Views About Science Survey

VASS - P 204

Thank you for taking this survey that is part of a battery of instruments designed by Prof. Ibrahim A. Halloun in collaboration with a number of researchers in Lebanon and abroad. Each instrument is intended to identify factors that affect student understanding of particular aspects of science and that need to be accounted for in the design of instructional material.

For any information, please visit Prof. Halloun's website: www.inco.com.lb/halloun.

*All data are **confidential.** Your identity will not be disclosed to any party.*

Please:

*Do **not write** anything on this questionnaire.*
*Mark your answers on the **answer sheet** and follow marking instructions given there.*
*Mark **only one** answer per item*
*Answer **all questions** to the best of your knowledge. Do not skip any question.*
*Avoid guessing. Your answers should reflect what **you** actually and honestly think.*
Plan to finish the survey in 40 minutes.

Each item in this survey presents two alternative statements (a) and (b) about a given issue, as in the following example:

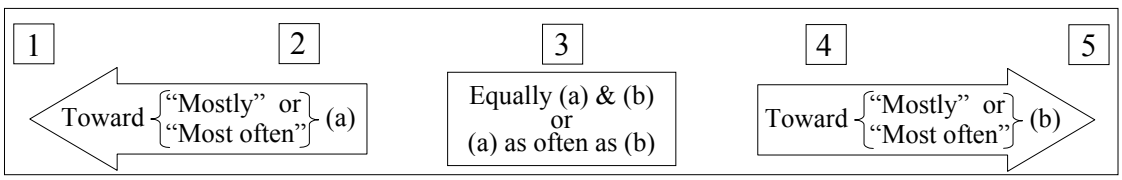
My physics course covers:
(a) abstract themes.
(b) practical themes.

You may be in a position to favor, to a certain degree, one alternative over the other, or to regard both alternatives (a) and (b) as equally favorable. Please state your position in every item by picking ***only one*** of the following five choices displayed at the bottom of each page:

1.	(a) >> (b):	Mostly (a), rarely (b), or	most often (a), seldom (b)
2.	(a) > (b):	More (a) than (b), or	(a) more often than (b)
3.	(a) = (b):	Equally (a) and (b), or	(a) as often as (b)
4.	(b) > (a):	More (b) than (a), or	(b) more often than (a)
5.	(b) >> (a):	Mostly (b), rarely (a), or	most often (b), seldom (a)

In the case of the example above, the five choices would mean the following:

1. My physics course covers *mostly* abstract themes and *rarely* any practical themes.
2. My physics course covers *more* abstract themes *than* practical themes.
3. My physics course covers *as much* abstract themes *as* practical themes.
4. My physics course covers *more* practical themes *than* abstract themes.
5. My physics course covers *mostly* practical themes and *rarely* any abstract themes.



1. By comparison to the rest of the class, I consider myself:
   (a) weak in physics.
   (b) excellent in physics.

2. What I actually learn in my current physics course is:
   (a) good for my course exams.
   (b) helpful in my everyday life.

3. My exam performance in my current physics course actually reflects how well I can:
   (a) recall course materials the way they are presented in class.
   (b) apply course materials in situations not discussed in class.

4. To do well in my current physics course, I actually need to go through the textbook or course materials and:
   (a) find the important information and memorize it the way it is presented.
   (b) reconstruct the material in my own way so that I can make sense of it.

The following twenty-three questions (5-27) are about *physicists* and their ways of doing physics. They are *not* about your physics courses. Please answer all these questions so as to reflect what you think physics is about as a *science*, and this irrespective of how things are actually being done in your current courses.

5. Physics and chemistry are:
   (a) related to each other by common principles.
   (b) are separate and independent of each other.

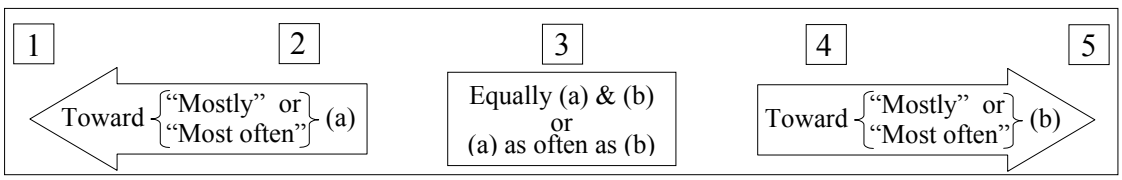
6. When faced with a natural event that occurs for the first time in a given place, physicists:
   (a) check whether this is a recurrence of a familiar event that took place elsewhere.
   (b) look for aspects that distinguish this particular event from all other events.

7. Once they come up with new information, physicists:
   (a) check whether it fits with the rest of their knowledge in physics.
   (b) ascertain its merits independently of their knowledge in physics.

8. When they investigate a particular object in the natural world, physicists:
   (a) look for all possible features that might be attributed to the object under investigation.
   (b) concentrate on particular features that they consider relevant to the purpose of study.

9. In order to decide whether two different objects may behave the same way in the natural world, physicists check whether the two objects:
   (a) are similar in all respects.
   (b) are subject to similar conditions.

10. Physicists say that electrons and protons exist in an atom because:
    (a) they have seen these particles in their actual form with some instruments.
    (b) they have made observations that may be attributed to such particles.



11. Physicists say that the earth and the moon attract one another because:
    (a) they have been able to detect and measure their mutual attraction with some instruments.
    (b) the moon's revolution around the earth can be explained in terms of such attraction.

12. When they investigate a particular event in the natural world, physicists decide what data they need to collect:
    (a) based on what they already know in physics.
    (b) after observing the event in all possible details.

13. In order to decide whether two natural events can be investigated the same way, physicists first look whether the two events:
    (a) involve similar objects.
    (b) occur in accordance with the same physics principles.

14. Physicists working in one branch of physics, like mechanics or thermodynamics, investigate the natural world in ways that may be followed in:
    (a) other branches of physics.
    (b) other scientific disciplines, like chemistry or biology.

15. In order to figure out how things actually work in the natural world, physicists:
    (a) survey aspects of this world that may be detected directly by our senses or through some instruments.
    (b) imagine how things could possibly exist in ways that may not be humanly possible to detect.

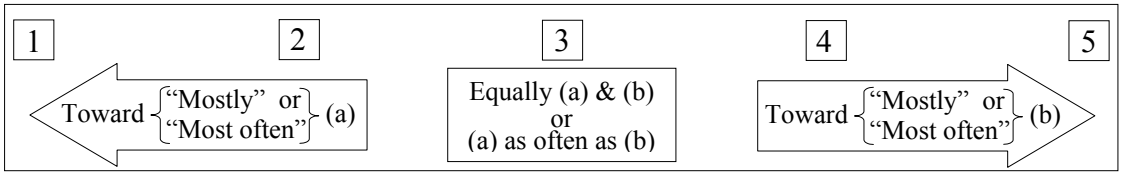
16. Physicists' findings about the natural world are:
    (a) dependent on current scientific knowledge.
    (b) accidental, depending on physicists' luck.

17. When investigating a particular event in the natural world, physicists follow:
    (a) one particular method that they consider most appropriate for the event under study.
    (b) a variety of methods to see if they may come up with the same conclusion every time.

18. The same natural event may be investigated from different perspectives in accordance with:
    (a) different principles coming from different branches in physics.
    (b) different principles coming from different scientific disciplines.

19. Physicists use mathematics:
    (a) to express their knowledge in meaningful ways.
    (b) to get numerical answers to physics problems.

20. Scientific concepts of mass and electric charge are:
    (a) inherent in the nature of physical objects and independent of how humans think.
    (b) invented by physicists to represent properties that physical objects might possess.



21. Scientific concepts of force and energy are:
    (a) inherent in the nature of physical objects and independent of how humans think.
    (b) invented by physicists to represent properties that physical objects might possess.

22. Two different scientific concepts may correspond to the same physical object:
    (a) in different respects.
    (b) in the same respects.

23. Newton's laws of motion (like his second law often expressed in the form **F** = m**a**) apply to physical objects that may be located:
    (a) anywhere in the universe.
    (b) in specific places of the universe.

24. Physicists' current ideas about particles that make up the atom apply to physical objects that may be located:
    (a) anywhere in the universe.
    (b) in specific places of the universe.

25. A bit of information is considered scientific from physicists' perspective:
    (a) when it has well-established merits regarding the natural world.
    (b) when it is offered by a group of trustworthy physicists.

26. Ideas about the natural world that nowadays physicists have accepted and successfully used for a long time:
    (a) may eventually be modified in some respects.
    (b) will continue to be accepted in their present form in the future.

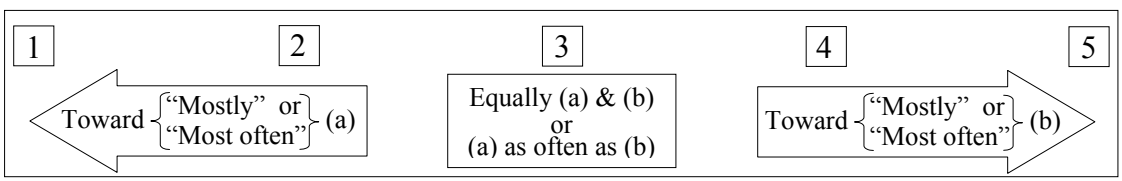
27. Physicists accept an idea about the natural world when the idea portrays this world:
    (a) exactly the way it is.
    (b) by approximation.

The following twelve questions (28-39) are about *your* physics *courses*. Please let your answers to all these questions reflect what *you actually* do in these courses, and how you actually feel about them.

28. Studying physics is for me:
    (a) an enjoyable experience.
    (b) a frustrating experience.

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

30. When I experience a difficulty while studying physics:
    (a) I seek help, or give up trying.
    (b) I try to figure it out on my own.



31. I go over the main body of a physics chapter:
    (a) before the chapter is covered in class.
    (b) after the chapter is covered in class.

32. I attempt to solve homework problems:
    (a) before they are solved in class.
    (b) after they are solved in class.

33. For me, discussing materials in my physics course with my classmates:
    (a) is a waste of time.
    (b) helps developing my reasoning skills.

34. For me, solving a physics problem more than one way:
    (a) is a waste of time.
    (b) helps developing my reasoning skills.

35. The first thing I do when solving a physics problem is:
    (a) represent the situation with sketches and drawings.
    (b) search for formulas that relate givens to unknowns.

36. After I have answered all questions in a homework physics problem:
    (a) I stop working on the problem.
    (b) I check my answers and the way I obtained them.

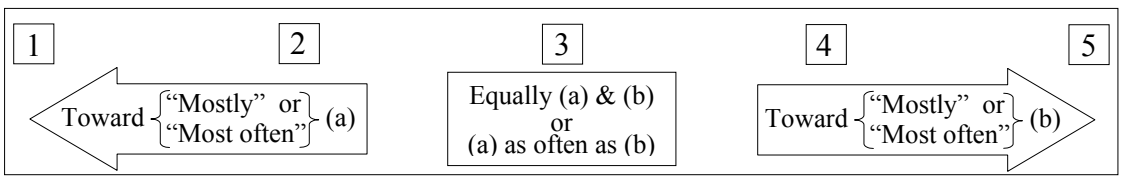
37. After the teacher solves a physics problem for which I got a wrong solution:
    (a) I discard my solution and learn the one presented by the teacher.
    (b) I try to figure out how the teacher's solution differs from mine.

38. After I succeed in solving a particular physics problem:
    (a) I figure out under what conditions I can apply the same method to another problem.
    (b) I memorize the method I followed in case I need it for solving a similar exam problem.

39. In order to solve a physics problem, I need to:
    (a) have seen the solution to a similar problem before.
    (b) know how to apply general problem solving techniques.

The following ten questions (40-49) are about the way you *would like* things to be done in your physics courses. Please let your answers to these questions reflect your *own preferences* or *aspirations*, irrespective of how things are actually being done in these courses.

40. I think that, when adequately presented, physics courses can be helpful to me:
    (a) in my everyday life.
    (b) if I were to become a physicist.



41. I would like my physics course to allow me relate physics:
    (a) to the way I think about certain things in the natural world.
    (b) to other sciences and their ways of dealing with the natural world.

42. I would like materials in my physics course to be covered in a way to help me:
    (a) do well on physics exams.
    (b) develop my reasoning skills.

43. I would like to study physics in order to satisfy:
    (a) my own interests.
    (b) what certain people expect of me.

44. I would like my understanding of physics courses to depend on:
    (a) how much effort I put into studying.
    (b) how well the teacher explains things in class.

45. I would like to learn about topics discussed in my physics course:
    (a) from my physics textbook.
    (b) from other sources.

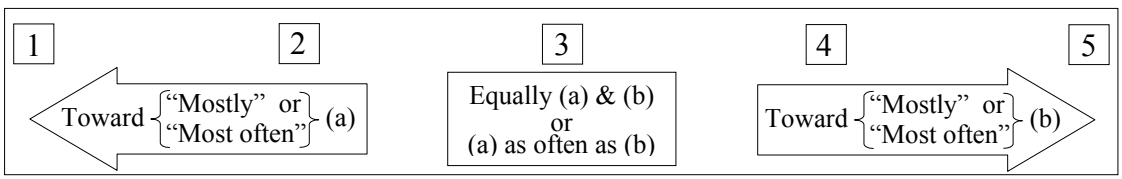
46. In my physics course, I would like to:
    (a) learn how physicists go about investigating the natural world.
    (b) acquire information about certain objects and events in the natural world.

47. I would like my performance on physics exams to reflect how well I can:
    (a) recall course materials the way they are presented in class.
    (b) apply course materials in situations not discussed in class.

48. For any question asked in class, I would like my physics teacher to:
    (a) provide the correct answer.
    (b) show how we may get the answer.

49. When studying physics in a textbook or in course materials, I would like to:
    (a) find the important information and memorize it the way it is presented.
    (b) reconstruct the material in my own way so that I can make sense of it.

50. I answered the questions in this survey:
    (a) to the best of my ability.
    (b) without thinking seriously about them.



VASS 204 Taxonomy

Scientific dimensions	Items
1. Epistemology:	
E1 Science is a *coherent body of knowledge* about *patterns* in physical realities (systems or phenomena) - rather than a loose collection of information about particular empirical facts.	5, 6, 7
E2 A limited number of *primary* aspects *common* to a variety of physical realities and their environments are responsible for a given pattern - and not a comprehensive similarity in all possible features that may actually be attributed to any given reality.	8, 9
E3 Primary aspects of physical realities, and especially *explanatory* or causal aspects, may need to be *inferred* from certain observations - and are not necessarily exposed directly to our senses or detectable through instruments.	10, 11
2. Methodology:	
M1 The methods of science are *theory-laden*, *systematic* and *generic* - rather than idiosyncratic and situation specific.	12, 13, 14
M2 Natural patterns are usually *unveiled* by *careful investigation* - rather than discovered accidentally through direct perception of physical realities.	15, 16
M3 Scientists may follow *variety* of *methods* and rely on a *variety* of *theories* to investigate a given physical reality from different perspectives, - rather than on a single method governed by a particular theory.	17, 18
M4 Mathematics is used by scientists for processing information efficiently - than for mere number crunching.	19
3. Viability:	
V1 Scientific *conceptions* (concepts, laws, models) are *invented* by scientists to represent physical realities in some respects; – they are not necessarily inherent in the nature of such realities.	20, 21
V2 Every scientific conception has a *well-delineated function* within a particular scientific theory, but a *domain* that may extend to a multitude of physical realities throughout the universe. - No two conceptions can serve exactly the same function, and no conception is generally restricted to localized realities.	22, 23, 24
V3 Every scientific conception is *corroborated* with *reliable evidence* from the empirical world - rather than faithfully accepted from particular scientific authorities.	25
V4 Scientific knowledge is *approximate, tentative,* and *refutable* - rather than exact, absolute and final.	26, 27

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Pedagogic dimensions	
4. Readiness to learning:	
D1 Science is *learnable by anyone* willing to make the effort - not just by a few talented people.	29
D2 Achievement depends more on *personal effort* and *perseverance* - than on the influence of teacher, peers or textbook.	30, 44
Understanding favors: ***D3*** students who come to class with a prepared mind - rather than those who study only after the teacher covers materials in class,	31, 32
D4 and those who seek scientific information from alternative sources and discuss it with peers - rather than those who stick to the textbook and their own ways of doing things.	33, 45
5. Reflective thinking:	
For meaningful understanding of science, one needs to: ***T1*** concentrate more on the development of *generic methods* for *construction* and *application* of scientific ideas - than on memorizing facts and procedures;	46, 47, 48
T2 model a situation and investigate it in *many ways* - instead of relying exclusively on a formula-centered approach;	34, 35
T3 continuously *evaluate* one's own work for *consistency* and *effectiveness* - instead of just accumulating new information from presumed authorities;	36, 37
T4 *reconstruct* new subject knowledge in one's own way while delineating its *scope* - instead of memorizing it as given and without realizing its viability conditions.	38, 39, 49
6. Personal relevance:	
R1 Science is *relevant to everyone's life.* - It is not of exclusive concern to scientists.	40, 41
R2 Studying science should be an *enjoyable* and a *self-satisfying* experience - rather than a frustrating one undertaken to satisfy curriculum requirement and other people's expectations.	28, 42, 43

