

Evaluation of Cyberchase Phase One Pilot Study



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by

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EXECUTIVE SUMMARY

A pilot study of five programs in the Cyberchase series was conducted in late Fall, 2001. The study was designed to assess the broad educational value, impact, and appeal of the series, and to pilot the approach and instrumentation for a more extensive study in the spring of 2002. The study included more than 450 children and 20 teachers in the San Francisco Bay Area, encompassing the diversity of this region. The major findings of this study are presented below:

- **Both the children and teachers were enthusiastic about the appeal and value of the programs.** The children were engaged by the characters, story, and content. Teachers believed the series supported math instruction in the third and fourth grade classrooms, even though the series is designed for out-of-school viewing.
- **Attitudes about doing math improved significantly after viewing five episodes of Cyberchase.** Children's attitudes improved, to a statistically significant degree, across grade level, gender, and all four ethnic groups.
- **Self-confidence about solving math problems improved significantly after viewing Cyberchase.** Children's self-confidence improved, to a statistically significant degree, across grade, gender, and all ethnic groups.
- **Children's awareness of the scope of math tended to show an increase after viewing Cyberchase.** Although not statistically significant, there was evidence that the children's awareness of math broadened after viewing Cyberchase.
- **Content knowledge about math improved significantly after viewing Cyberchase.** For each of the individual programs viewed, content knowledge improved, to a statistically significant degree, for all groups represented.
- **Our study suggests that this series will appeal to and positively influence children's attitudes, self-confidence and math content knowledge.** We found no notable differences in the results between boys and girls, between third and fourth graders, and among the various ethnic groups in our sample. Our findings support that viewing Cyberchase had a positive influence on children and their engagement with mathematics ideas. This study was less comprehensive than the one to be conducted in the spring, one that will include broadcasts, a website, and print materials for both children and their parents.

These findings are further developed in the next section.

SUMMARY OF FINDINGS

Overview of the Study

Cyberchase is an animated math adventure series for television that uses dramatic adventure stories to inspire an interest in and appreciation for mathematics among eight to eleven-year-old viewers, and to introduce them to important mathematical tools and problem solving strategies. The shows close with short, live-action segments that link the math topics to children's every day lives.

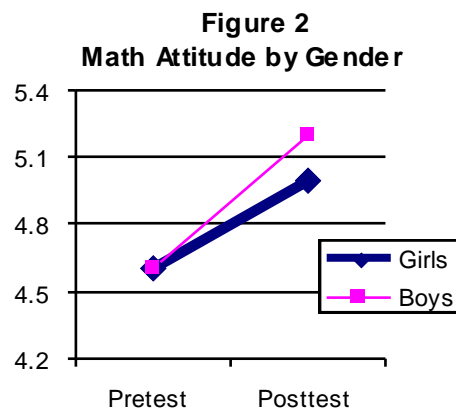
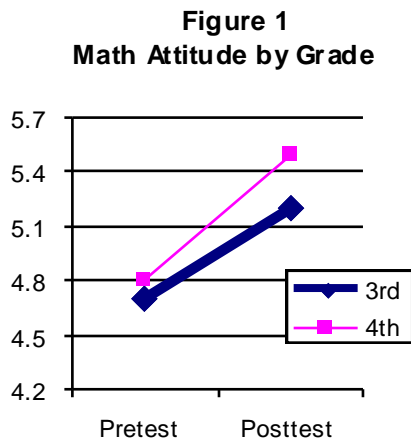
Children in this study viewed five episodes of Cyberchase that covered the math topics of navigation, estimation, area, fractions, and surveys. The episodes were distributed with a pretest, one posttest per episode (given immediately after the tapes were shown), and an aggregate posttest (given a week after the fifth episode was shown). The true/false, multiple-choice and open-ended questions on the pretest and posttests were grouped according to the research questions, and were compiled into composite indices. In this summary the scores were transformed so that a higher score reflects a more positive attitude, awareness, self-confidence or content knowledge.

Sample

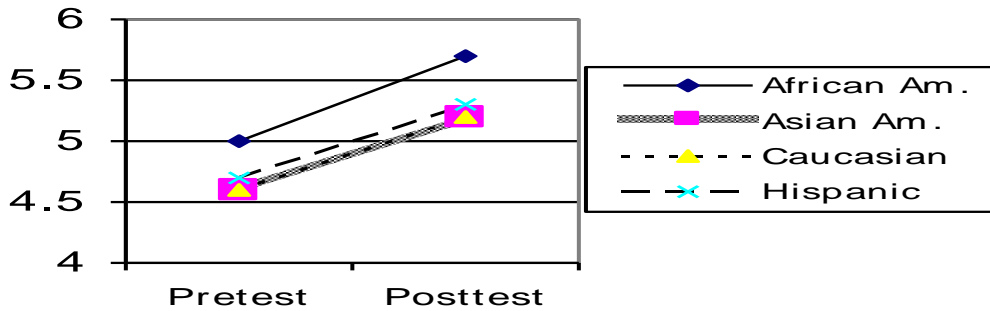
This study was conducted with 465 third and fourth graders in twenty classrooms in the San Francisco Bay Area during a three-week period in late October 2001. The sample was well balanced between girls and boys, and between third and fourth grades, and representative of African-American, Asian-American, Caucasian, and Hispanic students. The sample is detailed fully in Volume II.

Attitudes

After watching Cyberchase, the children showed an overall and statistically significant positive change in their interest in and attitudes about doing math. Both 3rd and 4th graders showed an increase in positive math attitudes (Figure 1). Both girls and boys showed an increase in positive math attitudes (Figure 2). African-American, Asian-American, Caucasian, and Hispanic children also all showed a statistically significant increase in positive math attitudes (Figure 3, on the following page).



**Figure 3
Math Attitude by Ethnicity**



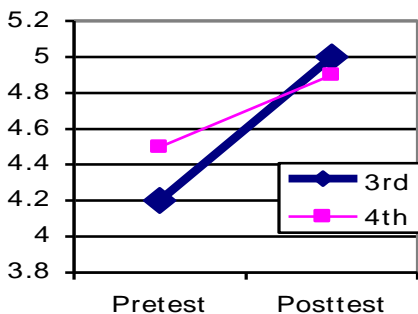
Each of the ethnic groups showed about the same increase in positive math attitudes, which may reflect the diverse nature of the program characters. Children’s attitudes about liking and doing math improved, which suggests that the programs presented role models who themselves have positive attitudes about doing math-related things.

Most of the teachers said that children in general need a variety of ways to learn and understand new skills, and that this video series with the short live-action segments that link the math topics to children’s every day lives could be a valuable addition to the cross-curricular math learning process.

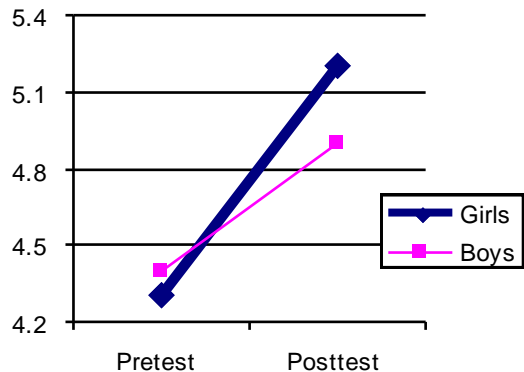
Self-Confidence

Children felt more confident about their ability to solve math problems after viewing Cyberchase; this change was statistically significant. Both 3rd and 4th graders (Figure 4), and girls and boys (Figure 5) showed a statistically significant increase in self-confidence about problem solving skills.

**Figure 4
Problem Solving Self Confidence by Grade**

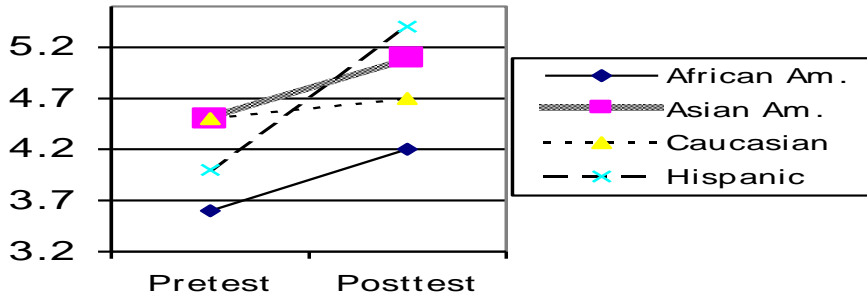


**Figure 5
Problem Solving Self Confidence by Gender**



An analysis by ethnic groups also showed a statistically significant improvement across groups (Figure 6). Hispanic children showed a stronger increase in self-confidence: it is not clear if this is a regional phenomenon or attributable to other factors. This should be explored further in phase two of the study.

**Figure 6
Problem Solving Self Confidence by Ethnicity**

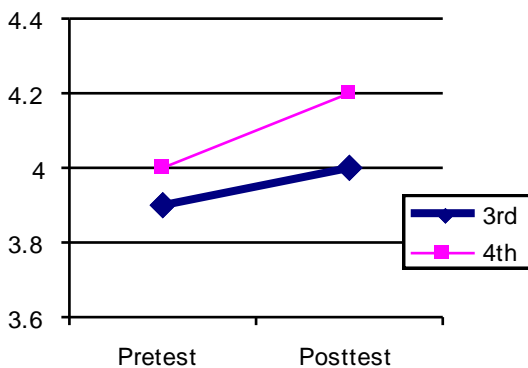


“I liked the fact that the girl characters were strong in mathematical concepts. Many girls in my class are afraid of math already (very sad) and lack confidence. Good role models.” - teacher participant

Math Awareness

Math awareness reflects how broadly children define “math”, and what kinds of activities children see as being related to math, such as building a kite or baking a cake. We found no overall statistically significant difference between the pretest and posttest for children’s awareness of the scope of math. We did find a trend towards a broader view of math, as shown in the following charts. These trends may show up more strongly with increased exposure to the programs.

**Figure 7
Awareness of Math by Grade**



**Figure 8
Awareness of Math by Gender**

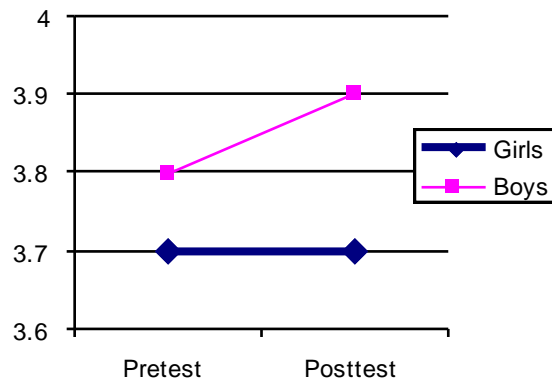
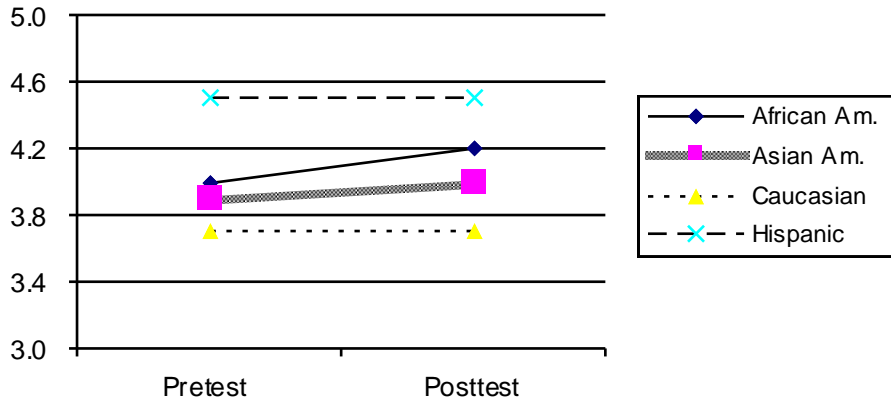


Figure 9
Awareness of Math by Ethnicity



“The [children] enjoyed watching [Cyberchase] “instead” of math. Had the attitude that this was entertainment.” - teacher participant

Content Knowledge

We looked at the content topics presented in each of the five Cyberchase episodes viewed and found that, for each program, children learned elements of the content presented. The difference was statistically significant for the sample as a whole, as well as for grade level (Figure 10), gender (Figure 11), and ethnicity (Figure 12). Caucasian and Hispanic children showed a slightly greater increase in content knowledge. It is not clear if this is a regional finding and, therefore, should be explored in greater detail in the next phase of the study. In addition to an increase in knowledge, children believed that their math skills had improved.

Figure 10
Content Knowledge by Grade

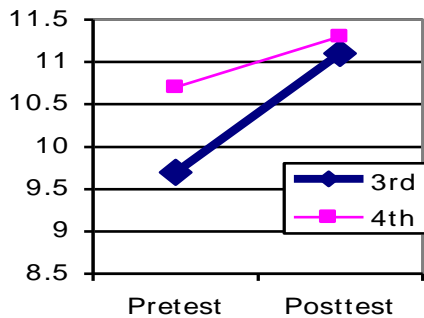


Figure 11
Content Knowledge by Gender

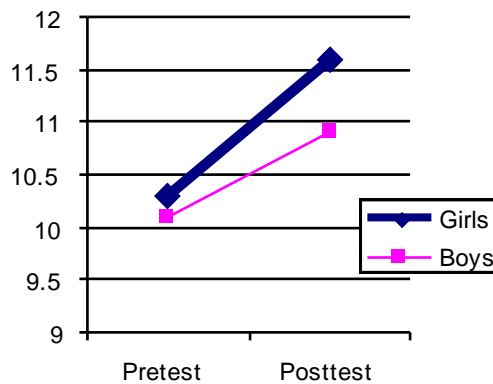
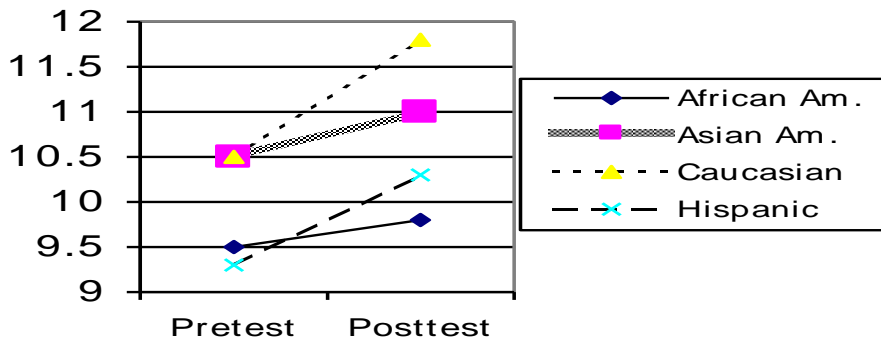


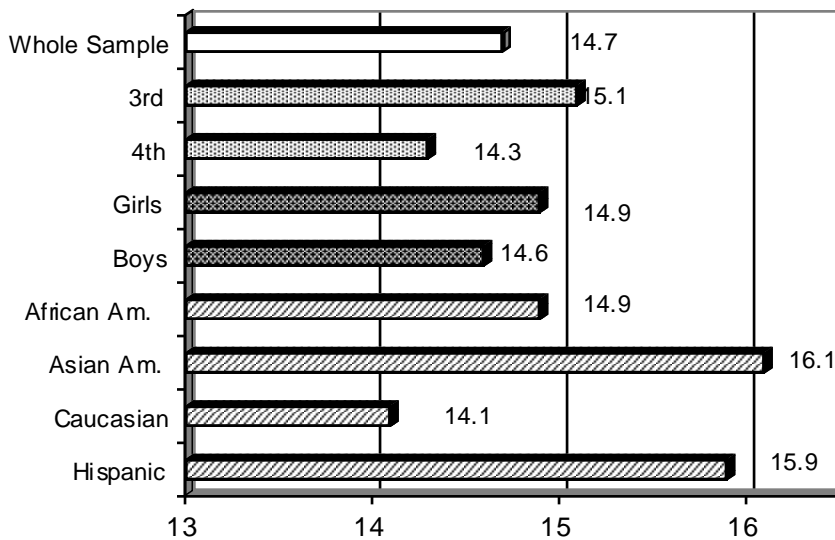
Figure 12
Content Knowledge by Ethnicity



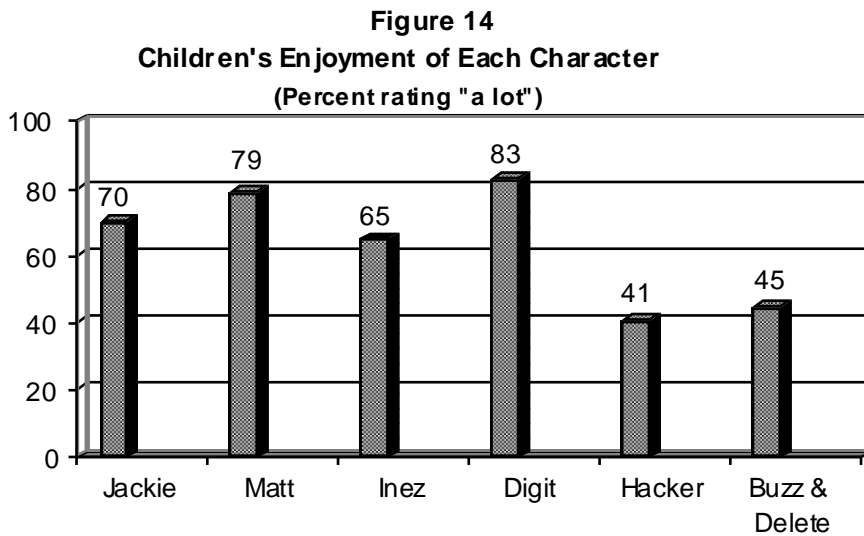
Children’s Reactions to the Programs and Characters

Children reacted positively to the Cyberchase program and the characters portrayed. After showing each program, we asked the children how much they enjoyed the episode. The cumulative findings are reported in Figure 13. The numerical values reflect a summary variable of the children’s enjoyment of each of the five episodes. Girls reported greater enjoyment than boys. Third graders reported greater enjoyment than fourth graders. Asian-American and Hispanic children reported the most enjoyment by ethnic group. These phenomena should all be explored in phase two of the study.

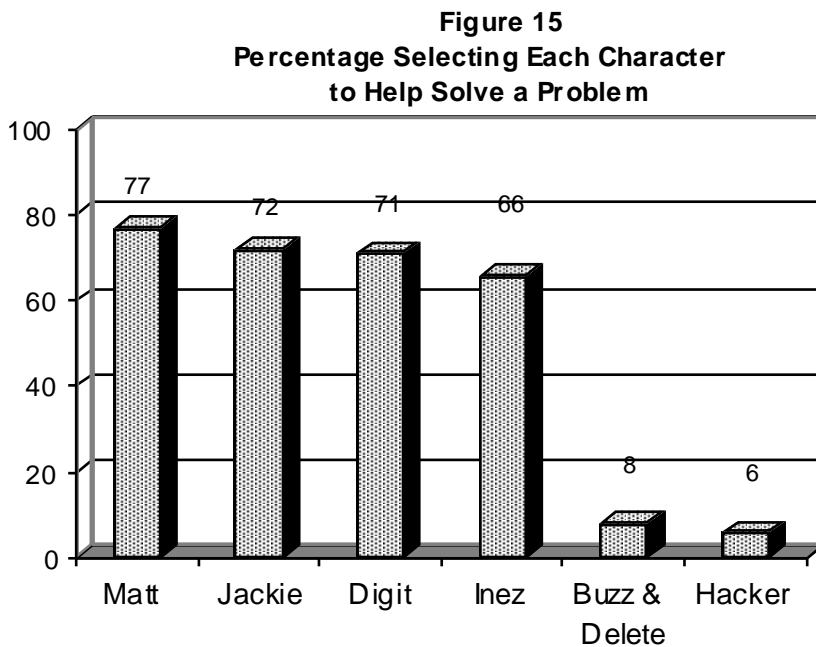
Figure 13
Children’s Enjoyment of Viewing Cyberchase



After viewing all the programs, the children reported how much they enjoyed each of the characters (Figure 14). Close to 70% of the sample reported liking each of the “good guy” characters “a lot”, and nearly 50% reported liking the “bad guy” characters “a lot”.



We also asked the children to choose which of the characters they would like to help them solve a math problem. Most children chose the four “good guy” characters to help them (Figure 15). The children chose, in descending order, Matt, Jackie, Digit and Inez. When asked to provide a



list of words describing each of the characters, the most common words were smart, nice, funny and cool (see Table 1.) The children in the study were quite consistent in their choices of words to describe the characters.

Table 1
Sample’s Descriptions of Cyberchase Characters

Character	Most Common Descriptor (%)	2 nd Descriptor (%)	3 rd Descriptor (%)	4 th Descriptor (%)	5 th Descriptor (%)
Jackie	Smart 44	Nice 34	Funny 25	Cool 17	Friendly 12
Matt	Smart 46	Nice 30	Cool 30	Funny 27	Helpful 9
Inez	Smart 46	Nice 29	Funny 20	Cool 17	Helpful 8
Digit	Funny 52	Smart 25	Cool 22	Nice 22	Helpful 13
Hacker	Mean 51	Evil 21	Funny 12	Weird 11	Dumb 8
Buzz & Delete	Funny 34	Mean 25	Weird 20	Dumb 18	Stupid 11

“It’s amazing how TV captures their attention.” - teacher

“They loved [Cyberchase]. Some have visited the website. They can’t wait for the program to begin in January.” - teacher

“Cyberchase links education to [children’s] own experience: watching cartoons.” - teacher

Teachers’ Reactions to Cyberchase and its Characters

Teachers were enthusiastic about the series, suggested having stronger math content to help justify its use in the classroom, and planned to use it to support their math teaching. In addition to the previous teacher quotes, the following are also representative of their reactions:

“I have found myself laughing - it is very engaging.” - teacher

“I think that some students find math more fun and most of the class sees math more as a useful tool rather than a compartmentalized subject.” - teacher

“I am not sure I would classify it as attitude, but it has opened students’ eyes to all the area they use math in.” - teacher

“[The children show] a greater interest in math [after watching Cyberchase]” - teacher

These materials are developed in greater detail in an accompanying volume to this Executive Summary.