be controlled by the position and/or by the shape of the elements. Textual and graphic elements should be organized on the screen in such a way that the user’s eye moves naturally from top to bottom and from left to right in the desired order.

The highlighting technique can help improve learners’ interest and improve screen format. Highlighting can be used to emphasize desired text, instructions, or graphics. Highlighting techniques most often used are underlining, boldface type, inverse video (black letters on white background), flashing text, and all capital letters.

Paging is a technique that allows a software designer to move from page to page. A variety of techniques may be used for paging additional material: (1) erasing all the old material on the screen and then displaying the new frame or
page of information; (2) scrolling technique that consists of displaying the new information on the bottom of the screen one line at a time while scrolling the old information off the top of the screen; and (3) erasing only a portion of the screen and displaying new information in the erased portion. As pointed out by Merrill (1982) the scrolling technique makes it extremely difficult to read new text while the old text is scrolling.

Low-literate learners have different reading abilities and some read more slowly than others. In screen design, it is important to consider user control of the computer screen. When the screen is controlled by users, they can work at their own pace. Screen design under user control requires some action from the user, such as pressing a key on the keyboard to signal new information. This can be done by displaying a message on the bottom of the screen, such as go back or return, continue or go forward, quit or end section and menu screen. On the other hand, having the screen under computer control changes the screen for a fixed period of time.

**Graphics and Voice in Software Design:** Understanding of humans' perceptual needs and abilities is needed to develop effective instructional software, especially those which introduce graphics enhancement in their design. Visual perception and visual learning are related to learners' preferences, visual memory, and eye movement, all important components of perception. In this section, important components in the design of instructional software enhanced
with voice and graphics are presented: visual literacy, visual communication, visual perception, screen design, visual learning, screen color, figure, and ground.

The use of microcomputers with graphics enhancement as a tool or aid to facilitate the teaching and instructional process has been increasing dramatically. However, research related to the effectiveness of graphics and voice in computer based learning still needs to be undertaken. Reed (1985) states that the increase in popularity of graphics in educational software creates a need to evaluate the effectiveness of the graphics.

Graphics are defined as representational or pictorial display produced for computer representation (Meadows, Gordon & Singleton, 1984). Literature shows an increasing use of graphics and voice as a way to enhance students' learning. As indicated by Baek and Layne (1988), developers of educational instructional software believe that graphics and voice can facilitate the learning process. However, according to Shiau (1989), "adding graphics to text does not necessarily improve the quality of educational software" (p. 33), while graphics can obstruct or promote learning according to the way graphics are designed and used.

Shiau (1989) and Soulier (1988, cited in Shiau 1989) list four advantages of the use of graphics to enhance educational software and to convey information to learners:

1. Graphics are remembered better than text. Effective graphics software design can improve learners' retention of the material.
2. Graphics can be designed to enhance the central messages.

3. Diagrams, charts, and illustrations help learners synthesize and organize information.

4. Graphics provide attractive and easy ways to hold the learners' attention.

Some researchers failed to show graphics as a way to improve learning. Reed (1985), in a study designed to investigate the effectiveness of graphics in learning, failed to show the effectiveness of this computer program enhancement when subjects failed to perceive and correctly interpret the relevant information presented on the screen. Another study that failed to show the effectiveness of graphics was done by Doll (1986). The researcher's hypothesis was that interactive graphics would be effective with elderly people.

Shiau (1989) sees graphics as an integral part of the communication process in computer assisted learning (CAI). Visual communication is an important tool in education. Visual communication can be used to motivate learners and to transmit meaning. Visual-based instruction can attract learners' attention, stimulate critical thinking and creative development, promote emotional response, and give meaning to word symbols (Shiau, 1989). The use of visual communication in our contemporary society is an essential communication tool. In adult education, visual communication or visual learning offers learners the opportunity to interact with visual information, read
visual language, and translate meaning. The concept of visual literacy is the use of knowledge, capacities, and skills for understanding the uses of letters and sound in the visual mode (Elwell & Hess, 1979, cited in Shiau, 1989).

Shiau (1989) studied visual perception and visual learning among children in the design of instructional graphics in educational software. He also explored the relationship between attention and visual learning, memory and visual learning, and the influence of age and gender on visual learning.

Visual perception and visual learning are important factors to be considered in CAI graphic design. The quality of the visual learning environment plays an important role in the development of visual perception. Visual perception refers to the process by which a person receives visual information and adjusts his/her behavior on the basis of this information (Shiau, 1989). Age, individual growth, and past experience influence perceptual abilities.

Shiau (1989) also summarized previous research on the effectiveness of instructional graphics. He reported some important findings related to factors that need to be considered when designing instructional software enhanced with graphics: 1) fidelity, color of graphics, simulation, and animation are important properties of the effect of graphics on the learning process; 2) color should be used carefully; 3) theory-based principles should be applied to show the important features of the subject matter; and 4) graphics material presentation and organization should be built on learners' perceptual ability and preferences.
Instructional graphics can be classified according to the specific techniques or by their function. Alensandrini (1985, cited in Shiau, 1989) categorized graphics related to their function. Three types of graphics are recognized: (1) analogical, abstract, or informational, (2) representational, and (3) logical. Representational graphics are those that represent the physical similarity of the object or concept that they represent or are isomorphic with the objects or topics that they represent (Alesandrin, 1985, cited in Shiau, 1989; Goodrich, 1990). Analogical graphics are used to explain concepts by showing something else and implying a similarity. This type of graphic is used to facilitate a learner’s understanding or interpreting of new information. On the other hand, logical graphics present visuals that are related to the concept represented logically or conceptually. Symbols, graphs, charts, and diagrams are common examples.

Baek and Layne (1988) studied the relative effectiveness of color, graphics, and animation in computer-assisted learning of rules. They compared three computer-assisted learning (CAL) modes: a) CAL without graphics, b) CAL with graphics, and c) CAL with animated graphics. Results of the analysis showed that color does not increase student interest in the content material. According to the researchers, color failed to improve learning when color was not used to emphasize a particular aspect of the material. However, graphics were more effective when they were accompanied by an explanation of the graphics. Baek and Layne (1988) suggested that when studying the effectiveness of graphics and animation in
computer assisted learning, the content of the passage needs to be considered.

Color can be used as a way to group information, to attract attention, and to help learners to locate and identify objects on the screen. Color affects learners' ability to differentiate between objects, distorts preferences, promotes changes in moods and feeling, and influences the aesthetic experience.

Color is a critical factor in graphics design. Concerning color Shiau (1989) points out that:

1. Different techniques and strategies must be used for color-deficient people.

2. The surroundings and foreground of colors can affect perception of size.

3. Overuse of color should be avoided because use of many colors creates a cluttered screen appearance. The use of color in graphics application should be limited to a few colors.

4. Color affects elderly learners differently than younger learners. Therefore, age is an important consideration in screen design.
Elderly learners prefer screens with less color, and especially prefer screens with higher grey content.

5. Colors should be limited to no more than six. It is difficult for the mind to maintain more than five to seven visual elements.

6. Color coding has some advantages for graphics design: (1) it is easy to identify color coding by shape, size, and brightness coding; (2) is easier to distinguish peripheral vision than size or shape coding; and (3) individuals learn faster and remember the information longer when information is presented achromatically.

7. Color association, color combination, and color application affect graphic design (refer to Table 2). The appropriate combination of colors can result in effective information processing and user acceptance of the screen information.
Table 2

**Effective Color Combinations**

<table>
<thead>
<tr>
<th>Good Combination</th>
<th>Bad Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>green and magenta</td>
<td>blue/green/purple</td>
</tr>
<tr>
<td>white and green</td>
<td>red, blue/green/purple /yellow/magenta</td>
</tr>
<tr>
<td>gold and cyan/green</td>
<td>white and cyan/yellow</td>
</tr>
<tr>
<td>green and lavender</td>
<td>green and cyan</td>
</tr>
<tr>
<td>cyan and red</td>
<td>cyan and lavender</td>
</tr>
<tr>
<td>white, gold, and green</td>
<td>red, yellow, and green</td>
</tr>
<tr>
<td>white, red, and cyan</td>
<td>red, blue, and green</td>
</tr>
<tr>
<td>red, cyan, and gold</td>
<td>white, cyan, and yellow</td>
</tr>
<tr>
<td>cyan, yellow, and lavender</td>
<td>red, magenta, and blue</td>
</tr>
<tr>
<td>gold, magenta, blue, and green</td>
<td>green, cyan, and blue</td>
</tr>
<tr>
<td>gold, lavender, and green</td>
<td></td>
</tr>
</tbody>
</table>

8. Color meaning and color association are very important considerations in effective graphics design (see Table 3).

The Food and Nutrition Service of the U.S.D.A. (Gaston & Daniels, 1988) developed guidelines for writing for adults with limited reading skills; these guidelines were used for designing the budgeting CAI. The following principles were recognized as important in writing adult education material:

1) Organization of the information.
   (a) ideas and concepts should be presented in their simplest form.
   (b) consistency and continuity help adults with limited reading skills to follow the information or points.
   (c) repetition and summarization of information refreshes user memory.

2) When writing texts,
   (a) avoid abstract words or phases.
   (b) use short words or non-technical words of two syllables or less.
### Table 3

**Color Coding for Appropriate Association**

<table>
<thead>
<tr>
<th>Color</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>stop, danger, hot, fire, caution, warning</td>
</tr>
<tr>
<td>Yellow</td>
<td>caution, slow, test, yield, pause</td>
</tr>
<tr>
<td>Green</td>
<td>go, ok, clear, go to next screen, proceed</td>
</tr>
<tr>
<td>Blue</td>
<td>cold, water</td>
</tr>
<tr>
<td>White</td>
<td>good, water</td>
</tr>
<tr>
<td>Black</td>
<td>evil, bad</td>
</tr>
<tr>
<td>Warm Color</td>
<td>action, response required, spatial closeness</td>
</tr>
<tr>
<td>Cool Colors</td>
<td>status, background information, spatial remoteness</td>
</tr>
</tbody>
</table>

(c) avoid adjectives and adverbs.

(d) use strong and active verbs.

(e) use familiar words and expressions.

(f) use positive and motivating statements instead of negative words.

(g) avoid abbreviations, quotations, unfamiliar words, acronyms, and contractions.

(h) avoid statistics.

(i) use words with single meanings.

(j) use short sentences of 8 to 10 words and short paragraphs.

(k) use questions and exclamation marks to emphasize the message.

(l) use the active voice.

(m) avoid long lists of words or sentences.

(n) avoid passive voice.

3) In designing graphics,

(a) use simple and realistic graphics with which the user can identify.
(b) place graphics without captions next to the related text.

(b) remove unneeded background or extraneous detail.

(c) avoid graphics that reinforce the negative behavior.

(d) balance words and graphics with the background space.

(e) the screen content may move from upper left corner or upper middle in order to follow the eye movement.

(f) use letter size of 14-30 points.

(g) use easy-to-read letter style.

(h) use mixed lettering of capitals and lower case.

(g) use contrasting lettering color with background color.

4) Readability of the computer software.

USDA used two methods to compute readability: the Fry Graph level index and the SMOG Readability Formula. They point out that if the reading
level is unknown, reading level of 5th to 6th grade level can be used. Commercial computer programs such as Right Writer and Key Grammar Checker were used to check the readability level of the Budgeting CAI. The readability level of Budgeting CAI is sixth grade level.

Other criteria were found in the literature related to computer software design for adult learners with limited education. Morton (1984); Rouse & Nikelson (1989); and The Center of Community Education of Montana State University (1989) point out four components for adults with limited education: software content, program format, curriculum instructional design, and learner readiness:

Software Content, for adults needs to:

1. be compatible with defined objectives, skills, and concept taught.
2. be accurate and free of errors.
3. contain learning experiences that match the software objectives.
4. have introductions and instructions at a low readability level.
5. provide a plan to see if objectives are met.
6. contain a input-consistent pattern for the software.
7. give a response for a correct answer the first time.
8. summarize the learning performance.
9. provide positive reinforcement.
10. provide help after incorrect answers.
11. state learning objectives that are clear and worthwhile for adult learners.
12. teach concepts clearly so that they are easily understood.
13. be organized logically.

Program format needs to:

1. begin with a menu.
2. use scrolling with precaution.
3. actively involve learners in the program.
4. provide access to management of individualized learners’ prescription or performance. Therefore, software stores information related to performance on evaluation instruments or items, resources used, test scores, and units completed.
5. control time appropriately or adult learners are allowed to control the time needed to complete the lesson.
6. contain graphics appropriate to the screen message.
7. have graphics that enhance the program and the learning objectives.
8. have graphics to reward only correct responses.
9. have adult-oriented graphics.
10. have voice or speech that is easy to understand.
11. permit use of headphones.
12. use an audio level that is appropriate for adult learners.

Software Curriculum Design:
1. is defined by the grade or ability level.
2. is free of racial, sex, age, and ethnic bias, stereotype, and discrimination.
3. can be generalized and applied.
4. is tested with a sample similar to the intended audience of the program.
5. uses supplementary and instructional material such as workbooks, worksheets, answer keys, text, cassettes, videos, and user manual to support the program.
6. has educator's or instructor's guide available.
7. provides learners with appropriate, useful, and timely feedback on their progress.
8. can be easily integrated into Adult Basic Education (ABE) curricula.
9. is appropriate for adults' learning methodology.
10. is adaptable to student-centered or self-paced instruction.
captures learners' interest and contributes to learners' motivation.

assesses individual learning differences.

Learners' Readiness:

1. Software is user-friendly while easily providing users
   with help, exiting, opportunities for moving forward,
   and/or return commands.

2. Text is clear and easily read.

3. Enables learners to move through the program with
   minimal assistance.

4. Considers learners' intellectual, emotional, and
   physical readiness.

Criteria for Evaluation of the BCAI

One important aspect that needed to be considered in the software
evaluation was the software design. Different approaches to computer design
were found in the literature (Overbaugh, 1991; Rodenstein & Lambert 1982;
Shiau, 1989).

Many variables must be considered in the development of the evaluation
design to assess the effectiveness of a computer assisted instruction package.
Three major variables must be considered in the evaluation: the CAI package
itself, the level of computer skill and training of the user, and the instructor's level
and quality of teaching skills. As indicated by Charleston, Villagomez, and Shaffer (1989), the evaluation design must include uniform and objective measures of what CAI means in operational terms. They point out that the evaluation must reflect the extent to which the package includes curriculum emphasis as well as software design features.

The Office of Vocational and Adult Education of the Division of Adult Literacy (1990) set up some criteria for software evaluation, and The National Commission for Employment Policy sponsored a project to design an evaluation of the appropriateness and effectiveness of computer-assisted instructional packages used in the remediation of basic skills (Charleston, Villagomez, & Shaffer, 1989). The basic components of software evaluation are: (1) types of CAI packages (purpose of the packages, context orientation, instructional level of the materials); (2) quality measures (curriculum design features that include content, flexibility, feedback, and learning styles, software design features and characteristics that include user interface with equipment; functional design components that include menu systems, design components and interaction with user, and management services); (3) implementation features that include installation, speed of operation, performance options, maintenance, and technical support; (4) hardware requirements; and (5) teacher assistance.
The Office of Technology Assessment of the United States Congress (1988) suggested criteria for assessing software that include: instructional quality, content, appropriateness, questioning techniques, approach and motivation, evaluator's field test results, creativity, learner control, learning objectives, goals and outcomes, feedback, simulations, teacher modifiability, evaluation and record keeping, documentation and support materials, technical quality, clarity, start-up and implementation, graphics and audio, and hardware and marketing issues.

Rodenstein and Lambert (1982) indicated the following criteria for software evaluation: (1) suitable for grade and ability levels, (2) hardware requirements, (3) encourages repeated use, (4) simple editing and correction procedures, (5) variable speed of presentation, (6) capable of addressing students by name, (7) error free, (8) clear and appropriate accompanying materials, (9) concise and thorough documentation, (10) based on educational methodology, (11) positive reinforcement of correct responses, and (12) automatic warning of typing errors.

To evaluate the Budgeting CAI, a combination of different evaluation forms was used (Charleston, Villagomez, & Shaffer, 1989; Overbaugh, 1991; Rodenstein & Lambert, 1982; U.S. Office of Vocational Education, 1984, 1990). This instrument (see Appendix A) was sent with the computer program screens to
a committee of experts who through their comments helped the researcher to improve the design of the computer program.


The expert module is comprised of the expert knowledge the program will present. Rambally (1986) states that this module is responsible for generating problem-solving procedures. The purpose in this section is to review literature related to cash flow management and budgeting as tools for financial management. Cash flow theory is considered the knowledge domain of the budgeting CAI.

Textbooks and research published during last 12 years were reviewed. As pointed out by Godwin (1990, p. 163), little theoretical development and empirical research were found in the literature related to family financial management, particularly in the areas of how families manage their cash flow, what causes different families to manage differently, and what consequences result from families' cash flow management. This information would be helpful for measuring the effectiveness of programs and policies among families to strengthen their choices in financial markets.
Family Resource Management

Professionals in family resource management have been trying to help families achieve better financial situations by helping them gain knowledge and skills to manage their financial resources effectively (Garman & Forgue, 1988, 1991; Godwin, 1990).

Scholars in family resource management use the same concepts found in the systems approach, such as input, throughput, and output (Beutler, & Masson, 1988; Churaman, 1990; Deacon & Firebaugh, 1988; Heck & Douthitt, 1982; Jerries & Craig, 1986). There was some agreement among managerial specialists in relation to the elements that characterize the managerial function: planning, standard setting, resource allocation, action sequencing, and implementing.

Vaines (1983) points out that the systems framework presents an organizational representation of the central ideas common to all members of the field. It was developed to facilitate the clarification of home economics as an organic whole in precise and explicit ways.

Deacon and Firebaugh's (1988) systems model of family resource management is recognized as a conceptual framework encompassing personal subsystems and the family management subsystem (refer to Figure 4). The family resource management model of Deacon and Firebaugh (1982) is useful to explain, identify, and analyze the interrelationship between these two subsystems. Also,
Figure 4. Managerial Model

this model can help to identify the managerial variables that affect achievement of family financial goals. Deacon and Firebaugh (1982) use managerial elements of planning activities, standard setting, resource allocation, action sequencing, and implementing activities: facilitating, checking and adjusting.

Deacon and Firebaugh (1988) stated that "inputs are in the forms of matter, energy, and/or information that enter the family system and affect the throughput process in the achievement of output" (p. 9). Managerial outputs include demands, in the form of goals, events and resources. Resources contain such human resources as family skills, abilities and knowledge. Material resources, such as money and durable goods, are means that allow a family to meet demands (Deacon & Firebaugh, 1988).

Managerial throughput components are planning and implementing. Planning is related to the decision in terms of sequence of actions. Planning has been identified as the mechanism through which change can take place (Johnson, Heltsley & Warren, 1982). The process of planning determines what is to be done and how it is to be achieved. This requires determining how and what resources are to be utilized in the process of goal achievement. Therefore, the planning process is essential to the achievement of family goals. Research related to planning was done by Beutler and Mason (1987); and Johnson, Heltsley, and
Warren (1982). Implementing is the process of actuating the plans and procedures and controlling actions (Deacon & Firebaugh, 1988).

The final phase of the Deacon and Firebaugh (1988) family resource management model is output. This consists of those products of the system resulting from inputs and the throughput process. Literature indicates that a number of researchers has reported output, especially in satisfaction. Research related to financial management and satisfaction was found in the literature (Bailey, 1987; Hira, 1988; Jerries & Craig, 1986; Leech, 1991; Morgan, 1989).

Family resource management researchers put more emphasis on practices than on the process of working with the applicability of their theoretical framework. In praxis, the application of theory is not real. Researchers emphasize the study of financial practices rather than the application and integration between theory and praxis (Davis, 1989; Edmondson & Pasley, 1989; Godwin, 1990; Hira, 1987, 1988; Schnittgrund & Baker, 1983).

Family resource management scholars have been trying to develop a theoretical framework for family financial management. However, as stated by Godwin (1992), "family financial management includes activities that are too broad in scope and disparate to develop a theory which encompasses them all" (p.3).
Family Financial Management

Edward (1988) argues that by using family financial planning as a system, a researcher can analyze the financial management of a family, individual, or organization in a systematic way. The systems approach allows the family to interact with the environment.

For Deacon and Firebaugh (1981), "family financial management is a process of allocating and transforming resources in order to meet demands" (p. 29). Money management is a process that integrates planning and implementing.

As pointed out by Garman & Forgue (1988), family financial management is a dynamic and active process performed to allocate income and wealth. Godwin (1990) defined family financial management as a process of planning, implementing, and evaluating done by individuals and family members involved in the allocation of their current flow of family income and stock of wealth toward the end of meeting the family's implicit and explicit goals. (p. 164)

The way families use their money is an indicator of their abilities or skills in financial planning (Key, Stafford, & Dickson, 1990). Money management is a process that integrates planning and implementing. Family financial well-being is a result of money income in relation to prices for typically-purchased consumer goods and services (Bailey, 1987). But money income is not the only measure of
financial well-being of families. They can obtain goods and services by other methods of exchange.

Money constitutes a resource that families use to accomplish or fulfill their needs. Because resources are scarce it is assumed that families have budget constraints, with money being one of the available scarce resources that the family has. Families are confronted with choices among an infinite array of goods and services. Constraints arise as the family devotes a particular resource to a particular end, leaving fewer resources available for other uses (Poduska, 1988).

Family needs and wants are infinite, whereas resources are limited; families must find effective ways to cope with scarcity and constraints in order to maximize utility or find ways to best use their available resources.

Davis (1989) points out that "the process of budgeting, recording expenditures, comparing the expenditures to budgeting, and preparing a personal finance statement are the four processes widely recommended by academics and the popular press" (p. 113). However, Godwin (1991, 1992) stated that "little research has investigated the effectiveness of budgeting, record keeping, and assessing the family balance sheet in facilitating better financial status" (p. 155).
Cash Flow Management

Cash flow involves the process of planning, implementing, and evaluating the family flow of income toward reaching their short-term financial goals. Cash flow management was defined by Godwin (1990) as

a set of activities performed by individuals and family members focused on allocating the family's flow of income toward the immediate goal of meeting their tacit or explicit financial needs (p. 163).

Cash flow management is one of the financial activities in which families are engaged. According to Godwin (1990), cash flow management (CFM) is the most fundamental aspect of family financial management. As indicated by Godwin, the cash flow approach requires little specific knowledge to accomplish and is done in a short period.

However, effective use of family budgeting as cash-flow management has received little attention from home economists over the years (Beutler & Mason, 1987). Godwin and Koonce (1992) argue that knowledge related to families' cash flow is scarce. This is true to a greater extent for low income families.

Cash-flow management is a broader concept than is budgeting. Cash flow management includes budgeting tasks and use of financial statements to estimate family financial status, planning financial goals, and evaluating family financial decisions (Garman & Forgue, 1988; Godwin & Koonce, 1992). Therefore,
budgeting and cash flow are similar but not identical. Cash flow management includes the evaluation of family financial status and the process of delineating financial goals. In addition, cash flow includes tasks that are typically related to budgeting as projecting future income and expenditures, and the reconciliation of the two (Godwin & Koonce, 1992).

Mitra (1982) reported on budget cash flow. According to Mittra, cash management planning is the preparation for cash flow management. A review of the literature indicates that cash flow management can help the family to: (1) determine the adequacy of savings to meet expected net worth growth; and (2) achieve financial goals in a systematic and effective way. Also, cash-flow management can be used to diagnose the family's economic situation. In this sense, Mittra argues that cash flow management can help families to identify areas of excess spending. Therefore, families can restructure their spending patterns to a desirable level, especially the cash outflow or expenses.

Godwin and Koonce (1992) studied the cash-flow management behavior and attitudes of newlywed couples with different income levels. Five dependent variables were measured: cash flow management behavior, cash-flow management attitudes, locus of control, organizational style, and time horizon. Five dimensions of cash-flow management are identified as record keeping, income and expenditure monitoring, budget projection, balance sheet assessment,
and budget balancing. Godwin and Koonce (1992) reported that low-income couples showed positive differences when compared with moderate income couples on some cash flow tasks. They found that low-income couples: (a) were more willing to project and balance their budget, (b) have positive attitudes toward planning and practicing effective cash-flow management, (c) have a clear perception related to the role of financial skills in success in life, and (d) were more effective in cash-flow management than their middle and upper-income counterparts. Edward (1988) recognized nine components of family financial planning that appear to be very similar to cash-flow management steps.

The theoretical construct of cash-flow management includes the following tasks or steps (Garman & Forgue, 1988; Godwin, 1990):

**Step 1** Assess the current financial position of the family through the use of a balance sheet.

**Step 2** Assess the past financial behavior of the family through the use of cash-flow (income-expenditure) statement. This can be done by analyzing past income, past expenditures and the net surplus or deficit.
Step 3  Project and prioritize long and short-term goals.

Step 4  Attach time horizons and dollar values to the prioritized goals.

Step 5  Project income and expenditures over a future period.

Step 6  Plan expenditures for fixed and flexible consumption categories over the same period.

Step 7  Analyze income and expenditures for a planned surplus or deficit.

Step 8  Adjust income and expenditures to bring them into balance.

Step 9  Plan savings to meet irregular expenditures.

Step 10 Record and monitor income and expenditures as they occur.

Step 11 Adjust expenditures when needed.

Step 12 Analyze and evaluate the implementation of the plan for the selected period.
Step 13    Repeat the process again for the next period.

The cash-flow model can be used to assess differences in families' cash-flow behavior. Godwin (1990) views cash flow as a process that can be used over the life course of the family. Figure 4 illustrates the managerial model used for this research.

Godwin (1990) proposed a theory to examine family cash-flow behavioral patterns over a period of time. Four components are recognized by Godwin (1990) as measures of cash-flow management over family life cycle: frequency, degree of formality, extensiveness, and effectiveness of subjective and objective outcomes. Ability and willingness were identified as antecedents that can have some linkage with cash flow management.

Godwin (1990) proposed two major propositions for modeling the antecedents and consequences of family cash-flow management. The first proposition of the model states that "the greater the family's ability to manage their financial resources and the greater their willingness to manage, the more extensive will be the cash-flow management behavior engaged in by the family" (p. 167). In order to measure a family's ability to manage their cash flow management, two variables must be considered. They measured financial capital by family income and human capital. Human capital was measured by the age of family members at first marriage, years of formal education, amount of education
in financial management, and specific knowledge of financial markets. As indicated by Godwin (1990)

Families’ willingness to manage their cash flow can be measured by the subjective expected benefit and costs of cash flow management, attitudes toward planning, and the time horizon of the family financial manager, as well the locus of control and organization style of the manager. (p. 221)

Findings from research focused on three family financial management practices such as record keeping, budgeting and recording spending (Davis, 1989). Findings indicated that high-income households used these patterns more than low-income households. According to Davis (1989), results from this support the suggestion of Deacon and Firebaugh (1988) that differences in resources and demands result in different financial management styles.

Beutler and Hogan (1986) found that education was the input measure that had greater positive influence (beta = 0.30) on the use of formalized budgeting than the other input variables of age, marital status, income, and home production activity.

The second proposition of Godwin’s (1990) model was that engaging in extensive cash-flow management behavior will result in higher objective financial status and greater subjective financial well-being of families. Also, a family’s willingness to spend their scarce resources of personal time and energy in
the household production task of cash-flow management is one of the factors that affects family cash-flow management.

Beutler and Mason (1988) found that family budget formality was positively related to their net worth and preparedness for emergencies. These researchers raise the question of the validity of the assumption that textbooks assume that cash flow is a normative budget process and recommend development of the knowledge base in this area of management process.

Godwin (1990) recognized that families' performance in all of these tasks or steps of cash flow management would not necessarily result in families' being financially better off. Therefore, one cannot assume that families will maximize utility by engaging in these tasks. According to Godwin, it is true that families perform some of these tasks only at specific times in the selected period. In order to measure CFM more accurately, it is necessary to consider two dimensions of cash-flow management: optimal frequency and the degree of formality with which families perform each task. Both concepts are interrelated; families that complete the tasks with optimal frequency may also do so more formally (Godwin, 1990). The measurement parameter is the extensiveness of the CFM (Godwin, 1991).

According to Godwin (1990), extensiveness is the degree to which families complete the tasks with optimal frequency and formality. Extensiveness can be
measured on a continuum from extensive cash-flow management that includes those families that complete all the tasks and those with extensive written records of each step of the process of cash-flow management. At the opposite end of the continuum are those families that do not complete any of the tasks and have only used their mental abilities to track cash flow.

As indicated by Godwin (1992), cash-flow management outcomes deal with measurement of family financial status and with their satisfaction with their financial status. However, Godwin raised the question of whether more extensive cash flow management, ceteris paribus, causes families to have to improved financial status over time. Therefore, the proof of effectiveness of cash flow task would be the

degree to which it results over time in better financial status for families, independently of any improvement that would have occurred without having completed the tasks. (Godwin, 1990, p. 167)

Research done by Godwin (1991) with newlywed spouses showed that extensive cash-flow management would not result in better financial well-being. The three cash flow management behaviors selected as independent variables, record keeping, balance sheet assessment, and budget balancing, were significantly related to couples' net worth. Income was negatively related to record-keeping and budgeting. The researcher also found that cash-flow management was not
related to family financial satisfaction, except that family's balance sheet was positively related to greater financial satisfaction. The three antecedent variables that were positively related to cash-flow management were education, sources of income, and perceived benefits of cash-flow management.

**Cash Flow Budgeting**

Budgeting is recognized in most research as a financial management practice (Davis, 1989). A budget is viewed as a basis of a "family financial management plan and is used as a technique to help families resolve financial problems" (Schnittgrund & Baker, 1983, p. 262).

According to Titus, Fallow, and Hira (1989) more is known about who is more likely to have a budget, use credit cards, or save than is known about the relationships between input variables characteristics, the throughput variables of specific management practice and the output variables of solvency, net worth and satisfaction of household money management. (p. 310)

In the above statement there is an indication that the family resource management researcher places more emphasis on practices than on the process of applying a theoretical framework.

A review of literature revealed no agreement on the definition of budgeting. Amling and Droms (1982) defined a budget as simply a personal plan to decide how to spend current and future income. Bailard, Bieul, and Kaiser
(1982) view budgeting as simply an allocation of one's income to cover one's expenses to meet two purposes: the implementation of a system of disciplined spending and a way to reduce the amount of money wasted through needless expenditures. Deacon and Firebaugh (1988) define budget as a "mental or written, general or specific plan that indicates the quality and quantity and the sequence to allocate available financial resources among various needs and wants" (p.138).

As indicated by Poduska (1988); Garman & Forgue (1988); and Godwin (1992), budgeting is a narrow concept which focuses only on projecting, monitoring, and controlling income, and spending and allocating the available resources. Budgeting can help families to (1) avoid financial problems, (2) attain goals, (3) increase wealth, and (4) improve or maintain a lifestyle (Schnittgrund & Baker, 1983).

A budget is a document or set of documents used to record future and actual income and expenditures for a period of time (Garman & Forgue, 1991). Garman and Forgue (1988) state a comprehensive definition of budgeting as a process of projecting, monitoring, and controlling future income and expenditures and reconciling the two by planning and controlling efforts ... to achieve short term and long term goals. (p. 125)
The steps in budgeting vary among scholars and researchers. Bailard, Bieul, and Kaiser (1982) established only two steps for budgeting: becoming aware of expenditure patterns and the planning process. According to Garman and Forgue (1988, 1991), budgeting is comprised of seven phases:

- **Phase 1** Setting financial goals
- **Phase 2** Planning
- **Phase 3** Decision making
- **Phase 4** Implementing
- **Phase 5** Controlling
- **Phase 6** Evaluating
- **Phase 7** Success in achieving financial goals

Research completed with divorced mothers indicates that they have different points of view on budgeting (Adams & McCabe, 1988). The respondents stated that budgeting is: the only way to get ahead financially (58%); the best way to build up a savings account (58%); a way to keep them from overspending (50%). On the other hand, 67% of the divorced women in the sample indicated that they can do well without a budget. Approximately 33% of the respondents indicated that they had a written budget compared to 67% who did not have one. Heck (1983); Mullis and Schnittgrund (1982); and Schnittgrund and Baker (1983) found that families with spending plans were more satisfied with their financial
management practices than those without spending plans. Distinctions between frequency and formality of performing budgeting tasks were found in the literature.

Two approaches to budgeting were most commonly found: budget as a mental activity (informal budgeting) and budgeting as a formal written record. Formal budgeting was defined by Beutler and Mason (1987) as a written plan made in advance for a period of up to a year followed by regular review and evaluations. Informal budgeting "is plan rarely written and tend to allocate income for a week or less. Record is not too specific and expenditures are seldom reviewed or evaluated" (p. 5). Research done in relation to income and financial management practices established that high-income families made more written plans than middle-income families (Beutler & Manson, 1987).

Budget formality varied through the stages of the life cycle. Research by Mullis and Schnitgrund (1982) assessed how low-income families used budgeting to cope with the economic demands of the expanding stage. The researchers also considered the beginning and contracting family life cycle stages. The null hypothesis of the research was rejected, as low-income families did not engage in budgeting behavior significantly more during the expanding stages than in beginning and contracting stages. Research findings revealed that low-income families used informal and unwritten budgets. However, 51.9% of those with
budgets were very satisfied and satisfied compared to 47.9% of those who did not have budgets.

The Iowa Income and Expenditure Survey was developed as a result of the Comprehensive Development of a Standard of Needs for Iowa ADC Recipients project (Beutler & Mason, 1987). The purpose in this research was to obtain data related to ADC families’ characteristics, those who used formalized cash flow budget, and objective and subjective measures of well-being and level of living (Beutler & Mason, 1987). This research used a Deacon and Firebaugh (1988) system model of family resource management.

Beutler and Mason (1987) hypothesized the relationship of the cash-flow plan or budget formality throughout variable to the empirical input variables and the network variable. They assessed the potential benefit associated with the use of a formal budget. The research findings showed that more than 33% of the population reported no advanced planning for spending income and no record or review and evaluation of spending. Another third of the population reported advanced planning with the horizon of 1 week to a month, with written plans seldom or sometimes used. About 25% of the population used written budget plans with a 3 to 4 month planning horizon.

Budget cash-flow component was also reviewed for the purpose of this research. In general, the budget format contains three basic components: cash
inflow (income), cash outflow (expenditures), and the differences between the two (income-expenditures) that can have two possible results: surplus or deficit (Gitman, 1984; Mittra, 1990).

In relation to expenses, budget categories were found to be divided into several categories (Garman & Forgue, 1988, 1991; Gitman, 1984; Bailard, Bieul & Kaiser, 1982):

- **housing**: rent, mortgage payments, repairs and improvements, property insurance, and property taxes.
- **utilities**: gas and electricity (energy), waste disposal, water, telephone.
- **food**: all food items, food away from home, and pet food.
- **family necessities or personal care**: laundry and dry cleaning, toiletries and cosmetics, barber and hairdresser, postage and stationery, and minor home furnishings.
- **medical**: insurance, drugs and medicines, hospital bills, doctor bills, and dentist bills.
clothing: all clothing purchases, alterations, and repairs.

automobiles/transportation: purchase or installment payments, gas and oil, insurance and license fees, repairs, parking, tolls, rental, taxi, and bus fare.

recreation/entertainment: admissions, games and hobbies, club dues, alcoholic beverages, tobacco, photographic supplies, sporting goods, and vacation.

education: books, magazines, newspapers, tuition and course fees.

savings/investment: for long term goals, (house down payment, long term savings) and for short term goals.

miscellaneous: gifts, church, charities, life insurance, taxes, and union and professional dues.
In terms of categories included in their budgets, divorced women tended to reduce certain categories as cited by Adams and McCabe (1988): movies (83%); gifts (75%); entertaining at home (67%); dining out (58%); and clothing (50%).

Garman and Forgue (1988, p. 158) classified budgets into two categories: simple and complex, according to the number of categories included in each. Table 4 shows items included in simple and complex budgets.


Family budgets were compared by Poduska (1988) in the Western economic communities and other selected countries. The researcher selected the following expenditure categories: food, clothing, shelter, transportation, health care, household goods, recreation and entertainment, and miscellaneous. Findings indicated that food was the only category in which the U.S.A. family budgets were substantially lower than those of European and non-European families (Poduska, 1988). The Engel's food consumption law, in which families in countries with better economic conditions devote less money to food consumption compared to poor countries, can be applied to this research. In Poduska's (1988) research,
Table 4

Sample Budgeting Classifications and Expense Guidelines

<table>
<thead>
<tr>
<th>Simple</th>
<th>Complex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>Income</td>
</tr>
<tr>
<td>salary</td>
<td>salary</td>
</tr>
<tr>
<td>nonsalary</td>
<td>capital gains</td>
</tr>
<tr>
<td></td>
<td>rent</td>
</tr>
<tr>
<td></td>
<td>tax refunds</td>
</tr>
<tr>
<td></td>
<td>interest</td>
</tr>
<tr>
<td></td>
<td>loans</td>
</tr>
<tr>
<td></td>
<td>dividends</td>
</tr>
<tr>
<td></td>
<td>other</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expenses</th>
<th>Fixed Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Home mortgages</td>
</tr>
<tr>
<td></td>
<td>Revolving savings funds</td>
</tr>
<tr>
<td>Housing and utilities</td>
<td>Life insurance</td>
</tr>
<tr>
<td>Transportation</td>
<td>Health insurance</td>
</tr>
<tr>
<td>Insurance</td>
<td>Disability insurance</td>
</tr>
<tr>
<td>Clothing</td>
<td>Homeowner’s insurance</td>
</tr>
<tr>
<td>Medical</td>
<td>Auto insurance</td>
</tr>
<tr>
<td>Entertainment vacations</td>
<td>Church</td>
</tr>
<tr>
<td>Savings/investments</td>
<td>Other contributions</td>
</tr>
<tr>
<td>Personal/miscellaneous</td>
<td>Christmas gifts</td>
</tr>
<tr>
<td>Credit payments</td>
<td>Other gifts</td>
</tr>
<tr>
<td>Gifts and contributions</td>
<td>Automobile loan</td>
</tr>
<tr>
<td>Taxes</td>
<td>Loan 1</td>
</tr>
<tr>
<td></td>
<td>Loan 2</td>
</tr>
<tr>
<td></td>
<td>Saving (withheld from salary)</td>
</tr>
<tr>
<td></td>
<td>Federal income taxes</td>
</tr>
<tr>
<td></td>
<td>State income taxes</td>
</tr>
<tr>
<td></td>
<td>Real estate property taxes</td>
</tr>
<tr>
<td></td>
<td>Personal property taxes</td>
</tr>
<tr>
<td></td>
<td>Mutual fund investment</td>
</tr>
<tr>
<td></td>
<td>Monthly investment plan</td>
</tr>
<tr>
<td></td>
<td>Pension contributions</td>
</tr>
<tr>
<td></td>
<td>Individual retirement account</td>
</tr>
</tbody>
</table>

"families in Italy devoted a greatest proportion of their budget to food (33%),
while families in U.S. devoted the least (18.27%)" (p. 18).

Two different types of budget methods were found in the literature: the
fail-safe and the flexible budget (Bailard, Bieul & Raiser, 1982). The fail-safe
budget is the method designed to set limits or specific amounts of money for each
category. This method requires one to balance the budget, while financial
managers will not spend more than the limit in any budget category. The flexible
method allows natural variations in month-to-month expenditures. Therefore,
positive or negative accumulations may occur within categories. Four types of
budget behavior will be used: balanced budget, negative budget, sorrow, budget
and leaky budget.

Goal setting or financial objectives have been recognized as a first step for
financial planning and budgeting (Amling & Droms, 1982; Bailard, Bieul &
important part in managerial activity. Goals are value-based objectives (Deacon
& Firebaugh, 1988) and according to White (1985) are a basis for financial
decisions.

Amling and Droms (1982) used the management planning system to deal
with goals. According to management by objectives (MBO), goals represent the
first step in planning financial objectives. This method followed these steps:
define personal financial goals and objectives; rank objectives in order of priority; develop realistic action plan and strategies to determine how and when each objective will be achieved; monitor progress; evaluate results; and revise and replace goals and objectives that are achieved or changed. The three first steps of his approach to goal management were used in designing the Budgeting CAI as an expert system.

Beutler and Mason (1987) reported that single parents adopted a goal-centered planning style. They argue that the goal-centered style was characterized by modifying, deleting, or deprioritizing. McCaskey (1974) claimed that goal-directed planning is a rational and analytical approach.

Long-term goals in this research are defined as goals or objectives which are wants and desires that individuals can accomplish over a long period of time or for 6 months or more (Garman & Forgue, 1991). Short-term goals or objectives are wants and desires that individuals will accomplish in a short period of time or for 6 months or less (Garman & Forgue, 1991).

Jerries and Craig (1986) found that budgeting can be useful to achieve goals and to attain a better standard of living. Therefore, organized approaches (written budget and record keeping) to financial management contribute to increased satisfaction.
According to Hanna (1989)

financial decisions can be modeled in terms of maximization of expected utility. It is possible to design computer software that could enable educated consumers to use utility analysis without mathematical skills or detailed knowledge of economics. (p. 57)

Because the audience that will use the computer program consists of low-literacy individuals or families, a short definition of budget is used. The definition is drawn from those definition used by different scholars (Davis, 1989; Garman & Forgue, 1991). A family budget is a plan for the use of income, expenses, and savings to achieve the goals that individuals and the family want to achieve.

Summary

Illiteracy constitutes one of the major problems Puerto Rican women confront in addition to limited economic resources. In order to assess the effect of a computer program enhanced with voice and graphics on low-literate women, a Budgeting CAI was designed. Low-literate women need effective methods of teaching to stimulate them, especially when education takes place in informal settings, such as the Cooperative Extension Service. Research shows the computer is an effective method of teaching low-literate learners.

In order to measure the independent variable literacy, an intensive search for instruments in Puerto Rico and United States was conducted. No adult basic
skills test in Spanish was found to be appropriate for this study. Subsequently, grade level was used to determine the level of literacy of women that participated in this study.

The literature contains guidelines for designing the Budgeting CAI. Color was used to stimulate learners and color to emphasize aspects of the learning content on the screen. Voice was an essential element used in the design of the Budgeting CAI to stimulate learners in using it.
CHAPTER III
METHODOLOGY

The purpose in this chapter is to describe the methodology and procedures used to conduct this research. This chapter includes the following sections: a) research design, b) sample, c) treatment, d) instrumentation, e) data collection procedures, and f) data analysis.

Research Design

The research design selected was a true experimental design, which is a way to investigate cause-effect relationships. This can be done by "exposing one or more experimental groups to one or more treatment conditions and comparing the results to one or more groups not receiving the treatment" (Isaac & Michael, 1990, p. 42).

An experimental design is used to test the significance of selected hypotheses. These hypotheses were developed to investigate the effect of computer programs as methods of teaching (computer program with voice and graphics and computer program with text only), along with a control group, on participants' posttest knowledge budgeting scores. The literature indicates that demographic characteristics can have some effect on the dependent variable. The
independent variables in the study are: methods of teaching, literacy, age, attitudes toward computers, income, marital status, number of children, place of residence and pretest budgeting knowledge scores. Computer program with voice and graphics and computer program with text only are the treatments.

The experimental method involves procedures of randomization, control, treatment, and comparison groups (Airasan, 1991). Specifically, the research design used in this study is randomized pretest-posttest control group design, with two manipulated independent variables (Campbell & Stanley, 1963). The manipulated variables were: (1) computer program with voice and graphics and (2) computer program with text only.

The following is a description of the research design in this study:

<table>
<thead>
<tr>
<th>Treatment</th>
<th>R</th>
<th>O</th>
<th>X¹</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer program with graphics and voice</td>
<td>R</td>
<td>O</td>
<td>X¹</td>
<td>O</td>
</tr>
<tr>
<td>Computer program with text only</td>
<td>R</td>
<td>O</td>
<td>X²</td>
<td>O</td>
</tr>
<tr>
<td>Control group</td>
<td>R</td>
<td>O</td>
<td></td>
<td>O</td>
</tr>
</tbody>
</table>

where O X¹ = subjects receiving pre/posttest and budgeting computer program with graphics and voice.

O X² = subjects receiving pre/posttest and using budgeting computer program with text only.

O = Control group subjects receiving only pre/posttest.

R = Randomized sample.
Research Questions

Research Question 1:
What are the women's perceived alternatives for life
situations to cope with financial crises?

Research Question 2:
How do the women perceive the role of money
management in meeting family needs, goals, and
desires?

Hypotheses

The following hypotheses were developed to investigate the effect of the
two methods of teaching (computer program with voice and graphics and
computer program with text only) along with a control group on participants’
posttest budgeting knowledge scores. The hypotheses of this study are the
following:

Research Hypothesis 1:
There are significant differences among the demographic variables
for the women in each of the three groups.

Research Hypothesis 2:
There are relationships between the pretest budgeting knowledge
scores and the independent variables of: 1) age, 2) number of
children, 3) literacy, 4) attitudes toward computer, and 5) residence.
Research Hypothesis 3:
Literacy, marital status, age, place of residence, and number of children explain a significant proportion of the variability of pretest budgeting knowledge scores.

Research Hypothesis 4:
Pretest budgeting knowledge scores explain a significant proportion of the variance in the posttest budgeting knowledge scores.

Research Hypothesis 5:
Those women in the two groups using the Budgeting Computer Assisted Instruction (i.e., voice and graphics, and text only) have significantly higher posttest budgeting knowledge scores than those women in the control group after controlling for pretest budgeting knowledge.

Research Hypothesis 6:
Attitudes about the computer and the Budgeting Computer Assisted Instruction explain the variability in posttest budgeting knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the two groups using the Budgeting Computer Assisted Instruction.

Research Hypothesis 7:
Computer attitudes in regard to voice and graphics explain variability in the posttest budgeting knowledge scores, over and
above the variability explained by the pretest budgeting knowledge scores in the group using the Budgeting Computer Assisted Instruction.

A summary of the variables measured in this study can be found in Table 5.

Sample

This study was conducted in Puerto Rico. Puerto Rico is located in the Caribbean Sea. It is the smallest of the three biggest islands in the Caribbean (refer to Figure 5). The data were collected in one municipality of this Island. According to the Department of Education, women with literacy problems can be found across the Island. The researcher identified the target population as literate and non-literate Puerto Rican women. However, due to limited resources, the sample was selected from a specific municipality in Puerto Rico (refer to Figure 6).

Data from the Department of Education indicate that the north central part of the Island has high illiteracy rates. The Arecibo region, according to the Department of Education Regional Office, has three municipalities with high illiteracy rates: 1) Ciales (21.2%), Utuado (21.7%), and Lares (21.7%). Other municipalities by regions with high illiteracy rates are: Mayaguez Region: Las Marias (16.9%), Maricao (17.5%), Ponce (20.7%), and Guayanilla (20.7%); and in Caguas Region: Cidra (23.2%), and Maunabo (20.6%). Figure 7 shows the
Table 5

**Variables in This Study and Their Measurement**

<table>
<thead>
<tr>
<th>Variable Type</th>
<th>Variables Description</th>
<th>Measurement Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X1</td>
<td>Teaching method</td>
<td>nominal</td>
</tr>
<tr>
<td></td>
<td>graphics/voice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>text only</td>
<td></td>
</tr>
<tr>
<td></td>
<td>control group</td>
<td></td>
</tr>
<tr>
<td>X2</td>
<td>Literacy</td>
<td>nominal/interval</td>
</tr>
<tr>
<td>X3</td>
<td>Marital status</td>
<td>nominal</td>
</tr>
<tr>
<td></td>
<td>single</td>
<td></td>
</tr>
<tr>
<td></td>
<td>married</td>
<td></td>
</tr>
<tr>
<td></td>
<td>widowed</td>
<td></td>
</tr>
<tr>
<td></td>
<td>divorced</td>
<td></td>
</tr>
<tr>
<td></td>
<td>living together</td>
<td></td>
</tr>
<tr>
<td></td>
<td>separated</td>
<td></td>
</tr>
<tr>
<td>X4</td>
<td>Residence</td>
<td>nominal</td>
</tr>
<tr>
<td></td>
<td>rural</td>
<td></td>
</tr>
<tr>
<td></td>
<td>urban</td>
<td></td>
</tr>
<tr>
<td>X5</td>
<td>Number of children</td>
<td>ratio</td>
</tr>
<tr>
<td>X6</td>
<td>Age</td>
<td>interval</td>
</tr>
<tr>
<td>X7</td>
<td>Attitudes toward BCAI</td>
<td>interval</td>
</tr>
<tr>
<td>X8</td>
<td>Pretest score of budgeting knowledge</td>
<td>interval</td>
</tr>
<tr>
<td><strong>Dependent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y1</td>
<td>posttest family budgeting knowledge score</td>
<td>interval</td>
</tr>
</tbody>
</table>
Figure 5.  Puerto Rico and the Caribbean Island.

Figure 6. Municipalities of Puerto Rico

Figure 7. Municipalities With High Illiteracy Rates.

municipalities with high rates of illiteracy problems. To select a municipality with high illiteracy rates, a random selection was done. The Department of Education provided a list of municipalities with highest illiteracy rates. From this list, a simple random procedure was used to select the municipality. The selected municipality for the research was Maunabo (refer to Figure 8). Maunabo is the municipality with the highest rate of literacy problems in Caguas region.

According to the 1990 Census, the female population of Maunabo was 6,170.

The women for the study were selected randomly. To select a random sample of women, contact was made with the Director and Associate Dean of the Puerto Rico Agricultural Extension Service during the year before the study.

The researcher obtained a list of the Puerto Rico Homemaker Club members (Extension program) from Maunabo, the selected municipality. The Maunabo municipality list of Homemakers Clubs with 185 women enrolled was used as a frame for the study.

A simple random procedure was used to give an equal chance to all of the women to be included in the sample. As indicated by Frankel and Warren (1990), random sampling has the advantage of producing a representative sample from the population. A list of random numbers was used to select names for each of the three groups: the two treatment groups and the control group.
Figure 8. **Maunabo Municipality**

To calculate the sample size, the following decisions were made: (1) the alpha level was set .05, (2) the hypotheses were designed to use a one-tailed test, (3) Delta or the association between variables was set at 0.35, and the statistical power was set at 99% (Kraemer & Thiemann, 1987). The power of the test of significance is set to demonstrate significance if the alternative hypothesis appears to be the true. The required sample size for this level of power is 120 participants.

The calculated sample size was 123 individuals, 41 women for each of the three groups. The decision was made using the Krejcie and Morgan (1970) table to determine the sample size. Extra subjects were selected in case participants refused to finish the treatment or refused to participate.

Women were randomly assigned to each level of the independent variable: X1, computer program with voice and graphics; X2, computer with text only, and X3, the control group of persons who did not receive any treatment, only the pre and posttests. Based on sampling, findings from this research can be generalized only to the Homemakers Club members of Maunabo municipality from which the sample was drawn.
Treatment

Design of Budgeting Computer Assisted Instruction (BCAI)

The treatment in the research was a BCAI designed through a cooperative effort of different home economics scholars and Extension specialist/scholar. In the design of the BCAI, different concepts related to cash flow management, CAI design theories, and adult learner curriculum design approaches were used.

In term of cash flow management, nine steps were used in the design of the BCAI:

Step 1 Determine individual and family financial goals.
Step 2 Estimate total income.
Step 3 Estimate variable expenses.
Step 4 Estimate fixed expenses.
Step 5 Estimate family economic situation.
Step 6 Analyze individual or family economic situation in terms of these four situations: balanced budget, negative budget, sorrow budget, leaky budget.
Step 7 Reallocate variable expenses.
Step 8 Make the budget.
Step 9 Evaluate the budget.
The cash-flow steps were divided into four steps:

(1) Short-term goal planning (subjective measurement): Goal Check List was used to measure this step.

(2) Financial situation analysis (objective measurements):
   a. Calculate monthly cash income (take home income), expenses (spending for consumption) and savings. The definitions of these variables are as follows:
      Total monthly take-home income: the sum of all take home income.
      Total monthly spending for consumption: the sum of all expenses.
   b. Categorization of users in four categories according to their financial situations:
      Leaky budget, Negative budget, Sorrow Budget, Balanced Budget

(3) Budgeting

(4) Recommendations
The division of the BCAI into four steps allowed the researcher to present the budgeting learning material in an organized way and allowed the user flexibility in stopping the learning process at any time. Figure 9 shows the steps of the BCAI according to these four steps.

Because the audience that used the computer program consisted of low-literacy individuals or families, a short definition of budget is used. The definition was drawn from those definitions used by different scholars (Davis, 1989; Garman & Forgue, 1991). Family budget is a plan for the use of income, expenses, and savings to achieve the goals that individuals and the family want to achieve.

For the purposes of the design of the BCAI, the complex budget classification was used (Garman & Forgue, 1988). This approach includes detailed categories of income and expenditures from which the user can select multiple alternatives or options. The following general categories were selected (Garman & Forgue, 1988; Banco Popular de Puerto Rico):

<table>
<thead>
<tr>
<th>Variable expenses</th>
<th>Fixed Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Housing</td>
</tr>
<tr>
<td>Clothing</td>
<td>Education</td>
</tr>
<tr>
<td>Transportation</td>
<td>Insurance</td>
</tr>
<tr>
<td>Health</td>
<td>Debts</td>
</tr>
<tr>
<td>Entertainment</td>
<td>Other</td>
</tr>
</tbody>
</table>
Figure 9. Budgeting Computer Assisted Instruction Steps
Another important part of the BCAI is related to goal planning. Families selected one short-term goal from a previously selected list of three. A calculation of amount of money needed, saving period, and monthly savings was required to allow the user to understand the process of setting goals, prioritizing and saving to achieve the desired goal. A goal-setting worksheet was included on one of the BCAI screens.

To identify financial problem areas of the families using the BCAI, four financial situations were identified: sorrow budget, balanced budget, negative budget, and leaky budget. To make these categorizations, family monthly take-home income, monthly spending for consumption, and savings were considered as follows:

\[ \text{Monthly Take-home income} \]
\[ \text{Monthly Spending for Consumption} \] \hspace{1cm} (1)
\[ \text{Monthly Savings} \]
This result is four basic situations:

where:

\[ I = \text{income} \]
\[ E = \text{expenses} \]
\[ $G = \text{money for goal accomplishment} \]
\[ D = \text{debts} \]

then:

1) balanced budget: if \( I = E \) and \( D = 0 \) or \( d < I \) and \( < $ G \) and goal = 1 (yes), then budget is balanced. (2)

2) leaky budget: if \( I < E \) and debts > \( I \) and \( $ G \) and goal = 1 (yes), then budget is leaky. (3)

3) negative budget: if \( I < E \) and debts < income and \( $ G \) and goal = 2 (no), then budget is negative. (4)

4) sorrow budget: if \( I < E \) and \( D > I \) and \( $ G \) and goal = 2 (no), then budget is sorrow. (5)

The meaning of these four situations is as follows:
1. Families with **balanced budget**: the economic situation where families have (1) equal income and expenses, (2) meet their financial goals, and (3) do not incur debts.

2. Family with **negative budget** refers to those budgets that: (1) their expenses do not exceed their income, (2) they are not in an over-spending situation (no debts), (3) they do not meet their financial goals.

3. Families with **sorrow budget** are those that: (1) their expenses exceed their income, (2) are over-spending (incurring debts), (3) do not meet their financial goals.

4. Families with **leaky budget** are those that: (1) have more expenses than income, (2) are in over-spending situation, (3) are meeting their goals.

Figure 10 shows the relationship between income, expenses, debts, and goals and the four categorizations of family financial situations described above.
To compute families’ financial situations, the following computation formulas were used in the BCAI:

1. Estimation of actual expenses per expense subgroup.

   Net Monthly Income
   Expenses per expense subgroup
   Result $\times 100$  \hspace{1cm} (6)

2. Estimation of recommended expenses per expense subgroup.

   Expenses per expense subgroup
   Net Monthly Income $\times$ Recommended expenses per expense subgroup  \hspace{1cm} (7)
3. Estimation of the recommended sample budget:
   Bimonthly budget: Divide the total recommended expenses by 2.
   Weekly budget: Divide the total recommended expenses by 4.

4. Estimation of total expenses.

5. Estimation of total income.


7. Estimation of economic situation: the total expense is the sum of all the expenses. To calculate the differences (economic situation), subtract total monthly expenses from the total monthly income:

   \[
   \text{Total Monthly Income} - \text{Total Monthly Expenses}
   \]

8. Result can be one of these alternatives:

   Leaky budget
   Negative budget
   Balanced budget
   Sorrow budget

   Family economists have recognized that income consists of earnings, other cash income, and in-kind income (Hogarth, 1986). For the purpose of designing the BCAI, income includes: salary, food check, pension, child support, gifts
(family & friends), social assistance, Women, Infant and Children Program (WIC), and other in-kind income.

For the purpose in this study, the list of expenses was divided into two categories: fixed and variable expenses. Variable expenses are defined as those expenditures for which the amount paid and the pay period change when needed. Fixed expenses are those items for which the consumer both spends the same amount of money every payment period and is expected to pay on specific dates.

A list of goals was selected from the literature to be included in the BCAI, as follows (Garman & Forgue, 1988):

**Short-term Goals**

1. Buy good clothes.
2. Pay for Christmas gifts and decorations.
5. Buy a bicycle.
7. Save to buy new furniture.
8. Buy a video tape or VCR.
10. Pay up or pay down my charge cards.
11. Open a savings account for emergencies.
12. Open a credit union account.
13. Save for my children’s birthdays.
14. Save for summer camp.
15. Save for summer vacation.
16. Save to visit an amusement park.
17. Pay up or reduce my debts.
18. Buy a satellite antenna.
19. Have a balanced budget.

**Long-term goals**

20. Save for my children’s college expenses.
22. Save for travel.
23. Redecorate or rearrange the house.
24. Buy some jewelry.
25. Open an IRA account.
26. Save for medical problems.
27. Save to have a savings account.
28. Pay for the house years in advance.
29. Buy life insurance policy.
30. Purchase a new car.
31. Go to college.
32. Save for my children's weddings.
33. Save for my children's 15th birthdays.
34. Save for my children's high school graduation.
35. Save for retirement travel.
36. Save for death expenses.
37. Save for a new home down payment.
38. Finish a vocational degree.
39. Save for investment such as mutual funds, bonds.
40. Pay off my debts.

The use of the term, cash-flow management, does not appear in the computer program. The reason for using the term budgeting instead of cash-flow management was based on the target audiences that used the BCAI. Low-literate individuals and families in Puerto Rico do not relate to the concept of cash-flow management. This assumption is based on observation and experience of the researcher with this audience. Budgeting is a commonly used term. However, in order to relate the concept of budgeting to the audience, the researcher used it interchangeably with plan of savings, income, and expenses.
The recommended expenses were based on the Food Basket for a family of five members. Table 6 shows the percentages that were calculated by the Labor Force Department of Puerto Rico (July, 1992).

A cash-inflow worksheet was designed for the user of the BCAI to fill out before using the CAI. The cash inflow worksheet is included in the user manual (Appendix A).

Development of the BCAI

The researcher collaborated with the computer programmer, the radio and television specialist, and the graphic artist on the design of the computer program to introduce voice and graphics into the budgeting computer program. The focus of the computer instructional software is budgeting cash flow.

The computer program was divided into six sections (including the pre/post test sections) to allow participants to rest between each part. The content of the learning material was the same for all subjects in the treatment groups with voice and graphics and text only.

An English version of the BCAI was developed first and translated into Spanish. The Spanish version was used in the study. Both versions were validated for content validity by a committee of experts. The Panel of experts consisted of:
Table 6

Percentages for Recommended Expenses

<table>
<thead>
<tr>
<th>Expense subgroups</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>36</td>
</tr>
<tr>
<td>Transportation</td>
<td>15</td>
</tr>
<tr>
<td>Mortgage/rent</td>
<td>20</td>
</tr>
<tr>
<td>Service</td>
<td>6</td>
</tr>
<tr>
<td>Insurance</td>
<td>4</td>
</tr>
<tr>
<td>Debts</td>
<td>15</td>
</tr>
<tr>
<td>Clothing</td>
<td>8</td>
</tr>
<tr>
<td>Health</td>
<td>5</td>
</tr>
<tr>
<td>Education</td>
<td>4</td>
</tr>
<tr>
<td>Entertainment</td>
<td>3</td>
</tr>
<tr>
<td>Savings</td>
<td>2</td>
</tr>
<tr>
<td>Other expenses</td>
<td>7</td>
</tr>
</tbody>
</table>

Claudette Smith, Family Resource Management Specialist, North Carolina State University.

Nayda Torres, Family Resource Management Specialist, University of Florida.

Maria Canabal, Associate Professor, Illinois State University.

Carolyn McKinney, Family Resource Management Specialist, The Ohio State University.

A questionnaire was developed to determine content validity of the BCAI (DeLoayza, Grosser & Bulkin, 1988) (Appendix B). Recommendations by the panel of experts were incorporated into the computer programs. Letters of appreciation for their assistance were send to the panel of experts (Appendix C).

Two versions of the BCAI were developed for this study. The difference between the two programs is the method of presentation for the two treatment (experimental) groups. Experimental group 1 experienced the BCAI with graphics and voice while experimental group 2 used the program with written statements only (text). The control group received only the three instruments that were incorporated into the computer and not the experimental intervention.

The two versions of the BCAI were prepared using DBase language for the Compact, IBM compatible personal computer. Color monitors were used for both experimental groups and control group because the BCAI is in color.
Participants used computers in the intervention and in the pre/posttests by themselves. The computer program gave the subjects control of the sequencing of the BCAI. Each screen gave learners three options: to go forward, to go backward, or to quit.

Six computers were set-up for this research: two with the BCAI with voice and graphics; two with BCAI with text only and two with pre/posttest (control group). Each of the computers with voice and graphics was situated in different places in the Extension office. The two computers with text only were placed together in the same location and the two with pre/posttest in another area in the office. One laser printer connected to all the computers was used to print the BCAI output.

The computers with the BCAI with voice and graphics had a voice master card installed in each one. This voice device reproduces the voice that was previously recorded. This provided a less fearful environment because participants were not exposed to another computer device, only the computer itself.

Instrumentation

Three instruments were used in this study to collect the data on all the variables. The instruments are the following: (a) pretest and posttest on
Budgeting Knowledge (Appendix D); (b) Attitudes Toward Computers Likert Scale (Appendix E); and (c) Demographic Characteristics Instrument, that included the open-end questions and questions related to the women's perception about the role of money management in meeting family needs, goals and desires in Appendix F. These three instruments were integrated into the computer program by the Puerto Rico Agriculture Extension programmer. The Budgeting Knowledge Test, the Attitudes Toward Computers Scale, and the Demographic Characteristics Instrument were placed at the beginning of the program. Budgeting Knowledge Posttest and Attitudes Toward Computers Scale were placed at the conclusion of the program. The control group received only these three instruments, which were placed in a computer which did not contain the experimental intervention, the BCAI.

**Budgeting Knowledge Pretest and Posttest**

To measure the dependent variable, budgeting knowledge, a multiple choice cognitive test was developed. According to Cranton (1989), multiple choice is an appropriate technique to measure level of knowledge in the cognitive domain. According to Sudman and Bradburn (1982), knowledge questions are appropriate to measure educational achievement. The instrument was designed using closed-end questions and input from the literature review and from members of the researcher's graduate committee.
The constitutive definitions of knowledge about budgeting were selected from the literature review: budgeting knowledge is a structure of concepts and relationships built by reflective thought out of information about budgeting received, such as facts, definitions, rules, terms, and other bits of information that will allow individuals and families to plan the use of income, expenses, and savings to attain the goals they want to achieve in a specified order or series of steps. The elements that define this construct are: definition of budgeting, identification of the purpose of budgeting, definition of economic goals, identification of short-term economic goals, definition and calculation of personal or family expenses, income and savings, analysis of the economic situation, and analysis and modification of the sample budget. These elements are included in the curriculum of the BCAI.

The Budgeting Knowledge Test consists of 19 items. Each item has four alternatives, of which only one is the best answer. Budgeting knowledge was measured as the sum or the overall score on 19 items of the Budgeting Knowledge Test. The total score (maximum score is 19) represents budgeting knowledge.

**Attitudes Toward Computers Scale**

To measure attitudes toward budgeting computer assisted-instruction (BCAI), a second instrument was designed as a Likert Scale. This technique is
appropriate to measure the affective domain (Cranton, 1989). This Likert Scale was designed to measure respondents' feelings toward budgeting computer assisted-instruction and contains three elements that define the construct: general computer attitudes, attitudes toward computer graphics, and attitudes toward computer voice. The constitutive definition of attitudes toward computer-assisted budgeting instruction is the following: agreement or disagreement toward budgeting computer-assisted instruction enhanced with voice, text, and graphics.

To measure the attitudinal object, attitudes toward BCAI, 48 items were used. Of these, 25 were positive and 23 were negative. A positive attitude toward BCAI was indicated by scale scores that ranged from 3.49 to 5; negative attitudes toward BCAI constitute the lowest scale scores, ranging from 0 to 2.49; and neutral attitudes toward BCAI are indicated by scores in the range from 2.50 to 3.49.

Two different ratings were used for each of the subscales. General Attitudes Scale ratings range from 23 to 115. Attitudes toward Graphics Scale ratings range from 12 to 60. Attitudes toward Voice Scale ratings range from 12 to 60. Scoring ranges for strongly disagree, disagree, undecided, agree, and strongly disagree are the following:
General attitudes toward computer and BCAI

<p>| | | |</p>
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<tbody>
<tr>
<td>SD</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>D</td>
<td>35</td>
<td>57</td>
</tr>
<tr>
<td>U</td>
<td>58</td>
<td>80</td>
</tr>
<tr>
<td>A</td>
<td>81</td>
<td>103</td>
</tr>
<tr>
<td>SA</td>
<td>104</td>
<td>115</td>
</tr>
</tbody>
</table>

Attitudes toward BCAI voice/graphics

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<tbody>
<tr>
<td>SD</td>
<td>0</td>
<td>18</td>
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<tr>
<td>D</td>
<td>19</td>
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<td>43</td>
<td>54</td>
</tr>
<tr>
<td>SA</td>
<td>55</td>
<td>60</td>
</tr>
</tbody>
</table>

A demographic characteristics instrument was designed. These data aided in determining if identified extraneous variables affected the results of the test.

**Content validity of the instruments**

According to Mueller (1986), content validity and internal consistency are often used in combination in attitudinal-scales as a measure of minimal acceptable evidence of construct validity. Judges were asked if each identified item fell within the domain of the construct and if collectively, the items
comprehensively measured the domain. Thus, the panel of experts satisfied the criterion identified by Mueller as an index of construct validity.

The validity testing process for the instruments was done using a panel of experts and field testing. To establish content validity of the English version of the instruments, the researcher's graduate committee reviewed the instruments. Then these instruments were translated into Spanish. Both English and Spanish versions of the instruments and the BCAI were checked for translation accuracy by a professor at The Ohio State University.

Content validity was determined by four experts of the construct at The Ohio State University, University of Illinois, and University of Florida. Two of them validated the English version of the instruments as well the BCAI. The other two experts determined the validity of the Spanish version of the instruments and the BCAI. The Spanish version was, also, reviewed in Puerto Rico by the Extension specialists for content validity for the identified population. Recommendations by the panel of experts on the English and Spanish versions were incorporated into the instruments and BCAI. Inappropriate and unclear items were deleted or edited for the final versions of the instruments.

Two field tests were conducted in Luquillo municipality with members of the Homemakers Clubs. In the first field test, participants received paper copies of the instruments, not the computer screen presentations. The Extension Home
Economists in this municipality conducted the first field test. Five participants were asked to evaluate the instruments by answering the questions and providing responses about item clarity, wording, length, format, the instruments' overall appearance, and which objectives the items measure. Appendix G contains the letter, the questions asked of the field test participants and the results of the field test.

A second field test was conducted to test the instruments with the computer screen printed on paper. Six items were deleted from the instruments: two from the Demographic Characteristics Instruments and four from the Attitudes Toward the BCAI Scale. These items were deleted because they were too long and were divided in three computer screens. This confused the participants.

Reliability of Instruments

The Budgeting Knowledge Test was designed as a summated instrument. According to Norland (1992), summated instruments are those that have several items added together to represent one variable. To assess the reliability of these two instruments: 1) Budgeting Knowledge Test and 2) Attitudes Toward BCAI Scale, different statistical techniques were applied. The Statistical Packet for Social Science (SPSS-PC+) was used to calculate Cronbach's alpha, dichotomous alpha and Crosstabs.
According to Mueller (1986), reliability tests are an effective way to determine if the measurement is consistent and accurate. This statistic is designed to estimate the amount of error that is present in the measurement. Mueller states that "the reliability coefficients indicate the proportion of the total variance in test score that is legitimate" (p. 58).

For the purpose in this research a pilot test was conducted in Puerto Rico to test the reliability and usability of the instruments. An accessible group of 15 Extended Food and Nutrition Educational (EFNED) program clients of Maunabo municipality, who were not part of the population of the study, participated in the pilot test.

Reliability for the budgeting knowledge test was assessed using test-retest procedure and internal consistency. Test-retest procedure involved the administering the instruments to the same group twice, with 4 days between administrations. A letter was sent to participants giving details for the test-retest procedure (see Appendix H).

Test-retest reliability compares the scores of the first administration with the scores of the second administration. Crosstabs analysis was done with the test-retest data. This analysis assesses the level of agreement between the first administration and the second administration of the instrument.
The results of the test-retest analysis for the budgeting knowledge test are shown in Appendix H. The percentage of agreement ranged from 60 to 100 for the 23 items. The mean and the median for the test-retest analysis are as follows: $\bar{M} = 73$, $Md = 84$.

A measure of internal consistency was calculated as an additional reliability check beyond the test-retest procedure. Dichotomous alpha was used for this purpose. Internal consistency reliability was used to test construct validity. According to Mueller (1986) internal consistency indicates that the items are substantially intercorrelated. "This means that all items are working together to measure the same underlying variable. Internal consistency constitutes evidence that the construct is being measured" (p. 71).

To determine internal consistency on the budgeting knowledge test, responses were recoded so that the correct answer was 1 and all other responses were coded as 0. The dichotomous alpha can provide data to the researcher on which items can be deleted to increase the reliability coefficient.

According to Nunnally (1967), a good rule of thumb for reliability is 0.8 or 0.9. In some cases, 0.5-0.6 is enough in the early stages research. For this research, the expected reliability coefficient on the knowledge test was 0.6, which is acceptable. The reliability coefficient for the Budgeting Knowledge Test was 0.56. This coefficients meet 0.5 minimal coefficient level as advocated by
Nunnally. Four items were deleted as the item analysis indicated that they were poor items. The coefficients for these items were very low.

When the reliability of this instrument was analyzed using data from the sample (122 participants), the reliability coefficient (internal consistency) was 0.88 which surpasses the Nunnally's recommendation.

Reliability for attitudes toward the BCAI was assessed using test-retest and internal consistency procedures. The results of the test-retest analysis for this instrument are shown in Appendix H. The percentage of agreement ranged from 36 to 86 for the 52 items. The mean and median for this procedure are as follows: \( M = 65 \) and \( Md = 64 \).

The internal consistency for the instrument that measures attitudes toward the BCAI (5 point Likert Scale) was determined using Cronbach's alpha. Internal consistency reliability was used to test construct validity. For this instrument, the overall reliability coefficient for the pilot test was .85. Four items were deleted. The reliability coefficients for the subscales are: general attitudes toward BCAI .75; attitudes toward computer graphics .85, and attitudes toward computer voice .88. The coefficients exceeded Nunnally's recommended coefficient level. The Cronbach alpha reliability coefficient for this scale for the 122 participants in the sample was .91.
Item Analysis

According to Mueller (1986, p. 13), "item analysis is necessary in order to refine the item pool into the finished scale" of the Budgeting Knowledge Test. Item analysis provides information related to the difficulty of each item and the degree to which each item discriminates between high and low achievers. In addition, item analysis can be used to compare the degree to which each item is related to the total test score (Cranton, 1989).

Determination of difficulty index is part of item analysis. The difficulty index as stated by Mueller (1986) indicates the percentage of respondents who answered each item correctly. The percentage of respondents choosing each response and item mean responses were used as indices of item variability, response distribution, and spread. The results of the item analysis indicated that responses are spread across the response categories.

Item discrimination index was used as another criterion to reject items. Item discrimination index "shows the extent to which each item discriminates among respondents in the same manner as the total score scale" (Mueller, 1986, p. 14). Item analysis is determined by the calculation of two indexes: difficulty and discrimination. The difficulty index requires ranking respondents' total scores from the lowest to the highest scores. Then, only the 27% of the top and bottom scores are used. The difficulty index is the result of the calculation of the average
percentage of the upper and lower groups' right responses for each item. The
discrimination index is the result of the subtraction of the bottom from the upper
group's percentages. The average difficulty index in this study was 60 and item
difficulty ranged from 12 to 100 percentage (refer to Appendix I). According to
Gritzacher (1992) difficulty index mean should be about 50. These implies that
the items in the budgeting knowledge questionnaire were easier than the
recommended mean. The item analysis approach used in this study was the
Minnesota Method. This analysis was hand calculated.

Data Collection Procedures

Protecting Human Subjects

To follow the human subjects protection requirement of The Ohio State
University, the research proposal and instruments were submitted to the
University Human Subjects Review Committee and accepted with conditions
(Research Protocol Number 93b0136). The Human Subject Committee asked
that the following be included in the research proposal and to forward to them
the following:

1) revise the consent form to be a single page document;
2) revise the solicitation script to subjects to inform them of incentives;
3) provide letter of support from Extension Service or Home Economist;
4) clarify how researcher will assess literacy level of subjects.

All the requirements of the human subject committee were met. The Behavioral and Social Sciences Human Subjects Review Committee Approval Forms, the consent form, and the Extension Service support letters are included in Appendix J.

To avoid response error and interviewer variability, an orientation meeting with the home economists was conducted. According to Fowler (1988), response error can be avoided by using consistent methods of administration and by giving participants clear instructions. A Home Economics Instruction Manual was designed to explain in a consistent way the computer program and the instructions for answering the questions in the program (Titus, Fanslow & Hira, 1989; Creviston, Hashmi, Hoban, & Koch, 1985; Maddux, 1985; Shumard, 1985; Abbott & Wysocki, 1984; Turner & McGrath, 1984; Needles, 1983; Dippold, Stafford, Hathaway & Hawsh, 1981; Silveira, 1980; Matejic, 1979; Udvari & Laible, 1978; Mellers, 1976) (Appendix K).

Local Arrangements

Arrangements were made with the Dean's Office, the Associate Dean for Extension and local Extension office to administer the study (Appendix M). Also, personal contact and arrangements were made with the Extension regional office interim co-leader.
For participants to understand their role in this research, written and oral information was given to them. The Home Economist of the Municipality notified the Homemaker Club members of their selection to participate in the research at their monthly Club Meeting. Participants were informed about the purpose of the learning material, the purpose of the study, the confidentiality of the obtained data, and how to answer questions. The Home Economist explained to the participants the difference between confidentiality and anonymity. The Home Economist sent the research material package to each individual (see Appendix A). The research material package consisted of a cover letter, a Budget Analysis worksheet, and a consent form to participate in the research. The cover letter informed participants of the nature and purpose of the study and the directions to complete the Budget Analysis worksheet included in the user manual. Subjects were asked to sign the letter of consent, and a copy of it was later mailed to them. Also, participants received a reminder letter from the researcher to motivate them to participate and be on time (Appendix L).

**Data Collection Procedures to Achieve Control**

To control for locality, the instruments were administered under the same conditions in three locations, two of which had a computer with the BCAI in it and a third location with a computer with only the instruments in it for the control group. The two methods of teaching were randomly assigned to different
hours, in order to control for history. The participants in the sample were asked not to share information with anyone regarding the type of computer experience (that is method) they used.

To control for implementation, a Puerto Rico Agricultural Extension Service faculty member was trained. A Home Economists Manual was used as a guide to the Extension Service Home Economists. Novelty and disruption could constitute a threat to external validity; however, such factors can also be an incentive for low and high literacy women to participate in the research, particularly because of exposure to computers. To control for disruption, only the subjects were in the office during the experimental session.

The Hawthorne effect could be a threat to external validity. However, this can be reduced because subjects were unaware of which variables were being manipulated. Pretest sensitization is controlled because the subjects did not gain information that could affect their posttest scores.

Data Collection

The data for this study were collected in Puerto Rico in Summer, 1993. Participants was randomly assigned for each day of data collection. The data collection was held for 10 days with each interview taking about 3 hours, but this varied according to the literacy level of each participant.
Data were collected through a computer-aided interviewing technique. The computer interviewing technique was used to help low-literate women minimize their fear of the computer. The three instruments were placed in the computer program. The posttest data were collected by computer interviewing, which offers some advantages for data collection. According to Sawtooth Software (1992), computer interviewing has the following advantages: 1) the researcher can collect data quickly; 2) administration of the questionnaire is consistent and controlled; 3) accurate and honest self-reporting data can be produced; and 4) editing time is eliminated. They point out that computer interviewing helps the researcher to obtain more accurate data, especially when the information is sensitive, personal, or of a status-related nature. Participants used computers by themselves in the pretests, in the intervention, and in the posttests.

To stimulate participation, coffee and snacks were offered as refreshments. Also, arrangements with merchants were made to offer other incentives to stimulate participation. Two food certificates were offered to the selected participants. A lottery was held using the number of name signs in the assistance notebooks to select the winners of the food certificates.
The data collection was divided into three sections: pretest, the experimental intervention, and the posttest section. No time limits were imposed on the experimental intervention section.

**Controlling for Non Response**

Refusal to answer is a possible non-response situation with which the researcher can be confronted, and such refusal can extend to refusal to finish the test and the research intervention. However, some of the participant refuse to finish and their data were deleted from the study. Analysis of the refusal is the way to deal with non-response error. Refusal rate is the proportion of eligible respondents contacted who declined or did not finish the interview. Dillman (1978) pointed out that the importance of determining refusal rate allows the researcher to determine if the characteristics of those who refuse are different from those who respond.

Fowler (1988) stated that response rate can be calculated by dividing the number of participants by the number of people in the sample and subtracting the number from 100. This figure constitutes the refusal rate. To avoid refusal to answer, the instruments were set-up in the computer and required participants to answer each item to proceed with the program. However, the option to quit or finish at each step of the treatment was presented on the menu on each computer screen.
Data Analysis

The appropriate inferential statistical analyses for the hypotheses and research questions for this study are Analysis of Covariance (ANCOVA), correlations, ANOVA and Regression. Descriptive analysis as frequencies, Chi-Square and Measure of Central Tendency were used to describe the sample.

ANCOVA is a combination of analysis of variance and regression. ANCOVA is used in true experimental research to increase the power of the analysis. ANCOVA analysis was used to describe the effect of the manipulated independent variables: 1) voice and graphics, 2) text only and, 3) control group on the dependent variable budgeting knowledge after adjusting for the covariate (pretest scores). As stated by Frankel and Warren (1990), ANCOVA allows the researcher to adjust the posttest mean scores for each group to compensate for the initial differences between the groups on the pretest.

Regression is a method of analyzing the variability in a dependent variable that is accounted for by one or more independent variables. Regression was used to determine the contribution of the manipulated and measured variables to the variance in the posttest scores. Regression analysis was used to analyze the relationship between a single dependent variable and independent variables. Regression measures the magnitude, strength, and direction of the association.
between dependent and independent variables. Also, regression allows the researcher to examine the statistical significance of the anticipated prediction.

To test the hypothesis of relationship or associations between variables, correlation analysis was used. Correlation is used to quantify the relationship or association between variables. According to Glass and Stanley (1970), Pearson Product-Moment correlation is an appropriate statistic for hypothesis testing when one sample is selected and metric variables are used. In this research, Pearson Product-Moment correlations were used to indicate the magnitude of the relationships between the dependent variable and each of the independent interval variables. Point-biserial correlation was applied as the appropriate statistical method when the scale of measurement of one variable was interval or ratio and the other variable was nominal with two levels.

To test the hypothesis of differences between group means, an F test was used. The F test allows the researcher to test differences between groups means. The decision to accept or reject each of the hypotheses was determined by the alpha level or the probability of making Type 1 error (rejecting the hypothesis when it is true). Therefore, the null hypothesis could be rejected when the test statistic was equal to or less than alpha (.05).
The data were analyzed using the Statistical Package for the Social Sciences (SPSS) and SAS. Table 7 contains a summary of the hypotheses and analyses used in this study.

Summary

The BCAI was designed to help families to maximize the use of their cash-flow by planned use. Also, the program can help them to plan their short term goals. The immediate output of the program was the knowledge that families can gain from the use of it.

In the process of designing the BCAI, the Godwin (1990) and Garman & Forgue (1991) approaches to cash-flow management were used. The cash-flow approach can help families to maximize their assets.

The selected research design was experimental. Two research questions and seven hypotheses were developed to test the effect of two methods of teaching: computer program with voice and graphics and computer program with text only along with a control group. Data were collected on eight independent variables.
Table 7

Research Questions, Hypotheses and Data Analysis Techniques

<table>
<thead>
<tr>
<th>Research Hypothesis/ Question</th>
<th>Hypotheses/ Question</th>
<th>Analysis Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>What are the women's perceived alternatives for life situations to cope which financial crises?</td>
<td>Frequencies, Central Tendency Measures, Chi-Square</td>
</tr>
<tr>
<td>Q2</td>
<td>How do the women perceive the role of money management in meeting family needs, goals and desires?</td>
<td>Frequencies, Central Tendency Measures, Chi-Square</td>
</tr>
<tr>
<td>H1</td>
<td>There are significant differences among the demographic variables for the women in each of the three groups.</td>
<td>Means, Std Dev, ANOVA Chi-Square</td>
</tr>
<tr>
<td>H2</td>
<td>There are relationships between the pretest budgeting knowledge scores and the independent variables: 1) age, 2) number of children, 3) literacy, 4) attitudes toward computer and 5) residence.</td>
<td>Correlation</td>
</tr>
<tr>
<td>H3</td>
<td>Literacy, marital status, age, place of residence, and number of children explain a significant proportion of the variability in the pretest budgeting knowledge scores.</td>
<td>ANCOVA</td>
</tr>
<tr>
<td>H4</td>
<td>Pretest budgeting knowledge scores explain a significant proportion of the variance in the budgeting posttest scores.</td>
<td>Regression</td>
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Table 7, (continued)

<table>
<thead>
<tr>
<th>Research Hypothesis/ Question</th>
<th>Hypothesis/ Question</th>
<th>Analysis Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>H5</td>
<td>Those women in the two groups using the Budgeting Computer Assisted Instruction (i.e., voice and graphics, and text only), have significantly higher posttest budgeting knowledge scores than those women in the control group after controlling for pretest budgeting knowledge.</td>
<td>ANCOVA Regression</td>
</tr>
<tr>
<td>H6</td>
<td>Attitudes about the computer and the Budgeting Computer Assisted Instruction explain the variability in posttest budgeting knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the two groups using the Budgeting Computer Assisted Instruction.</td>
<td>Regression</td>
</tr>
<tr>
<td>H7</td>
<td>Computer attitudes in regard to voice and graphics explain variability in the posttest budgeting scores, over and above the variability explained by the pretest budgeting knowledge scores in the group using the Budgeting Computer Assisted Instruction.</td>
<td>Regression</td>
</tr>
</tbody>
</table>
CHAPTER IV
FINDINGS AND DISCUSSION

This study was designed to investigate the effects of the Budgeting Computer Assisted Instruction (BCAI) as a method of teaching. The design for this research is experimental, specifically, randomized pretest-posttest control group design.

One hundred twenty three women were divided into three groups. The control and the text only groups were composed of 41 subjects each. The voice and graphics group originally consisted of 41 subjects. However, one of the subjects in this group was determined to be an outlier and during the initial screening of the data was deleted. This subject had a very high pretest score and low posttest budgeting knowledge score.

Each subject was randomly assigned to one of the three groups. Each group received a different level of the treatment. Two groups received one of two methods of teaching (i.e. BCAI with voice and graphics and BCAI with text only) as well the instruments. The control group did not receive any treatment only the pretest and the posttest. Computer interview was the method used to administer the pretest and posttest.

The data were obtained using the Budgeting Knowledge Test, the Attitudes Toward BCAI Scale and the Demographics Characteristics Instrument. Three
instruments were administered before the treatment: the Budgeting Knowledge Test, the Attitudes Toward Computer BCAI Scale and the Demographic Characteristics Instrument. The posttest consisted of the Budgeting Knowledge Test and the Attitudes Toward Computer BCAI Scale. Attitudes Toward BCAI, rated on a 5-point Likert Scale, was administered at the conclusion of the BCAI.

The dependent variable was the subject's score on budgeting knowledge posttest. The pretest was used as covariate. There were seven independent variables: marital status, age, place of residence, number of children, literacy, teaching method and attitudes toward BCAI.

The data were collected from August to October, 1993. Findings were based on analyses of data from women who belonged to the Home Economics Program of the Agricultural Extension Service, from the Maunabo municipality in Puerto Rico.

Inferential and descriptive statistics were used to test the hypotheses and test the differences between groups. Statistical analysis included ANOVA, ANCOVA, Regression, Chi-Square tests, and correlations. Findings are reported and discussed for each hypothesis with the acceptance or rejection of hypotheses based on $p = .05$. Descriptive statistics included frequencies, means and standard deviations.

The purpose in this chapter is to present findings and discussion. The presentation of the data analysis for this study is divided into the following
sections: 1) findings and discussion related to research questions and hypotheses testing, and 2) summary of the chapter.

Research Questions

Research Question 1: What are the women’s perceived alternatives for life situations to cope with financial crises?

Five open-end questions were included in the demographic characteristics instrument to assess participant perception of the alternatives to cope with life situations that create financial crises such as job loss, divorce, accident, illness, and death in the family. Participants differed in their responses as follows:

**Perceived Alternatives after Loss of a Job:** The most frequent alternatives given after loss of a job were: 1) find another job/self employment (37%) and family help/other (63%). Examples of answers in the other category are: stay at home, study, and use their savings. Refer to Table 8.

**Perceived Alternatives after Divorce:** Table 9 contains participants’ perceived alternatives after divorce. The given alternatives after divorce were find a job (16%) and other (84%). Data in Table 9 reveal that the most common answer in the other category was look for family help.

**Perceived Alternatives after an Accident:** As indicated in Table 10, participants’ most common answer of alternatives after an accident was: family help/other (70%). A much smaller percentage cited medical services (19%), life insurance/pension/savings (8%), and find a job/start a business (3%).
Table 8

Perceived Alternatives after Loss of a Job

<table>
<thead>
<tr>
<th>Job Loss</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$f$</td>
<td>%</td>
<td>$f$</td>
<td>%</td>
</tr>
<tr>
<td>Find Another Job/</td>
<td>12</td>
<td>75</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Self Employment</td>
<td>4</td>
<td>25</td>
<td>25</td>
<td>80</td>
</tr>
<tr>
<td>Family Help/Other</td>
<td>4</td>
<td>25</td>
<td>25</td>
<td>80</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>16</td>
<td>34</td>
<td>100</td>
</tr>
</tbody>
</table>

$^a$ 67 missing cases
Table 9

Perceived Alternatives after Divorce

<table>
<thead>
<tr>
<th>Alternatives After Divorce</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Find a Job/Work</td>
<td>4</td>
<td>15</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Other</td>
<td>22</td>
<td>85</td>
<td>25</td>
<td>81</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>100</td>
<td>31</td>
<td>100</td>
</tr>
</tbody>
</table>

a 56 missing cases

Note: others family help, friends help
Table 10

Perceived Alternatives after an Accident

<table>
<thead>
<tr>
<th>Alternatives After an Accident</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Family help/other</td>
<td>14</td>
<td>50</td>
<td>20</td>
<td>77</td>
</tr>
<tr>
<td>Medical Services</td>
<td>11</td>
<td>39</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Life insurance/ Pension/Savings</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Find a job/Start a business</td>
<td>2</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>100</td>
<td>26</td>
<td>100</td>
</tr>
</tbody>
</table>

a 30 missing cases
Perceived Alternatives when Confronted with Illness: The most frequent response was family help/other (77%). A second source of help when faced with an illness was health services/plan by 23% of participants. Refer to Table 11.

Perceived Alternatives when Confronted with Death: Participants’ responses to their perception of the alternatives when confronted with death is shown in Table 12. The most common response is family help/other (72%). With 13% of response, the next most common response they wrote in the help category is funeral payment plans.

Research Question 2: How do the women perceive the role of money management in meeting family needs, goals and desires?

In order to assess participants’ perceptions of the role of money management, six questions were included in the demographic section of the instrument. Respondents’ answers to these questions were the following:

Table 13 reveals that 100% of the participants perceived budgeting as important in home management. This perception about budgeting suggests that participants were conscious of the role of budgeting in money management especially for them with their scarce economic resources. About 54% of women in the three groups felt unhappy about their economic situation. This is consistent for the two groups, respectively, voice and graphics (61%) and text only (59%) but lower for the control group (41%). Refer to Table 14. There was no difference in participants’ feelings about their economic situation among the three groups as
Table 11

Perceived Alternatives When Confronted with Illness

<table>
<thead>
<tr>
<th>Alternatives in Illness Situation</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family help/other</td>
<td>21</td>
<td>18</td>
<td>72</td>
<td>26</td>
</tr>
<tr>
<td>Health Services/plan</td>
<td>11</td>
<td>34</td>
<td>7</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
<td>25</td>
<td>100</td>
</tr>
</tbody>
</table>

\(^a\) 38 missing cases
Table 12

Perceived Alternatives when Confronted with a Death in the Family

<table>
<thead>
<tr>
<th>Alternatives for Death Situations</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insurance</td>
<td>2 8 0 0 2 2 2 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td>1 4 4 15 0 0 5 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family help/others</td>
<td>19 66 13 50 29 88 61 72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Find a job</td>
<td>2 8 1 4 2 6 5 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit plan</td>
<td>1 4 1 4 0 0 2 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Funeral Payment Plans</td>
<td>5 18 4 15 2 6 11 13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select the less expensive buried goods</td>
<td>0 0 1 4 0 0 1 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>28 100 26 100 33 100 87&lt;sup&gt;a&lt;/sup&gt; 100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> 39 missing cases
Table 13

Frequency Distribution of Participants' Perceptions of the Importance of Budgeting in Money Management

<table>
<thead>
<tr>
<th>Think Budgeting is important</th>
<th>Control Group</th>
<th>Voice &amp; Graphics Only</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>41</td>
<td>40</td>
<td>41</td>
<td>122</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>40</td>
<td>41</td>
<td>122</td>
</tr>
</tbody>
</table>
Table 14

Frequency Distribution of Participants' Feelings About Family Economic Situation

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( f )</td>
<td>( % )</td>
<td>( f )</td>
<td>( % )</td>
</tr>
<tr>
<td>Felt Happy About Family</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economic Situation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td>59</td>
<td>16</td>
<td>39</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>41</td>
<td>24</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Chi-Square = \((2, n = 122) = 3.48, p = .175\)
Cramer's V = .169
revealed by Chi-Square. Sixty three percent of the women in the three groups have no expectations of being able to achieve their personal or family needs, desires, goals and wants. Refer to Table 15. This is one of the consequences of women’s money constraints and their lack of budgeting knowledge. Goal planning is essential to achieve needs, desires, goals and wants. However, if they need to increase their income and cannot increase it, they may not be able to achieve their needs, desires, goals and wants even if they can budget. Chi-Square analysis showed that there is no difference among the three groups in participants’ expectations to achieve family needs, desires, goals and wants. Ninety-nine percent of respondents think that budgeting cannot help them to meet needs, attain goals and desires. Refer to Table 16. This may be the result of their limited economic situation and women’s hopeless feeling about life. Women in the three groups (99%) think that saving is important in money management as shown in Table 17. Data show that 99% of the women in the three groups expect to stay the same as indicated in Table 18. This is in contradiction to their previous position in regard to saving, that consider saving important.

Hypotheses Testing

Seven hypotheses were developed for this study:

Null Hypothesis 1: There are no significant differences among the demographic variables for the women in each of the three groups.
Table 15

Frequency Distribution of Participants’ Expectations of Achieving Family Needs, Desires, Goals and Wants in a Short Period of Time

<table>
<thead>
<tr>
<th>Achieve, Needs, Desires, Goals, &amp; Wants</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>16</td>
<td>39</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td>No</td>
<td>25</td>
<td>61</td>
<td>29</td>
<td>73</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Chi-Square = (2, n = 122) = 3.11, p = .21
Cramer’s V = .16
Table 16

Frequency Distribution of Participants’ Perception of the Role of Budgeting to Help Family Meet Needs, Goals and Desires

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>40 98</td>
<td>38 96</td>
<td>40 98</td>
<td>118 97</td>
</tr>
<tr>
<td>No</td>
<td>1 2</td>
<td>2 4</td>
<td>1 2</td>
<td>4 3</td>
</tr>
<tr>
<td>Total</td>
<td>41 100</td>
<td>40 100</td>
<td>41 100</td>
<td>122 100</td>
</tr>
</tbody>
</table>
Table 17

Frequency Distribution of Participants' Perception of the Role of Saving in Money Management

<table>
<thead>
<tr>
<th>Think Saving is Important</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>40</td>
<td>98</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 18

Frequency Distribution of Participants' Expectations About Savings

<table>
<thead>
<tr>
<th>Expectations About Future Savings</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stay the same</td>
<td>41</td>
<td>39</td>
<td>41</td>
<td>121</td>
</tr>
<tr>
<td>Improve</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Get worse</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>40</td>
<td>41</td>
<td>122</td>
</tr>
</tbody>
</table>

| Overall %                        | 100           | 100              | 100       | 100     |
Several selected demographic characteristics of the respondents were considered to test this hypothesis. The selected demographic characteristics were: 1) place of residence, 2) age, 3) literacy level, 4) marital status, 5) number of children, 6) household composition, 7) employment status, 8) nature of work, 9) and location of work. Chi-Square and ANOVA was used to test this hypothesis. Significant relationships and differences were found between the following demographic variables and groups:

**Place of residence:** Table 19 shows data on the participants' place of residence in this research. The majority of the women in the sample (73%) live in the rural area as compared with only 27% who lived in the urban area. Differences in group means were found for place of residence. Eighty percent of participants in the voice and graphics treatment group lived in rural areas as compared to 76% of respondents in text only group and 63% of respondents in the control group. Chi-Square was calculated and found not to be statistically significant. A high percent of participants in the three groups lived in rural areas. This is consistent with the researcher's expectation about the place of residence of participants' being related to their literacy level according to Hamadache & Martin (1986). They state that there is a relationship between place of residence and literacy level. Higher percentages of low literate persons are frequently found living in rural areas.

**Age:** Table 20 presents findings on participants' age ranges. As illustrated in this table participants' ages ranged from 18 to 81. Most of the women in the
Table 19

**Frequency Distribution of Rural or Urban Place of Residence**

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Control Group</th>
<th>Voice Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$f$</td>
<td>$%$</td>
<td>$f$</td>
<td>$%$</td>
</tr>
<tr>
<td>Rural</td>
<td>26</td>
<td>63</td>
<td>32</td>
<td>81</td>
</tr>
<tr>
<td>Urban</td>
<td>15</td>
<td>37</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Chi-Square = $(2, n = 122) = 3.04, p = .22$

Cramer's $V = .158$
Table 20

Frequency Distribution of Participants' Age Ranges

<table>
<thead>
<tr>
<th>Age Ranges</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>10-19</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20-29</td>
<td>7</td>
<td>18</td>
<td>14</td>
<td>37</td>
</tr>
<tr>
<td>30-39</td>
<td>9</td>
<td>23</td>
<td>13</td>
<td>32</td>
</tr>
<tr>
<td>40-49</td>
<td>9</td>
<td>23</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>50-59</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>60-69</td>
<td>8</td>
<td>20</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>70-79</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80-89</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>39\textsuperscript{a}</td>
<td>100</td>
<td>40\textsuperscript{b}</td>
<td>100</td>
</tr>
</tbody>
</table>

\textsuperscript{a} 2 missing cases \hspace{1cm} \textsuperscript{b} M = 37 \hspace{1cm} \textsuperscript{c} 1 missing case \hspace{1cm} \textsuperscript{d} 3 missing cases
\textsuperscript{M} = 45 \hspace{1cm} \textsuperscript{SD} = 16.53 \hspace{1cm} \textsuperscript{M} = 40 \hspace{1cm} \textsuperscript{SD} = 14.33

For the Model: $F = 3.68, p = .03$
three groups (90%) have ages ranging from 20 to 81. The mean ages for the three groups were: control group ($M = 45$), voice and graphics group ($M = 37$), and text only group ($M = 40$). The control group women were the oldest of the three groups. ANOVA using raw data shows that there was a significant difference in the age of women in the three groups with F value ($F = 3.68, p = .03$). The median age for the three groups was 39 years of age. The age of the women who participated in this research were older than the women in the municipality who had a median age of 26 years (Census Bureau, 1990). It may be that young women have more family responsibilities and do not make time to join Homemakers Club.

**Literacy Level:** Table 21 presents findings on literacy level which is defined as the ability of women to read and write with understanding a short, simple statement as indicated by having completed at least grade 9. The majority of the women in the three groups were literate (9 years of schooling or more). Only 20% were non-literate. In general, participant literacy level for the three groups was more likely to be below 8 years of schooling ($M = 8$). About 80% of participants in the three groups were literate. However, the mean literacy levels (years of education) for the three groups were: control group, $M = 8$; voice and graphics, $M = 9$; and text only, $M = 7$. Perhaps there are fewer non-literate women in the study than expected because non-literate are less likely to participate in a Homemakers Club. There was not a significant relationship in literacy level among the three groups when Chi-Square was applied. The focus in
Table 21

Frequency Distribution of Participants' Literacy Status

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literate</td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Literatea</td>
<td>33</td>
<td>83</td>
<td>36</td>
<td>90</td>
</tr>
<tr>
<td>Non-Literate</td>
<td>7</td>
<td>17</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>40a</td>
<td>100</td>
<td>40b</td>
<td>100</td>
</tr>
</tbody>
</table>

^a 1 missing case
\( M = 8 \) \( \text{SD} = .38 \)
\( M = 9 \) \( \text{SD} = .30 \)
\( M = 7 \) \( \text{SD} = .46 \)
\( M = 8 \) \( \text{SD} = .39 \)

^definition: Ability of women to read and write with understanding a short, simple statement as indicated by having completed at least grade 9 (Census Bureau, 1980)

\( \chi^2 = (2, n = 121) = 5.23, p = .07 \)

Cramer's V = .21
this research was to test the effectiveness of the BCAI as an educational method, Beutler and Hogan (1986) found that education had a positive influence on the use of formalized budgeting.

**Marital Status:** The marital status of the women in the three groups is shown in Table 22. Overall participant marital status was distributed from the highest to the lowest percentages as follows: married/living together (61%), single/widowed (10%) and divorced/separated (29%). Married status was consistently highest for the three groups: control group (56%), voice and graphics (67%), and text only group (61%). Chi-Square revealed no statistically significant relationships for marital status among the three groups.

**Children Living at Home with Participant:** About half of women in the three groups (60%) reported having from one to four children living at home with them (See Table 23). About one third of them (34%) reported having no children at home. Only 6% of respondents in this research have from five to eight children living at home with them. There were no significant differences in the number of children living at home among the three groups (F = .98, p = .38) after ANOVA was applied.

**Persons Living at Home with Participants:** Data concerning the number of persons living at home with participants showed differences among groups. Participants having between none to three persons at home had the highest percentage (43%) as compared to 57% for those participant households that had
Table 22

Frequency Distribution of Marital Status

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Single/Widow</td>
<td>5</td>
<td>12</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>Married/Living Together</td>
<td>23</td>
<td>56</td>
<td>27</td>
<td>67</td>
</tr>
<tr>
<td>Divorced/Separated</td>
<td>13</td>
<td>31</td>
<td>9</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

a 1 missing case
Chi-Square = (4, n = 121) = 1.74, p = .78
Cramer's V = .08
Table 23

Frequency Distribution of Number of Children Living at Home with Participants

<table>
<thead>
<tr>
<th>Children Living at Home</th>
<th>Groups</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Group</td>
<td>Voice &amp; Graphics</td>
<td>Text Only</td>
<td>Overall</td>
<td></td>
</tr>
<tr>
<td></td>
<td>( f )</td>
<td>%</td>
<td>( f )</td>
<td>%</td>
<td>( f )</td>
</tr>
<tr>
<td>0</td>
<td>15</td>
<td>37</td>
<td>13</td>
<td>34</td>
<td>13</td>
</tr>
<tr>
<td>1-2</td>
<td>6</td>
<td>15</td>
<td>6</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>3-4</td>
<td>12</td>
<td>30</td>
<td>13</td>
<td>31</td>
<td>14</td>
</tr>
<tr>
<td>5-6</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>7-8</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>40(^a)</td>
<td>100</td>
<td>40</td>
<td>100</td>
<td>41</td>
</tr>
</tbody>
</table>

\(^a\) 1 missing case

For the Model: \( F = .98, p = .38 \)
four to 10 persons living at home. Women in the control group as well those in the voice and graphics group had a mean of three persons living with them as compared to those women in the text only group which had four people living with them (M = 4) (see Table 24). When ANOVA was applied, no significant difference in number of person living at home with participants was found for the three groups (F = .31, p = .73).

**Employment Status:** As reported in Table 25, differences among groups were also found for employment status. About 68% of respondents were unemployed. This is consistent for the women in the three groups, respectively, control group (61%), voice and graphics (63%), and text only (81%). There was no significant relationship between employment status and the three groups as revealed by Chi-Square.

**Workplace of Participant Working Outside the Home:** About 39% of participants in the voice and graphics group worked outside the home, as compared to those in the control group (42%) and those in text only (27%). There was no significant relationship between groups and participants who worked outside the home (refer to Table 26).

An open-end question was used to determine the workplace of those respondents who work outside the home (refer to Table 27). The majority of respondents (62%) worked in the public sector. A low percentage of participants worked in private sector (19%) and (19%) in other places. Comparing those
Table 24

Frequency Distribution of Number of Persons Living at Participants’ Home

<table>
<thead>
<tr>
<th>Persons Living at Home</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>1-3</td>
<td>18</td>
<td>46</td>
<td>14</td>
<td>36</td>
</tr>
<tr>
<td>4-6</td>
<td>19</td>
<td>48</td>
<td>22</td>
<td>53</td>
</tr>
<tr>
<td>7-10</td>
<td>3</td>
<td>7</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>40a</td>
<td>100</td>
<td>40b</td>
<td>100</td>
</tr>
</tbody>
</table>

a 1 missing case
Note: a b M for groups = 3  cM = 4  dM = 1
For the Model: F = .31, p = .73
Table 25

**Frequency Distribution of Participants' Employment Status**

<table>
<thead>
<tr>
<th>Employment Status</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>Employed</td>
<td>16</td>
<td>39</td>
<td>15</td>
<td>37</td>
</tr>
<tr>
<td>Unemployed</td>
<td>25</td>
<td>61</td>
<td>25</td>
<td>63</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Chi-Square = (2, n = 122) = 4.42, p = .11
Cramer’s V = .19
Table 26

**Frequency Distribution of Participants' Working Outside the Home**

<table>
<thead>
<tr>
<th>Working Outside the Home</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( f )</td>
<td>%</td>
<td>( f )</td>
<td>%</td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>42</td>
<td>16</td>
<td>39</td>
</tr>
<tr>
<td>No</td>
<td>24</td>
<td>58</td>
<td>24</td>
<td>61</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

Chi-Square = \( (2; n = 122) = 2.30, p = .31 \)

Crammer's V = .14
Table 27

Workplace for Women Working Outside the Home

<table>
<thead>
<tr>
<th>Groups</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
<th>( f )</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workplace</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public Sector</td>
<td>10</td>
<td>4</td>
<td>8</td>
<td>22</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td>Private Sector</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>7</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Other(^a)</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>10</td>
<td>13</td>
<td>36</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Note: Other\(^a\) includes self employed, and home business.
participants in the three groups that work outside the home, those that work in the public sector have the following percents: control group (77%), voice and graphic (40%) and text only (62%).

Examples of private sector workplaces are hotels and factories. Respondents indicated that another workplace was their own businesses or being self-employed. From Table 26 it can be inferred that the highest percent of the women in the three groups do not work outside the home because only 36 women indicated their place of work. Table 26 reveals that 64% of the women were not employed outside the home.

**Personal Income:** Groups differed in personal income status as shown in Table 28. Participant personal income ranged from 0 to $3,500. Eighty seven percent of respondents in the three groups had personal income less than $1,000. One hundred percent of women in the three groups had personal income below the poverty level for Puerto Rico which is $4,117. Women in control group had higher median personal income ($540.00) as compared in those in voice and graphics (MD = $378.00) and in text only (MD = $428.00). ANOVA analysis showed that there was no significant difference in personal income among the three groups (F = 1.94, p = .14).

The higher personal income of participants in the control group may be due to the higher percentages of women who were working outside the home and to the fact that they were more likely to be single/widowed or divorced/separated as compared to the other two groups.
Table 28

Frequency Distribution of Personal Income Status

<table>
<thead>
<tr>
<th>Personal Income</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>$0-500</td>
<td>18</td>
<td>50</td>
<td>20</td>
<td>57</td>
</tr>
<tr>
<td>$501-1000</td>
<td>11</td>
<td>33</td>
<td>12</td>
<td>37</td>
</tr>
<tr>
<td>$1001-1500</td>
<td>4</td>
<td>11</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>$1501-2000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$2001-2500</td>
<td>2</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$2501-3000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$3001-3500</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>36</td>
<td>100</td>
<td>34</td>
<td>100</td>
</tr>
</tbody>
</table>

\[ a \hspace{1cm} 5 \text{ missing cases} \]
\[ b \hspace{1cm} 6 \text{ missing cases} \]
\[ c \hspace{1cm} 2 \text{ missing case} \]
\[ d \hspace{1cm} 13 \text{ missing cases} \]

\[ M = \$676.41 \]
\[ SD = \$723.85 \]
\[ MD = \$540.00 \]

\[ M = \$447.28 \]
\[ SD = \$367.24 \]
\[ MD = \$378.00 \]

\[ M = \$465.56 \]
\[ SD = \$489.58 \]
\[ MD = \$428.00 \]

\[ M = \$529.02 \]
\[ SD = \$554.48 \]
\[ MD = \$428.00 \]

For the Model: \[ F = 1.94, \ p = .14 \]
Family Income: As shown in Table 29, the monthly mean income of the women's families was $714.43 and the median income was $520.00. Based on the median monthly income, their median annual income would be $6,240.00. According to the Census Bureau (1990), the annual median family income for Maunabo in 1990 was $7,444. These data indicate that the annual family median income of the three groups of women was lower than that of the 1990 Census. Respondents who participated in the voice and graphics group had a higher median family income ($580.00) as compared to those in the other two groups: control group (MD = $350.00) and text only (MD = $500.00). There was not a significant difference in family income among the three groups (F = 1.84, p = .17) when the ANOVA test was employed.

Number of Dependents on Participants' Income: The number of dependents on participants' income ranged from none to nine persons. Participants with one to three dependents had the highest percentages for the three groups (43%) compared to 16% of participants with no dependents on their income. Only 38% of participants had between four to nine persons who depended on their income. Women in the text only group had one to six persons that depended on their income (88%) as compared to those in the control group (73%) and voice and graphics group (77%) (see Table 30). ANOVA was used and results indicate that there was a significant difference in the number of persons who depended on participants' income by group (F = 5.34, p = .006).
Table 29

Frequency Distribution of Family Income Status

<table>
<thead>
<tr>
<th>Family Income</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>f</td>
<td>%</td>
<td>f</td>
<td>%</td>
</tr>
<tr>
<td>$0-500</td>
<td>21</td>
<td>57</td>
<td>16</td>
<td>43</td>
</tr>
<tr>
<td>$501-1000</td>
<td>6</td>
<td>16</td>
<td>13</td>
<td>39</td>
</tr>
<tr>
<td>$1001-1500</td>
<td>9</td>
<td>24</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>$1501-2000</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>$2001-2500</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$2501-3000</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$3001-3500</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$3501-4000</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>37a</td>
<td>100</td>
<td>36b</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>114d</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a 5 missing cases  b 6 missing cases  c 8 missing cases

\[ M = $556.75 \]  \[ M = $890.70 \]  \[ M = $692.44 \]  \[ M = $714.43 \]
\[ SD = $594.91 \]  \[ SD = $1033.39 \]  \[ SD = $643.57 \]  \[ SD = $785.97 \]
\[ MD = $350.00 \]  \[ MD = $580.00 \]  \[ MD = $500.00 \]  \[ MD = $520.00 \]

For the Model:  \[ F = 1.84, p = .17 \]
Table 30

Frequency Distribution of Number of Dependents Supported by Participants'

Income

<table>
<thead>
<tr>
<th>Number Depending on Income</th>
<th>Control Group</th>
<th>Voice &amp; Graphics</th>
<th>Text Only</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$f$</td>
<td>%</td>
<td>$f$</td>
<td>%</td>
</tr>
<tr>
<td>0</td>
<td>11</td>
<td>27</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td>1-3</td>
<td>18</td>
<td>44</td>
<td>16</td>
<td>40</td>
</tr>
<tr>
<td>4-6</td>
<td>12</td>
<td>29</td>
<td>15</td>
<td>37</td>
</tr>
<tr>
<td>7-9</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>

Total 41\textsuperscript{a} 100 40\textsuperscript{b} 100 41\textsuperscript{c} 100 122\textsuperscript{d} 100

Note: \textsuperscript{a} \textsuperscript{b} \textsuperscript{d}M = 3 \textsuperscript{c}M = 2
For the Model: F = 5.34, p = .006)
Null Hypothesis 2: There are no relationships between the pretest budgeting knowledge scores and the independent variables of: 1) age, 2) number of children, 3) literacy, 4) attitudes toward Budgeting Computer Assisted Instruction and 5) residence.

The independent variable, Attitudes Toward Computer Assisted instruction, was divided into three subscales: general attitudes toward computer, attitudes toward BCAI graphics, and attitudes toward BCAI voice.

Table 31 shows the means and the standard deviations of participants' pretest and posttest general attitudes toward BCAI, attitudes toward BCAI graphics and attitudes toward BCAI voice. Those women in the control group had positive posttest general attitudes toward computer and the BCAI (M = 86.88), positive attitudes toward BCAI graphics (M = 48.54) and neutral attitudes toward BCAI voice (M = 35.32). This is similar to those women who received the treatment with voice and graphics and had the following attitudes: positive attitudes toward computer (M = 82.68); positive attitudes toward BCAI graphics (M = 47.28), and neutral attitudes toward BCAI with voice (M = 35.90). Women who received the BCAI with voice only had the following attitudes: positive general attitudes toward computer and the BCAI (M = 82.78), neutral attitudes toward the BCAI voice (M = 34.71); and a positive attitudes toward the BCAI graphics (M = 45.34).

To test Hypothesis 2 Pearson Product-Moment and Point-biserial Correlation were used. There was no significant correlation between pretest
Table 31

Means and Standard Deviations of Participants' General Attitudes Toward BCAI, Toward BCAI Voice and BCAI Graphics

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Pre General Attitudes</th>
<th>Post General Attitudes</th>
<th>Pre Attitudes Toward Graphics</th>
<th>Post Attitudes Toward Graphics</th>
<th>Pre Attitudes Toward Voice</th>
<th>Post Attitudes Toward Voice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
<td>M  SD</td>
</tr>
<tr>
<td>Voice &amp; Graphics</td>
<td>85.30 8.59</td>
<td>82.68 9.51</td>
<td>47.03 6.57</td>
<td>47.28 6.70</td>
<td>37.75 7.37</td>
<td>35.90 9.34</td>
</tr>
<tr>
<td>Text Only</td>
<td>82.20 8.56</td>
<td>82.78 9.01</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>86.88 7.38</td>
<td>85.39 7.32</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a n = 41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b n = 40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: 5-Point Likert Scale used with 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree
General Attitudes Scale ratings range from 23 to 115.
Attitudes toward Graphics Scale ratings range from 12 to 60.
Attitudes toward Voice Scale ratings range from 12 to 60.
budgeting knowledge scores and age, number of children, place of residence and attitudes toward BCAI voice.

Table 32 contains information on the relationships between the dependent and independent variables. Pearson Correlations show that there was a positive moderate association between literacy and pretest budgeting knowledge \((r = .30, p = .00)\). Also a positive moderate association existed between pretest budgeting knowledge and general attitudes toward BCAI \((r = .32, p = .00)\) as well with attitudes toward BCAI graphics \((r = .35, p = .00)\). For the SAS correlation matrix containing all the variables that were analyzed, refer to Appendix M.

**Null Hypothesis 3:** Literacy, marital status, age, place of residence, and number of children do not explain a significant proportion of the variability in the pretest budgeting knowledge scores.

Analysis of Covariance (ANCOVA) was used to test this hypothesis. As shown in Table 33, the demographic variables were all entered together into the model. Only literacy was statistically significant. Consequently, the null hypothesis is accepted for marital status \((F = .97, p = .55)\), age \((F = 9.76, p = .99)\), place of residence \((F = .70, p = .40)\), and number of children \((F = .15, p = .84)\) (refer to Table 33).

A model with literacy alone explained 8% of the pretest knowledge scores. As shown in Table 34 the probability associated with the F value \((F = 11.04, p = 0.002)\) is lower than alpha .05. The null hypothesis was rejected for literacy.
Table 32

Relationships Between Pretest Budgeting Knowledge and Independent Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>119</td>
<td>-.05</td>
<td>.60</td>
</tr>
<tr>
<td>Number of Children</td>
<td>121</td>
<td>-.10</td>
<td>.28</td>
</tr>
<tr>
<td>Literacy</td>
<td>120</td>
<td>.30</td>
<td>.00</td>
</tr>
<tr>
<td>Place of Residence</td>
<td>122</td>
<td>.13</td>
<td>.14</td>
</tr>
<tr>
<td>General Attitudes Toward BCAI</td>
<td>122</td>
<td>.32</td>
<td>.00</td>
</tr>
<tr>
<td>Attitudes Toward BCAI Graphics</td>
<td>122</td>
<td>.35</td>
<td>.00</td>
</tr>
<tr>
<td>Attitudes Toward BCAI Voice</td>
<td>122</td>
<td>.05</td>
<td>.57</td>
</tr>
</tbody>
</table>

*a Pearson Correlation
*b Point-Biserial Correlation
Table 33

Analysis of Covariance: Pretest with Literacy, Marital Status, Age, Place of Residence, and Number of Children as Covariates

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of Residence</td>
<td>1</td>
<td>8.7910</td>
<td>8.7910</td>
<td>.70</td>
<td>.404</td>
</tr>
<tr>
<td>Marital Status</td>
<td>5</td>
<td>50.4245</td>
<td>10.0849</td>
<td>.97</td>
<td>.549</td>
</tr>
<tr>
<td>Number of Children</td>
<td>1</td>
<td>.4742</td>
<td>.4742</td>
<td>.15</td>
<td>.846</td>
</tr>
<tr>
<td>Literacy</td>
<td>1</td>
<td>122.4227</td>
<td>122.4227</td>
<td>11.04</td>
<td>.002</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>.00005</td>
<td>.00005</td>
<td>9.76</td>
<td>.998</td>
</tr>
<tr>
<td>Error</td>
<td>108</td>
<td>1354.4977</td>
<td>12.5416</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>117</td>
<td>1581.9745</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 34

Analysis of Covariance: Budgeting Knowledge Pretest with Literacy as a Covariate

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literacy</td>
<td>1</td>
<td>140.0270</td>
<td>122.4227</td>
<td>11.45</td>
<td>.001</td>
</tr>
<tr>
<td>Error</td>
<td>118</td>
<td>1442.7729</td>
<td>12.5416</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>119</td>
<td>1582.8000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the model: \( R^2 = .08 \)
Figure 11 shows the distribution of the covariate pretest budgeting knowledge scores and the independent variable, literacy.

**Null Hypothesis 4:** Pretest budgeting knowledge scores do not explain a significant proportion of the variance in the budgeting posttest scores.

Simple regression was used to explain the variance in the posttest budgeting knowledge scores related to budgeting knowledge pretest scores. This method allows the researcher to determine if posttest budgeting knowledge can be explained by its relationship with pretest budgeting knowledge. Residuals were analyzed by plotting the overall and normal scatterplot. Residuals are normally distributed with a mean of zero and residuals fall between +3 to -3. Figure 12 indicates that 91% of the cases are between +3 to -3.

As shown in Table 35 pretest budgeting knowledge scores explained a significant proportion of the variance in the posttest budgeting knowledge scores. About 55% of variability of pretest budgeting knowledge scores can be explained by pretest budgeting knowledge scores ($R^2$). The correlation coefficient of pretest budgeting knowledge scores with posttest budgeting knowledge scores is .74. Figure 13 shows the plots of the pretest and posttest budgeting scores.

The probability associated with the F value ($F$, (1,116) = 150.3155, $p$ = .00001) is less than alpha 0.05 (refer to Table 34). The null hypothesis was
Figure 11. Plot of Literacy Level of Participants

Note: A = 1 obs, B = 2 obs, etc.
Figure 12. Standardized Scatterplot

Across - Pretest of Budgeting Knowledge  Down - *Residuals
Table 35

**Regression Values of Pretest Budgeting Knowledge Scores**

<table>
<thead>
<tr>
<th>Variable</th>
<th>$R$</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>b</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Budgeting Knowledge Scores</td>
<td>.74</td>
<td>.55</td>
<td>.55</td>
<td>.74</td>
<td>150.3155</td>
<td>.0000</td>
</tr>
</tbody>
</table>

$MS = 840.8573$

Standard Error = 2.36

df = 1
Pretest Budgeting Knowledge

Figure 13.  Plot of Posttest Budgeting Knowledge with Pretest Budgeting Knowledge Scores

Note:  122 cases plotted
rejected. Therefore, pretest budgeting knowledge scores explained a significant portion of the variance of the posttest budgeting knowledge scores.

Null Hypothesis 5: Those women in the two groups using the Budgeting Computer Assisted Instruction (i.e., voice and graphics, and text only) do not have significantly higher posttest budgeting knowledge scores than those women in the control group after controlling for pretest budgeting knowledge.

Using Analysis of Covariance (ANCOVA), the budgeting knowledge scores were analyzed. ANCOVA was used to test differences, between groups that received the BCAI and the control group, in the posttest budgeting knowledge scores using the pretest budgeting knowledge scores as a covariate. The dependent variable is the subject’s scores on budgeting knowledge posttest. The probability level of making type 1 error was set at 0.05.

Interaction between pretest budgeting knowledge scores and treatment groups was found to be significant, F (2,116) = 3.31, p = .04 (Table 36). Significant departure from parallelism was observed (Figure 14). As shown in Figure 14 posttest budgeting knowledge scores depend on both pretest and group. Higher posttest scores were always associated with higher pretest scores. However, women who received the BCAI with text only had higher posttest scores as compared to the other two groups when the pretest budgeting knowledge scores were less than 10.00. Participants in the treatment group with voice and
Table 36

Analysis of Covariance: Posttest Scores of Budgeting Knowledge with Budgeting Knowledge Pretest as Covariates

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>2</td>
<td>39.6973</td>
<td>19.8486</td>
<td>3.27</td>
<td>.04</td>
</tr>
<tr>
<td>Pretest Budgeting Knowledge Scores</td>
<td>1</td>
<td>919.0127</td>
<td>919.0127</td>
<td>151.45</td>
<td>.00</td>
</tr>
<tr>
<td>Pretest Budgeting Knowledge Scores by Group</td>
<td>2</td>
<td>40.1241</td>
<td>40.1241</td>
<td>3.31</td>
<td>.04</td>
</tr>
<tr>
<td>Error</td>
<td>116</td>
<td>703.9200</td>
<td>6.0683</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>121</td>
<td>1688.3688</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 14. **Plot of Pretest Budgeting and Posttest Budgeting Knowledge Scores**

Note: A = 1 obs, B = 2 obs, etc.
graphics and those in the control group had higher posttest budgeting knowledge scores than participants in the text only group when the pretest knowledge scores were higher than 10.00. The null hypothesis was rejected for the voice and graphics group and accepted for the text only group.

Regression was used to assess how pretest budgeting knowledge scores explained variability in the posttest budgeting knowledge scores. Participants' posttest scores for the two treatment groups and the control group are shown in Table 37. Pretest budgeting knowledge scores significantly ($p = .0001$) explained 65% of the variance in the posttest knowledge scores in the voice and graphics treatment group. The regression analysis for the treatment group that received the BCAI with text only with the values of $F (1,39) = 18.69, p = .0001$ accounted for 2% of the variability of the posttest budgeting knowledge scores. For those women who participated in the control group, pretest budgeting knowledge scores accounted for a significant amount (71%) of the variability in the posttest budgeting knowledge scores with the probability of $F (1,39) = 96.44, p = .0001$ (see Table 37). For both text only and control groups the probability associated with the $p$ was less than .05.

In order to assess how groups were different using the pretest as covariates, the mean posttest scores were statistically adjusted to reflect any differences which may have existed among groups prior to the treatment. The unadjusted and adjusted posttest budgeting knowledge mean scores of women in the three treatment groups are displayed in Table 38. Women who used the BCAI with
Table 37

**Regression Analysis: Budgeting Knowledge Posttest Scores with Pretest Budgeting Knowledge Scores as Covariates in the Three Groups**

<table>
<thead>
<tr>
<th>Group</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Voice &amp; Graphics</strong>(^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest Budgeting Knowledge</td>
<td>1</td>
<td>425.3120</td>
<td>425.3120</td>
<td>72.06</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>38</td>
<td>224.2879</td>
<td>5.9023</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>39</td>
<td>649.6000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Text Only</strong>(^b)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest Budgeting Knowledge</td>
<td>1</td>
<td>156.0953</td>
<td>156.0953</td>
<td>18.69</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>39</td>
<td>325.8071</td>
<td>8.3540</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>40</td>
<td>481.9024</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control Group</strong>(^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretest Budgeting Knowledge</td>
<td>1</td>
<td>380.3701</td>
<td>380.3701</td>
<td>96.44</td>
<td>.0001</td>
</tr>
<tr>
<td>Error</td>
<td>39</td>
<td>153.8250</td>
<td>3.9442</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>40</td>
<td>534.1951</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the Model: \(^aR^2 = .65\), \(^bR^2 = .32\), \(^cR^2 = .71\).
Table 38

Pretest and Posttest Means Scores of Budgeting Knowledge

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Pretest</th>
<th>Unadjusted</th>
<th>Adjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group</td>
<td>41</td>
<td>9.27</td>
<td>9.46</td>
<td>9.52</td>
</tr>
<tr>
<td>Voice &amp; Graphics</td>
<td>40</td>
<td>9.65</td>
<td>10.10</td>
<td>9.89</td>
</tr>
<tr>
<td>Text Only</td>
<td>41</td>
<td>8.27</td>
<td>9.05</td>
<td>8.26</td>
</tr>
</tbody>
</table>
voice and graphics had a higher posttest budgeting knowledge mean ($M = 10.10$) when compared with those who did not receive the BCAI and were in the control group ($M = 9.46$). Women who received the BCAI with the text only had a lower mean score ($M = 9.05$) than those in the voice and graphics group and lower than those in the control group. Refer to Table 39.

This indicates that the group of women who received the BCAI in the voice and graphics group gained more posttest budgeting knowledge as compared to those in the text only group and control group when they scored more than 10 on pretest budgeting knowledge. Women in the control group had the lower posttest budgeting knowledge scores as compared to the other two groups when they scored less than 10 on the pretest budgeting knowledge scores. Women in the voice and graphics group with scores less than 10 on pretest budgeting knowledge increased their posttest budgeting knowledge scores more than women in the text only group. Therefore, the BCAI with voice and graphics and with text only is shown to be effective in teaching women with low pretest budgeting knowledge scores.

The variance in the scores of participants in the three groups can result from the design features of the treatment, the design of the study as well of the literacy level of participants. About 71% of women in the text only group were literate as compared with 90% and 83% in the voice and graphics and control groups, respectively. Women with low pretest budgeting knowledge scores did better with the BCAI with text only and voice and graphics than those in the
Table 39

Means and Standard Deviations of Participant's Budgeting Knowledge Scores on Pretest and Posttest by Treatment and Control Groups

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Voice &amp; Graphics&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Text Only&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Control Group&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
</tr>
<tr>
<td>Mean</td>
<td>9.65</td>
<td>10.10</td>
<td>8.27</td>
</tr>
<tr>
<td>St Dev</td>
<td>3.89</td>
<td>4.08</td>
<td>3.61</td>
</tr>
</tbody>
</table>

<sup>a</sup>n = 41  
<sup>b</sup>n = 40
control group. The design of the study can also be a factor that effects the results. Women in the control group answered only the three instruments as compared with the other two groups that received treatments. The higher posttest scores of the control group could have resulted from the budgeting knowledge gained from the pretest. However, the increase of posttest budgeting knowledge scores of the women who received the BCAI with voice and graphics could result from their experience with the BCAI. The lowest posttest scores of women who received the BCAI with text only can be the result of the design features of this BCAI without graphics and voice.

The results of this study were consistent with research done by Shiau (1989) and Goodrich (1990) who recognize computers as a method of teaching, and that learning occurs through the use of computer-assisted instruction. Studies done by Caldwell and Held (1984), Canada and Brusca (1990), and Sian, Macleod, Glisso, & Durndell (1990) demonstrated that computers can be an effective way to help low-literate learners and women to gain basic skills, to expose them to computers as well as to gain computer skills.

Null Hypothesis 6: General attitudes about the computer and the Budgeting Computer Assisted Instruction do not explain the variability of posttest knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the two groups using the Budgeting Computer Assisted Instruction.
Using Multiple Regression this hypothesis was tested. This analysis shows that general attitudes (F (1,37) = .59, p = .45) did not explain variance in the posttest budgeting knowledge scores over and above the pretest budgeting knowledge scores (F (1,37) = 71.27, p = .001) in the voice and graphics treatment group (refer to Table 40). The variability of the pretest budgeting knowledge scores was over and above the variability of posttest budgeting knowledge scores. Pretest budgeting knowledge scores explained 66% of the variance in the posttest budgeting knowledge scores in the treatment group that received BCAI with voice and graphics. The alpha value is less than .05. The null hypothesis was accepted for general attitudes toward computer and rejected for pretest budgeting knowledge.

As shown in Table 41, for the treatment group with text only, general attitudes toward BCAI (F (1,38) = 3.53, p = .068) did not explain a significant proportion of the variance in the posttest budgeting scores and pretest budgeting knowledge scores were over and above the variance of general attitudes toward BCAI with value of F (1,38) = 19.90, p = .001. Thus, general attitudes toward the computer and the BCAI did not explain the variability of the posttest budgeting knowledge in treatment groups that received the BCAI with voice and graphics and the treatment group that received the BCAI with text only over and above the pretest budgeting knowledge scores.
Table 40

**Multiple Regression: Posttest Budgeting Knowledge Scores with as General Attitudes Toward BCAI of Participants who Received the BCAI with Voice and Graphics**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Budgeting Knowledge Scores</td>
<td>1</td>
<td>425.3121</td>
<td>425.3121</td>
<td>71.27</td>
<td>.001</td>
</tr>
<tr>
<td>General Attitudes Toward BCAI</td>
<td>1</td>
<td>3.4976</td>
<td>3.4976</td>
<td>.59</td>
<td>.45</td>
</tr>
<tr>
<td>Error</td>
<td>37</td>
<td>220.7903</td>
<td>5.9673</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>649.6000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the model: R² = .66
Table 41

Multiple Regression: Posttest Budgeting Knowledge Scores with General Attitudes Toward BCAI of Participants who Received BCAI with Text Only

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Budgeting Knowledge Scores</td>
<td>1</td>
<td>156.0953</td>
<td>156.0953</td>
<td>19.90</td>
<td>.001</td>
</tr>
<tr>
<td>General Attitudes Toward BCAI</td>
<td>1</td>
<td>27.7059</td>
<td>27.7059</td>
<td>3.53</td>
<td>.068</td>
</tr>
<tr>
<td>Error</td>
<td>38</td>
<td>298.1012</td>
<td>7.8447</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>481.9024</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the model: $R^2 = .38$
Null Hypothesis 7: Computer attitudes in regard to voice and graphics do not explain variability in the posttest budgeting scores, over and above the variability explained by the pretest budgeting knowledge scores in the group using the Budgeting Computer Assisted Instruction.

Multiple Regression analysis was used to determine if attitudes toward voice and attitudes explained the variability in posttest budgeting knowledge scores. Semi partial correlation was selected as a method of entering the variables into the equation because the literature did not provide a theoretical framework to guide the order in which the independent variables should be entered into the equation. Semi partial correlation was used to determine the contribution of attitudes toward voice and graphics to the variability of the posttest budgeting scores over and above the variability explained by pretest budgeting knowledge scores. Attitudes toward BCAI (as two separate subscales) and pretest budgeting knowledge scores as independent variables were entered into the equation.

Multiple Regression was used to determine the contribution of attitudes toward computer graphics in the BCAI. As shown in Table 42, attitudes toward graphics explained 73% of the variance in posttest budgeting scores of women who were instructed by the BCAI with voice and graphics with a significant F value of (1,37) = 8.28, p = .006. The null hypothesis was rejected for voice and graphics group in that graphics explained variability over and above pretest
Table 42

Multiple Regression: Posttest Budgeting Knowledge Scores with Attitudes Toward Graphics of Participants who Received the BCAI with Voice and Graphics

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Budgeting Knowledge Scores</td>
<td>1</td>
<td>425.3120</td>
<td>425.3120</td>
<td>85.87</td>
<td>.000</td>
</tr>
<tr>
<td>Attitudes Toward Graphics</td>
<td>1</td>
<td>41.0284</td>
<td>41.0284</td>
<td>8.28</td>
<td>.006</td>
</tr>
<tr>
<td>Error</td>
<td>37</td>
<td>183.2596</td>
<td>4.9529</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>649.6000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the model: $R^2 = .73$
budgeting knowledge scores. Figure 15 shows the dispersion of the scores reflecting women's attitudes toward the BCAI graphics and the posttest budgeting scores. Attitudes toward BCAI graphics significantly explained variability of posttest budgeting knowledge scores of women in the voice and graphics group.

Multiple regression was used to determine if attitudes toward voice explained the variance in the posttest budgeting knowledge scores of women who received the voice and graphics BCAI, over and above the variability explained by pretest budgeting knowledge scores. As shown in Table 43, attitudes toward voice did not explain \((p = .76)\) the variance in the posttest budgeting knowledge scores of the women who received the voice and graphics BCAI, over and above the pretest budgeting knowledge scores (Refer to Table 43). The null hypothesis was accepted; attitudes toward voice did not explain the variance in the posttest budgeting knowledge scores of participants who received the BCAI with voice and graphics over and above the pretest budgeting knowledge scores.

The findings in this study are in agreement with those done by Doll (1986) and Reed (1985) which failed to show the effectiveness of computer programs enhanced with graphics. Participants in the Reed study failed to perceive and interpret the information presented by the program.
Figure 15.  
Plot of Posttest Budgeting and Attitudes Toward Graphics

Note: A = 1 obs, B = 2 obs, etc.
Table 43

Multiple Regression: Budgeting Knowledge Scores with Attitudes Toward Voice of Participants who Received the BCAI with Voice and Graphics

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest Budgeting Knowledge</td>
<td>1</td>
<td>425.3120</td>
<td>425.3120</td>
<td>70.34</td>
<td>.00</td>
</tr>
<tr>
<td>Attitudes Toward Voice</td>
<td>1</td>
<td>.5814</td>
<td>.5814</td>
<td>.10</td>
<td>.76</td>
</tr>
<tr>
<td>Error</td>
<td>37</td>
<td>223.7066</td>
<td>6.0461</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>649.6000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For the model: $R^2 = 65$
Summary

In testing the research question and hypotheses, analysis consisted of frequencies, Central Tendency Measures, correlation, ANCOVA, Regression, Chi-Square, and ANOVA.

For Research Question 1, participants were asked to identify their perceived alternatives for life situations to cope with financial crises. Five open-ended questions assessed the women's perceptions about life issues that create financial crises such as job loss, divorce, accident, illness, and death in the family. Find another job and family help were the most common answers to cope with life situations that create financial crises such as job loss, divorce, accident, illness, and death in the family.

Research Question 2 was designed to assess how women perceived the role of money management in meeting family needs, goals and desires. Participants perceived budgeting and saving as important in home management. Almost half of respondents felt unhappy about their economic situation. No significant relationship was found between participants' feelings about their economic situation as result of Chi-Square. Women did not expect to achieve their personal or family needs, desires, goals and wants. No significant relationship was found between participants' expectations to achieve family needs, desires, goals and wants among the three groups. However, almost all respondents thought that budgeting could help them to meet needs, attains goals and desires.
Hypothesis 1 was designed to determine if there were differences in demographic characteristics of the women between groups. ANOVA and Chi-Square were used to test this hypothesis. ANOVA was used to determine if differences existed between groups when demographic variables were continuous. Significant differences were found between groups for the demographic variables of age and number of dependents relying on participants' income. Groups were significantly different on age as follows: control group (M = 45), voice and graphics group (M = 37), and text only group (M = 40). In term of the variable, number of dependents on participants' income, women in the three groups who had one to three dependents had the highest percentages for the three groups (43%) compared to 16% of participants with no dependents on their income. No significant differences were found among the groups on number of children living with participants, household, personal and family income.

Chi-Square was used to determine if relationships existed, in participants' demographic characteristics among groups for categorical variables. No relationships were found among groups on the following demographic variables: literacy, place of residence, marital status, employment status, and workplace. Pearson Product-Moment and Point-Biserial Correlations were used to test Hypothesis 2, if relationships existed between the pretest budgeting knowledge scores and the independent variables age, number of children, literacy, place of residence and attitudes toward BCAI. Pearson Product-Moment correlation showed that pretest budgeting knowledge scores were not significantly correlated
with age and number of children. Point-Biserial analyses showed that there was no relationship between pretest budgeting knowledge scores and place of residence. The analysis showed that a statistically significant positive moderate association ($r = .30$) was found between literacy (treated as a continuous variable) and pretest budgeting knowledge scores. The demographic variable, Attitudes toward BCAI, was divided into three subscales: general attitudes toward computer and BCAI, attitudes toward BCAI with graphics, and attitudes toward BCAI with voice. Subsequently, there were statistically significant moderate associations between pretest budgeting knowledge scores ($r = .32$) and general attitudes toward BCAI and attitudes toward BCAI graphics ($r = .35$).

Hypothesis 3 was designed to determine if the independent variables of literacy, marital status, age, place of residence and number of children explained variability in pretest budgeting knowledge scores. ANCOVA was used to test this hypothesis. Literacy alone explained only 8% of the variability of the pretest budgeting knowledge scores. Consequently, Hypothesis 3 was rejected for literacy and accepted for marital status, age, place of residence and number of children.

After investigating how the demographic variables explained variability in pretest budgeting scores, tests were conducted to determine if pretest budgeting knowledge scores explained variability in posttest knowledge scores. Simple regression was used because only pretest and posttest budgeting knowledge scores were entered into the model. Pretest budgeting knowledge explained 55% of the variance in the posttest budgeting knowledge scores. Therefore, Hypothesis 4 was
rejected. Pretest budgeting knowledge scores explained variability in the posttest budgeting knowledge scores.

The researcher was interested in assessing how groups differed on posttest budgeting scores. To test Hypothesis 5, ANCOVA was used. Significant interaction was found between treatment group and the pretest budgeting knowledge scores. High posttest budgeting knowledge scores were associated with high pretest scores. Groups differed on the posttest budgeting scores. Women who participated in the BCAI with voice and graphics had higher mean scores as compared to those in the control group and those in the text only group. However, women in the control group had higher mean scores than those who received the BCAI with text only.

Hypothesis 6 was designed to test if attitudes toward the computer and BCAI explained the variance in the posttest budgeting scores. The null hypothesis was accepted for both groups; general attitudes toward computer and toward BCAI did not explain the variability in the posttest budgeting scores in the two groups that received the BCAI with voice and graphics and the BCAI with text only over and above the pretest budgeting knowledge scores.

Hypothesis 7 was designed to assess if attitudes toward graphics and voice explained variance in the posttest budgeting scores of participants who received the BCAI with voice and graphics, over and above the pretest budgeting knowledge scores. Multiple regression was used. The result of this analysis showed that attitudes toward graphics explained 73% of the variance of the
posttest budgeting scores of participants over the pretest budgeting scores. However, attitudes toward voice did not explain the variability in the posttest budgeting scores in the voice and graphics treatment group. Subsequently, the null hypothesis was rejected for attitudes toward BCAI graphics and accepted for attitudes toward BCAI with voice.
CHAPTER V
SUMMARY, CONCLUSIONS, IMPLICATIONS
AND RECOMMENDATIONS

Summary

The purpose in this study was to investigate the effect of two computerized methods of teaching on knowledge of budgeting for literate and non-literate women in Puerto Rico. The two pieces of budgeting computer software, one with text only and one with graphics and voice enhancements were used.

This study was needed in Puerto Rico since few educational institutions are devoted to teaching adult learners. This study focused on testing budgeting computer assisted instruction which had not been done previously. For Puerto Rican families, the economic situation continues to be a problem. Puerto Rico has been subject to social, political, and economic changes that have affected the quality of life of families and individuals. These are results of industrialization, increased use of technology and educational facilities, as well as changes in consumer behavior and life styles. As pointed out by the P.R. Agricultural Extension Service (1994) such changes can be found in forms of: high cost of living, misuse of money and credit, increase in wage-earner couples, higher divorce rate, teenage pregnancies, increased number of female households heads,
increased number of women in the labor force, and increased number of elderly and single households. In Puerto Rico, high percentages of women's educational levels are still in pre and illiterate stages. Low-literate women as learners need innovative and individualized teaching methods to stimulate them to use them, especially when the learning process takes place in informal settings, such as Cooperative Extension Service.

As a result of these situations, a Budgeting Computerized Assisted Instruction was designed to use as a method for teaching low literate women. These adult women and low or illiterate learners have special learning styles and needs. Subsequently, the two BCAI were designed as methods for teaching adult low literate women in Puerto Rico. A Budgeting Computer Assisted Instruction with voice and graphics is a computer software, enhanced with graphics and voice, designed to allow consumers to set up a family budget.

In designing the BCAI, principles of teaching adult learners, theories about low and illiterate learners, computerized assisted instruction techniques and family resource management concepts and theory were used. The BCAI presented the budgeting concepts in five steps: 1) goal planning, 2) budget analysis, 3) budget modification, 4) budgeting 5) recommendations.

Two versions of the BCAI were designed, one enhanced with voice and graphics and one with text only. In the process of the development of the BCAI an English version was designed first and translated to Spanish. An Ohio State University professor verified the accuracy of the translation.
A randomized pretest-posttest control group design was used. A true experimental design is used to investigate cause-effect relationships. The purpose in this experimental study was to investigate if a Budgeting Computer Assisted Instruction (BCAI) with voice and graphics could enhance the budgeting knowledge of Puerto Rican literate and non literate women as compared with another computerized BCAI with text only.

The dependent variable, budgeting knowledge, was selected by the researcher as the area of interest. The selection was done because of the Puerto Rico women’s situations, their many economic problems and the few educational institutions that help them to improve their financial management knowledge and skills. Eight independent variables were selected: 1) teaching methods (BCAI with voice and graphics, BCAI with text only and a control group), 2) literacy, 3) age, 4) place of residence, 5) attitudes toward BCAI, 6) number of children, 7) marital status and 8) pretest budgeting knowledge. Each woman who participated in the research provided data on the independent variables. Two research questions sought information about the woman’s perceived alternatives for life situations that create financial crises and how the women perceived the role of money management in meeting family needs, goals and desires.

Grade level was used as index of literacy because a short length, Adult Spanish Standardized test for measuring literacy was not found. A literate woman was defined as a woman able to read and write with understanding a short, simple statement as indicated by having completed at least grade 9.
The research site selected was Puerto Rico (P.R.) since the researcher is a Puerto Rican native and works and lives there. Maunabo was the municipality randomly selected for this study. Maunabo was one of the municipalities with high literacy level as reported by the P.R. Department of Education.

The target population was literate and non-literate Puerto Rican women of this municipality. Women who participated in this research were randomly selected. One hundred twenty three subjects were randomly assigned to three groups; the two treatment groups and the control group. The first group (n = 40) consisted of women who received the BCAI with voice and graphics, the pretest of budgeting knowledge, attitudes toward BCAI, the demographic characteristics instrument, the posttest attitudes toward BCAI scale and the posttest budgeting knowledge test. The second group (n = 41) included participants who received the BCAI with text only and the instruments. The control group (n = 41) received only the pretest and posttest of the budgeting knowledge questionnaire, the attitudes toward computer scale and the demographic characteristics instrument. One subject was dropped from the voice and graphics group because of her outlier scores. Therefore, different groups of women were exposed to different levels of the independent variable, method of teaching. In that way, specific numbers of women experienced only one level of the manipulated variable.

Content validity procedure was followed in this study as well as reliability testing. Four experts in family resource management were consulted for content
validity and Puerto Rico Extension specialists for population validity. Two field
tests were conducted to test the validity of the instruments in term of item clarity,
wording, length, format, the instruments' overall appearance, and which objectives
the items measure. Changes were made to the instruments after these field tests.

The reliability for the budgeting knowledge questionnaire and the attitudes
toward BCAI scale was established through pilot testing that was conducted in
Puerto Rico. Dichotomous alpha, Cronbach Alpha and test-retest procedures
were used for reliability purposes. Nunnally's rule of thumb was followed. This
rule established 0.5 to 0.6 reliability coefficient as an acceptable in early research
stages. The results of the test-retest of the budgeting knowledge questionnaire
showed that the percentage of agreement ranged from 60 to 100 for the 23 items
with a Mean = 73 and a Median = 84. The reliability coefficient measuring
internal consistency of the budgeting knowledge questionnaire using data from the
main study was 0.88 (n = 122) which surpasses Nunnally's recommendation.

For attitudes toward BCAI the test-retest procedure indicated that the
percentage of agreement ranged from 36 to 86% for the 52 items with Mean = 65
and Median = 64. The Cronbach alpha on data in the main study indicated a
reliability coefficient of .91 for attitudes toward BCAI scale (n = 122).

The Minnesota Method was used to determine difficulty index. The item
analysis indicated that the average difficulty index for the budgeting knowledge
scores was 60 and item difficulty ranged from 12 to 100% (higher numbers
indicate easier items).
The data for this study were collected in Summer, 1993, using a computer-aided interviewing technique to collect the pretest and posttest data and information from the three instruments designed for this research: Budgeting Knowledge Questionnaire, a Demographic Characteristics Instrument that included open-end questions to assess the women's perceived role of budgeting in the meeting family goals, wants, needs and desires, and Attitudes Toward BCAI.

Six computers were set-up for this research: two with the BCAI with voice and graphics; two with BCAI with text only and two with pre/posttest (control group). Each of the computers with voice and graphics was situated in different places in the Extension office. The two computers with text only were placed together in the same location and the two with pre/posttest in another area in the office.

Prior to the treatment, participants in each group were given a pretest to measure the dependent variable, budgeting knowledge. The pretest was used as covariate. The pretest was used to describe groups' budgeting knowledge before the treatment and to compare the scores with those from the posttest to assess if an increase in budgeting knowledge occurred.

Inferential statistics and descriptive analysis were used to test and analyze two research questions and seven hypotheses. Each hypothesis was tested at alpha level .05. The methods used in statistical analysis were ANCOVA, Regression, Pearson Product-Moment, Point-Biserial, Correlation, ANOVA. The
descriptive statistics used were Chi-Square, Measures of Central Tendency and percentages.

Findings

Research Question 1: What are the women's perceived alternatives for life situations to cope with financial crises?

Five open-ended questions were designed to assess participant perceived alternatives for coping with life situations such as job loss, divorce, accident, illness, and death that create financial crises. The most common responses to life situations such as job loss, divorce, accidents, illness, death were to find another job and family help.

Research Question 2: How do the women perceive the role of money management in meeting family needs, goals and desires?

Research Question 2 asked women about the role of money management in meeting family needs, goals and desires. One hundred percent of the women perceived budgeting and saving as important in home management but did not believe that budgeting would help them to meet their needs, wants, goals and desires. In general, about 50% of women in the three groups felt unhappy about their economic situation and did not believe that they could achieve family goals in a short period of time. However, they expected to save in the future. No relationships were found between expectation to achieve needs, wants, goals, and
desires and participants' feelings about their economic situation among the three groups.

**Hypothesis 1:** There are significant differences among the demographic variables for the women in each of the three groups.

The results of ANOVA showed that significant differences were found among groups on the demographic variables, age and number of persons who depend on participants' income. Women in the three groups have a median age of 39 years. Women in the three groups have a mean of three persons as dependents on their income. No significant differences were found in the three groups on the variables: grade level, number of children, number of persons living at home with participant, personal income, and family income.

Chi-Square was calculated and found not to yield significant relationships on the categorical variables by group. No relationships were found among groups on the following: literacy, place of residence, marital status, employment status, and workplace.

**Hypothesis 2:** There are relationships between the budgeting knowledge scores and the independent variables: 1) age, 2) number of children, 3) literacy, 4) attitudes toward computer and 5) residence.

The statistical analyses (Pearson Product-Moment and Point-biserial Correlation) show that there was a positive moderate association between literacy, general attitudes toward BCAI and attitudes toward graphics and pretest budgeting knowledge. A positive moderate association was found between
literacy and pretest budgeting knowledge (.30), between pretest budgeting
knowledge and general attitudes toward BCAI and computers (.32) and between
attitudes toward BCAI graphics (.35).

No significant correlation existed between pretest budgeting knowledge
scores and the demographic variables: age, number of children, place of
residence and attitudes toward BCAI voice.

**Hypothesis 3:** Literacy, marital status, age, place of
residence, and number of children explain
a significant proportion of the variability
in the pretest budgeting knowledge scores.

It was found that literacy accounted only for 8% of the variance in the
pretest budgeting knowledge scores when this variable was entered in the model.
Therefore, the null hypothesis was rejected for literacy and accepted for place of
residence, marital status, number of children, and age.

**Hypothesis 4:** Pretest budgeting knowledge scores
explain a significant proportion of the
variance in the budgeting posttest
scores.

Pretest budgeting knowledge scores accounted for 55% of the variance in
the posttest budgeting knowledge scores. The null hypotheses was rejected.
Pretest budgeting knowledge scores explained a significant portion of the variance
of the posttest budgeting knowledge scores.
Hypothesis 5: Those women in the two groups using the Budgeting Computer Assisted Instruction (i.e., voice and graphics, and text only), have significantly higher posttest budgeting knowledge scores than those women in the control group after controlling for pretest budgeting knowledge.

Interaction between pretest budgeting knowledge scores and treatment groups was found to be significant. Women with higher pretest scores had higher posttest scores, especially participants who received the BCAI with text only as compared to the participants who used the BCAI with voice and graphics and the control group when the pretest budgeting knowledge scores were less than 10.00. However, women who received the BCAI with voice and graphics and those in the control group had higher posttest budgeting knowledge scores than participants in text only group when pretest knowledge scores were higher than 10.00. Therefore, it can be seen that women with less knowledge about budgeting did better in the voice and graphics group as compared to participants who started with higher pretest budgeting knowledge scores and did worse in the text only group. Also, it was found that pretest budgeting knowledge scores explained 65% of the variance in the posttest knowledge scores in the voice and graphics treatment group. On the other hand, for group that received the BCAI with text only 2% of the variability of the posttest budgeting knowledge scores was accounted for. The pretest budgeting knowledge scores explained 71% of the variance in the posttest budgeting knowledge scores of control group participants.
Hypothesis 6: Attitudes about the computer and the Budgeting Computer Assisted Instruction explain the variability of posttest knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the two groups using the Budgeting Computer Assisted Instruction.

General attitudes toward the computer did not explain the variability of the posttest budgeting knowledge scores in the treatment group that received the BCAI with voice and graphics neither did it explain the variance for the treatment group that received the BCAI with text only over and above the pretest budgeting knowledge scores.

Hypothesis 7: Computer attitudes in regard to voice and graphics explain variability in the posttest budgeting scores, over and above the variability explained by the pretest budgeting knowledge scores in the group using the Budgeting Computer Assisted Instruction.

Attitudes toward graphics explained 73% of the variance in posttest budgeting scores of women who received the BCAI with voice and graphics over and above the pretest budgeting knowledge. Attitudes toward voice did not explain the variance in the posttest budgeting knowledge scores of women who received the voice and graphics BCAI, over and above the pretest budgeting knowledge scores over and above their pretest budgeting knowledge scores.
Conclusions

The following conclusions were derived from this research which was designed to investigate the effects of two methods of teaching on budgeting knowledge gain of literate and non-literate women of Maunabo, Puerto Rico. Participants were members of the Homemaker Clubs of the Extension Service. The Homemaker Clubs members who participated in this study have the following characteristics:

1. are middle aged with a median years of 36 years of age.
2. are more likely to live in rural areas.
3. have completed a mean educational level of 11th grade.
4. more than two thirds of them are literate; less than one third are low literate.
5. their economic situation is poor and below the poverty level.
6. the majority of them are married.
7. have an average of three children.
8. have a mean of three persons depending on their income.
9. indicate that the most common alternatives after loss of a job are to find another job and family help.
10. participants' perceived alternatives to cope with life situations that create financial crises such as divorce, illness, accidents and death are to get family help.
11. perceive budgeting and saving as important in home management.
12. more than half of them feel unhappy about their economic situation and think that budgeting cannot help them to meet needs, attains goals and desires.

13. expect to save in the future.

14. The literacy level of Homemaker Club members who participated to this research is the most important demographic variable that affects their budgeting knowledge gain. Their attitudes toward BCAI with voice and graphics also have an effect on their budgeting scores.

15. Pretest budgeting knowledge scores show that those members with low pretest budgeting knowledge gain more budgeting knowledge with the BCAI with voice and graphics than those with high pretest budgeting scores.

16. Budgeting Computer Assisted Instruction with voice and graphics is an effective method to teach budgeting concepts to those women with low pretest budgeting knowledge.

17. Attitudes toward graphics and pre budgeting knowledge scores explain the posttest budgeting scores.

18. General attitudes toward BCAI and attitudes toward voice do not explain variability in the posttest budgeting knowledge scores.

19. The BCAI has some of the characteristics that educators of adults recognize as an important component in the design of educational methods (Beck, 1990; Cranton, 1989; Knowles, 1981; Cross, 1981;
and Gardner, 1966). Some of the characteristics of educational methods recognized by them are: 1) stimulate several senses; 2) promote practice repetition, review, and reinforcement of concepts, 3) promote informal, flexible and permissible educational environment, 4) allow learners to learn at their own pace; use a variety of motivational techniques and give opportunity to upgrade learners to use technological innovations.

20. Visual communication is an important method used in contemporary society to stimulate individuals according to the message presented. The BCAI used visual communication through the use of computer graphics.

**Implications of this Study**

1. Corporations and policy makers need to maximize the use of national human resources, especially in our contemporary society, where corporation marketing strategies use advanced technology to influence consumer decisions. Consequently, corporations and policymakers need to be responsible in providing educational resources to help consumers make rational decisions. Subsequently corporations and government must become more socially responsible for funding educational materials and programs such as
the BCAI. The BCAI can be used as a part of financial management
counselling program that can be used in work place settings.

2. Hemus (1990) recognized the literate consumer as one who has the
knowledge and skills to make appropriate decisions in a complex
market place. The BCAI can help low literate women to gain
knowledge about budgeting and to make decisions regarding the use
of their money. Educational methods, such as the BCAI need to be
available to promote consumer literacy. Educational learning
centers with individualized computer assisted instruction in shopping
malls and stores can be implemented.

3. This BCAI offers institutions that serve adults with limited learning
skills in family financial management a way to reach and teach them
in more effective ways.

4. The National Assessment of Educational Progress (NAEP, 1985)
reported that young adults need to improve quantitative literacy,
that is, they need to develop skills in those basic arithmetic
functions in financial management. The BCAI can be used as a way
to teach them financial management concepts in a unique and
motivating way.

5. The BCAI can help adults learners to demonstrate mastery in
financial management. The BCAI allows users to: 1) define, plan
in advance and make goal decisions; 2) list their expenses and
income; and 3) revaluate, analyze and make changes in their cash flow and expenses in order to balance their budgets. This process will allow learners in a short period of time to demonstrate mastery in basic financial management concepts and skills. This will allow them to function more proficiently in society. Also the learners may use the BCAI repeatedly any time needed, not only once.

6. Currently, the BCAI is the only computer program designed for low literate consumers and women that is available in U.S. Cooperative Extension System. This program can be tested and used in other states that have Hispanic audiences. Cooperation between family resource management specialists in the states and other countries is needed to improve the quality of the program. Puerto Rico Extension belongs to the U.S. Cooperative Extension Service. C.E.S. is the institution that provides educational services to adults in U.S.A. and Puerto Rico. Therefore, this institution needs to use the most effective teaching methods to reach adult audiences, especially in our contemporary society where resources are scarce. Subsequently, CES should invest more of their resources to improve the effectiveness of the BCAI as a method of teaching adult learners.

7. The BCAI can provide educational experiences with computers for Cooperative Extension clientele across gender and economic lines.
The BCAI offers women who use it, an educational experience to overcome the technology gender gap that literature indicates still is an issue. For economically less advantaged learners the BCAI can provide experience with computers and overcome fears about computer technology.

8. In order to give flexibility to users in scheduling the use of the BCAI, the BCAI needs to be divided into seven sections. In that way, learners can used it at their convenience, according their needs, and in terms of how learning takes place for them.

9. Participants’ attitudes toward the BCAI graphics affected positively their budgeting knowledge gain. Therefore, effort can be made by educational institutions to include and test graphics in educational computer programs.

Recommendations for Future Research

The following recommendations are offered based on the findings in this study:

1. The instruments need to be evaluated for validity and reliability with similar audiences. Changes need to be made in the instruments. The budgeting knowledge test needs to be reviewed to improve the quality of marginal and poor items.
2. Repeat this study in other places where Extension serves Puerto Rican audiences, using the randomized pretest posttest control group or quasi experimental design.

3. Duplicate this study in states that have Mexican, Cubans or other Hispanic people in order to determine how understandable the Spanish used in the BCAI is to people of different Hispanic origins.

4. Use computerized interview for the instruments to collect data regarding steps in the program: goal settings, analysis of family economic situation, and budgeting. This information is needed for use in a follow-up counseling program. This information was collected for this study, but the BCAI does not contain programming to store and review the stored data.

5. Eliminate from the Demographic Characteristics Questionnaire open-ended items related to perception. Make a separate instrument for this purpose.

6. Adapt the panel of experts' questionnaire for the BCAI users to evaluate the BCAI.

7. Reduce the items in the Attitudes Toward BCAI Scale by deleting the general attitudes toward computers
7. Reduce the items in the Attitudes Toward BCAI Scale by deleting the general attitudes toward computers scale. This will allow the researcher to focus on participants' attitudes toward graphics and voice that is a major focus in the research.

8. Another possibility is to repeat the study using a randomized pretest posttest control group design with a third treatment option. The third treatment group will be given a print copy of BCAI computer screens. This educational unit will be divided and presented to learners as written individualized instruction. The steps will be the same as the BCAI. This comparison can be practical and less costly. Also, this procedure test three different methods of teaching adult audiences in informal settings. The individualized written budgeting instruction can be useful in those CES units with few resources.

9. Have computer CAI designers, financial counselors, adult education and family resource management specialists/scholars evaluate the BCAI in terms of how the program fits into adult education guidelines and how the program meets basic financial management concepts.
10. Use the data collected by the BCAI to study the effectiveness of the program in helping consumers who use it, as a budgeting counselling project, in terms of Godwin’s (1990) cash flow management approach.

11. Study the effectiveness of the sections of the BCAI according to stated objectives: 1) goal planning, 2) record keeping, 3) budget analysis and modification (budget balancing), 4) evaluation of economic situation, 5) implementing, and 6) evaluating.


Center for Community Education. (1989). *Computer software for teaching basic skills to adults: an evaluation*. Montana State University.


National Center for Research in Vocational Education (1982). *Fact Sheet No.10.* Columbus, OH: The Ohio State University.


Shiau, R. (1989). The considerations of visual perception and visual learning among children in the design of instructional graphics in educational


APPENDIX A

RESEARCH PACKAGE
Dear,

We are very pleased you agreed to participate in this research. This study is for my dissertation and to test the effectiveness of computer programs enhanced with voice and graphics to teach budgeting. In addition, we want to know how you feel about computers. We want to know about some of your characteristics so we can determine the effectiveness of the program with different people.

To save time and to help you to use the Budgeting Computer Assisted Instruction, we appreciate you fill out the information that the enclosed guide asks you to bring to the day of the workshop.

Please do the following:

1. Answer the required information in the budgeting user manual.
2. Bring this information with you on the workshop day.
3. If you do not understand some of the questions or items, please ask the home economists.
As you know, the workshop is scheduled for:

Date: 
Time: 
Location: 

Incentives will be given to all participants in the study to show appreciation for participation. Your name will be placed in a drawing for a $25.00 grocery certificate. Snacks will be available during the Workshop. We look forward to seeing and meeting with you again,

Thank you for your help and time,

Carmen T. Andrades Garay
Consumer Education Specialist

Ruth Lebron
Home Economist
Maunabo

Joan Gritzacher
Professor and Adviser
USER INSTRUCTION MANUAL

Carmen T. Andrades Garay
Consumer Education Specialist
Introduction

This manual was designed to help you to understand and use the program in an effective way. The program will ask some questions of you so that you can analyze your budget. The computer program was designed to be user friendly. In that way you can use the program without knowing anything about computers and without being able to read or write. It is expected that you can enjoy the experience of using the computer as a way of learning. Also, we hope that the design of the program will allow you to make your budgets and manage your economic resources more effectively to avoid economic pressure for yourself and your family. Enjoy the program.
Objectives of the Program

After completion of the computer program on the family budgeting, women in this research will accomplish the following objectives:

1. Define budget.
2. Identify the purpose of a family budget.
3. Define financial goals.
4. List three personal or family goals.
5. Define family income.
6. List sources of family income, for example salary, food check, pension, and other.
7. List your expenses and savings.
8. Define fixed expenses.
9. List your own and your family’s fixed expenses.
10. Define variable expenses.
11. List your personal and your family’s variable expenses.
12. Identify your economic situation as one of these four alternatives:
    - balanced budget
    - negative budget
    - Leaky budget
    - sorrow budget
13. From the list of expenses, select 10 of 13 expenses that you want to include in a family budget.

14. Identify the amount of money your family spends in each of the expense subgroups.

15. Revise the sample plan of income, expenses, and savings.

16. List the steps in budgeting.

Information needed to analyze and make your budget:

1. Budget analysis worksheet. You must bring this information with you, on the day of your appointment with the home economist.

Instructions:

1. Write the amount of income or money that your family receives from salary, pension, food check, WIC, or other sources.

   Once in a month: $______________
   Twice in a month: $______________
   Once in a week: $______________

2. Monthly expenses: write the amount of money that you or your family spends every month on the following:

   a. Food

      Money spent on food/groceries

      monthly, bimonthly, or weekly $_____

      Money spent on food/groceries every day or occasionally $_____
<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money spent on food</td>
<td>in restaurant/snacks</td>
<td>$_____</td>
</tr>
<tr>
<td>Total money spent on food</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Housing</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on mortgage or rent</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on gasoline</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on tolls</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on public transportation</td>
<td>(bus, public car)</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on parking</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Other (buying bicycle, motorcycle,</td>
<td>buying walking or tennis shoes)</td>
<td>$_____</td>
</tr>
<tr>
<td>walking or tennis shoes)</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on water/sewer</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on energy</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on telephone</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on gas</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on cable</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Other services your family buys</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Total of services</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on health insurance</td>
<td></td>
<td>$_____</td>
</tr>
</tbody>
</table>
Money spent on life insurance $_____
Money spent on other types of insurance $_____
Total $_____

f. Debits

Money paid to:
Bank $_____
Credit cards $_____
Finance Co. $_____
Money lender $_____
Credit union $_____

g. Clothing

Money spent on Christmas $_____
Money spent on uniforms $_____
Money spent on special activities $_____
Total $_____

h. Health

Money spent on medicine $_____
Money spent on doctor visits $_____
Money spent on medical deductible $_____
Total $_____

i. Education

Money spent on newspaper $_____

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money spent on college</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on books</td>
<td>$_____</td>
</tr>
<tr>
<td>Total</td>
<td>$_____</td>
</tr>
</tbody>
</table>

**j. Entertainment**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money spent on sports (baseball, basketball, others)</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on social and civic activities</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on hobbies</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on movies</td>
<td>$_____</td>
</tr>
<tr>
<td>Other</td>
<td>$_____</td>
</tr>
<tr>
<td>Total</td>
<td>$_____</td>
</tr>
</tbody>
</table>

**k. Savings**

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>$_____</td>
</tr>
</tbody>
</table>

**l. Other expenses**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Money spent on laundry</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on donations</td>
<td>$_____</td>
</tr>
<tr>
<td>Money spent on church</td>
<td>$_____</td>
</tr>
<tr>
<td>Total</td>
<td>$_____</td>
</tr>
</tbody>
</table>

**Goals we want to reach:**

We want you to think about objectives or goals that you or your family want and plan to reach in the next 6 months or in the next 2 years. A financial or economic goal is an aim or objective that you and your family want to reach in a long or short period of time. Financial objectives or goals are those objectives
that you want to accomplish in order to satisfy your economic needs and desires.

Goals can be classified as short-term goals and long-term goals. Examples:

Example of short-term goal: Pay my debts on time. Example of long-term goal:
Buy a house.

Goal Checklist:

This goal checklist is to help users think about those needs, wants, and desires. The following is a list of long and short term goals. The purpose of the goal checklist is to help users to list your own and your family’s goals.

Instructions for users:

1. From the list, select one short-term goal and one long term goal.

   Select those goals that you and your family want to reach. You can select from this list. On the next screen, you can write other goals. These goals are different than the ones on the list.

2. Please mark your selection by typing an x. The x identifies your selection of yes or no. Type the x in the available blank to the right of each item.
## Goals Checklist

<table>
<thead>
<tr>
<th>Goals</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term goals are those aims that you want to reach in a short period. This period includes 6 months or less.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Buy good clothes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Pay for Christmas gifts and decorations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Buy a bicycle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Buy a video cassette recorder or vcr.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Pay up or pay down my charge cards.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Open a savings account for emergencies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Open a credit union account.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Save for summer camp.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. Save for summer vacation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. Save to visit an amusement park.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Pay up or reduce my debts.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. Buy a satellite antenna.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Have a balanced budget.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Long-term goals</strong> are those aims you want to achieve over longer periods. These periods include a year or more.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Save for my children's college expenses.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Goals</td>
<td>Yes</td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>22.</td>
<td>Save for travel.</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Redecorate or rearrange the house.</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Buy some jewelry.</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Open an IRA account.</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Save for medical problems.</td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Save to have a savings account.</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Pay for the house years in advance.</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Buy a life insurance policy.</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Purchase a new car.</td>
<td></td>
</tr>
<tr>
<td>31.</td>
<td>Finish my college degree.</td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>Save for my children's weddings.</td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>Save for my children's 15th birthdays.</td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>Save for my children's high school graduation.</td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>Save for retirement travel.</td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>Save for death expenses.</td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>Save for a new home down payment.</td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>Finish a vocational degree.</td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>Save for investment in mutual fund, bonds, etc.</td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>Pay off all my debts.</td>
<td></td>
</tr>
</tbody>
</table>
4. Information that the computer give to the user.

A. Budget Analysis

<table>
<thead>
<tr>
<th>Item</th>
<th>Monthly Expenses</th>
<th>Recommended Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Improvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B. **Family Budget Modification**

### Planning for Income, Expenses and Saving

<table>
<thead>
<tr>
<th>Category</th>
<th>Budget Analysis</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recommended Expenses</td>
<td>Real Expenses</td>
</tr>
<tr>
<td>Food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clothing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Entertainment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total $</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
C. Sample Budget

Budget or plan of income and expenses: in this way you can have money from pay day to pay day.

Month: __________________________

What money did you take into account? Or, What is your income? Income that you receive every week, bimonthly, and monthly: (salary, pension, alimony, food check, social security check, WIC, social service check, etc.)

<table>
<thead>
<tr>
<th>Category</th>
<th>Week 1</th>
<th>Week 2 Bimonthly 1</th>
<th>Week 3</th>
<th>Week 4 Bimonthly 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Income</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>
Variable expenses: are those expenses for which the amount you pay changes every time you pay.

<table>
<thead>
<tr>
<th>Category</th>
<th>Week 1</th>
<th>Week 2 Bimonthly 1</th>
<th>Week 3</th>
<th>Week 4 Bimonthly 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Food</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Clothing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Transportation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Health</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Entertainment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Other (barber, personal care, etc)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Expenses</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>
Fixed expenses: all expenses that the amount of money you pay is the same every time.

<table>
<thead>
<tr>
<th>Category</th>
<th>Week 1</th>
<th>Week 2 Bimonthly 1</th>
<th>Week 3</th>
<th>Week 4 Bimonthly 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Housing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Loan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Insurance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Expenses</td>
<td>$</td>
<td>$</td>
<td>$</td>
<td>$</td>
</tr>
</tbody>
</table>
Your income situation. The computer can give you one of the following results:

A. Negative budget

Be careful, your budget it is hot!

Your budget is over extended; you do not have enough money to cover your expenses. You have more expenses than income. You need professional advice.

Monthly income $__________

Total expenses $__________

You have an over-extended budget of $__________
B. Leaky Budget

Be careful, Your budget is hot!

You have a money leak!

Do you know where your money is or how you use your money?

You need professional assistance. Please ask the Home Economists in your municipality.

Monthly income $ _____________

Total expenses $ _____________

Do you know where your money is? Yes No

In your checking account ___ ___

In your saving account ___ ___

Others? ___ ___

What? _______________

I do not know where my money is ___ Yes ___ No
C. Balanced Budget

Congratulations! Congratulations, you have a balanced budget.

You spent in proportion to what you received!

- Monthly income $_____________
- Total expenses $_____________
D. Sorrow Budget

You have enough money to cover your expenses. You do not meet your goals. If you want to fulfill the goal stated in your Goals Checklist as: ______________,

this constitutes a problem because your needs and desires are not fulfilled. You need professional advice from home economists.

Monthly income $____________
Total expenses $____________
Total savings $____________

You do not fulfill your economic goals.

Please answer these questions:

Do you know the reasons you do not fulfill your goals?

Yes___ No___

Do you need professional help?

Yes___ No___

You do not have savings that can help you to solve or cope with your economic situation. Your savings can help you to cope with this situation. Savings are very important for family economic health!
APPENDIX B

BUDGETING COMPUTER ASSISTED INSTRUCTION PANEL OF

EXPERTS LETTER

Dear :

I am very happy about your positive response to serve as a member of the Panel of Experts for my Dissertation research study. I appreciate your commitment to help graduate students to improve the quality of their research by giving your valuable time to review this research packet. This research is designed to test the effectiveness of an intelligent computer assisted instruction (BCAI) on budgeting for literate and non-literate women in Puerto Rico. The research design includes two methods of teaching (computer program with voice and graphics and computer program with text only) along with a control group to determine participants' pre/posttest knowledge of budgeting scores, the dependent variable. Participants' attitudes toward computers are measured as an independent variable.

I request your help in objectively evaluating the instruments as well as the BCAI in terms of their adequately representing the content domain of the research. Enclosed in this packet you will find a brief explanation of the study, hypotheses, and the two instruments (Budgeting Knowledge Instrument and Likert Scale Attitude Toward Computers).

In addition, please write your comments on any of the computer program screens, and please answer the Budgeting Evaluation Form enclosed. Your written comments on the instruments should especially address the following points: item clarity, length, and format.

Your judgments will contribute greatly to the development of the final instruments. Please review the BCAI storyboard and instruments and return by 1993. If you have any questions, please call me in the evening at (614) 846-2165.
Thank you for your time and support

Sincerely,

Carmen T. Andrades-Garay
Doctoral Student

Joan Gritzacher
Professor and Advisor
Purpose in this Study

The purpose in this study is to investigate the effect of two computerized methods of teaching knowledge of budgeting for literate and non-literate women in Puerto Rico. The two pieces of budgeting computer software, one with text only and one with special enhancements of graphics and voice, will be used as methods of teaching family budgeting to non-literate and literate women in Puerto Rico.

The research was designed to validate a computerized budget program that can be used by literate and non-literate women.

**Research Question 1:**

How do the women perceive the role of money management in meeting family needs, goals and desires?

**Research Question 2:**

What are the woman's perceived alternatives for life situations to cope with financial crises?

**Hypotheses**

**Research Hypothesis 1:**

There are significant differences among the demographic variables for the women in each of the three groups.

**Research Hypothesis 2:**
There are relationships between the pretest budgeting knowledge scores and the independent variables of: 1) age, 2) number of children, 3) literacy, 4) attitudes toward computer and 5) residence.

**Research Hypothesis 3:**

Literacy, marital status, age, place of residence, and number of children explain a significant proportion of the variability of pretest budgeting knowledge scores.

**Research Hypothesis 4:**

Pretest budgeting knowledge scores explain a significant proportion of the variance in the posttest budgeting knowledge scores.

**Research Hypothesis 5:**

Those women in the two groups using the Budgeting Computer Assisted Instruction (i.e., voice and graphics, and text only) have significantly higher posttest budgeting knowledge scores than those women in the control group after controlling for pretest budgeting knowledge.

**Research Hypothesis 6:**

Attitudes about the computer and the Budgeting Computer Assisted Instruction explain the variability in posttest budgeting knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the two groups using the Budgeting Computer Assisted Instruction.
Research Hypothesis 7:

Computer attitudes in regard to voice and graphics explain variability in the posttest budgeting knowledge scores, over and above the variability explained by the pretest budgeting knowledge scores in the group using the Budgeting Computer Assisted Instruction.
Subject matter: Budgeting

Target audience: Low-literacy consumer

Purpose of the BCAI:
The purpose in this intelligent computer assisted instruction is to teach knowledge of budgeting to literate and non-literate women in Puerto Rico. The budgeting computer software will be enhanced with graphics and voice.

The research was designed to validate a computerized budget program and to test the research hypotheses.

Purpose of this Evaluation:

This evaluation was designed to assess the effectiveness of the BCAI design.

The form is divided in two section as follows: type of computer application and the software features.
Part One

**Instructions:** Please select one box that best completes the sentence. Mark your selection the right box.

**Type of Computer Application**

<table>
<thead>
<tr>
<th>1. The purpose of the BCAI is</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. problem solving</td>
</tr>
<tr>
<td>b. drill and practice</td>
</tr>
<tr>
<td>c. game</td>
</tr>
<tr>
<td>d. tutorial</td>
</tr>
<tr>
<td>e. primary instruction</td>
</tr>
<tr>
<td>f. simulation and application</td>
</tr>
<tr>
<td>g. diagnostic and prescriptive</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. The instructional level of the package is</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. basic literacy</td>
</tr>
<tr>
<td>b. advanced skills</td>
</tr>
<tr>
<td>c. adult education</td>
</tr>
</tbody>
</table>
PART TWO: Software Features

Instructions:

Please indicate the applicability of each section to the BCAI by checking the column that indicates how well the CAI meets each criterion. If a section is not applicable, check NA and proceed to the next item. Please check only one box per item. The following key is used:

- NA = Not Applicable to this CAI packages.
- 0 = Feature does not exist in the package.
- 1 = Feature exists but is very poorly presented throughout.
- 3 = Feature is presented but needs some improvement.
- 4 = Feature is presented exceptionally well throughout.
Curriculum Design Features

<table>
<thead>
<tr>
<th>Items</th>
<th>NA</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Objectives are clearly defined.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Subject matter is accurate.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Subject matter motivates learner to learn.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Subject matter is reviewed and reinforced.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Subject matter is on the level of the learner.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Concepts are covered in depth for the purpose of the program.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Vocabulary, concepts, and examples are relevant to learner.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Each section is manageable in size.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>9. Content is logical and well organized.</td>
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<tr>
<td>10. Subject matter reflects expert knowledge.</td>
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<tr>
<td>11. Content is free of grammar, spelling, punctuation, and usage errors.</td>
<td></td>
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<tr>
<td>12. Definitions are provided when necessary.</td>
<td></td>
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</tr>
<tr>
<td>13. Content is void of racial, ethnic or sex discrimination, bias, and stereotype.</td>
<td></td>
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<tr>
<td>14. Format is challenging but not frustrating.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Items</td>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>----------------------------------------------------------------------</td>
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<tr>
<td>15. The content has educational value.</td>
<td></td>
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<tr>
<td>Feedback</td>
<td>NA</td>
<td>0</td>
<td>1</td>
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</tr>
<tr>
<td>16. Feedback is positive.</td>
<td></td>
<td></td>
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<tr>
<td>17. Feedback is appropriate to the intended learners’ population.</td>
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<td>18. Feedback is informative.</td>
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<td>19. Feedback help routines are available.</td>
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<tr>
<td>20. Feedback is timely.</td>
<td></td>
<td></td>
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<tr>
<td>21. Feedback is useful and supportive of learning.</td>
<td></td>
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<tr>
<td>22. Feedback remains on the screen for an appropriate amount of time.</td>
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</tr>
<tr>
<td>Appropriateness</td>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. Tone of address is appropriate to learners.</td>
<td></td>
<td></td>
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<tr>
<td>24. The means of response is appropriate to the intended learners.</td>
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<tr>
<td>25. Difficulty level is based on appropriate reading ability.</td>
<td></td>
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<tr>
<td>26. The program is useful for informal education.</td>
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<tr>
<td>27. The program is time efficient for learners when compared with another methods.</td>
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<tr>
<td>28. The program is time efficient for the home economists.</td>
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<tr>
<td>29. Sufficient information is presented for the intended learning to occur.</td>
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<tr>
<td>Items</td>
<td>NA</td>
<td>0</td>
<td>1</td>
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<td>----------------------------------------------------------------------</td>
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<tr>
<td><strong>Learning Styles</strong></td>
<td></td>
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<tr>
<td>30. Content includes visual reinforcement of learning.</td>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>2</td>
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</tr>
<tr>
<td>31. Content includes auditory reinforcement of learning.</td>
<td></td>
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<tr>
<td>32. Calculations done by the program do not cause confusion.</td>
<td></td>
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<tr>
<td>33. The program provides learners the opportunity to make decisions.</td>
<td></td>
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<tr>
<td><strong>Software Design Features</strong></td>
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</tr>
<tr>
<td>34. The selection and range of colors on the screen are effective.</td>
<td></td>
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</tr>
<tr>
<td>35. Images are clear, detailed, and can be easily interpreted.</td>
<td></td>
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</tr>
<tr>
<td>36. A reasonable number of images are displayed at one time.</td>
<td></td>
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<tr>
<td>37. The size of images and characters is appropriate.</td>
<td></td>
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<tr>
<td>38. The transitions between screen displays are effective.</td>
<td></td>
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<tr>
<td>39. Program avoids unnecessary moving back and forth between screens.</td>
<td></td>
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<td>40. Special features are used appropriately.</td>
<td></td>
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<tr>
<td>41. Sound is clear and is used effectively.</td>
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<tr>
<td>42. Graphics and voice enhancements are complementary.</td>
<td></td>
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<tr>
<td>43. Program requires a minimal amount of typing.</td>
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<tr>
<td>Item</td>
<td>Description</td>
<td></td>
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<tr>
<td>44</td>
<td>Program allows user to make corrections without difficulty.</td>
<td></td>
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</tr>
<tr>
<td>45</td>
<td>Graphics and audio are used to motivate and to enhance teaching.</td>
<td></td>
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</tr>
<tr>
<td>46</td>
<td>Graphics and audio are appropriate for the intended learners</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>47</td>
<td>Graphics, audio, and color enhance the instructional process.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>48</td>
<td>Graphics help to focus attention on the content and are not distracting.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>49</td>
<td>Sequence of the content topics and instructions is logical and in appropriate steps.</td>
<td></td>
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<tr>
<td>50</td>
<td>Instructions are clear and appropriate.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Interaction with User</strong></td>
<td></td>
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</tr>
<tr>
<td>51</td>
<td>A supportive and positive emotional climate is maintained.</td>
<td></td>
<td></td>
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<tr>
<td>52</td>
<td>Screen direction are clear and effective.</td>
<td></td>
<td></td>
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<tr>
<td>53</td>
<td>Use of the recorded voice for instruction is effective.</td>
<td></td>
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<tr>
<td>54</td>
<td>Learner's performance is printed.</td>
<td></td>
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</tr>
<tr>
<td>55</td>
<td>Number of learner attempts per lesson is recorded.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Items</td>
<td>NA</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td>----------------------------------------------------------------------</td>
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<tr>
<td>56. Pretest performance is recorded.</td>
<td></td>
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<tr>
<td>57. Graphics are sex-bias, ethnic, racial, and politically bias free.</td>
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<tr>
<td>58. Posttest performance is recorded.</td>
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</tbody>
</table>
APPENDIX C

LETTER OF APPRECIATION SENT TO THE PANEL OF EXPERT
October 21, 1993

To: Janet Henderson, Ph.D., Associate Professor
   Agricultural Education Department, Ohio State University

Dear Dr. Henderson:

Blessings come with thanks actions! Life is a continuous thanking circle! Every day we give thanks. When we walk in the life route, we thank God for all new days and for all the opportunities He has given us. To be able to learn, love and give of ourselves are the most wonderful experiences that human beings can have.

A field test and a pilot test of the instruments were conducted on the Spanish version of the instruments with members of the Homemakers Clubs in Puerto Rico. An accessible group of 15 who were not part of the population to be studied participated in the pilot test.

I want to take time to give you some relevant information about the data collection process. The data for the study was collected from August to October 8, 1993. The data collection was held for 40 days with each subject requiring about 3 hours. The selected county was Maunabo, which has a high rate of illiteracy problems. The home economists of this county, Ruth Lebron, and all the personnel of this Extension Office helped with the data collection. They did a wonderful job. The sample size was 122 Extension home Economics programs clients.

We appreciate your help in verifying the correspondence between the English and Spanish versions of the computer program that I am using for my dissertation. Thanks for being a special professor and human being.
Sincerely,

Carmen T. Andrades-Garay
Graduate Student
Home Economics Education
Department
The Ohio State University

Joan Gritzmacier
Professor and Advisor
Home Economic Education
Department
The Ohio State University
October 21, 1993

To: Claudette Smith  
Family Resource Management Specialist  
North Carolina State University

Dear Ms. Smith:

Blessings come with thanks actions! Life is a continuous thanking circle! Every day we give thank. When we walk in the life route, we thank God for all new days and for all the opportunities He has given us. To be able to learn, love and give of ourselves are the most wonderful experiences that human beings can have.

A field test and a pilot test of the instruments were conducted on the Spanish version of the instruments with members of the Homemakers Clubs in Puerto Rico. An accessible group of 15 who were not part of the population to be studied participated in the pilot test.

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Sincerely,

[Signature]

Carmen T. Andrades-Garay
Doctoral Student

[Signature]

Joan Gritzmacher
Professor and Advisor
APPENDIX D

BUDGETING TEST
PRETEST/POSTTEST
The purpose of this pre and posttest is to test your knowledge about budgeting. Please follow the pre and posttest instructions.

**INSTRUCTIONS:**

1. Read the following sentences and the list of alternatives carefully.
2. Select the best alternative.
3. In the blank at the left, type the letter of the one best alternative that completes the sentence or answers the question.
### Multiple Choice Questions:

<table>
<thead>
<tr>
<th>Question</th>
<th>What is Budgeting?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>a. a plan for using money to achieve one individual goal.</td>
</tr>
<tr>
<td></td>
<td>b. record keeping of all the family expenses to achieve their goals.</td>
</tr>
<tr>
<td></td>
<td>* c. a plan for the use of income, expenses, and savings to achieve goals.</td>
</tr>
<tr>
<td></td>
<td>d. a way to find out how the family is spending money.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Who needs a budget?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>a. businesses only.</td>
</tr>
<tr>
<td></td>
<td>b. people who are rich.</td>
</tr>
<tr>
<td></td>
<td>c. families with children.</td>
</tr>
<tr>
<td></td>
<td>* d. anyone who wants to get the most from his/her money.</td>
</tr>
</tbody>
</table>
3. What is a financial goal?

   a. guide to satisfy family needs.
   b. formal outline of family achievement.
   * c. purpose or objective that the family wants to reach.
   d. family proposal for the future.

4. All of following are purposes of a budget EXCEPT

   a. reviewing personal and family goals.
   b. saving money.
   c. paying all the economic responsibilities.
   * d. planning in advance for fixed expenses.

5. Which of the following would be an expense sub-group in a budget?

   * a. money spent to pay rent for your house.
   b. a bill from your dentist.
   c. your income before taxes.
   d. your income after income taxes.
6. The best definition of fixed expenses is those expenses that
   a. do not change over time.
   b. the day of pay does not change.
   c. the amount of pay does change not over time.
   * d. the amount and the day of pay may not change
      for a predetermined period.

7. Which of the following is a fixed expense?
   a. gasoline for only one car, used mostly by the
      family.
   b. deposits in the savings account.
   * c. rent payments.
   d. water bills.

8. Variable expenses are defined as those expenses that
   a. change a over time.
   b. the day you pay changes over time.
   c. the amount you pay change from pay day to pay
      day.
   * d. the amount and the day of pay may change over
      time.
<table>
<thead>
<tr>
<th>9._____</th>
<th>Which of the following is an example of variable expenses?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. payment for a car loan.</td>
</tr>
<tr>
<td></td>
<td>b. rent for three-bedroom apartment.</td>
</tr>
<tr>
<td></td>
<td>c. children's school clothes.</td>
</tr>
<tr>
<td>*</td>
<td>d. tuition paid for college.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>10._____</th>
<th>A balanced budget occurs when a family or individual's income is</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. lower than the fixed expenses.</td>
</tr>
<tr>
<td>*</td>
<td>b. the same as variable and fixed expenses.</td>
</tr>
<tr>
<td></td>
<td>c. higher than expenses.</td>
</tr>
<tr>
<td></td>
<td>d. in balance with variable expenses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>11._____</th>
<th>Sorrow budget occurs when expenses are</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>a. less than income.</td>
</tr>
<tr>
<td></td>
<td>b. same as income.</td>
</tr>
<tr>
<td>*</td>
<td>c. more than income.</td>
</tr>
<tr>
<td></td>
<td>d. more than variable expenses and fixed expenses.</td>
</tr>
<tr>
<td>12. ____</td>
<td>A Negative budget occurs when families do not know</td>
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<td>-----------</td>
<td>-----------------------------------------------------</td>
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<tr>
<td></td>
<td>a. where they buy their goods and services.</td>
</tr>
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<td></td>
<td>b. where they use their money.</td>
</tr>
<tr>
<td></td>
<td>* c. for what or/how they spend their money.</td>
</tr>
<tr>
<td></td>
<td>d. why they spend their money.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>13. ____</th>
<th>Generally families with money-leaks have one of these situations.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. pay all their debts on time.</td>
</tr>
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<td></td>
<td>* b. have economic problems and do not fulfill their goals.</td>
</tr>
<tr>
<td></td>
<td>c. have more money than they need.</td>
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<td></td>
<td>d. are not concerned about money.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14. ____</th>
<th>To modify the family budget, a consumer must modify the quantity of money that she or he spends in specific subgroups as</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. income subgroups.</td>
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<tr>
<td></td>
<td>b. income and expense subgroups.</td>
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<tr>
<td></td>
<td>* c. expense subgroup.</td>
</tr>
<tr>
<td></td>
<td>d. saving and income subgroup.</td>
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</tbody>
</table>
### Question 15
How do you analyze a budget?

- a. compare salary and most important expenses.
- b. compare all fixed expenses with variable expenses.
- **c. compare all the family variable and fixed expenses with all the family income.**
- d. compare the family income with the variable expenses.

### Question 16
To make a workable family budget, the budget maker must have the cooperation of

- a. wife.
- b. children.
- c. husband.
- **d. all family members.**

### Question 17
Which of the following is NOT a good example of budget recommendations.

- a. have long and short term goals.
- b. review budget monthly.
- **c. spend money when problems arise.**
- d. plan a budget with the family as a team.
18. If you were making a budget, your first step would be to
   a. evaluate your economic decisions.
   * b. determine your family goals.
   c. estimate your total income.
   d. reallocate your variable income.

19. The last step in making a budget is to
   * a. reevaluate the budget.
   b. estimate fixed expenses.
   c. estimate variable expenses.
   d. set your long-term goals.

* correct answers
Thanks for completing this Test.
APPENDIX E

ATTITUDES TOWARD BUDGETING COMPUTER

ASSISTED INSTRUCTION
LET'S DO IT!

We are very interested in knowing how you feel about the Budgeting Computer Program. This information is very important in helping us to improve the quality of the program. The purpose in this program is help to consumers in planning their budget. Therefore your cooperation will assist us in serving individuals in our community. Please follow the instructions very carefully.
Instructions:

1. Please indicate on the line to the right of each statement how much you agree or disagree with the statement.

2. Mark with a circle the response which corresponds to your attitude toward each of the items.

3. Please mark every item.

4. You can select an answer from the following scale:

   SD  =  STRONGLY DISAGREE
   D   =  DISAGREE
   U   =  UNCERTAIN
   A   =  AGREE
   SA  =  STRONGLY AGREE

EXAMPLE:

If you strongly agree with the given sentence, circle number SA.

   I like the beach.  SD D U A (SA).

If you agree with the given sentence, circle number A.

   I like the beach.  SD D U (A) SA.

If you are uncertain about your feelings about the given sentence, circle number U.

   I like the beach.  SD D (U) A SA.

If you disagree with the given sentence, circle number D.

   I like the beach.  SD (D) U A SA.

If you strongly disagree with the given sentence, circle number SD.

   I like the beach.  (SD) D U A SA.
YOU CAN START ANSWERING THE TEST:

<table>
<thead>
<tr>
<th>GENERAL ATTITUDES BCAI</th>
<th>SD</th>
<th>D</th>
<th>U</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Budgeting Computer program helps me to make my budget. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>2. I feel comfortable using the computer to learn budgeting. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>3. I feel comfortable operating the computer myself. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>4. The computer is a good way to present information about budgeting. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>5. I feel anxious about using the Budget Computer Program. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>6. The Budgeting Computer Program is too long. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>7. Program instructions help me to use the program. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>8. Learning about budgeting using the computer is interesting. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>9. In general, the program contains valuable information. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>10. The objectives of budgeting computer programs are not easily fulfilled. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>11. Budgeting computer programs do not teach me how to make a budget. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>12. I do not have enough knowledge to use a computer well. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td>13. Budgeting computer programs are not important. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
<td>SA</td>
</tr>
<tr>
<td></td>
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<td>---</td>
</tr>
<tr>
<td>14.</td>
<td>The budgeting computer programs are not exciting. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>15.</td>
<td>Women can become better at budgeting when using the Budget Computer Program. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>16.</td>
<td>I can use budgeting computer programs. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>17.</td>
<td>The Budget Computer Program will help individuals to plan their income and expenses. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>18.</td>
<td>The Budgeting Computer Program makes me uncomfortable. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>19.</td>
<td>I get bored when I think about using the Budgeting Computer Program. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>20.</td>
<td>I am not the type to do well with the Budgeting Computer Program. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>21.</td>
<td>I have self-confidence when I have to use Budgeting Computer Program. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>22.</td>
<td>Making a budget using Budgeting Computer Program is time consuming. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>23.</td>
<td>I do not like working with Budgeting Computer Program because it is too difficult. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
</tbody>
</table>

**GRAPHICS ENHANCEMENT**  
SD | D | U | A | SA
<table>
<thead>
<tr>
<th></th>
<th>STRONGLY DISAGREE</th>
<th>DISAGREE</th>
<th>UNCERTAIN</th>
<th>AGREE</th>
<th>STRONGLY AGREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.</td>
<td>The graphics help me to understand the material about budgeting. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>25.</td>
<td>Color motivates me to use computer programs. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>26.</td>
<td>The information on the screen is easy to read. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>27.</td>
<td>I think that the graphics on the computer screen are too small. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>28.</td>
<td>The graphics on computer programs make me nervous. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>29.</td>
<td>I enjoy graphics in computer programs. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>30.</td>
<td>Graphics make the program easy to understand. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>31.</td>
<td>The graphics encourage me to finish the programs. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>32.</td>
<td>The graphics motivated me to use the program. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>33.</td>
<td>The graphics in a computer program confuse me. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>34.</td>
<td>I am not sure if I can follow instructions correctly if a computer program tells me to select a colored circle. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>35.</td>
<td>Budgeting Computer Programs have too many graphics. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>36.</td>
<td>Graphics do not help me to understand the budgeting material. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
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</tbody>
</table>
### ATTITUDES TOWARD VOICE

<p>| | | | | | |</p>
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</tr>
</thead>
<tbody>
<tr>
<td>37.</td>
<td>The voice in Budgeting Computer Program is not clear. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>38.</td>
<td>The voice in Budgeting Computer Program helps me to understand the budgeting material. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>39.</td>
<td>The voice in Budgeting Computer Program motivate me to use it. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>40.</td>
<td>The voice in Budgeting Computer Program cannot be heard. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>41.</td>
<td>The voice in Computer Budgeting program made me nervous. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>42.</td>
<td>I enjoyed Budgeting Computer Program that used a voice. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>43.</td>
<td>The voice in Budgeting Computer Program encouraged me to finish the programs. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>44.</td>
<td>The voice in Budgeting Computer Program confused me. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>45.</td>
<td>The voice in computer programs captured my attention. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>46.</td>
<td>The voice in a Budgeting Computer Program narrated information appropriately. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>47.</td>
<td>The voice made computer Budgeting Program easy to use. (P)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
<tr>
<td>48.</td>
<td>The male voice in computer programs made me uncomfortable. (N)</td>
<td>SD</td>
<td>D</td>
<td>U</td>
<td>A</td>
</tr>
</tbody>
</table>

**Note:** N = Negative items P = Positive items. These letters do not appear on the computer screens.
THANK YOU FOR COMPLETING THIS SCALE

WE HOPE THAT YOU ENJOYED THE COMPUTER PROGRAM.
IT IS BETTER TO GIVE THAN TO RECEIVE!

THANKS!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
APPENDIX F

DEMOGRAPHIC CHARACTERISTICS AND OPEN-END QUESTIONS INSTRUMENT
DEMOGRAPHIC CHARACTERISTICS
OPEN-END QUESTIONS

PERSONAL INFORMATION

THE FOLLOWING INFORMATION IS NEEDED IN ORDER TO KNOW HOW SOME CHARACTERISTICS OF USERS AFFECT THE USE OF THE COMPUTER PROGRAM. ALL THE INFORMATION WILL BE KEPT CONFIDENTIAL.

PLEASE ANSWER ACCURATELY
PLEASE CIRCLE THE LETTER OF THE ALTERNATIVE THAT CORRESPONDS TO YOUR ANSWER:

1. PLACE OF RESIDENCE
   A. RURAL
   B. URBAN

2. EMPLOYMENT STATUS
   A. EMPLOYED
   B. UNEMPLOYED

3. MARITAL STATUS
   A. SINGLE
   B. MARRIED
   C. WIDOWED
   D. DIVORCED
   E. SEPARATED
   F. LIVING TOGETHER

4. DO YOU THINK SAVING IS IMPORTANT FOR YOU AND YOUR FAMILY?
   A. YES       B. NO

5. ARE YOU WORKING OUTSIDE THE HOME?
   A. YES       B. NO
6. WHAT EXPECTATIONS DO YOU OR YOUR FAMILY HAVE ABOUT FUTURE SAVINGS?
   A. IMPROVE
   B. STAY THE SAME
   C. BECOME WORSE

7. DO YOU CONSIDER THAT YOU OR YOUR FAMILY CAN ACHIEVE ALL DESIRES, NEEDS, GOALS, AND WANTS IN A SHORT PERIOD OF TIME?
   A. YES B. NO

8. DO YOU FEEL HAPPY ABOUT YOUR FAMILY'S ECONOMIC SITUATION?
   A. YES B. NO

9. DO YOU THINK THAT PLANNING HOW TO USE YOUR INCOME, EXPENSES, AND SAVINGS OR BUDGETING ARE IMPORTANT?
   A. YES B. NO

10. DO YOU THINK BUDGETING CAN HELP YOU TO MEET YOUR FAMILY NEEDS AND ATTAIN YOUR GOALS AND DESIRES?
    A. YES B. NO
PLEASE ANSWER THE FOLLOWING QUESTIONS:

11. WHAT IS YOUR INCOME?
   MY INCOME: $__________________
   WHAT IS YOUR FAMILY TOTAL INCOME?
   FAMILY INCOME: $__________________

12. WHAT IS YOUR AGE?
   AGE:__________________

13. HOW MANY CHILDREN ARE LIVING IN YOUR HOME?
   ____________________

14. HOW MANY PEOPLE ARE LIVING IN YOUR HOME?
   (PLEASE INCLUDE YOURSELF)
   ____________________

15. HOW MANY PEOPLE DEPEND ON YOUR OR
    THE FAMILY INCOME?
   ____________________

16. IN WHICH MUNICIPALITY DO YOU LIVE?
   ____________________

17. WHAT IS THE LAST GRADE YOU COMPLETED?
   ANSWER IN NUMBER (EXAMPLE: TWELVE GRADE = 12)
   ____________________
18. IF YOU WORK OUTSIDE THE HOME, WHERE DO YOU WORK? EXAMPLE: FACTORY, OFFICE, GOVERNMENT

19. WHAT ALTERNATIVES DO YOU HAVE IF YOU LOSE YOUR JOB(S)?

20. WHAT ALTERNATIVES DO YOU HAVE IF YOU DIVORCE?

21. WHAT ALTERNATIVES DO YOU HAVE IF YOU HAVE AN ACCIDENT?

22. WHAT ALTERNATIVES DO YOU HAVE IF YOU HAVE ILLNESS IN THE FAMILY?

23. WHAT ALTERNATIVES DO YOU HAVE IF YOU HAVE A DEATH IN THE FAMILY?
APPENDIX G

LETTER WITH INSTRUCTIONS AND QUESTIONS ASKED OF PARTICIPANTS IN THE FIELD TEST.
Dear,

We are very pleased you agreed to participate in evaluating the instruments so that we can field test them. These instruments will be used to collect information for the study that I will conduct for my dissertation dealing with the effectiveness of a computer program enhanced with voice and graphics to teach budgeting. In addition, we want to know how you feel about computers. We want to know about some of your characteristics so we can determine the effectiveness of the program with different people. If you do not understand the items, please indicate and/or make suggestions for improvement of the instrument. Your ideas will help us to improve the instrument that will be used in the research. Please do the following:

1. Answer the budgeting items.
2. Write comments and suggestions on the instruments.
3. Complete the enclosed questionnaire and the instruments.
4. After you have finished completing the forms, give them to the home economists.

Thank you for your help and time,

Carmen T. Andrades Garay
Consumer Education Specialist

Zaida Figueroa
Home Economist

Joan Gritzmacher
Professor and Adviser
HOW TO DO EVALUATE THESE FORM?

Please answer the following questions after you read and fill out the Budgeting Knowledge questionnaire. Mark the appropriate answer with an X in the YES or NO box.

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>QUESTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>1. Was this questionnaire easy to answer?</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>2. Was part of the questionnaire confusing?</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>3. Were the questionnaire items clear?</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>4. Did questionnaire motivate you to answer the questions?</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>5. Is the size of the letters appropriate?</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>6. Is the language used clear and appropriate?</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>7. Is the test too long?</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>8. Did you learn something taking this test?</td>
</tr>
</tbody>
</table>
APPENDIX H

LETTER FOR TEST-RETEST
REMINDER LETTER
Dear,

We want to thank you for your participation in the field test last week. We appreciate your willingness to participate. We still need your help and want to remind you when we will meet again. As you know, the second session in which you agreed to participate is scheduled for:

Date:
Time:
Location:

We look forward to seeing and meeting with you again.

Thanks,

Sincerely,

Home Economist

Carmen T. Andrades Garay
Consumer Education Specialist

Joan Gritzacher
Professor and Adviser
APPENDIX I

ANALYSIS OF THE INSTRUMENTS
Table 44

Percent of Agreement Between Respondents Answers on Budgeting Knowledge in the Test-retest

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Percent of Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>73</td>
</tr>
<tr>
<td>2</td>
<td>86</td>
</tr>
<tr>
<td>3</td>
<td>67</td>
</tr>
<tr>
<td>4</td>
<td>93</td>
</tr>
<tr>
<td>5</td>
<td>67</td>
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<td>6</td>
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<td>22</td>
<td>86</td>
</tr>
<tr>
<td>23</td>
<td>80</td>
</tr>
</tbody>
</table>
Table 45

Percent of Agreement Between Respondents Answers on Attitudes Toward Computer in the Test-retest

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Percent of Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>80</td>
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<td>4</td>
<td>57</td>
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<tr>
<td>5</td>
<td>83</td>
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<td>6</td>
<td>71</td>
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<td>7</td>
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<td>86</td>
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Table 45, (continued)

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Percent of Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>31</td>
<td>64</td>
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<tr>
<td>32</td>
<td>79</td>
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### Table 46

**Index of Discrimination of Budgeting Knowledge**

<table>
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<tr>
<th>Item</th>
<th>Difficulty Index</th>
<th>Discrimination Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What is Budgeting?</td>
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<td>50</td>
</tr>
<tr>
<td>2. Who needs a budget?</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>3. All of the following are ways to avoid economic difficulties EXCEPT</td>
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<tr>
<td>4. What is a financial goal?</td>
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<td>25</td>
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<tr>
<td>5. All of following are purposes of a budget EXCEPT</td>
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<td>25</td>
</tr>
<tr>
<td>6. Which of the following is NOT a reason for making budget?</td>
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<td>50</td>
</tr>
<tr>
<td>7. The best definition of family income is the</td>
<td>12</td>
<td>00</td>
</tr>
<tr>
<td>8. Which of the following would be an expense sub-group in a budget?</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>9. The best definition of fixed expenses is those expenses that</td>
<td>25</td>
<td>00</td>
</tr>
<tr>
<td>10. Which of the following is a fixed expense?</td>
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<td>25</td>
</tr>
<tr>
<td>11. Variable expenses are defined as those expenses that</td>
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</table>
Table 46, (continued)

<table>
<thead>
<tr>
<th>Item</th>
<th>Difficulty Index</th>
<th>Discrimination Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Which of the following is an example of variable expenses?</td>
<td>87</td>
<td>50</td>
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<tr>
<td>13. A balanced budget occurs when a family or individual's income is</td>
<td>12</td>
<td>00</td>
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<tr>
<td>14. Which of the following alternatives best illustrates an example of a balanced budget?</td>
<td>100</td>
<td>00</td>
</tr>
<tr>
<td>15. Sorrow budget occurs when expenses are</td>
<td>87</td>
<td>25</td>
</tr>
<tr>
<td>16. A Negative budget occurs when families do not know</td>
<td>100</td>
<td>00</td>
</tr>
<tr>
<td>17. Generally families with money-leaks have one of these situations</td>
<td>25</td>
<td>00</td>
</tr>
<tr>
<td>18. To modify the family budget, a consumer must modify the quantity of money that she or he spends in specific sub-groups as</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>19. How do you analyze a budget?</td>
<td>62</td>
<td>75</td>
</tr>
<tr>
<td>20. To make a workable family budget, the budget maker must have the cooperation of</td>
<td>80</td>
<td>25</td>
</tr>
<tr>
<td>21. Which of the following is NOT a good example of budget recommendations</td>
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<td>25</td>
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<tr>
<td>22. If you were making a budget, your first step would be to</td>
<td>100</td>
<td>00</td>
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<tr>
<td>23. The last step in making a budget is to</td>
<td>62</td>
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</table>
APPENDIX J

HUMAN SUBJECTS REVIEW COMMITTEE FORMS
The Ohio State University

Protocol No. 93b0136

Consent for Participation in the CAI Budgeting Research

I consent to participate in research involving: Effects of Methods of Teaching Computerized Family Budgeting. Mrs. Carmen T. Andrade Garay and Mrs. Ruth Lebron have explained the purpose of the study, the procedures to be followed, and the expected duration of my participation. Possible benefits of the study have been described.

I acknowledge that I have had the opportunity to obtain additional information regarding the study and that any questions I have been answered to my full satisfaction. Further, I understand that I am free to withdraw consent at any time and to discontinue participation in the study without prejudice to me.

Finally, I acknowledge that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date: ____________________________ Signed ____________________________

Participant

Firma: ____________________________

Joan Gritzacher
Profesor and Advisor

Firma: ____________________________

Carmen T. Andrade Garay
Estudiante de Doctorado

Testigo: ____________________________

Economista del Hogar
7 de abril de 1993.

Sra. Teresa Andrades
P.O. Box 3393
Columbus, Ohio 43210-0393

Estimada señora Andrades:

Reciba un saludo especial de mi parte. Para mi es un honor poder colaborar contigo en tu trabajo de investigación.

Te envío los listados más recientes de los clubes. Las personas que tienen un asterisco son aquellas que en los últimos meses no han asistido a los clubes. Pero aún no las hemos dado de baja. Al momento no he recibido el listado del PEAN. Debo pedir autorización a la economista y tan pronto la localice te hago llegar el listado PEAN.

Cualquier otra ayuda, puedes llamar a nuestra oficina. Éxito!

Cordialmente,

[Signature]

Economista del Hogar
April 30, 1993

Mrs. Carmen T. Andrades Garay
Consumer Education Specialist
Puerto Rico Agricultural Extension Service
1932 Forest Elm Court
Columbus, Ohio 43229

Dear Mrs. Andrades:

The Puerto Rico Agricultural Extension Service is willing to support your dissertation research regarding to the effect of computer as a method of teaching with voice and graphics for low literate women. We authorize you to collect the data form the Homemaker Clubs of Maunabo as well the pilot test in Luquillo. You are also authorize to train the home economists of these municipalities, in order they can help you in the data collection, and use our facilities and equipment.

Sincerely,

[Signature]
Rodrigo H. Rodriguez Casañas
Associate Dean and Subdirector
BEHAVIORAL AND SOCIAL SCIENCES
HUMAN SUBJECTS COMMITTEE (HSRC)
The Ohio State University

Date May 7, 1993

RESEARCH PROTOCOL:
93B0136 EFFECTS OF METHODS OF TEACHING COMPUTERIZED FAMILY BUDGETING TO LITERATE AND NON-LITERATE WOMEN IN PUERTO RICO,
Joan E. Gritzmacher, Carmen T. Andrades-Garay, Home Economics Education
presented for review by the Behavioral and Social Sciences Review Committee to ensure proper protection of the rights and welfare of the individuals involved with consideration of the methods used to obtain informed consent and the justification of risks in terms of potential benefits to be gained, The Committee action was:

___ APPROVED          ___ DEFERRED*

X ___ APPROVED WITH CONDITIONS*  ___ DISAPPROVED

___ NO REVIEW NECESSARY

*CONDITIONS/COMMENTS:
Subjects were deemed NOT AT RISK and the protocol was unanimously APPROVED WITH THE FOLLOWING CONDITIONS:

1. Revise the consent form to be a single page document and forward a copy to the Committee.
2. Revise the solicitation script to subjects to inform them of incentives, and forward a copy to the Committee.
3. Provide letter of support from the Extension Service or Home Economist.
4. Clarify how researcher will assess literacy level of subjects.

Comment: Approval is for research to be conducted subsequent to the date of approval and does not include research conducted prior to that date. If you agree to the above conditions, PLEASE SIGN THIS FORM IN THE SPACE PROVIDED BELOW AND RETURN WITH THE ADDITIONAL INFORMATION REQUESTED TO THE HUMAN SUBJECTS REVIEW DESK, 300 RESEARCH FOUNDATION, 1960 KENNY ROAD, CAMPUS within a week. Upon such compliance, the approval form will be mailed to you. (in case of a deferred protocol, please submit the requested information at your earliest convenience. The next meeting of the Committee will be two weeks from the meeting date indicated above)

DATE May 17, 1993
Signatures(s)

HS-025A (Rev. 2/91)
(CONDITIONS/COMMENTS)
BEHAVIORAL AND SOCIAL SCIENCES
HUMAN SUBJECTS COMMITTEE
The Ohio State University

Research Involving Human Subjects

ACTION OF THE REVIEW COMMITTEE

With regard to the employment of human subjects in the proposed research protocol:

93B0136 EFFECTS OF METHODS OF TEACHING COMPUTERIZED FAMILY
BUDGETING TO LITERATE AND NON-LITERATE WOMEN IN
PUERTO RICO, Joan E. Gritzmacher, Carmen T. Andrades-Garay,
Home Economics Education

THE BEHAVIORAL AND SOCIAL SCIENCES COMMITTEE

__ APPROVED ___ DISAPPROVED

X APPROVED WITH CONDITIONS* ___ WAIVER OF WRITTEN
CONSENT GRANTED

* Conditions stated by the Committee have been met by the Investigator and, therefore, the protocol
is APPROVED.

it is the consent of the principal investigator to retain a copy of each signed consent
form for at least four (4) years beyond the termination of the subject's participation
in the proposed activity. Should the principal investigator leave the University,
signed forms are to be transferred to the Human Subject Review Committee for
the required retention period. This application has been approved for the period of
one year. You are reminded that you must promptly report any problems to the
Review Committee, and that no procedural changes may be made without prior
review and approval. You are also reminded that the identity of the research
participants must be kept confidential.

Signed: ____________________________
(Chairperson)

Date: May 7, 1993

HS-025B (Rev. 8/90)
APPENDIX K

HOME ECONOMICS INSTRUCTION MANUAL
HOME ECONOMISTS INSTRUCTION MANUAL

Carmen T. Andrades Garay
Consumer Education Specialist
Introduction

This manual was designed to help the users to understand and use the program in an effective way. The program will ask some questions of users to enable them to analyze their budgets. The computer program was designed to be user friendly. In that way the user can use the program without knowing anything about computers and without being able to read or write. It is expected that users can enjoy the experience of using the computer as a way of learning. Also, we hope that the design of the program will allow users to make a budget so that they can manage their family's economic resources more effectively and avoid economic pressure for self and their family.
General Information about the Program

Program name: Budgeting Computer Assisted Instruction (BCAI)

Authors: Carmen T. Andrades-Garay
Consumer Education Specialist

Catalina Camacho
Programmer

Graphics Editor: Nancy Mercado

Radio/TV Specialist: Pedro Julio Gonzalez

Purpose of the program: This program is designed to help the consumer to
analyze and make their family budget.

Objective of the program: Refer to Appendix A, page 271.

Calculations. The mathematical representations are the following (refer to pages
131 to 132):

1. The computational formulas for the family or personal budget are
   based on: monthly income and monthly expenses.

2. Recommended percentage of income for subgroups expenses.

3. Estimate of the actual percentage of expenses per category.

4. How to estimate the recommended expenses per category. Multiply
   the recommended percentage of each specific category, previously
   established, by the monthly income. The mathematical
   representation is the following:

   \[ \text{Actual ideal percentage per category} \times \text{monthly income} \]
   Ideal expenses per category

5. Estimate the recommended budget.
6. Estimate the total expenses:
   
The total expenses will be determined by adding all the expenses per category.

7. Estimate the differences to obtain the woman's economic situation

**Information needed to analyze and user make their budget:**

A. Budget Analysis Worksheet (see Appendix A, page 266).

B. Others information that the program will ask user: Refer to Appendix E.

C. Goal Analysis sections:

1. Goals you want to reach (Appendix A, page 266).

2. Goal Checklist (see page 276).

3. Others goals that users would want to accomplished:

   Short-term goal 1: __________________

   Short-term goal 2: __________________

   Long-term goal 1: _________________

   Long-term goal 2: _________________

   From the list, they would select and type the number of three goals that they you can reach in the next 6 months.

   Goal number 1. ________________________________

   Goal number 2. ________________________________

   Goal number 3. ________________________________
From these three goals, select and type the number one goal that you want to reach in the next six months:

Goal number: _______________

4. Goal Planning: To help users in goals planning they would fill out this section in the computer program. The instruction are the followings:

1. Write again the number of the goal that they want to accomplish.

2. Determine the amount of money they need to achieve it goal.

3. Write the amount of money needed in the following table:

<table>
<thead>
<tr>
<th>Goal</th>
<th>Cost or money</th>
<th>Months Needed</th>
<th>amount save</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td></td>
<td>$</td>
</tr>
</tbody>
</table>

D. Information that the computer give to users.

1. Budget analysis (see page 279).

2. Family Budget Modification (Please see page 280).

3. Sample Budget (refer to page to 281):
   a. Budget or plan of income and expenses
b. Variable expenses

c. Fixed expenses

4. Woman's income situation (see Appendix A, page to 284).
APPENDIX L

LETTER FOR PARTICIPANTS
Estimada socia:

Recibe un saludo especial de parte de tu Economista del Hogar. Es para mí importante comunicarte el que nuestro municipio fue seccionado para desarrollar un proyecto de PRESUPUESTO FAMILIAR. Urge que todas las socías participen de este proyecto, por lo tanto esto incluye a las socías pro correspondencia.

Nuestra especialista en Educación al Consumidor la Sra. Teresa Andrades estará con nosotros los días del 16 al 27 de agosto del año en curso. Este trabajo será individual, y nos estamos comprometiendo a proveerles transportación ida y vuelta sus hogares.

Cada socia participará y será entrevistada un día específico en el horario que la especialista le asigne. Yo cuento con ustedes y pronto recibirán más detalles.

Cordialmente,

Economista del Hogar

6 de agosto de 1993.

SOCIA CLUBES DE ECONOMIA DEL HOGAR
SERVICIO DE ECONOMIA DEL HOGAR
Estimada señora:

Estamos muy agradecidas de que hallas accedido en participar en este estudio. Yo estoy estudiando el doctorado en la Universidad de Estado de Ohio y es nuestro interés probar la efectividad de un programa de computadora de presupuesto familiar, con voz y gráficas. Además, queremos saber sobre las características de las socias de los Clubes de Economía del Hogar y clientela de Extension que usen el programa y saber cómo se sienten con relación a las computadoras. Esto nos ayudará a determinar la efectividad del programa de presupuesto familiar.

Para ahorrar tiempo y para ayudarte a usar el programa de presupuesto computarizado te agradeceremos que llenes la información que se solicita en el Manual de Instrucciones. Te agradeceremos traigas la informacion el día del taller de presupuesto. Favor de hacer lo siguiente:


2. Trae la información, al día del taller.

3. Si no entiendes algunas de las preguntas u oraciones, favor de preguntar a la Economista del Hogar.
El taller esta programado para:

Hora:
Stio: Oficina de Servicio de Extension Agr cola
Maunabo, Puerto Rico

Espero verte y reunirme contigo,
Gracias por tu ayuda y tiempo,

Carmen T. Andrades Garay
Especialista en Educación
al Consumidor

Ruth Lebron
Economista del Hogar
Maunabo

Joan Gritzmacher
Profesora y Consejera
APPENDIX M

CORRELATIONAL MATRIX
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