Cyberchase Teachers' Guide
Formative Evaluation of Outreach In-School Activities for Teachers and Students

Report for
WNET Thirteen

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EXECUTIVE SUMMARY OF *CYBERCHASE TEACHERS' GUIDE* EVALUATION
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This formative evaluation gathered feedback from teachers and their fourth grade children in response to two activities included in the *Cyberchase* Teachers' Guide. The user-based feedback will assist with the design of new school-based materials. The general goals for the research were to explore reactions to the guide; assess appeal and difficulties in implementation of two activities; estimate comprehension of activity content; and evaluate teacher interest in further activities.

Sample. Four fourth-grade teachers and their classes were recruited at each of three national sites in California, Florida and Massachusetts. The teacher sample of 12 included 10 females and 2 males, with 2 minority representatives. None of the teachers had seen the *Cyberchase* television series but at least half of the student sample had. Of the fourth-grade students, 275 participated in the "Count the Beats" activity (51% females, 45% minorities), and 273 participated in the "Sort It Out" activity (50% females, 47% minorities).

Procedure. Participants reviewed and implemented two activities from the *Cyberchase* Teacher Guide: "Count the Beats" and "Sort It Out." Teachers were interviewed after reading through the *Cyberchase* guide; teachers then implemented the two main activities with their fourth grade students, completed a teacher and a student survey after each activity, and were interviewed after their experience.

Reactions to teacher guide. After the initial review of the teacher guide but before implementing activities, 11 of the 12 teachers reported that they would do at least one of the activities with their students if they had received the guide in the mail. On the initial exposure, teachers reported liking the clear explanation of simple activities, the guide layout, the curriculum fit of the activities, the easily obtainable materials and the Tips bubbles. To improve the guide, teachers requested provision of full-size black line worksheets, grade level correlations, and one activity on a page.

Implementation of activities. One-quarter of the teachers had no difficulty implementing "Count the Beats;" but two-thirds noted that students had difficulty finding their pulse, and two teachers did not have enough calculators for every student in their class. In "Sort It Out," seven of the twelve teachers substituted the Guide's suggested string Venn diagram with other techniques. Two of the five teachers who used the string approach found that students focused more on the string than the sorting activity.

Comprehension of activity content. All teachers agreed that "Count the Beats" uses math skills, mainly estimation, multiplication and computation. All students could describe some sort of learning from "Count the Beats," with most saying that they learned how many heart beats they had in a certain time period or that they learned how to find or count their heart rate. Teachers reported that "Sort It Out" uses mainly logic, attribute comparison and sorting, but one-quarter of the sample did not feel the activity used math skills but was instead appropriate for their language arts curriculum. Two teachers ap-

peared to not have a complete understanding of the application of Venn diagrams. From "Sort It Out," most students felt they learned how to sort things or how to use a Venn diagram to sort things.

Appeal of activities. The activities were rated relatively high in appeal both by teachers and their students. On a scale of 1 to 5, where 5 means "liked very much," "Count the Beats" was rated at 4.3 (teachers) and 4.2 (students). Those who reported having watched *Cyberchase* were significantly more positive about the "Count the Beats" than those who had not watched the show. "Sort It Out" was rated at 4.7 (teachers) and 4.4 (students).

With respect to "Count the Beats," teachers liked most the use of calculators, estimation, the interdisciplinary quality of the activity and the hands-on aspect; however, they found that students had difficulty finding their pulse. Eight of the twelve teachers would recommend the activity, emphasizing the curriculum fit, the cross-curriculum focus and the use of hands-on real-life content. Four of twelve teachers hesitated in their recommendation due to the difficulty of finding pulses and the fit with their particular curriculum. Students liked most finding the answers of how many times their heat beats in a minute, hour, day or year; they also liked counting heart beats and feeling their pulse. Small portions of the student sample disliked the math calculations and not finding their pulse.

Teachers liked "Sort It Out" because their students had to think, sort and solve, their students enjoyed the activity and it encouraged student interaction. Nine teachers would recommend the activity because of the cross-curriculum focus and the hands-on activity. Those hesitating to recommend the activity were concerned with the time required for preparation work and class implementation. The participating students liked most sorting and figuring out someone else's sort. Small portions of the sample had difficulty with the thought process, the sorting activity and the lack of peer cooperation.

Interest in future activities. Seven of the teachers were interested in receiving activities to help their students understand about spending, saving and budgeting money. The uninterested teachers voiced a lack of need for these activities for their grade level. Seven teachers preferred to receive instructions by mail because of technology, paper and ink limitations at school as well as teacher habit. Four teachers preferred downloading from the web because of efficiency and home access. Two teachers recommended that they receive emails telling them what is available and when, because they don't have time to peruse websites. One teacher suggested making the downloaded files open for manipulation by the teacher user. The remaining teacher had no preference either way.

Conclusions. The following conclusions are based on only twelve teachers and should be considered tentative in their recommendation power. The activities were appreciated by both the teachers and their students, and students understood the main learning goals. Continue the current guide approach of clear explanations of simple activities that fit into fourth-grade curriculum. The teachers particularly liked activities that were hands-on and interdisciplinary using teamwork with easily found materials and real-life applications. They requested the addition of master black line worksheets and more examples or demonstrations of how activities work. Perhaps pdf worksheet files and numerous implementation examples could be part of the website's teacher section with links noted in the printed guide. Slightly more than half of the teachers were interested in future money activities and preferred receiving such activities via mail.

INTRODUCTION

This formative evaluation gathered feedback from teachers and their fourth grade students in response to two activities included in the *Cyberchase* Teachers' Guide. The user-based feedback will assist with the design of new school-based materials. The general goals for the research were:

- To explore reactions to the teacher guide generally;
- To assess appeal of the two activities;
- To pinpoint difficulties in the implementation of the two activities;
- To estimate comprehension of the activity content.
- To evaluate teacher interest in further activities.

METHOD

Sample demographics and background information

Four fourth-grade teachers and their classes were recruited from one private and one public school in urban and exurban areas around Sacramento, CA. Four fourth-grade teachers and their classes participated from two public schools in rural Broward County and urban Dade County around Miami, FL. Four teachers participated from two public schools in Littleton and Ayer, MA, in the exurban fringe of Boston. Of 12 participating teachers, 10 (83%) were females and 2 (17%) were Hispanic. None of the teachers had ever watched *Cyberchase* on television.

The 275 fourth graders participating in the "Count the Beats" activity included 51% females and 45% minorities (Hispanic, African-American, Asian). The 253 fourth graders participating in the "Sort It Out" activity included 50% females and 47% minorities. Students who reported ever watching the television show *Cyberchase* included 51% of the sample in "Count the Beats" and 53% of the sample in "Sort it Out."

Sample Distribution	Females	Males	Minorities
Teachers (n = 12)	10	2	2 females
"Count the Beats" Students (n = 275)	139	136	64 females, 60 males
"Sort it Out" Students (n = 253)	126	127	60 females, 58 males

Procedure

During week one of the study, teachers received a *Cyberchase Teacher Guide* with a Multimedia Research survey stapled to the back cover as well as student surveys for each of the two activities. The teacher read through all the guide but focused on two activities in particular: "Count the Beats" and "Sort It Out." Teachers were interviewed at the end of week one to respond to the teacher guide generally, to review activity procedure and ask about perceived difficulties in implementation.

Teachers were asked to implement the two activities during weeks two and/or three. The activities could be done in any order, with the student and teacher response surveys completed after each activity.

After completing both activities, interviews with teachers focused on difficulties implementing the activities and perception of such activities as using math skills as well as interest in money-related activities and best methods of receiving activities.

Analysis

Mean student ratings were assessed for influences of gender, ethnic background and familiarity with *Cyberchase*. Student open-ended responses were sorted and coded by keyword/phrase, and categories obtaining 5% or more of the sample are reported.

RESULTS: TEACHERS' REACTIONS TO GUIDE GENERALLY

Initial Teacher Appeal

In the pre-activity interview, teachers discussed what they liked about the guide:

- 8 (67%) teachers liked the clear explanation of simple activities; e.g.,
  "It's real simple and very clear."
  "The explanations are thorough. The activities are really simple and easy to do;"
  "It is really simple and easy to follow."

- 5 (42%) liked the layout; e.g.,
  "The pages are easy to read. There is a nice clean format. The font is clear. The information is well laid out, not cluttered. The materials are listed;"
  "I liked the graphic organization, easy to follow diagrams;"
  "I liked the fact that everything was laid out step by step by step. It was set up in a format that works well in my lesson plan book. I don't have to reformat it into my lesson plan."

- 5 (42%) liked the fact that the activities fit into the curriculum; e.g.,
  "It is about things we cover in our curriculum;"
  "It fits into the standards for our state, which I really like a lot because that takes a lot of time for a teacher."

- 5 (42%) noted that the materials were listed and easily obtainable; e.g.,
  "The materials are inexpensive and easy to obtain;"
  "I like the materials with bullets in a box."

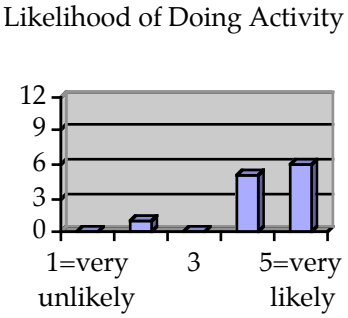
- 4 (33%) specifically mentioned the Tips bubble; e.g.,
  "The Tips are useful for applying the lesson the first time;"
  "Tips are great, gives you a little 'hey, watch out for this.'"

Ten (83%) teachers had suggestions to improve the teacher guide generally. The most frequent request was for provision of black line worksheets:

"It's always nice to have a worksheet component. They could give you a transparency to go overhead for a visual thing."
"I made up a worksheet for "Count the Beats." It would have been nice of you to provide it."
"Most teachers prefer to have the black line already provided for all activities rather than having to make their own."
"For "Count the Beats," have a form already made with the chart on it, a pre-made chart for the kids to use. Something I could copy so all they have to do is fill in the spaces."
"The pictures would be more useful if they were of the activity, not just ornamental. Like the "Sort It Out" one might show a collection of objects that might be used instead of kids holding the materials list."
"I would like to see grade level correlations to each activity."
"What would be considered success for a particular grade level, a standard to measure my success, a rubric of expectations – 50% to comprehend it first round, is that good?"
"The activities seemed a bit crowded or busy. Things should have been more spread out. One activity on a page would have been less stressful. Two on a page had a frantic feeling."
"Maybe there should have been only one activity on a page."
"It says *Cyberchase* episode. I'm wondering how that relates to the activity. Based on the topic I'm seeing, I don't know what that means. I'm wondering if there is a connection between the theme of the episode and the activity."

Initial Potential to Participate

Before actually doing an activity but after reading through the guide, teachers were asked how likely it is that they would do at least one of the activities with their students if they had received the guide in the mail and not as part of an evaluation project. Choosing on a scale of 1 to 5, where "5" is "very likely" to do an activity, 6 (50%) of the teachers chose "5", saying they were "very likely" to do at least one activity. The mean response was "4.3" (see chart for full distribution). The one (8%) teacher choosing a "2" felt uncomfortable using outside materials because she is a new teacher: "three or four years down the line, I will be more comfortable and take some more liberties, maybe salt the lesson with some *Cyberchase* materials."



Teachers' Perception of Math in Activities

In the post-activity interview, teachers were asked if they felt that the two activities used math skills. All teachers felt that "Count the Beats" used math skills, listing the following: estimation (7 teachers), multiplication (5), computation (4), counting (2), large numbers (2), using calculators (2), place value, sequencing, constructing a table, reading a table and logic.

The teachers reported that "Sort It Out" used logic (4 teachers), attribute comparison (4), sorting (3), classification (2), categorization, analysis, and math vocabulary like 'Venn diagram.' Three (25%) teachers from two different Florida schools were less convinced that this activity used math skills but liked it nonetheless for other learning outcomes, as described below:

> This teacher sorted electrical items and battery-powered items. "Venn Diagram, I would say no [it didn't use math skills]. The way it worked, it seemed more reading, because I automatically talk about comparing and contrasting. I thought it was really good because I put a slant towards science. I drew a Venn diagram on the floor with chalk and I had electrical things you plugged into outlets (TV, VCRs) -- and things with batteries."
>
> This teacher sorted magazine pictures. "As far as a Venn diagram, how I used it, you could sort things but I don't feel that I used it for math. I used it for language arts reading. There was definitely character skills we used because we all did it together. We had to be patient when other people were thinking and not call out when other people were thinking and things like that."
>
> This teacher sorted different kinds of cookies. "I don't think the Venn diagram used math skills. I think it was a much better language arts lesson to compare and contrast, and an excellent language arts lesson. What I liked about the Venn diagram is that it taught the children that cookies and things that are larger than life for kids and sorting is a very difficult thing to teach [sic]. It is an important FCAT (FL Comp. Achievement Test) required skill, which is usually difficult to teach. I liked the activity. I just don't see it as a math activity."

RESULTS: COUNT THE BEATS

Implementation

In the pre-activity interview, none of the teachers foresaw any difficulties in implementing this activity.

In the post-activity written survey and interview, teachers were asked what difficulties, if any, they had doing the activity. Three (25%) teachers reported no difficulty with this activity. Two (17%) teachers had problems because they did not have enough calculators for everyone in the class. Eight (67%) of the 12 teachers noted that students had difficulty finding their pulse, and some students never did, prompting teachers to take the kids' pulse or provide them with an average pulse rate:

> "My children had a hard time getting their heartbeats. It was really tough and took a lot of time."
>
> "When it came to finding their heartbeats, I had to take a lot of pulses. Out of 21 kids, 1/3 had to have their pulses taken by an adult."
>
> "It took a few students a little longer than others to find their heartbeat, but I would do it again regardless."
>
> "Trying to get the kids to find their pulse, but we worked through it. . . Once we got everyone's pulse everything went along very smoothly. I think the guide was very helpful on giving hints and even indicated that the children would have problems finding the pulse, and it worked through a solution for us. That was to tell the kids how to hold their hands and fingers. It was very step-by-step, very scripted."
>
> "The hardest thing was to find their pulse. They did add a tip in the Guide about that, but it was a challenge."

Appeal

In the post-activity written survey, teachers were asked how much they liked doing the activity and what they liked or disliked about it. The 12 teachers' quantitative appeal ratings ranged from "liked very much" (5) to "it was okay" (3), with a mean appeal rating of 4.3.

Written responses (see table below) indicate that teachers liked most the use of calculators (4 teachers), the focus on estimation (4), the interdisciplinary quality of the activity (3), the hands-on aspect (3) and working with large numbers (2) and place value (2). Teachers also reported disliking the fact that the students had difficulty finding their pulse.

Teachers' Appeal Responses:

Those who liked very much said:	Those who liked somewhat said:	Those who liked okay said:
The kids' understanding what their pulse is and realizing the values of their estimations.	Fit well with estimation unit. Review of time measures. Easily adaptable for science. Some students couldn't find their pulse.	Exciting to find out the answers but difficult computations at beginning of the year.
Students always have trouble with estimation. I was able to show them how they could estimate quickly without guessing.	Having students predict/estimate their yearly heartbeats led to some humorous discussions. They ranged from a few thousand to trillions.	Very difficult for students to find and count their heartbeats.
Students learned to find their pulse. Many had never done this before. Also, students enjoyed using calculators to practice math skills.	It was tricky helping the kids find their pulse. Some kids hardly seemed to have one (suspected I've suspected before! ☺ It fit in with the place value lessons we were doing this week.	
It crossed curriculum with science and within mathematics itself, such as calculator lessons.	I liked that it incorporated two subjects: math and science. I also liked the "hands-on' aspect of finding the students' pulses. This personalizes it for the children which often leads to better understanding.	
Students were very excited when they saw the larger numbers. It was very "hands-on. " They enjoy using calculators.		
Kids got to practice multiplication, place value and working with a calculator and large numbers.		

In the post-activity written survey, fourth-grade students were asked:

- How much did you like doing the activity?
- What did you like most about the activity?
- What did you not like about the activity?

The 275 students' quantitative appeal ratings ranged from "disliked very much" (1) to "liked very much" (5), with a mean appeal rating of 4.2 . There were no gender or ethnic group differences in appeal, but those who reported having watched *Cyberchase* were significantly more positive about the activity (mean = 4.3) than those who have not watched the show (mean = 4.0).

Their written responses reveal that children liked most finding the answers of how many times their heart beats in a minute, hour, day or year. They also liked counting heart beats and feeling their pulse.

<u>What Students Liked Most About the Activity:</u>

- 17% liked finding out how many heart beats occur in a certain amount of time (minute, hour, day, year)
- 16% liked counting heart beats;
- 13% liked feeling their pulse or heart;
- 11% liked calculating or using the calculator;
- 9% liked finding their pulse;
- 8% liked estimating;
- 8% liked the math; adding; multiplying;
- 5% liked comparing their estimates with the actual results;
- 5% liked most that the activity was fun.

Over half (54%) of the students were unable to describe something they did not like about the activity. Small portions of the sample had difficulty with the math, finding their pulse and counting their heart beats.

<u>What Students Did Not Like About the Activity:</u>

- 54% did not describe something they disliked about the activity;
- 11% did not like the math; adding; multiplying;
- 7% had difficulty finding their pulse;
- 5% did not like counting heart beats;
- 5% felt that the activity was boring.

Teachers were asked how much they would recommend this activity to other teachers. Of the 12 teachers, 8 (67%) would recommend the activity, 3 (25%) would recommend the activity "somewhat", and 1 (8%) would not recommend the activity. Those recommending the activity emphasized the curriculum fit, the cross-curriculum focus and the use of hands-on real-life content. Those hesitating to recommend the activity were concerned with the difficulty of finding pulses and the fit with their particular curriculum.

Teachers' Recommendations

Those who recommend said:	Those who recommend somewhat:	Those not recommending said:
For any activity to be meaningful, it should be done in the context of a bigger picture. This allows for transfer or application to other areas. Although this activity did not blend into what we are currently studying, it was simple to do and fun for the students. I will use it next year when we are studying the content areas.	If it fits with their curriculum.	Doesn't tie in with curriculum/ expectations.
This activity is directly related to the curriculum and incorporates problem-solving. Problem solving is difficult for many children. This activity is great because it's a hands-on, personalized activity that teaches problem-solving.	The difficulty in finding the pulses would make it challenging to do with a larger class. The directions were clear and it was easy to understand. It fit with the curriculum.	
Great chance for kids to use a real life situation in math, instead of problems on a page.	The difficulty of finding pulses limits my recommendation but I might recommend for the end of the fourth grade year.	
I would recommend it as a wonderful way to integrate math and science skills into lessons.		
I feel this is a great interactive hands-on cross-curriculum style activity.		
It is a good method of showing estimation. It involves the children. They were very animated during the activity.		
Good way to practice operations.		
No explanation of recommendation		

Most Interesting Thing Learned

Student participants were asked to report the most interesting thing they learned from the activity. Most students felt they learned how many heart beats they had in a certain time period and that they learned how to find or count their heart rate.

What Students Learned from the Activity:

- 28% learned how many heart beats they had in a year, which was the main challenge of the activity;
- 20% learned how to find or count their pulse;
- 12% wrote that they learned how many heart beats they had, with no time period mentioned;
- 7% noted that their heart beats fast;
- 5% learned how to use the calculator better;
- 5% listed how many times their heart beats in a minute
- 5% felt they learned how much the heart beats in a minute, hour, day and year.

Accurate measurement apparently was not a strong suit in the implementation of this activity. Some students reported their specific findings; these ranged from 40 to 660 beats in a minute, 2460 to 8200 beats in an hour, and 315,360 to 547,500,000 beats in a year.

RESULTS: SORT IT OUT

Implementation

In the pre-activity interview, none of the teachers foresaw any difficulties in implementing this activity; however, four (33%) teachers recommended that the guide offer example "objects" and "attributes" for the "Secret Sort" game to make their job easier.

In the actual implementation of the activity, in addition to magazine pictures, teachers chose a wide variety of objects to be sorted in the "Secret Sort" game including electrical and battery-powered machines, various polygon shapes, writing tools (pencils, pens, crayons, hi-liters), Halloween candy, and various kinds of cookies that the students ate at the end of the activity; for example:

> "You need to give suggestions to the teachers. I found words that were in all cap, all lower, or some upper and lower case. Give examples for the teachers for what to look for to cut out in the magazines. It would have been nice to have a few more examples of what we could do."

> "The kids cut pictures out of the magazines. We introduced Venn diagram, drew big diagrams on the board and had a whole bunch of tape. We talked about attributes and how to sort people. We wrote all those on the board – about 20 ways. We guided the children towards people with brown hair, people who wore glasses, and then brown hair and glasses. It garnered a lot of discussion…. Then we used teams of four so that the children would have interaction between each other and could discuss and negotiate what to sort. We used cookies. Bought chocolate cookies, vanilla cookies, chocolate and vanilla, cookies with sprinkles, cookies without sprinkles, sandwich cookies with chocolate on one side and vanilla on one side. From there we randomly put a handful of each variation of cookies, 12 per team of four children, in a plastic bag. The teacher's "Secret Sort" was Chocolate (A), Vanilla (B), combination chocolate and vanilla cookies (C). 80% got the Chocolate-Vanilla mix correct."

> "The first activity took a while but it worked out really well. In my class, they got the gist of the Venn diagram. They had people with hair, people who were partially bald. The unknown were people who had helmets on. We had to go into the next day. For the second part, I drew a Venn diagram on the floor with chalk, and I had electrical things you plugged into outlets (TV, VCR) and things with batteries."

In the post-activity written survey and interview, teachers were asked what difficulties, if any, they had doing the activity. Seven (58%) teachers foresaw difficulties using the "string" Venn diagram and made their own modifications using a handout of a paper with two circles drawn; hula hoops; or circles drawn on a floor. One (8%) teacher simply gave verbal instructions to use student desks, as in "the left side of your desk will represent one set of attributes, the right side of your desk will represent the other set, and the center will represent both sets."

> "We found that using the strings to make the Venn diagram did not work. The children's ability to actually form a circle with the string and form a second overlapping circle was difficult. They didn't have the manual dexterity to do it. So we took a Venn diagram out of one of our literature supplements and photocopied it, so that each child/team had a 8.5 x 11" with a Venn diagram already predone and that took that challenge out of the way completely. Once we had the handout in place, the activity went very well. The handout keeps the children concentrating on how to sort instead of on the string."

"When you're dealing with 38 kids in a class, you need to do some things ahead of time. The string moves around, the circles aren't quite right, they kind of lose focus on the purpose of their mission. I used a paper handout form. Visually it was easier for them to see."

"I used hula hoops instead of strings."

"I came up with drawing the diagram on the floor with the marker. We have linoleum and we have dry erase markers. It was much more convenient to draw it on the floor."

"I drew a Venn diagram on the floor with chalk."

Some of those who did use the string found it created problems:

"The string for the Venn diagram would move and this caused the students to become distracted and preoccupied with the string itself."

"The children were more focused on keeping the string in a circle than on the activity."

In two cases it appeared that the teachers did not have a complete understanding of the application of Venn diagrams:

"The idea of the Venn diagram seemed like the wrong diagram. It was really hard to separate it. I made it work, but it was a real stretch. On my part, it was really hard to set up for that one. I would have liked to see an example of ABCD to make it clearer. Many of the pictures [we had] didn't fit the Venn diagram. It was hard. [Teacher apparently did not understand that D was for those pictures that did not have the ABC attributes.]"

"The directions were not clear enough to understand what needs to go in the A, B, C, D sections. It seemed easier to do "in the circle" or "out." An example of a complete diagram with the attributes would be better."

Appeal

In the post-activity written survey, teachers were asked how much they liked doing the activity and what they liked or disliked about it. The 12 teachers' quantitative appeal ratings ranged from "liked very much" (5) to "it was okay" (3), with a mean appeal rating of 4.7.

Written responses (see table below) indicate that teachers liked most the fact that their students had to think, sort and solve (4 teachers), that their students enjoyed the activity (3) and that the activity encouraged student interaction (3). Teachers disliked the preparation time (2) and the use of the string (3), which was replaced by some teachers with paper Venn diagrams, hula hoops or chalk circles on the floor (see Implementation section for more details of modifications).

Teachers' Appeal Responses:

Those who liked very much said:	Those who liked somewhat said:	Those who liked okay said:
I liked the fact that this lesson caused the students to think critically. The activity where they had to sort the objects really forced them to think beyond what may be expected of them on regular Venn activities. Usually they are told what items to sort. This is easier than trying to guess what someone else may have sorted as they did here.	The kids loved cutting and sorting the pictures but I disliked finding the materials	The kids enjoyed it. It seemed to take a lot of time for the amount of value in the lesson. The string recommendation needs to be longer.
It allowed for total participation as the students worked together in small groups. They loved trying to guess each other's "sorts."	I liked that it was hands-on. I liked that all the students were involved in the game.	
Very adaptable to different ability levels.		
You could incorporate any subject into this activity.		
It was wonderful to see the children interact with each other. They reasoned with each other to problem solve.		
I disliked the string for a Venn diagram. A pre-copied Venn diagram saves time and keeps the child focused on learning rather than on the circle of string.		
Very visual and kinesthetic. We used hula hoops. Lays a great foundation for future graphic organizer work.		
I liked the part where students had to figure out how things were being sorted.		
It required a lot of preparation.		

In the post-activity written survey, fourth-grade students were asked:

- ❖ How much did you like doing the activity?
- ❖ What did you like most about the activity?
- ❖ What did you not like about the activity?

The 253 students' quantitative appeal ratings ranged from "disliked very much" (1) to "liked very much" (5), with a mean appeal rating of 4.4. There were no differences in sub-group responses for gender, ethnic group or *Cyberchase* viewing.

Their written responses reveal that children liked most the sorting activity and guessing what someone else's sorting attributes were.

<u>What Students Liked Most About the Activity:</u>

- 23% wrote that they liked sorting;
- 23% liked figuring out or guessing someone else's sort;
- 13% liked eating the cookies after the sort [all from one class]
- 10% liked putting things in the diagram;
- 9% liked cutting out pictures;
- 6% liked teamwork;
- 6% found the activity challenging;
- 6% liked everything.

Almost three-quarters (71%) of the students were unable to describe something they did not like about the activity. Small portions of the sample had difficulty with the thought process, the sorting activity and the lack of peer cooperation.

<u>What Students Did Not Like About the Activity:</u>

- 71% did not describe something they disliked about the activity;
- 5% thought the activity was hard, confusing or frustrating;
- 4% felt their peers did not cooperate in the activity;
- 4% did not like sorting.

Teachers were asked how much they would recommend this activity to other teachers. Of the 12 teachers, 9 (75%) would recommend the activity and 3 (25%) would recommend the activity "somewhat." Those recommending the activity emphasized the cross-curriculum focus and the hands-on activity. Those hesitating to recommend the activity were concerned with the time required for both them and the students.

Teachers' Recommendations

Those who recommend said:	Those who recommend somewhat said:
Age appropriate and ties in with math and language arts curriculum.	I didn't like the time it took to gather the materials.
This activity is so generic in nature that it has many uses. It was simple to do and fun for the students. I'll use it next year.	It seemed to take a lot of time for the amount of value in the lesson.
I would not recommend this as a math activity. I would recommend this as an excellent tool to introduce and explain the Language Arts concept of compare/contrast using a Venn diagram.	It was above their understanding. A different graphic for the same activity would be better.
Fits into any grade level curriculum.	
It gives the students an opportunity to work hands on with sorting, attributes and compare and contrast skills.	
It is a great activity to get your students out of their seats and engaged in learning.	
So much of learning comes from learning how to think. This is a good way to do a hands-on fun activity while at the same time, teach the thinking process.	
Clear, easy, fun, lays foundation.	
I had kids viewing and analyzing polygons in a deeper,. more analytical way. [Various polygons were the objects to be sorted in this class]	

Most Interesting Thing Learned

Student participants were asked to report the most interesting thing they learned from the activity. Most students felt they learned how to sort things or how to use a Venn diagram to sort things.

<u>What Students Learned from the Activity:</u>

- 19% said that they learned how to sort things;
- 15% mentioned by name the Venn diagram – that they learned what it is and how to use it to sort things;
- 9% learned about "same/different" or "alike/not alike";
- 9% felt they learned nothing from the activity.
- 8% learned how to sort things in different ways or in different groups;
- 4% wrote that the learned how to "compare and contrast";
- 2% described the concept of outliers in a Venn diagram.

RESULTS: FUTURE ACTIVITIES

Interest in Receiving Financial Activities

Teachers were asked if they would like to receive activities to help their students understand about spending, saving and budgeting money. Seven (58%) teachers were interested in receiving such materials. The California teachers were more negative than those from Florida and Massachusetts. Full responses are presented in the table below.

Interest in Receiving Financial Activities

YES	YES AND NO	NO
Yes! I absolutely do teach that and would love to. I came from a business background. My children learn about mortgage banking from me. I just think that we cannot start that soon enough for children.	Something more for fifth and sixth grade, where we start to cover that, but not my grade.	We are involved in a Savings Make Sense program with the MA state treasury, and that has a curriculum that goes along with it. So, no, we wouldn't need anything additional.
I honestly think that the textbooks don't give us what we need for that.		Not especially. [CA]
Sure. Can never say no to that kind of good stuff.		Not at this time. [CA]
Yes, our math tries to focus on real world issues.		No. [CA]
Please, yes.		
Yes		
Yes [CA]		

As a final follow-up question, teachers were asked to specify the best way for them to receive activity instructions – by mail or downloading from a website. Seven (58%) teachers preferred to receive instructions by mail because of technology, paper and ink limitations at school as well as teacher habit. Four (33%) teachers preferred downloading from the web because of efficiency and home access. Two (17%) teachers recommended that they receive emails telling them what is available and when, because they don't have time to peruse websites. One (8%) teacher suggested making the downloaded files open for manipulation by the teacher user. The remaining teacher (8%) had no preference either way.

SUMMARY AND DISCUSSION

Twelve fourth grade teachers reviewed and implemented two activities from the *Cyberchase Teachers' Guide*: "Count The Beats" and "Sort It Out." Teachers were interviewed after reading through the *Cyberchase Teachers' Guide*; teachers then implemented the two activities with their fourth graders, completed a teacher and a student survey after each activity, and were interviewed after their experience. About 250-275 students participated in the activity review.

Reactions upon initial exposure

After the initial review of the teacher guide but before implementing activities, 11 of the 12 teachers reported that they would do at least one of the activities with their students if they had received the guide in the mail. On the initial exposure, teachers reported liking the clear explanation of simple activities, the guide layout, the curriculum fit of the activities, the easily obtainable materials and the Tips bubbles. To improve the guide, teachers requested provision of full-size black line worksheets, grade level correlations, and one activity on a page.

Implementation of activities

In the pre-activity interview, none of the teachers foresaw any difficulties in implementing "Count the Beats," but a number of teachers planned to substitute a different technique for the Guide suggestion of using string for the Venn diagram. They felt a string diagram would be awkward for their students.

One-quarter of the teachers had no difficulty implementing "Count the Beats;" but two-thirds noted that students had difficulty finding their pulse, and two teachers did not have enough calculators for every student in their class.

In "Sort It Out," seven teachers substituted the Guide's suggested string Venn diagram with other techniques. Two of the five teachers who used the string approach found that students focused more on the string than the sorting activity. Two teachers appeared to not have a complete understanding of the application of Venn diagrams.

Perception of math in activities

All teachers agreed that "Count the Beats" uses math skills, mainly estimation, multiplication and computation. Teachers reported that "Sort It Out" uses mainly logic, attribute comparison and sorting, but one-quarter of the sample did not feel the activity used math skills but was instead appropriate for their language arts curriculum.

All of the students could describe some sort of learning from "Count the Beats," with most students saying that they learned how many heart beats they had in a certain time period

and that they learned how to find or count their heart rate. From "Sort It Out," most students felt they learned how to sort things or how to use a Venn diagram to sort things.

Appeal of activities

Both activities were rated quite high in appeal by teachers and their students. With respect to "Count the Beats," teachers liked most the use of calculators, estimation, the interdisciplinary quality of the activity and the hands-on aspect; however, they found that students had difficulty finding their pulse. Eight of the twelve teachers would recommend the activity, emphasizing the curriculum fit, the cross-curriculum focus and the use of hands-on real-life content. The remaining teachers hesitated in their recommendation due to the difficulty of finding pulses and the fit with their particular curriculum. Students liked most finding the answers of how many times their heat beats in a minute, hour, day or year; they also liked counting heart beats and feeling their pulse. Small portions of the student sample disliked the math calculations and not finding their pulse.

Teachers liked "Sort It Out" because their students had to think, sort and solve, their students enjoyed the activity and it encouraged student interaction. Nine teachers would recommend the activity because of the cross-curriculum focus and the hands-on activity. Those hesitating to recommend the activity were concerned with the time required for preparation work and class implementation. The participating students liked most sorting and figuring out someone else's sort. Small portions of the sample had difficulty with the thought process, the sorting activity and the lack of peer cooperation.

Potential for further activities

Seven of the teachers were interested in receiving activities to help their students understand about spending, saving and budgeting money. The uninterested teachers voiced a lack of need for these activities for their grade level. Seven teachers preferred to receive instructions by mail because of technology, paper and ink limitations at school as well as teacher habit. Four teachers preferred downloading from the web because of efficiency and home access. Two teachers recommended that they receive emails telling them what is available and when, because they don't have time to peruse websites. One teacher suggested making the downloaded files open for manipulation by the teacher user. The remaining teacher had no preference either way.

Conclusions

The following conclusions are based on only twelve teachers and should be considered tentative in their recommendation power. The activities were appreciated by both the teachers and their students, and students understood the main learning goals. Continue the current guide approach of clear explanations of simple activities that fit into fourth-grade curriculum. The teachers particularly liked activities that were hands-on and interdisciplinary using teamwork with easily found materials and real-life applications. They requested the addition of master black line worksheets and more examples or demonstrations of how activities work. Perhaps pdf worksheet files and numerous implementation examples could be part of the website's teacher section with links noted in the printed guide. Slightly more than half of the teachers were interested in future money activities and preferred receiving such activities via mail.