Views About Sciences Survey

VASS

General Purpose:

To survey student views about *knowing* and *learning* science and assess their *relation to student understanding.*

Specific Objectives:

(a) To ascertain significant *differences* between the views of students, teachers and scientists.

(b) To identify patterns in student views and classify them in general *profiles*.

(c) To measure the *effectiveness of instruction* in *changing* student views and profiles.

(d) To assess the relation between student views/profiles and achievement.

(e) To compare student views/profiles at all grade levels 8-16.

(f) To ascertain differences in the views/profiles of students in the various sciences (Physics, Chemistry, Biology,...)

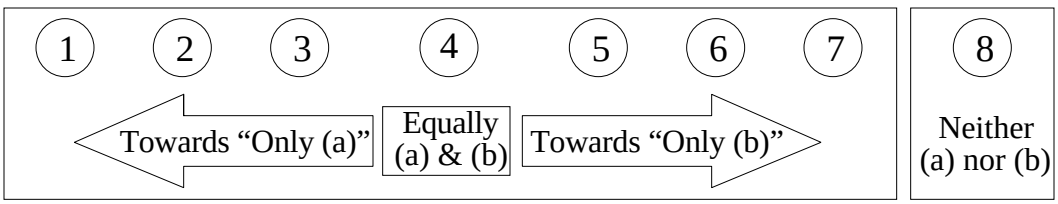
Contrasting Alternatives Design (CAD):

Respondents are asked to balance two contrasting alternatives on an eight-point scale. A special *VASS Answer Sheet* is designed for this purpose.

Learning physics requires:
(a) a serious effort.
(b) a special talent.

Answer Options

① Only (a), Never (b); ② Mostly (a), Rarely (b); ③ More (a) Than (b); ④ Equally (a) & (b);
⑤ More (b) Than (a); ⑥ Mostly (b), Rarely (a); ⑦ Only (b), Never (a); ⑧ Neither (a) Nor (b)



Taxonomy of Contrasting Views about Science:

Scientific dimensions

1. ***Structure:*** Science is a *coherent body of knowledge* about *patterns* in nature revealed by *careful investigation*
   — rather than a loose collection of directly perceived facts.

2. ***Methodology:*** The methods of science are *systematic* and *generic*
   — rather than idiosyncratic and situation specific.
   Mathematics is a *tool* used by scientists for describing and analyzing ideas
   — rather than a source of factual knowledge.
   Mathematical modeling for problem solving involves *more*
   — than selecting mathematical formulas for number crunching.

3. ***Validity:*** Scientific knowledge is *approximate, tentative,* and *refutable*
   — rather than exact, absolute and final.

Cognitive dimensions

4. ***Learnability:*** Science is *learnable by anyone* willing to make the effort
   — not just by a few talented people.
   Achievement depends more on *personal effort*
   — than on the influence of teacher or textbook.

5. ***Reflective thinking:*** For meaningful understanding of science, one needs to:
   (a) concentrate more on the *systematic use of principles*
   — than on memorizing facts;
   (b) examine situations in *many ways*
   — instead of following a single approach from an authoritative source;
   (c) look for *discrepancies in one's own knowledge*
   — instead of just accumulating new information;
   (d) *reconstruct* new subject knowledge in one's own way
   — instead of memorizing it as given.

6. ***Personal relevance:*** Science is *relevant to everyone's life.*
   — It is not of exclusive concern to scientists.
   Science should be studied more for *personal benefit*
   — than for fulfilling curriculum requirements.

Some Results*:

1. College and high school students hold views about knowing and learning science that can be classified in three types: *expert*, *mixed*, and *folk*. In the scientific dimensions of VASS, expert views are typical of *scientific realism*, while folk views are reminiscent of *positivism* or *naive realism*. In the cognitive dimensions, expert views characterize *critical learning,* while folk views characterize *passive learning*.

2. *Students do not show a consistent tendency* towards one type of view or another on all VASS items. Every student holds a mixture of folk, mixed and expert views in any VASS dimension.

3. Student views on the entire VASS can be grouped into four distinct profiles: *expert, high transitional, low transitional*, and *folk*.

4. *The profile distributions are similar in college and high school*. No more than 10% of all students exhibit an expert profile, and the remaining students are almost evenly distributed among the other three profiles.

5. *Student profiles correlate significantly with science achievement.* Students with an expert profile are the most likely to have the highest achievement in their science courses. Students with a folk profile are the most likely to have the lowest achievement. Students with transitional profiles are the most likely to fall in the middle.

* Ibrahim Halloun. (1996). Views about science and physics achievement. The VASS Story. *Proceedings of the International Conference on Undergraduate Physics Education.* American Institute of Physics Press, College Park, MD.