

# IHAD Summer Camp

## Pre/Post Assessment Analysis

### Particle Nature

Name	Solid			Liquid			Gas		
	Pre	Post	Delta	Pre	Post	Delta	Pre	Post	Delta
Student A	1	2	1	2	2	0	0	1	1
Student B	0	0	0	0	1	1	0	1	1
Student C	0	1	1	0	1	1	0	2	2
Student D	2	2	0	2	2	0	2	2	0
Student E	0	1	1	2	2	0	0	2	2
Student F	2	2	0	2	1	-1	1	2	1
Student G	0	0	0	2	2	0	2	2	0
Student H	0	0	0	2	1	-1	0	0	0
Student I	0	0	0	0	0	0	1	1	0
Student J	2	1	-1	2	2	0	0	2	2
Student K	1	2	1	1	2	1	2	2	0
Student L	2	2	0	2	2	0	2	2	0
Student M	2	2	0	2	2	0	2	2	0
Student N	0	2	2	0	2	2	0	2	2
Student O	2	1	-1	2	1	-1	0	0	0
Student P	0	2	2	2	2	0	2	2	0
Student Q	2	2	0	2	2	0	0	2	2
Averages	0.9	1.3	0.4	1.5	1.6	0.1	0.8	1.6	0.8

Total Students 17

Total points gained 6 2 13

Total # of students with positive shift (delta) 6 4 8

Total # of students with a negative shift (delta) 2 3 0

**Total # of students with a positive shift (delta) on at least one of solid, liquid or gas # 10**

**Percentage of students with a positive learning gain in particle nature (on at least one of solid, liquid or gas) 59%**

### Scoring

0	No evidence for particles or small pieces that make up the state of matter
1	Some evidence for particle nature, but drawn with something else behind or
2	Only particles and empty space present in the drawing

# IHAD Summer Camp

## Pre/Post Assessment Analysis

### Shape & Boundary

Name	Solid			Liquid			Gas		
	Pre	Post	Delta	Pre	Post	Delta	Pre	Post	Delta
Student A	1	2	1	2	2	0	3	3	0
Student B	2	2	0	0	2	2	0	3	3
Student C	2	3	1	1	3	2	1	3	2
Student D	3	2	-1	2	2	0	3	3	0
Student E	2	3	1	2	2	0	2	3	1
Student F	2	2	0	2	2	0	3	2	-1
Student G	2	2	0	2	2	0	3	3	0
Student H	2	2	0	2	2	0	3	3	0
Student I	2	2	0	2	2	0	2	3	1
Student J	2	2	0	2	2	0	0	3	3
Student K	2	2	0	1	2	1	1	3	2
Student L	3	2	-1	2	2	0	3	3	0
Student M	3	3	0	2	2	0	3	3	0
Student N	2	2	0	2	2	0	2	3	1
Student O	3	2	-1	2	2	0	1	3	2
Student P	2	2	0	2	2	0	2	3	1
Student Q	1	2	1	2	2	0	0	0	0
Averages	2.1	2.2	0.1	1.8	2.1	0.3	1.9	2.8	0.9

Total Students 17

Total points gained 1 5 15

Total # of students with positive learning gain 4 3 9

Total # of students with a negative learning gain 3 0 1

**Total # of students with a positive shift (delta) on at least one of solid, liquid or gas # 11**

**Percentage of students with a positive learning gain in particle nature (on at least one of solid, liquid or gas) 65%**

### Scoring

0	No evidence for macro or micro idea of shape or boundaries.
1	Some evidence for either macro or micro idea of shape or boundaries, but incorrect.
2	Show either microscopic or macroscopic picture correctly
3	Show macro level description correctly and also show evidence for microscopic level boundaries correctly.

**Correct Representation of Macroscopic:** A solid maintains definite shape and definite boundaries. A liquid fills its container and some top surface. A gas fills a closed container and 'overflows' an open container.

**Correct Representation of Microscopic:** If there is a surface, the surface is made up of particles not an abstract line.





# IHAD Summer Camp

## Pre/Post Assessment Analysis

### Conclusions

#### Individual observations

- 1) There are two students (highlighted in purple) that have notably high learning gains in nearly all categories
- 2) There are two students (highlighted in yellow) that have notably low or negative learning gains in nearly all categories

Conclusion:

#### General observations

- 1) Our pre and post assessments were not clearly linked with the curriculum of the summer camp.
- 2) Using the representation of the magnifying glass seemed to be a barrier for students. This may be due to the fact that some students may have used a magnifying glass before and had experience with how much it can "zoom in".
- 3) There were quite a few students that did not draw their objects at the bottom of the container. This was most prevalent in the drawings of solids. This may be due to the fact that they are used to drawing in boxes in school or that they just did not take gravity into consideration.
- 4) Two students showed a positive learning gain in depicting particle motion. This was not explicitly asked for on the worksheet. However, we decided to document the change. This may be due to the PhET activity.
- 5) Creating a rubric for gauging learning gains after the summer camp proved to be somewhat difficult. My suggestion for next time is to prepare an assessment rubric in conjunction with creating the pre/ post assessment, curriculum and learning goals. All of these things need to match up to ensure that the assessment is actually assessing what the students learn from the curriculum.
- 6) In looking through the student work, it seems as though there was an overall improvement in student understanding, as depicted in their drawings, but the rubric seems to indicate less of an overall improvement. I am not sure if this is because the rubric we used did not cover all the things the students improved on, if there were not enough categories (room for improvement), or if I have a false sense of improvement from just looking through the student pre/ post-assessments.
- 7) There is a pretty clear trend that the students had higher learning gains when depicting gas in the pre/ post assessment. This could be closely linked to the PhET activity that explicitly depicted the gas particles and demonstrated their behavior, or the fact that more of the activities focused on the properties of gases.
- 8) One factor that should be considered when evaluating the pre/ post assessments is then environments in which they were given. The pre test was given in the classroom at the very beginning and the post test was given at CU on the field trip day.
- 9) Another factor that could be considered when evaluating the pre/ post assessments is the differences in the presentation of the curriculum given in the two different classrooms.
- 10) It is also important to realize that this is a very small sample of the students work. Only those students that turned in both a pre and post assessment are included in this analysis. Not all the students were present for all activities, we have many pre tests from students that did not take the post test, we have many post test from students that did not take the pre test, etc.
- 11) We covered weeks worth of material in just three days which may be why we did not see a deeper understanding of the particle nature of matter, etc.
- 12) All 17 students had a positive shift in at least one category on this rubric.
- 13) Out of the 17 total students, 6 had negative shifts in at least one category on this rubric.
- 14) We can use the pre/post tests to gauge the robustness of the students' conceptions. It may be that the students that showed more sophisticated ideas on the pre test than on the post test did not have a robust understanding of the concept rather than interpreting it as the students learning wrong ideas or reinforcing misconceptions.

\*\*\*Survey from Eliana to see if the students liked it