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ABSTRACT

This paper presents the evaluation of a program on the use of interactive video technology to teach mathematics in middle schools. The implementation of the Adventures of Jasper Woodbury mathematics program involved 17 math teachers from eight schools in the Chicago area from September through November, 2000. The teachers were trained at Northeastern Illinois University. The training team included four professionals: the program director, two trainers (mathematics educators), and an evaluator (a measurement and evaluation professional). Program activities were organized in four main phases: pre-training planning, training of teachers, the teaching phase, and follow-up meetings. The training team worked together to plan, implement, and evaluate the program. Indications are that although pre and post data did not show highly significant group increases in knowledge, skills, and attitudes, some individual improvements were rather remarkable among teachers and students after learning mathematics with Jasper. (ASK)

DWIGHT D. EISENHOWER PROFESSIONAL DEVELOPMENT PROGRAM
FISCAL YEAR 2000

USE OF INTERACTIVE VIDEO TECHNOLOGY TO TEACH MIDDLE SCHOOL MATHEMATICS

In Chicago Schools
September - November, 2000

FINAL EVALUATION REPORT

"The adventures of Jasper Woodbury: Makes Mathematics Meaningful"

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November 30, 2000

1. Introduction

The implementation of the Adventures of Jasper Woodbury mathematics program involved 17 math teachers from 8 schools in the Chicago area, in September -November, 2000. The teachers were trained at Northeastern Illinois University. The training team included four professionals: - the program director, two trainers (mathematics educators) and an evaluator (a measurement and evaluation professional). Program activities were organized in four main phases; pre-training planning, training of teachers, the teaching phase, and follow-up meetings. The training team worked together to plan, implement and evaluate the program.

The Pre-Training Phase

During this phase, the training team familiarized itself with the Jasper materials by viewing episodes, and discussing the mathematics challenges and solutions, planned the training phase given the intended audience and communicated closely with the teachers who were to participate in the program. Buying and testing out equipment, organizing materials, and scheduling were completed during this phase.

Training of Teachers

The teachers were trained in August. During the training phase teachers were introduced to the Jasper materials by viewing episodes on laser discs,

videotapes, and students' CDs. Although the project was proposed as one using laser discs, there were changes in the formats that are now available to schools. When the various episodes were first developed, the primary device used to show them and from which information could be retrieved was a laser disc. One side of the disc contained the episode and possible analogous activities, and the other side had information for teachers. Students could use various devices such as a remote control, control software for use with computers, or even bar code readers to almost instantaneously access information from any point in an episode. A laser disc technology was being used less (with new DVD technology replacing it), the Learning Technology Center (LTC), which developed the program, decided to use a CD format for computers. Although some of summer workshop training was with laser discs, most of the work was done with the CD format. The LTC allowed the participants and participating schools to have complete sets of 12 episodes at a cost that was far below the anticipated retail cost. To use this format, the complete episodes were first shown on videotapes. To get immediate access to information in the episodes, the CDs were used. There were two CDs, one having information from the episodes which the students could access, and the other having information for the teachers.

The teachers worked in small groups to discuss the main mathematics challenges; they determined the relevant questions to ask, the types of information to look for in the laser discs, CDs/, or videotapes in order to answer those questions, and the different possible solutions. They then evaluated their

solutions. Each group presented and defended their most preferred solutions, while the rest of the participants asked them questions for clarification and justification. Later, the teachers were introduced to the solutions on the teachers' CDs. This was followed by rich discussions incorporating the classroom realities in the schools and how the Jasper materials might be used to maximize student learning, given their different contexts and student ability levels.

Teaching Mathematics with Jasper in the Schools

Upon completion of the 8-day training the teachers were ready to apply their new knowledge and skills in their mathematics classrooms. The teachers were more likely to start with the same Jasper episodes they had worked on extensively during the training - Rescue at Boone's Meadow, The Journey to Cedar Creek, The Big Splash, and The Right Angle.

By early November, about 1,275 grade 5-8 students were expected to have been introduced to the Jasper materials. Table 1 provides a more detailed representation of the students and teachers involved, as well as the Jasper episodes utilized during the program.

Follow-up Meetings with the Teachers

Three follow-up meetings were held during which the teachers shared feedback - successes, problems and possible solutions. The training team led the

discussions and also used these meetings to distribute additional materials to the teachers.

Possible Extended Use of Jasper

Several teachers expressed their willingness and enthusiasm to continue using the Jasper materials in their classrooms although the project had officially ended. The training team maintained contact with the teachers.

TABLE 1: TEACHERS AND STUDENTS INVOLVED IN THE PROGRAM

School	Type: Private/ Public	Students Per Grade Level Jasper Episode(s) Taught				School Total	Number of Teachers
		Grade 5	Grade 6	Grade 7	Grade 8		
1	Public		96 JCC RBM	27 JCC	38	161	3
2	Public		12 RBM	26 RBM		38	3
3	Public		28 TBS ACI			28	1
4	Public			62 JCC	25	87	3
5	Private				22 JCC	22	1
6	Public	26 JCC				26	2
7	Public		28 JCC			28	3
8	Private				18 JCC	18	1
Totals						**408**	**17**

Key to Jasper Episodes:

JCC = Journey to Cedar Creek

RBM = Rescue at Boone's Meadow

TBS = The Big Splash

TRA = The Right Angle

2. Evaluation of the Program

To avoid narrow approaches to the evaluation of the program it was necessary to employ collaboration and flexibility of participants in obtaining as authentic feedback as possible, and continuously incorporate it into the running of the program (Landerholm, Karr and Mushi, 2000). Traditional evaluation models have been criticized for being too rigid and often too focused on only some of the elements that affect the overall functioning of a dynamic program (Madaus, Scriven & Stufflebeam, 1983, House, 1980).

Earlier studies of the effect of the Jasper materials on the learning of mathematics have considered instruction and transfer (CTGV, 1993; Goldman Vye et al, 1991; Van Haneghan, 1992), different instructional models that characterized how teachers used Jasper in the classrooms (GTV, 1992) and group versus individual transfer of skills across Jasper episodes (CTGV, 1997).

In the current evaluation, the training team decided to examine the program from different perspectives: the teachers' performance on carefully selected math items involving skills covered in the four episodes discussed during the training, the teachers' comfort levels in teaching those skills, the students' comfort levels in learning those skills, the students' perception of their own learning of mathematics with and without Jasper, and the teacher's overall perception of using Jasper in their classrooms. Pre and post data were collected using a set of

30 carefully selected math items, teacher's questionnaires, and student questionnaires.

No comparison groups were used because it was impractical. Other instruments were used to provide additional authentic information as a means to crosscheck the implications of the differential pre and post scores and ratings, if any. The other instruments used were journals for teachers and students, teachers' lesson plans using, and without using, Jasper, samples of students work in solving the Jasper episodes, and informal discussions with the teachers during the follow-up meetings. The different sets of data were organized and triangulated to better inform the evaluation results and conclusions.

3. Evaluation Results

This evaluation report is organized in six parts:

a. Teachers' improvement of knowledge skills and attitudes

b. Students' improvement of knowledge, skills and attitudes

c. The running and improvement of program activities

d. Participants' satisfaction with the program

e. Summary of findings and conclusions

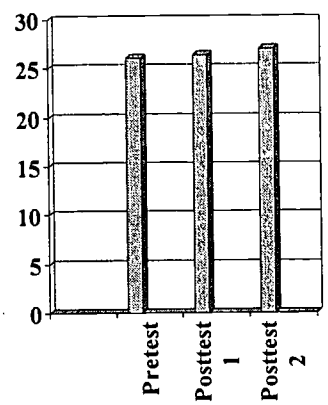
f. Additional comments by Program Director

a. Teachers' Improvement of Knowledge, Skills and Attitudes

Pretest and first posttest scores on 30 mathematics items spanning the content covered in the episodes discussed during the training, indicated that the mean scores for the group were about the same (26.11 and 26.35.) respectively. Of the 17 teachers 6 had increase in their first posttest scores compared to their pretest scores (between 1-9 points). Seven teachers showed a slight increase of scores between the pretest and the two posttests. Comparison between the pretest and the second posttest showed a slightly higher group mean (27). Figure 1 shows mean scores for the group on the three tests.

Figure 1: Comparison of Group Means

- **Comparison of group means indicated NO significant difference between the pretest and the first posttest; but a slightly larger increase in the second posttest (maximum score was 30)**



There was no significant group difference between the pretest scores and the first posttest scores. As a group, the teachers had a slight increase between the first posttest and second posttest. However, it was it is clear that some teachers experienced considerable improvement in their math skills between the posttests. Several factors can be employed to explain the lack of significant increase in scores in the first posttest. First, the eight-day training might have been a short period of overwhelming information and timed practice using new technology (laser discs, video and C.D. ROM) that the teachers were probably not very familiar with. They did the first posttest at a time when they had not had enough time to process the technology part of learning math and incorporate it into their repertoire of math skills. They probably resorted to doing the math in the normal way, thus obtaining a very similar score to the pretest. The slight increase (as a group) in their second posttest probably indicates that they learned more from their own teaching in addition to the Jasper training. Since the test items were not directly related to the Jasper episodes, it is also possible that they simply employed their background knowledge in mathematics, with, or without Jasper. The few teachers who experienced considerable improvement in their math skills also worked on more than one episode. It is possible that in discussing solutions with their students, they increased their overall knowledge of the related skills and did better on the second posttest.

Data from teachers' questionnaires showed that eleven of the seventeen teachers improved their attitudes towards teaching certain mathematics topics. Alongside each item on the test was a scale to indicate comfort level in teaching that concept/skill to students, and also the teacher's prospective students' comfort level in solving the item. Comparing the pre and post data indicated that some of the eleven teachers were more confident in teaching most of the concepts after they participated in the program. Figure 2 shows teachers' average ratings on comfort levels in teaching the test items. Figure 3 summarizes teachers' average ratings on their prospective students' comfort levels in doing the math items on the test.

Figure 2: Teachers' Average Ratings on Comfort Levels in Teaching the Content Reviewed by the Test Items

- **Teachers 3, 4, 6, 7, 9, 10,11,12, 13, 14, and 15 had increase in average ratings during and/or after the program**

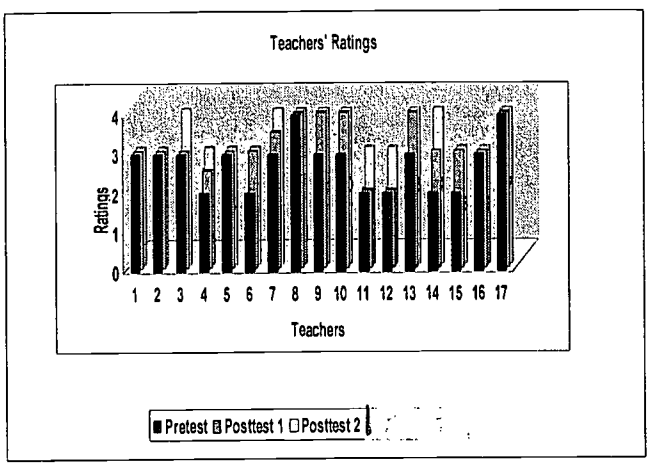
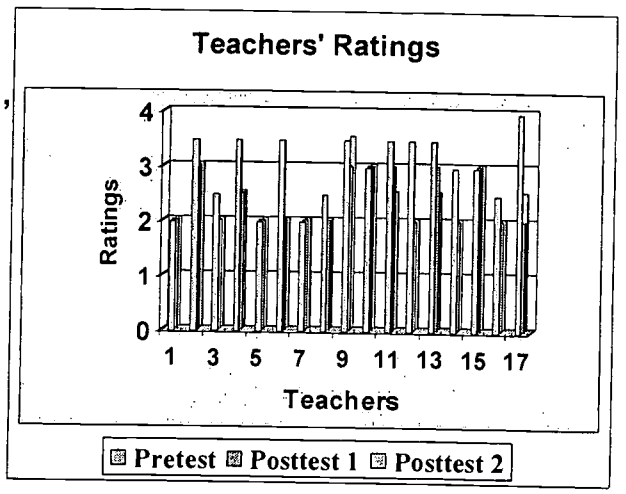


Figure 3: Teachers' Average Ratings of Students' Comfort Levels in Learning Content Measured by the Test Items

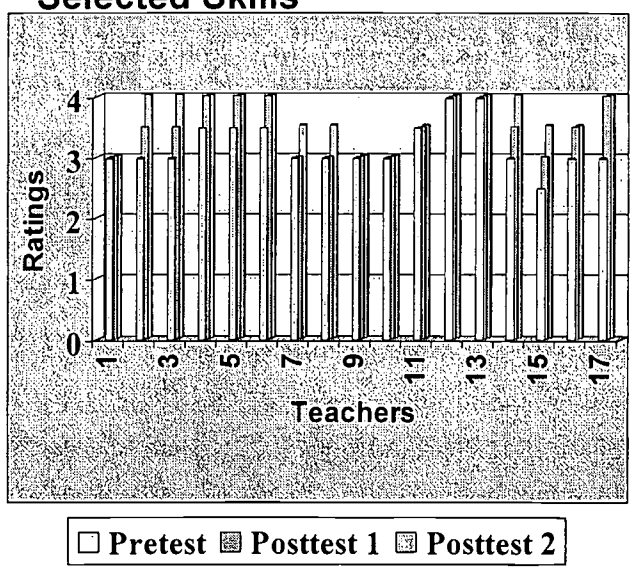
- Teachers 2, 3, 4, 5, 6, 8, 9, 11, 12, 13, 14 16 and 17 rated their prospective students higher in one or both posttests.



Data from teachers' questionnaires indicated higher posttest average ratings among 11 of the 17 teachers on 45 selected mathematics skills (see Appendix 1). Figure 4 summarizes these ratings..

Figure 4: Teachers' Average Ratings of 45 Selected Skills

- **Teachers 2, 3, 4, 5, 6, 7, 8, 14, 15, 16 and 17 had higher ratings on the 45 skills during and/or after the program**



Teachers' and students' journals highlighted issues that were not captured by the statistical data. Tables 2 and 3 list some of the comments and observations made by teachers and students.

TABLE 2: SELECTED TEACHERS COMMENTS AND OPINIONS COMPILED FROM THEIR JOURNALS

Grade level	Teachers' Comments (verbatim)	Most Likely Inference
5-8	Teaching math with Jasper was difficult in the beginning - later students caught up and liked it	Learning too many things at the same time - technology, working in groups, problem solving, presentations made it difficult in the beginning
5- 8	There were some technical difficulties - equipment, resource rooms, computer labs	More effective Involvement of administrators and technicians would be useful
5-8	I used small groups and large groups at different times	Similar to the format during training
6-8	I used mixed ability groups	Using mixed ability groups might have maximized collaboration/helping each other
6-8	I had to do spoon-feeding for some of the groups	Different students need different degrees of help from the teacher
6-8	Student participation was maximized when developing a group solution	Working together for a common goal promoted student participation
6-8	Students could link the experiences to other parts of the curriculum	Transfer of learning happened within mathematics and to other subjects
Grade 6 - gifted	Jigsaw groups facilitated sharing of experiences among all students in the class	Spending enough time sharing solutions and procedures might help the whole class
	Students could apply the skills to outside work, such as measuring buildings, angels, etc	Realization of the relevance of Mathematics in everyday life
6-8	Some of the kids got the answers right away, while others were struggling to find the necessary information from episodes	Different ability levels might need different type/sophistication of work.
6-8	Different students favored different approaches, e.g. watching the whole episode without taking notes, then watching and taking notes, and watching a third time to seek specific information. Others preferred watching once.	Different students have different learning styles and strategies that teachers must be aware of, in order to teach effectively.

TABLE 2: SELECTED TEACHERS' COMMENTS AND OPINIONS COMPILED FROM THEIR JOURNALS - CONTINUED

Grade level	Teachers' Comments (verbatim)	Most Likely Interpretation
6-7	Some kids who do not usually say anything in math class got to say something about what they did - or demonstrate something, such as remembering a necessary detail	Opportunity for students with different abilities and personalities to participate actively
7-8	Students thought there was too much information - they complained it was too difficult to single out the useful details. They wanted the information "cut and dry" so that they could just "do the math"	They were used to doing mathematics the traditional way - out of context. They needed to learn to ask the right questions, seek needed information timely, and ignore unnecessary information
6-8	During group work, kids were talking about their mathematics procedures and calculations, and justifying why they were doing them a certain way.	They were reflecting on their own learning and thinking about that process of learning - a useful meta-cognitive skill
5-8	Kids loved writing on overheads	A new opportunity for them
5-8	The students loved presenting to their classmates their group solutions and talking about them, each member in the group taking a role in the presentation	An opportunity to show what they learned/could do. Also getting attention from classmates
	My students did not like the analogous problems - they were just like book problems	Preference of the Jasper materials after being introduced to them
	The big splash took longer than the other episodes - it seemed to be more complicated and difficult to follow	A richer episode that could be taught at different levels at different times
	My students were very excited about the technology - they loved going to the resource lab.	Enjoying the technology
	I had an observation from the state (Quality Review) in the room. She was pleased with the way students were involved in their work. Practically all the students were participating actively, and cooperatively - working on RBM	The work was interesting to them - they were making sense of it in ways that they enjoyed it.
	Whenever my kids enter the classroom they ask with enthusiasm "are we going to do Jasper today?"	They enjoy working with Jasper - it makes sense to them
	Measuring things outdoors was very interesting to my students	They felt they had a real purpose - measuring real things

TABLE 3: SELECTED STUDENTS' COMMENTS AND OPINIONS COMPILED FROM THEIR JOURNALS

Grade Level	Students' Comments (verbatim)	Most Likely Interpretation
Grade 5	I learned that math is interesting if you do it together and say what you are doing	Comments from fifth graders in the same group, doing the same episode (JCC) at the same time. It seems all the children in the group liked working on the episode and they could see the relationship of the math they were doing with everyday life. Very few negative comments from this group/
	I learned that math is important to do. It is a lot of things	
	I learned how to do different math, a lot of math	
	I learned how to find clues from the story, and we could ask someone else in class, and the teacher too	
	I liked Jasper because we worked in groups and we talked about the math and we wrote what we did	
	I liked the Jasper math a little. It is interesting	
6 - gifted	I did not like the Capital Idea because it was not fun. It was too easy and not challenging. I would improve it by making it challenging.	Different comments about the same episode taught to the same group at the same time. This shows different learning abilities, and preferences among the gifted group. Need for the teacher to develop different objectives for different groups/individuals. Most of the 6th graders in this group thought the Capital Idea was too difficult, not interesting, or both. A few thought it was to easy
	I did not enjoy working with the Capital Idea because it is not interesting. I would improve by making it more fun	
	I did not enjoy working with this Japer episode (The Capital Idea) because the challenges seem a bit too hard. I would improve it by making the challenges easier and more in my level.	
Grade 7	I like this Jasper episode because it is fun to wok in groups with friends to solve problems	Samples of different comments from Grade seven students doing JCC within the same group, with the same teacher at the same time. Most of the students saw Jasper as making their learning of mathematics meaningful by relating it to real life situations. However, a few were not very comfortable with the thinking process, they thought it was hard. They would prefer book problems where all the needed information is provided clearly. There is need to emphasize the thinking process in learning mathematics.
	I did not like this Jasper episode because it involved multiplication plus I had to think hard for the answer	
	I liked the Jasper episode because I learned more to be social	
	I enjoyed this Jasper episode because it tests my math skills in real life situations	
	Jasper lets you use your math skills to solve everyday problems	
	I like learning math with Jasper because the problems that you solve are very similar to everyday situations	
	You will learn how to solve problems easier with Jasper	

TABLE 3: SELECTED STUDETNS' COMMENTS AND OPINIONS COMPILED FROM THEIR JOURNALS - CONTINUED

Grade	Students' Comments (verbatim)	Most Likely Interpretation
Grade 8	I prefer learning math with Jasper because it makes you think about what you are doing and why you are doing it	Comments from eighth graders in the same group, doing the same episode (JCC) with the same teacher at the same time. Some liked working with Jasper but some were concerned about time, and whether Jasper skills would be applicable in high school. They also seemed to worry about "how much math" they did, rather than the different skills applicable in one challenge. The group could be too used to learning math the traditional way, and find it difficult to change.
	Learning math with Jasper was easy because it was a movie - I could watch it and understand	
	My Jasper math class was different because we never get to watch movies. We never get to do stuff in small groups or do presentations and we never get to use calculators in our regular math class.	
	I would choose to learn math normally because I did not learn anything from Jasper. If Jasper taught me things I could use in high school, Jasper would be better	
	Learning with Jasper was hard because you had to delve hard into the problem to get clues to use to solve the problem	
	It took us two weeks to do one episodes and we used different materials. In our regular math class we are doing something every minute	
	I learned that math can be taught by a movie and you can have fun too	
	My regular math class is better because the information is always in front of me, all I have to do is do the math	
	I prefer learning math the normal way because we have the information right in front of you	
	I did not learn anything from Jasper. In our regular math class we learn a lot more math	
	We usually just do work out of our books and we do it faster	
	Learning math with Jasper was hard because you had to spend so much time looking for information	

At the time of writing this report all teachers involved in the project had completed at least one Jasper episode. Some teachers changed the Jasper techniques slightly, to fit their class contexts. For example, asking students to list the questions they decided to seek answers for, before presenting their solutions, having students evaluate their solutions in their group and decide on one solution to present to the class, and evaluating the least preferable solutions. All the teachers reported using the materials presented during the training. Problems faced in setting up computers for students, accessibility of students' CDs and in obtaining quality technical support differed from school to school.

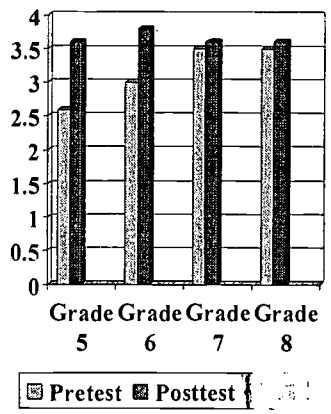
Four teachers reported using the Jasper materials with a colleague who was not involved in the program. At least one teacher who was not in the summer training used the program. However, some teachers who had used Jasper materials before were almost naturally interested in applying their knowledge and skills in collaboration with the newly trained teachers.

b. Students' Improvement of Knowledge, Skills and Attitudes

Pre and post surveys of students' comfort levels in learning mathematics indicated that learning mathematics with the Jasper materials and techniques was much more comfortable compared to traditional methods. The ratings are summarized in figure 5.

Figure 5: Students' Average Ratings of Their Comfort Levels in 20 Selected Skills

- **Fifth and 6th graders had higher ratings after using Jasper**
- **Seventh and 8th grades had no increase in ratings after using Jasper**
- **See Appendix 2 for the 20 selected skills**



Data from the students' journals indicated clearly that there were some skills that were learned directly because of using the Jasper approach to learn mathematics. The following are verbatim examples organized according to grade levels:

Excerpts from Grade 5: "I learned:

- "How to use the computer"
- "how to find clues from the story"

- "a lot of things"
- "he (Jasper) has a lot of, I mean a lot of problems"
- "a lot of math"
- "how many miles it (a boat) goes"
- "gas prices, cost of repair, how to use $ 20 for all that stuff"
- "watch for your mile (markers)"
- "how to do math problems from the video"
- "that you need extra gas"
- "math is important to do"
- "money math, time, and more things"
- "how to do different math than regular math"
- "math is interesting"
- "how to find a whole bunch of clues in one story"

Samples excerpts from Grade 6 students: "I learned:

- "that Jasper is better for math"
- "that new math has more words"
- "working in groups you learn a lot more"
- "have enough money when going on trips"
- "get home before sunset"
- "I got to use the computer"
- "what a CD ROM was"

- "how to figure out answers"
- "how to do research, look carefully for information"
- " a faster way to do math"
- "that it is fun to use math"
- "the program is exciting for sixth graders"
- "how to find information in a video"
- "always make sure you have full tank"
- "how to compute a lot of different numbers to find a solution"
- "how to work together"
- "to have a plan B"
- "how to make a business plan and how to calculate expenses"
- "math is everywhere and that challenges are good"
- "how to average data"
- "how to measure water and how to figure out time"
- "how to be organized"

Samples from Grade 7: "I learned:

- "how much time it took"
- "that it was boring"
- "to work together"
- "you shouldn't shoot the eagle- they are almost extinct"
- "I didn't learn anything"
- "how to solve the information you have to solve a problem"

- "how to figure out problems by watching episodes"
- "how to find out the rate of a vehicle using proportions and had to"
- "add, subtract, multiply, and divide a lot"
- "how to gather information, find out the distance and rate"
- "how to problem-solve and use the math I know to use"
- "how to solve a tricky question or problem"
- "a lot of math"
- "how to take math concepts, put them together and solve a problem"
- "how to look for clues and how to solve problems easier"
- "how to find the rate"
- "I haven't learned much"
- "practically nothing except how to solve a problem"

Samples from Grade 8: "I learned:

- "how to do a business plan"
- "to do business"
- "I don't know"
- "how to think things through"
- "a lot about business"
- "to be more observant and pay attention"
- "how to get money for the school year than before"
- "how to make a better survey"

- "anyone can do a business plan"
- "what revenue means, how to find profits how many gallons are in a cubic ft"
- "two things: pay a lot of attention, and pay even more attention"
- "how to work in groups"

Appendix 3 shows samples of students' solutions developed in groups as they were learning mathematics using the Jasper episodes.

It was evident from the follow-up meetings that teachers learned some useful strategies of dealing with their students in mathematics classes. Examples of these include:

- listening to students,
- accepting alternative solutions - not only the best
- asking for students' reasoning behind their solutions
- letting students make group decisions
- allowing students to move around in class
- allowing students to work cooperatively
- learning new possible ways from students

Teachers indicated that the Jasper program helped their students in different ways. Some excerpts include: "Students learned to:

- reason better
- use common sense put in real life situations
- rather than doing worksheets, use what they know to solve problems

- it has improved learning with a sense of purpose, conversation, and working together in groups
- students saw that math could be used in everyday situations. They used critical thinking to try to develop strategies
- they enjoyed math media format and the abilities to retrieve information . They also benefit from cooperative learning
- they realized how the math we learn in school is related to real life situations. They also worked with a more realistic problem solving situation than I could create myself
- There is a greater awareness of math in daily life -they see a connection between normal math class (computation) and realistic uses
- They were able to apply their learning - you can do a lot of algorithms but until it is applied it doesn't have the same impact. They also had to do multiple steps and organize thoughts and information
- The students learned how to solve problems, to use the math they already know, and found that the smarter the student, the more they realized how specific they had to be in order to solve the problem
- They have a better grasp on distance/rate and time problems
- Students have been motivated to plan/find a strategy to solve the questions in the environment of corporate learning

Lesson plans used before were compared to those used after teaching mathematics with Jasper. They did not reveal notable differences between them. Most of the teachers used required, fixed formats for their lesson plans.

c. The Running and Improvement of Program Activities

According to the feedback from the teachers, the program activities that appeared to go very well included:

- the training, - especially the hands on- approach - doing just what the students would do
- watching the episodes
- discussion of problems in groups
- follow-up meetings and discussion. Teachers shared experiences and learned from one another.

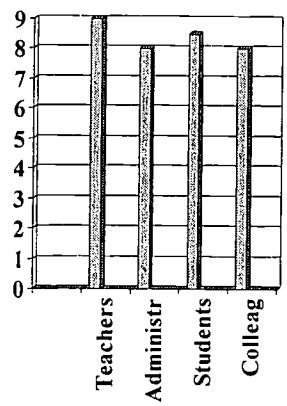
The teachers' survey indicated that technical support with equipment was a problem in many schools. The equipment might not be working properly, the technical person might not be able to help as needed, or there were simply no enough computers.

d. Participants' Satisfaction With the Program

Teachers were asked to indicate on a scale of 1-10 satisfaction levels of different participants in the program. The results of the ratings are summarized in Figure 6

Figure 6: Teachers' Average Ratings on Participant Satisfaction

- **Lowest rating = 1**
- **Highest rating = 10**
- **Teachers ratings indicated that they (teachers) were the most highly satisfied by the program (9), followed by students (8.5) and then by administrators and colleagues (8).**



Some suggestions for improvement as given by teachers, administrators and the program staff include the following:

- enough and better working equipment
- more training of teachers using hands on experiences
- involvement of more teachers

4. A Summary of Findings and Conclusions

a. Although pre and post data did not show highly significant group increases in knowledge, skills and attitudes, some individual improvements were quite remarkable among teachers and students after learning mathematics with Jasper.

b. A distinction seemed to emerge between *learning mathematics* and using *mathematics*. Many of the students liked learning mathematics (performing operations) but did not like using mathematics as the Jasper episodes required. They associated using mathematics with *thinking*, which they claimed was difficult to do.

c. Students raised an issue of *how much mathematics*, especially among the higher grades (7-8). Some expressed concern that learning with Jasper took a long time to finish one episode, while in their regular classes they did *much more mathematics* (mechanical operations) in a given time period. This implies that they might have overlooked the richness of Jasper episodes and only focused on the mechanical computations. One Jasper episode can be used to highlight a variety of mathematics skills that can be synthesized to develop a solution to a real life problem. On the one hand, the students seemed to be aware of this richness, but on the other, from past experiences, they perceived computations as the most

important component in mathematics, and there was much less computation work using the Jasper program than in a traditional class.

d. Learning mathematics through media that is interesting to students showed notable impact on students' attitudes towards mathematics. They realized that math could be interesting. The comment "learning math with Jasper is fun" was repeatedly made by students at all grade levels.

e. Students learned other skills and facts from the Jasper episodes. Some of the skills learned were: using the computer equipment and software, interpersonal skills, better reasoning skills, research skills and presentation skills. They also learned to perceive mathematics as a useful tool in everyday life. The facts learned include the scarcity of eagles, mileage per gallon and some specific units of measurement.

Concluding Remarks

Learning and learning mathematics with Jasper is a useful way to begin showing students that mathematics is an important tool that can be used to solve everyday problems. The perception of mathematics as only a school subject to be passed for academic reasons is very misleading. Students need to be helped to realize that using mathematics is an effective way to learn it meaningfully, and the Jasper episodes do just that.

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Figure 1: Comparison of Group Means

- Comparison of group means indicated NO significant difference between the pretest and the first posttest; but a slightly larger increase in the second posttest (maximum score was 30)

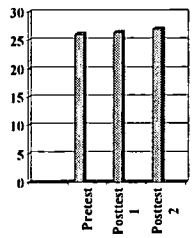


Figure 2: Teachers' Average Ratings on Comfort Levels in Teaching the Content Reviewed by the Test Items

- Teachers 3, 4, 6, 7, 9, 10,11,12, 13, 14, and 15 had increase in average ratings during and/or after the program

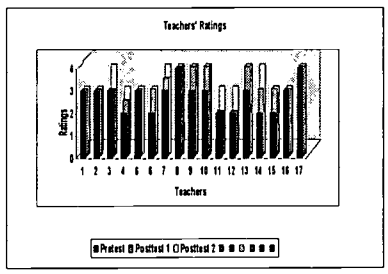


Figure 3: Teachers' Average Ratings of Students' Comfort Levels in Learning Content Measured by the Test Items

- Teachers 2, 3, 4, 5, 6, 8, 9, 11, 12, 13, 14 16 and 17 rated their prospective students higher in one or both posttests.

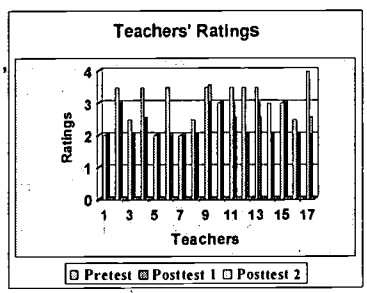


Figure 4: Teachers' Average Ratings of 45 Selected Skills

- Teachers 2, 3, 4, 5, 6, 7, 8, 14, 15, 16 and 17 had higher ratings on the 45 skills during and/or after the program

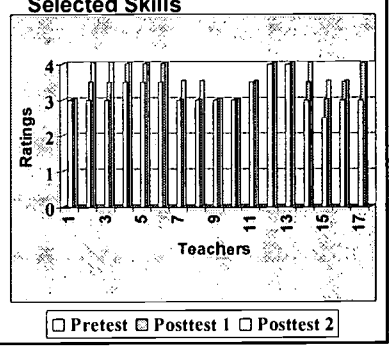


Figure 5: Students' Average Ratings of Their Comfort Levels in 20 Selected Skills

- Fifth and 6th graders had higher ratings after using Jasper
- Seventh and 8th grades had no increase in ratings after using Jasper
- See Appendix 2 for the 20 selected skills

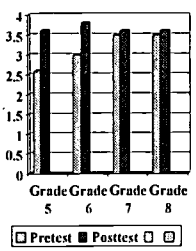
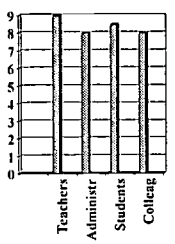


Figure 6: Teachers' Average Ratings on Participant Satisfaction

- Lowest rating = 1
- Highest rating = 10
- Teachers ratings indicated that they (teachers) were the most highly satisfied by the program (9), followed by students (8.5) and then by administrators and colleagues (8).



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