

Targeting Students For Growth Of Conceptual Understanding

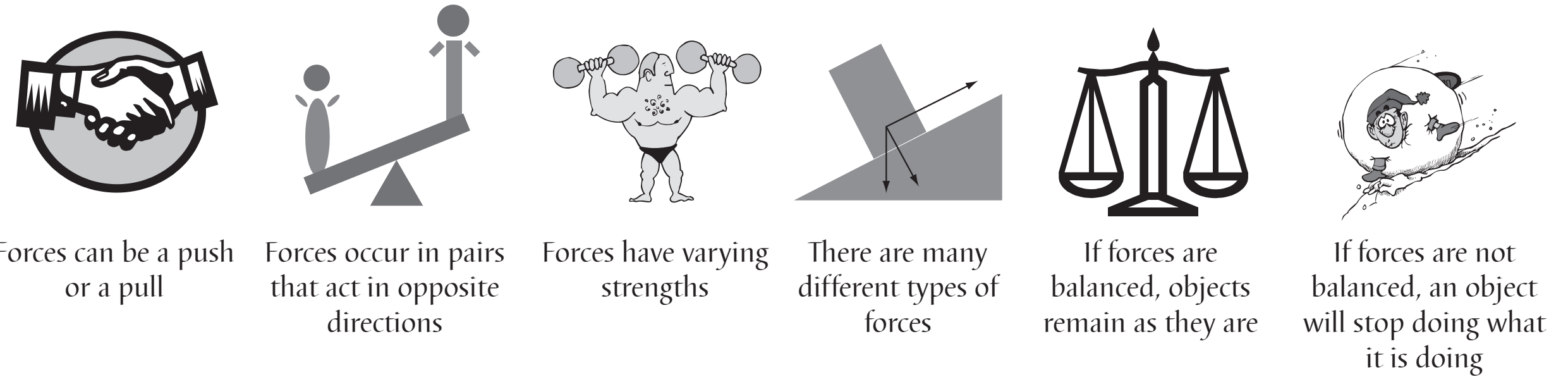
Context:

8th grade students at David A. Brown Middle school
 Rural school that is part of the Lake Elsinore Unified School district
 Target class: 36 students
 10 students of 36 are RSP (Resources students: Spec Ed)
 2 are English language learners : levels 4 and 5
 6 are Gifted and talented students
 Remaining are regular ed students
 One paraeducator in the class to work with RSP students



Learning Goal:

Based on the Conceptual flow that was developed using the 8th grade California Science Standards on Forces and Motion and the adopted textbook, *Focus on Physical Science* (Prentice Hall)



Assesment points were determined based on the conceptual flow
 Pretest was administered prior to instruction
 Juncture assessment administered after the fourth sub concept of the conceptual flow
 Post test was administered after unit instruction.

Pretest

Goal:

- To determine prior knowledge
- To determine misconceptions

Spring 2004 (see sample)

This version of the pretest (tool) was poorly written as it did not allow for any prior science vocabulary on forces/motion to emerge. Unable to determine "deep" prior knowledge

The pretest did not assess the concepts in the conceptual flow

Spring 2004 revision (see sample)

This version was also poorly written as it still did not allow any prior knowledge on forces to emerge.

Spring 2005 (see sample) New pretest

A new pretest was developed and administered.

This was a better tool : what I found in the student work used push and pull words such as longer and shorter were used longer arrow (force vector) must be a greater force than shorter arrow
 N must be the unit to measure forces
 pulling in opposite directions caused movement
 no mention of balnced or unbalanced forces
 no mention that forces act in pairs
 no mention that other forces may be invloved

Juncture : (performance task) (see sample on table)

Assessing conceptual understanding and science process skills
 Assessing data table construction, graphing and evidence stated in conclusions

Post test

Spring 2005 pretest was used as the post test

After post test was administered, the students were given their pretest and were prompted to answer the following question in their journals "Looking at your pre and post test, did your understanding of forces change? How did it change?"

Student	Pretest	Juncture	Post test (Interventions)
A: GATE	pulling with the same force no one gets the toy pulling harder gets the toy force is greater because the number (20N) is greater	states correct relationship between height, distance and surface states correctly the relationship between forces, gravity, friction, balanced and unbalanced units missing on data table used line graph correct graph labels uses evidence from data to support conclusion	neither child gets the toy because the forces are balanced correctly uses vector quantity as evidence in explanation provides comparison to newton's 1st law of motion stated a pull is a force gravity is another force that may be involved states friction is present
B: English	pulls the same no one gets the toy pulls more gets the toy	major issue with language "runaway ramps" states what happened but does not use science vocabulary or state relationship no evidence from data to support conclusion graph missing title, units	did not use balanced or unbalanced to explain diagram possible communication problem "Knows the toy isn't going anywhere" child (question2) gets the toy because more force was added
C: RSP	pulls to much and the toy rips in two pulls harder gets the toy	uses bar graph states that balanced and unbalanced forces can cause no motion and motion no evidence from data table to support conclusion	uses balanced and unbalanced to explain diagram interprets the force vectors correctly pulling is a force
Whole Class	pulling with the same force no one gets the toy pulls harder and gets the toy	data tables correct minor graphing errors (titles) lack of daa evidence to support conclusions	uses balanced and unbalanced to explain the motion interprets force quantites corectly