Will Multimedia Visual Learning Aids Benefit Target Students in a Project-Based Learning Environment?

An Investigation

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EDIT 180

Independent Research

Foothill Cohort

Materials

Students had the following physical materials at their disposal in class:
Personal Computer, only some with sound cards and speakers
Windows Operating System
Microsoft Office 2000
Internet Access to education websites
Crayons
Colored Pencils
Rulers
Colored Markers
Poster Paper
Prentice Hall Life Science Textbook and Guided Reading and Study Workbook for Prentice Hall Life Science

Students that chose to make a Cell City Model were asked to provide their own materials depending on the type of model that their group decided to build. If students did not like the poster paper that was distributed in class, they were given the option to purchase poster boards. Due to serious fiscal reductions in the state budget, these materials could not be provided.

Data Collection Procedures

Data collection was done for the following: Pre-Assessment & grouping, Assessment, and Post Assessment/Surveys.
For pre-assessment & grouping, students were simply asked orally in class two questions. The first question given to the students was, "Do you play videogames/computer games and/or watch TV more than two hours a day?" The male students were told to keep their hands up while the female students, if any were told to keep their hands down. The second question asked was, "Do you feel it is easier to have instructions in words or in pictures?" Students were told to keep their hands up if they liked instructions in pictures instead of words.
If there were more then four male students that kept their hands up, they were told to open and read the written instructions on their computer. The teacher would ask one question via e-mail with a response due in seven minutes, "Can you name three tasks that need to be completed?" If the student was able to needed the three tasks that needed to be completed, he was eliminated from the test group. This only needed to be done in one class.
Assessment of the actual project was based on a rubric given to the students. The teacher did three quarters of the assessment. The students did one quarter of the assessment. The teacher was responsible for assessing the academic understanding and completion of the Poster/Model contents, the legend, and the story. The students were responsible for assessing individual student contribution for the project. This was done anonymously and was turned into the teacher to tabulate. Students were allowed to assess their own contribution too. The scores were totaled and divided by four to give the average result for each student.
The total scores of each student were posted on the My Gradebook website .
Post-assessment of the grades was done using the My Gradebook website. This website has tools to analyze the student's grade in comparison to the average class grade through raw numerical data and line graphs. Post-assessment of the test group students was done to determine if their

overall needs were met from this assignment. The post-assessment was done via zoomerang anonymously. The post assessment will be used at a later date to determine changes for the following year for this specific project. The target students will answer the following questions at the end of the project:

1. What was your knowledge of cells, the organelles, and their function before starting this project?
2. After completing Cell City with your group, where do you think your knowledge level is now?
3. On a scale of 1-5, how cooperative were your group members in helping in the project?
    1. Not cooperative at all 2.Rarely Cooperative 3.Sometimes Cooperative 4.Mostly Cooperative 5.Very Cooperative

Student 1 Student 2 Student 3 Yourself

4. On a scale of 1-5, how would you rate the difficulty of this project?
    1. Easy 2.Somewhat Challenging 3.Challenging 4.Quite Challenging 5. Difficult
5. On a scale of 1-5, how fun was this project?
    1. I was just bored and talked 2. I liked it at times 3. I liked it 4. I liked it and it made me want to work harder5. I liked it so much that I ignored homework from other classes
6. What percentage of time were your partners on task working on the project?
7. What percentage of time were you on task, not just messing around?
8. On a scale of 1-5, how would you rate the following types of work as helpful in learning life science? Projects, Worksheet Assignments, Labs, and Tests
    1. Not useful 2.Sometimes useful 3.Useful 4.Very useful 5.Extremely useful
9. Which directions were most helpful in completing this project?
    Written directions or visual directions
10. Did you feel you had enough time to complete this assignment in the week that was given to your group?
    Yes or no
11. Rate the following in percentage completed by your group: Legend, Cell City, Story.
    1.0% 2.25% 3.50% 4.75% 5.100%
12. Overall, how satisfied were you with doing this project?
    1. Not satisfied at all, waste of time 2.Slightly Satisfied 3.Satisfied 4.Really satisfied 5.Best project ever
13. Please feel free to add any comments in the space provided.

Design of the Study

Four male students were put into a test group for each of the five classes taught. The students were chosen by answering the following questions: 1. Do you play on video/computer games or

watch television for at least two hours a day? 2. If so, do you like to learn through pictures or words? The students that played at least two hours a day and liked to learn through pictures or words were chosen to be in the test group.

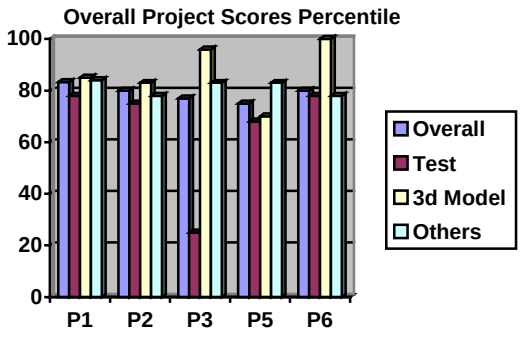
The rest of the class was given the following links to complete the assignment over a one week period:
http://www.geocities.com/clydekmann/CellCity.doc
http://shs.westport.k12.ct.us/asr/Bio%202/webquests/Cell%20City%20page%201.htm
The first link is basic instructions and requirements for students to complete their "Cell City" poster. The second link is more advanced instructions to construct a "Cell City" model as the cornerstone of the project.
The teacher chose the groups that the students were placed in. Factors involving choice of the remaining 120 students were in the following order of importance: Ability to get along with each other, Gender, and comparable ability levels.
The test group was given the following link to complete the assignment over a one week period of time:
http://www.geocities.com/clydekmann/CellCityVisual.ppt

All groups were given the following rubric for teacher assessment:
http://rubistar.4teachers.org/index.php?screen=ShowRubric&module=Rubistar&rubric_id=1006449&
A different rubric was given for students completing the Cell City Model in their website. Students were told that they will be assessed by the above rubric to avoid confusion. The point totals and the wording were different, but the concepts being assessed were the same. The students did not have to complete a legend like the other groups. They had to label various portions in their model and give the cell equivalent.

Data:

Out of 35 groups in five classes, 7 groups chose make a cell model, 20% out of the total groups. Five groups were assigned to the test groups, or 14% out of the total groups. 22 groups chose to make a Cell City poster, or 62% of the total groups.

Class Scores from Assessment



The average scores for the different groups can only be tabulated per class.

The Period 1 class average was 83.3%. The test group average score was 78%. The Cell City Model average score was 85%. The remainder of the class received an average score of 84%.

The Period 2 class average was 80%. The test group average score was 75%. The Cell City Model group average scores were 83%. The remainder of the class received an average score of 78%.

The Period 3 class average was 77%. The test group average score was 25%. The Cell City Model groups average scores were 96%. The remainder of the class received an average score of 83%.

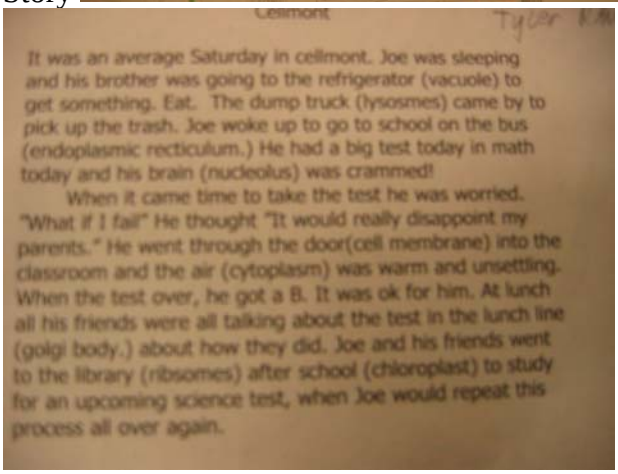
The Period 5 class average was 75%. The test group average score was 68%. The Cell City Model group average was 70%. The remainder of the class received an average score of 83%.

The Period 6 class average was 80%. The test group average score was 78%. The Cell City Model average score was 100%. The remainder of the class received an average score of 78%.

Student Samples

Test Group Poster

Story



It was an average Saturday in cellmont. Joe was sleeping and his brother was going to the refrigerator (vacuole) to get something. Eat. The dump truck (lysosmes) came by to pick up the trash. Joe woke up to go to school on the bus (endoplasmic recticulum.) He had a big test today in math today and his brain (nucleolus) was crammed!

When it came time to take the test he was worried. "What if I fail" He thought "It would really disappoint my parents." He went through the door(cell membrane) into the classroom and the air (cytoplasm) was warm and unsettling. When the test over, he got a B. It was ok for him. At lunch all his friends were all talking about the test in the lunch line (golgi body.) about how they did. Joe and his friends went to the library (ribsomes) after school (chloroplast) to study for an upcoming science test, when Joe would repeat this process all over again.

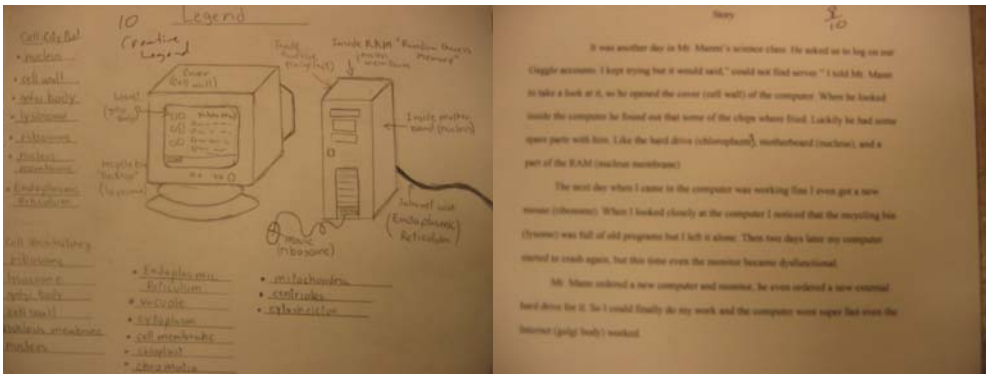
Cell City Model and Story

New Park Mall

Santa Clause is Coming to Town

Santa Clause is coming to New-Park Mall on December 1st so be sure to come. He will be right between JC Penneys and Mervyn's (mitochondria) in the center of the pathway (endoplasmic reticulum) where a train track (cytoskeleton) will be so the little kids can ride on the train. You can take pictures with Santa or you can just tell him what you want for Christmas. This year he will even give you a special present with your visit. So be sure to visit Santa on December 1st.

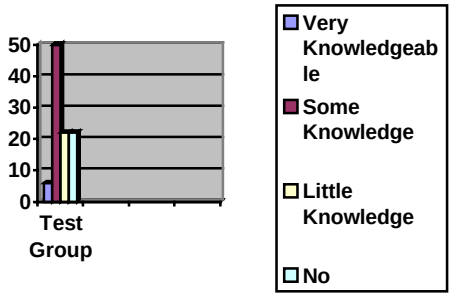
Cell City Legend and Story Non-Test



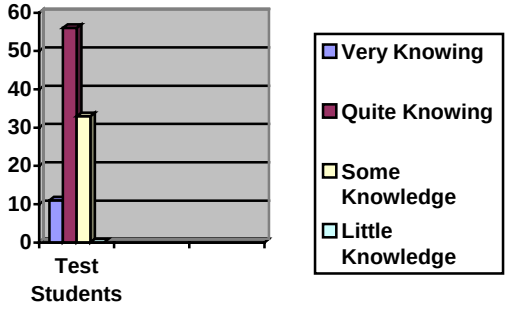
Survey Results

Out of the 20 students that were involved in the test group, 18 responded to the survey.

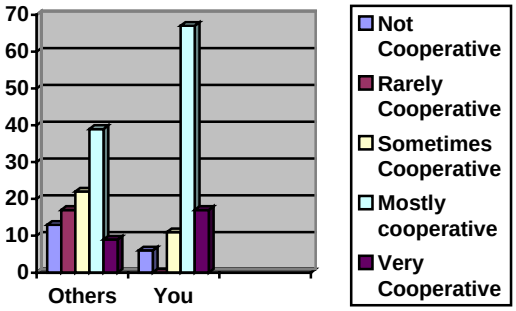
Question1:



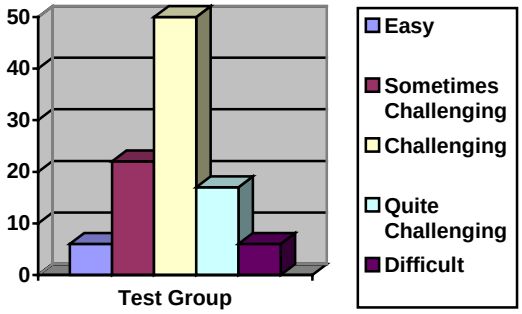
Question 2



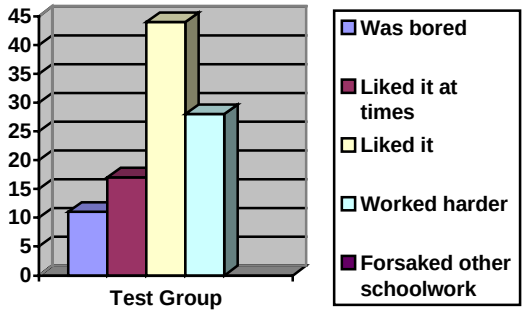
Question 3



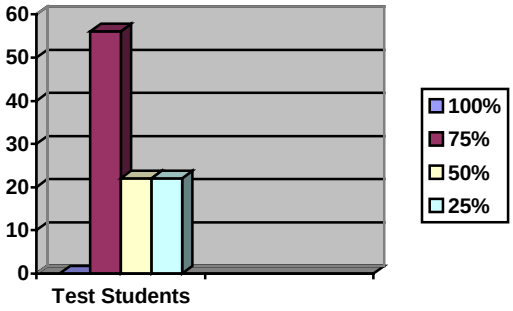
Question 4



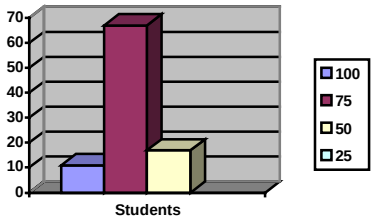
Question 5



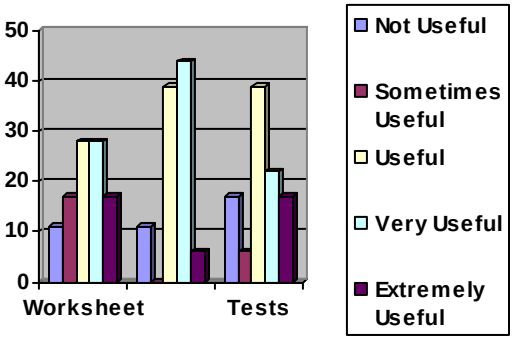
Question 6-Partners on task



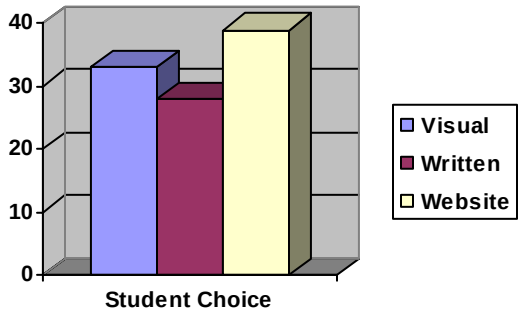
Question 7-Individuals on task



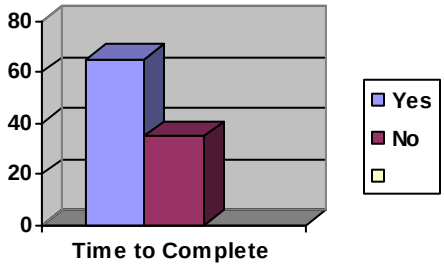
Question 8



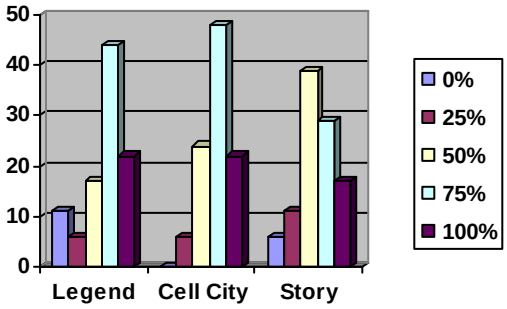
Question 9



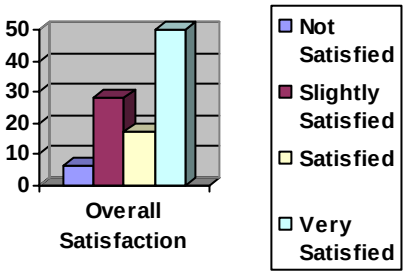
Question 10



Question 11



Question 12



Question 13-See Data Analysis

Data Analysis:

Assessment Scores by Teacher:

Six out of the seven groups that chose to make the Cell City Model were comprised of girls. Only one male group chose the Cell City Model option. Looking at their Cumulative files, over 80% of these specific students scored in the 70th percentile and above on the overall CAT 6 Language Arts tests in the 6th grade.

Except for third period, there was not a real statistical significance of the results of the assessment. The cause of statistical significance within the test group in comparison to the class average was caused by student inability to stay on task and desire to complete the project. These students received the same visual tool as the other test groups.

Survey Results Interpretation:

For question 1, prior knowledge of some of the students came from what they learned at their feeder elementary schools. There actually are no standards that relate to cells prior to 7th grade within the California Content Standards for Science Website (2004). Most Science Prep teachers at the elementary level have 6-8 preps and supplies are limited. They tend to teach what they are most comfortable with, and that is usually independent of the mandated standards.

There is a significant discrepancy between student perception of knowledge attained and the actual assessment score given by the teacher. In Question 2, not one student assessed their knowledge at D level. Whereas, the overall grade for the third period class was 25%. This leads to other issues not involving learning factors.

Over 51% of the students responded negatively about the level of cooperation from their group members, but when asked how they cooperated with their group, only 17% claimed that their level of cooperation was not positive. One of the biggest difficulties for this age group of students to overcome is the ability to take responsibility for ones actions.

72% of the respondents found this project to be fun. Considering the scores, it would be difficult to conclude that the fun factor negatively influenced their scores.
A high percentage of students were said to be on task at least 75% of the time, 56%. Self analysis showed that over 78% of the students were considered on task at least 75% of the time. These results show that some of these students are not able to perceive their actions in comparison to what others see of them.

Students valued labs and projects the most, but there was not much of a difference between the favorable results of labs and projects, 89% and worksheets, 73%, or tests, 77%. Results for the instructional tool defied their early responses. Only 33% said that the Visual PowerPoint Presentation was the most helpful. Upon asking the seven respondents that chose the website over the Visual PowerPoint Presentation, five of the respondents said that they liked the PowerPoint website better than the others. These students thought that because the PowerPoint Presentation was on the Internet, that this was the assignment instead of the other Internet instructions. The students that liked the written instructions thought that they were going to receive visual instructions with sound and interactions, not a static PowerPoint presentation. Six out of 17 student responses indicated that they needed more time to complete the project.

The student reported amount completed fell a little short of the actual amount completed. This occurred due to students being able to answer anonymously about their other group members.

The overall satisfaction level of this project demands that it will be done again the following year. There will be significant changes made to the project.

The negative personal comments show other issues regarding lack of communication and time management problems instead.

Here are some of their comments:

"I liked it, although I had to do most of the work."

"Adrian was working a little bit. Raffie wasn't working at all. He was trying to make jokes. Abraham and I were working half the time because we were trying to get them to work."

"Well I'm not going to say any names but some of the guys were not doing anything. They would just sit there and not do anything."

"Normally I'm not modest but here I had to be. I did most of the work; one guy drew the cell city and spent maybe 20 minutes of effort in it. Another occasionally colored it. Finally, the last guy played with his ruler the whole time. I think I deserve to express a little modesty here."

"I wasn't satisfied with my score because I did everything but the story."

"I was hoping that there would be sound in the PowerPoint Instructions. I also wanted something that I could try and sketch on the computer before doing the poster on construction paper."

The positive personal comments stressed basic satisfaction with the project. Here are some of their comments:

"I think we should do more projects like this one. I also think next year students should do a lot of these kinds of projects."

"It took time and it was challenging."

"It was a good assignment."

"The picture examples helped me a lot. Thank you."

Suggestions for change the next year in order of importance and ability to change

Make this assignment one day longer, giving students the time to compile their own project plan itemizing who will be doing which task relating to the project and how long each task is estimated to take. Give girls the option to use the PowerPoint Presentation example. Do the project a couple of weeks later in the quarter, so that it doesn't coincide with their first big project of the quarter. Make a tutorial showing step by step what needs to be done using Camtasia software, or Macromedia's Robo Demo. Assign students that will use the visual tutorial to computers that already have soundcards installed. Allow those students to use headphones as to not disturb the concentration of other students.