Cobern, W. W. (2000). The *Thinking about Science* Survey Instrument (TSSI) – SLCSP 151. Kalamazoo, MI: Scientific Literacy and Cultural Studies Project (http://www.wmich.edu/slcsp/slcsp151/tssi-v2.pdf).

The Thinking about Science Survey

Please respond to the following 60 items according to how you feel about science and other disciplines. Record your answers on the category recording form. This survey is completely anonymous.

		Strongly Disagree		Uncertain		Strongly Agree
1	Human emotion plays no part in the creation of scientific knowledge.	1	2	3	4	5
2	No source of knowledge provides absolute truth – not even science.	1	2	3	4	5
3	Scientific knowledge has often contributed to the destruction of our environment and natural resources.	1	2	3	4	5
4	Women are welcome in science just as much as men are.	1	2	3	4	5
5	Scientific research is rarely dangerous to the public.	1	2	3	4	5
6	Scientific research is generally very important.	1	2	3	4	5
7	A person can be both religious and scientific.	1	2	3	4	5
8	Scientific knowledge is the single most important factor in the improvement of medicine and public health.	1	2	3	4	5
9	Common sense contributes more to good health than does scientific knowledge.	1	2	3	4	5
10	Scientific research should be adequately funded by government.	1	2	3	4	5
11	Science is a more important source of knowledge than religion.	1	2	3	4	5
12	Scientific explanations tend to spoil the beauty of nature.	1	2	3	4	5
13	Students should not be forced to take science courses at the university.	1	2	3	4	5
14	The strength of our national economy does not depend on scientific knowledge.	1	2	3	4	5
15	Science should not be made an important subject for the elementary school grades.	1	2	3	4	5
16	Science helps develop our natural resources such as coal, gas, oil, and solar energy.	1	2	3	4	5
17	Scientific knowledge is the most objective form of knowledge.	1	2	3	4	5
18	Scientific research is often potentially dangerous to the public.	1	2	3	4	5
		Strongly Disagree		Uncertain		Strongly Agree
19	There is little need for the legal regulation of scientific research.	1	2	3	4	5
19	There is little need for the legal regulation of scientific research.	1	2	3	4	5
20	Scientific knowledge is useful in keeping our national economy competitive in today's world.	1	2	3	4	5
21	It is equally important for a person to have scientific knowledge and an appreciation for the arts.	1	2	3	4	5
22	The development of our natural resources, such as coal, gas, oil, solar energy, requires much more than scientific knowledge.	1	2	3	4	5
23	The scientific community is mostly dominated by men and is often unfriendly to women.	1	2	3	4	5
24	Understanding science is a good thing for everyone.	1	2	3	4	5
25	There are many good things we can do today because of scientific knowledge.	1	2	3	4	5
26	Scientists should not be allowed to research anything they wish.	1	2	3	4	5
27	No form of knowledge can be completely certain – not even scientific knowledge.	1	2	3	4	5
28	Scientific research should be carefully regulated by law.	1	2	3	4	5
29	We can be certain that scientific knowledge is reliable.	1	2	3	4	5
30	African Americans and other minority people are just as welcome in the scientific community as are white people.	1	2	3	4	5
31	The development of our natural resources, such as coal, gas, oil, solar energy, is dependent upon having adequate scientific knowledge.	1	2	3	4	5
32	Religious knowledge contributes more to the well being of a person's life than does science.	1	2	3	4	5
33	The methods of science are the most reliable source of true, factual knowledge.	1	2	3	4	5
34	Science is the best source of reliable knowledge.	1	2	3	4	5
35	Scientific research is morally neutral.	1	2	3	4	5
36	Science can contribute to our appreciation and experience of beauty.	1	2	3	4	5

37	Only a very few people really understand science.	1	2	3	4	5
		Strongly Disagree		**Uncertain**		**Strongly Agree**
38	Our natural environment would actually be helped by the absence of scientific knowledge.	1	2	3	4	5
38	Our natural environment would actually be helped by the absence of scientific knowledge.	1	2	3	4	5
39	Religion and science are almost always at odds with each other.	1	2	3	4	5
40	Religion tends to impede scientific progress.	1	2	3	4	5
41	Scientific knowledge is useful for only a few people.	1	2	3	4	5
42	Science is our best source of useful knowledge.	1	2	3	4	5
43	Science can help us preserve our natural environment and natural resources.	1	2	3	4	5
44	No form of knowledge – including science – can ever be completely objective.	1	2	3	4	5
45	Scientific research is economically and politically determined.	1	2	3	4	5
46	The methods of science are objective.	1	2	3	4	5
47	Scientific knowledge tends to erode spiritual values.	1	2	3	4	5
48	Scientific research makes important contributions to medicine and the improvement of public health.	1	2	3	4	5
49	Developing new scientific knowledge is very important for keeping our country economically competitive in today's world.	1	2	3	4	5
50	Scientific knowledge influences government decision making too much.	1	2	3	4	5
51	Scientific knowledge is useful.	1	2	3	4	5
52	All students should study science during the secondary school grade levels.	1	2	3	4	5
53	The scientific community is mostly dominated by white men and is often unfriendly to minority people.	1	2	3	4	5
54	Most people really do not need to know very much science.	1	2	3	4	5
55	Even at the university level all students should study at least some science.	1	2	3	4	5

56	Science should be taught at all school grade levels.	1	2	3	4	5
57	The government should not be in the business of using tax dollars to fund scientific research.	1	2	3	4	5
		Strongly Disagree		**Uncertain**		**Strongly Agree**
58	Scientific knowledge contributes little to good health.	1	2	3	4	5
59	Without science we will not be able to preserve our natural environment and natural resources.	1	2	3	4	5
60	Scientific knowledge is the truest form of knowledge.	1	2	3	4	5

Aldridge, J., Taylor, P., & Chen, C.C. (1997). *Development, validation and use of the beliefs about science and school science questionnaire (BASSSQ).* Annual Meeting of the National Association for Research in Science Teaching, Chicago, IL.

Your Views About What Occurs in Science

Please indicate how often, in your opinion, each practice **occurs in science.**

Process of Scientific Inquiry		Almost Never	Seldom	Some-times	Often	Almost Always
1.*	Scientific observations depend on what scientists set out to find.	1	2	3	4	5
2.	Scientific inquiry involves challenging other scientists' ideas.	1	2	3	4	5
3.	Scientific observations are affected by scientists' values and beliefs.	1	2	3	4	5
4.*	Scientific inquiry involves thinking critically about one's existing knowledge.	1	2	3	4	5
5.	Intuition plays a role in scientific inquiry.	1	2	3	4	5
6.	When making observations, scientists eliminate their beliefs and values.	1	2	3	4	5
7.	Scientific observations are guided by theories.	1	2	3	4	5
8.	Scientific inquiry starts with observations of nature.	1	2	3	4	5
9.	Scientific investigation follows the scientific method.	1	2	3	4	5
10.	Scientific ideas come from both scientific and non-scientific sources.	1	2	3	4	5

Certainty of Scientific Knowledge		Almost Never	Seldom	Some-times	Often	Almost Always
11.	Scientific knowledge gives a true account of the natural world.	1	2	3	4	5
12.	Scientific knowledge is tentative.	1	2	3	4	5
13.	Scientific knowledge is relative to the social context in which it is generated.	1	2	3	4	5
14.*	Scientific knowledge can be proven.	1	2	3	4	5
15.	The evaluation of scientific knowledge varies with changes in situations.	1	2	3	4	5
16.	The accuracy of current scientific knowledge is beyond question.	1	2	3	4	5
17.*	Currently accepted scientific knowledge will be modified in the future.	1	2	3	4	5
18.	Scientific knowledge is influenced by cultural and social attitudes.	1	2	3	4	5
19.	Scientific knowledge is free of human perspectives.	1	2	3	4	5
20.	Scientific knowledge is influenced by myths.	1	2	3	4	5

Process of School Science Inquiry		Almost Never	Seldom	Some-times	Often	Almost Always
21.	In science classes, investigations should enable students to explore their own ideas.	1	2	3	4	5
22.	In science classes, students should work collaboratively.	1	2	3	4	5
23.	In science classes, students should discuss ideas with others.	1	2	3	4	5
24.	In science classes, students should think creatively.	1	2	3	4	5
25.	In science classes, students should explore different methods of investigation.	1	2	3	4	5
26.	Students should view science as a problem-solving exercise.	1	2	3	4	5
27.*	In science classes, inquiry learning should start with observation.	1	2	3	4	5
28.*	In science classes, students should apply the scientific method.	1	2	3	4	5
29.	Students should enjoy themselves during science experiments.	1	2	3	4	5
30.*	Students should be taught that there is a distinction between theory and observation.	1	2	3	4	5
31.	In science classes, students should consider ethical issues related to scientific investigation.	1	2	3	4	5

Certainty of School Science Knowledge		Almost Never	Seldom	Some-times	Often	Almost Always
32.	In school science, students should be critical of accepted theories.	1	2	3	4	5
33.	In school science, students should view scientific knowledge as tentative.	1	2	3	4	5
34.	In school science, student understanding should be influenced by their existing knowledge.	1	2	3	4	5
35.	In school science, students should examine the history of accepted scientific knowledge.	1	2	3	4	5
36.	In school science, students should learn that more than one theory can account for a given set of data.	1	2	3	4	5
37.	In school science, students should learn about competing theories.	1	2	3	4	5
38.*	In school science, students should be taught that accepted scientific knowledge will be modified in the future.	1	2	3	4	5
39.	In school science, students should examine how society influences what counts as scientific knowledge.	1	2	3	4	5
40.*	In school science, students should consider social issues related to accepted scientific knowledge.	1	2	3	4	5
41.	In school science, students should be taught that scientific knowledge is objective and therefore free of human values.	1	2	3	4	5

*Items omitted during analysis
Underlined items reflect a more objectivist view and were therefor scored in reverse.

Survey of Attitudes Towards Science

The following statements are about the study of science. Please listen to, and read, each statement carefully. Use the following scale to show how much you agree or disagree with each statement.

If you STRONGLY DISAGREE	□	(2)	(3)	(4)	(5)
If you AGREE	(1)	□	(3)	(4)	(5)
If you are UNDECIDED	(1)	(2)	□	(4)	(5)
If you AGREE	(1)	(2)	(3)	□	(5)
If you STRONGLY AGREE	(1)	(2)	(3)	(4)	□

It is important that you respond to *every statement*, and that you fill in only one number per statement.

Attitudes Toward Science Inventory

ATSI ITEM STATEMENTS	STTONGLY	AGREE	UNDECIDE	DISAGREE	STRONGLY
1. Science is useful for solving the problems of everyday life.	1	2	3	4	5
2. Science is something that I enjoy very much.	1	2	3	4	5
3. I like the easy science assignments best.	1	2	3	4	5
4. I do not very well in science.	1	2	3	4	5
5. Science teachers show little interest in their students.	1	2	3	4	5
6. Doing science labs or hands-on activities is fun.	1	2	3	4	5
7. I feel at ease in a science class.	1	2	3	4	5
8. I would like to do some extra or un-assigned reading in science.	1	2	3	4	5
9. There is little need for science in most of today's jobs.	1	2	3	4	5
10. Science is easy for me.	1	2	3	4	5
11. When I hear the word "science," I have a feeling of dislike.	1	2	3	4	5
12. Most people should study some science.	1	2	3	4	5
13. I would like to spend less time in school studying science.	1	2	3	4	5
14. Sometimes I read ahead in our science book.	1	2	3	4	5
15. Science is helpful in understanding today's world.	1	2	3	4	5
16. I usually understand what we are talking about in science.	1	2	3	4	5
17. Science teachers make science interesting for me.	1	2	3	4	5
18. I do not like anything about science.	1	2	3	4	5
19. No matter how hard I try, I cannot understand science.	1	2	3	4	5
20. I feel tense or upset when someone talks to me about science.	1	2	3	4	5
21. Science teachers present materials in a way that I understand.	1	2	3	4	5

22. I often think, "I cannot do this," when a science assignment seems hard.	1	2	3	4	5
23. Science is of great importance to a country's development.	1	2	3	4	5
24. It is important to know science in order to get a good job.	1	2	3	4	5
25. It does not disturb or upset me to do science assignments.	1	2	3	4	5
26. I would like a job that does not use any science.	1	2	3	4	5
27. Science teachers know when I am having trouble with my assignments.	1	2	3	4	5
28. I enjoy talking to other people about science.	1	2	3	4	5
29. I enjoy watching a science program on television.	1	2	3	4	5
30. I am good at working science labs and hands-on activities.	1	2	3	4	5
31. Science teachers do not seem to enjoy teaching science.	1	2	3	4	5
32. I like the challenge of science assignments.	1	2	3	4	5
33. You can get along perfectly well in everyday life without science.	1	2	3	4	5
34. Working with science upsets me.	1	2	3	4	5
35. I remember most of the things I learn in science class.	1	2	3	4	5

36. It makes me nervous to even think about doing science.	1	2	3	4	5
37. I would rather be told scientific facts than find them out from experiments.	1	2	3	4	5
38. Most of the ideas in science are not very useful.	1	2	3	4	5
39. It scars me to have to take a science class.	1	2	3	4	5
40. Science teachers are willing to give me individual help.	1	2	3	4	5
41. The only reason I am talking science is because I have to.	1	2	3	4	5
42. It is important to me to understand the work I do in the science class.	1	2	3	4	5
43. I have a good feeling toward science.	1	2	3	4	5
44. Science teachers know a lot about science.	1	2	3	4	5
45. Science is one of my favorite subjects.	1	2	3	4	5
46. Science teachers do not like students to ask questions.	1	2	3	4	5
47. I have a real desire to learn science.	1	2	3	4	5
48. If I do not see how to do a science assignment right away, I never get it.	1	2	3	4	5

Weinburgh, M.H., & Steele, D. (2000). The modified attitudes toward science inventory: developing an instrument to be used with fifth grade urban students, *Journal of Women and Minorities in Science and Engineering, 6*, 87-94.

Perception of the teacher

1. Science teachers make science interesting.
2. Science teachers present material in a clear and understandable way.
3. Science teachers are willing to give us individual help.

Anxiety toward science

1. When I hear the word "science," I have a feeling of dislike.
2. I feel tense when someone talks to me about science.
3. It makes me nervous to even think about doing science.
4. It scares me to have to take a science class.
5. I have a good feeling toward science.*

Value of science to society

1. Science is useful for solving the problems of everyday life.
2. Most people should study some science.
3. Science is helpful in understanding today's world.
4. Science is of great importance to a country's development.
5. It is important to know science in order to get a good job.

Self-confidence in science

1. I do not do very well in science.*
2. Science is easy for me.
3. I usually understand what we are talking about in science.
4. No matter how hard I try, I cannot understand science.*
5. I often think, "I cannot do this," when a science assignment seems hard.*

Desire to do science

1. Science is something which I enjoy very much.
2. I would like to do some reading in science which has not been assigned to me.
3. Sometimes I read ahead in our science book.
4. I like the challenge of science assignments.
5. It is important to me to understand the work I do in the science class.
6. Science is one of my favorite subjects.
7. I have a real desire to learn science.

Note: The * indicates that the score will be reversed because the statements were worded negatively. Higher numerical scores reflect more positive attitudes in all areas except anxiety, where a lower numerical score reflects more positive attitudes (less anxiety).

Siegel, M.A., Ranney, M.A. (2003). Developing the Changes in Attitude about the Relevance of Science (CARS) Questionnaire and Assessing Two High School Science Classes. *Journal of Research in Science Teaching, 40*(8), 757-775.

CARS Items

Students checked a box labeled with one of the following choices: "strongly agree," "somewhat agree," "neutral," "somewhat disagree," "strongly disagree," or "don't understand." Students were encouraged to inquire about items before checking "don't understand"; the few resulting responses were coded differently from nonresponses and missing data. Each questionnaire ended with: "Please comment on any of these issues in your own words" and "Thank you very much!"

Numbers below represent the same items shown in Appendix B and C. Eight repeated items, numbered 18–25, appeared on each version of the questionnaire.

	Repeated Items on Versions A, B, and C
18	Much of what I learn in science classes is useful in my everyday life today.
19	Learning science can help me when I pick food to buy.
20	Caring about people is part of making a scientific choice, such as whether to use pesticides on plants.
21	Science helps me to make sensible decisions.
22	The things I do in science have nothing to do with the real world.
23	Science helps me to make decisions that could affect my body.
24	Learning science will have an effect on the way I vote in elections
25	Making decisions can be difficult without reliable evidence.

	Items Only on Version A
1	My parents encourage me to continue with science.
2	I plan to take more science classes in high school.
3	Science helps me to work with others to find answers.
4	Science class helps me to evaluate my own work.
5	Learning science helps me understand about the environment.
6	Emotion has no place in science.
7	Science class helps me to judge other people's points of view.
8	Science will help me understand more about world-wide problems.
9	Science has nothing to do with my life outside of school.
10	Experiments in science help me to learn with a group.
11	Science teaches me to help others make decisions.
12	Knowing science will not help me in sports.
13	Science has nothing to do with buying things, such as food and cars.
14	Knowledge of science could make it easier to fix a bicycle.
15	Science teaches me to think less clearly than I already do.
16	Making a good decision is a scientific process.
17	Science class will help prepare me for college.

	Items Only on Version B
26	Science class helps me to work with others to make decisions.
27	I am interested in learning more about computer technology and designing video games.
28	Science has nothing to do with local issues, such as waste from nearby factories.
29	Science can help me make better decisions about what I buy.
30	Science experiments can help me to better understand the world.
31	I would like to learn more about strategies for thinking in my science class.
32	Knowledge of science helps me to prevent the spread of colds/diseases.
33	Using scientific methods helps me make environmental decisions.
34	Learning science is not important for my future success.
35	I only take science because it is a required course.
36	In most cases, personal feelings are important for making choices in science.
37	Knowing science can help me to make better choices about medical issues.
38	Collecting evidence is an important part of making a decision.
39	Science class will help prepare me for major decisions in my future.
40	I will only take math classes for as long as I have to.
41	Learning science enables me to explain my thoughts better to others.
42	Knowledge of science will help me protect the environment.

	Items Only on Version C
43	Science will help me to understand the effect I have on the environment.
44	Science helps me to ask others for help with my work.
45	Using scientific methods helps me think things through.
46	Science can help me decide how to treat my cold or illness.
47	Usually, it is bad to have any feelings about the scientific issues I am considering.
48	Science should be required in school.
49	Science could help me figure out how to spin/shoot/throw/hit a ball.
50	Science class helps me to evaluate my own work.
51	I do not expect to use science much when I get out of school.
52	I am interested in a career as a scientist or engineer.
53	Making decisions can be difficult when I don't understand the choices.
54	My intuition helps me make decisions in science.
55	I have support from others to excel at science.
56	Using scientific methods helps me decide what to buy in the store.
57	Science will help me understand the importance of recycling.
58	Learning science can help me understand about things that affect people's health.
59	Science can help me to make better choices about various things in my life (e.g., food to eat, car to buy).

Nadelson, L., Jorcyk, C., Yang, D., Smith, M.J., Matson, S., Cornell, K., Husting, V. (2014). I Just Don't Trust Them: The Development and Validation of an Assessment Instrument to Measure Trust in Science and Scientists. *School Science and Mathematics, 114*(2), 76-86.

Trust in Science and Scientists Inventory

Directions: Rank your level of agreement to each of these statements on the scale provided.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. When scientists change their mind about a scientific idea it diminishes my trust in their work.*					
2. Scientists ignore evidence that contradicts their work.*					
3. *Scientific theories* are weak explanations.*					
4. Scientists intentionally keep their work secret.*					
5. We can trust scientists to share their discoveries even if they don't like their findings.					
6. Scientists don't value the ideas of others.*					
7. I trust that the work of scientists to make life better for people.					
8. Scientists don't care if laypersons understand their work.*					
9. We should trust the work of scientists.					
10. We should trust that scientists are being honest in their work.					
11. We should trust that scientists are being ethical in their work.					
12. Scientific theories are trustworthy.					
13. When scientists form a hypothesis they are just guessing.*					
14. People who understand science more have more trust in science.					
15. We can trust science to find the answers that explain the natural world.					
16. I trust scientists can find solutions to our major technological problems.					
17. We cannot trust scientists because they are biased in their perspectives.*					
18. Scientist will protect each other even when they are wrong.*					
19. We cannot trust scientists to consider ideas that contradict their own.*					
20. Today's scientists will sacrifice the well being of others to advance their research.*					
21. We cannot trust science because it moves too slowly.*					

* Reverse coded item.

Astalini, A., & Kurniawan, D. A. (2019). Pengembangan Instrumen Sikap Siswa Sekolah Menengah Pertama Terhadap Mata Pelajaran Ipa. J*urnal Pendidikan Sains (Jps)*, 7(1), 1. https://doi.org/10.26714/jps.7.1.2019.1-7

Adoption of a Scientific Stance

1- I enjoy reading about things that don't fit my previous thinking.
2- I don't like to repeat an experiment when the results are the same
3- I am curious about the world we live in.
4- Finding out about new things is not important.
5- I like to listen to people whose opinions differ from mine.
6- I feel bored hearing new thoughts.
7- I don't want to change my idea even though the evidence shows that it's a bad idea

Astalini, A., & Kurniawan, D. A. (2019). Pengembangan Instrumen Sikap Siswa Sekolah Menengah Pertama Terhadap Mata Pelajaran Ipa. J*urnal Pendidikan Sains (Jps)*, 7(1), 1. https://doi.org/10.26714/jps.7.1.2019.1-7

The interest in increasing the time to study science

(1) Strongly Disagree, (2)Disagree), (3) Neutral, (4) Agree and (5) Strongly Agree.

1- I want to be a science extracurricular member.
2- I'm tired of watching science programs on TV when I'm at home.
3- I want to be given a science book or scientific kit as a gift.
4- I don't like reading books on science during the holidays
5- I want to do science experiments at home.
6- Talking to friends about science after school can be boring
7- I enjoy activities in the science laboratory during school holidays.
8- Listening to science talk on the radio can be boring.

POINTS DE VUE SUR LA SCIENCE, LA TECHNOLOGIE ET LE TRAVAIL SCIENTIFIQUE*

Instructions

Les questions auxquelles nous vous invitons à répondre commencent toujours par une affirmation portant sur le thème « science », le thème « technologie » ou encore le thème« travail scientifique ». La plupart de ces affirmations expriment des points de vue extrêmes sur le sujet. Il est possible que vous soyez en parfait accord avec cette affirmation ou totalement en désaccord avec celle-ci ; il est également possible que votre attitude soit mitigée, et vous serez alors plus ou moins d'accord.

À la suite de cette affirmation, on propose une liste d'énoncés portant sur le thème. Ces énoncés expriment des points de vue ou des positions divergentes qui vont d'un extrême à l'autre en ce qui a trait à l'accord ou au désaccord avec l'affirmation précédente . Vous devez choisir **UN SEUL** de ces énoncés : celui qui se rapproche le plus de votre point de vue personnel ou de vos croyances.

La procédure à suivre est la suivante :

- Lisez attentivement l'affirmation.
- Demandez-vous si vous êtes d'accord ou non avec son contenu ou si vous êtes incapable de vous décider.
- Ensuite, lisez chacun des énoncés portant sur le sujet.
- Choisissez celui qui exprime le mieux votre point de vue personnel et **encerclez le chiffre correspondant**.

Trois énoncés, toujours les mêmes, terminent chaque question. Vous pouvez en faire usage si vous le désirez :

- « Je ne comprends pas » signifie que vous ne comprenez pas un mot-clé ou une phrase-clé.
- « Je ne connais pas suffisamment le sujet pour effectuer un choix. »
- « Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue » peut signifier qu'il vous est nécessaire de choisir plus d'un énoncé pour exprimer votre point de vue ou, encore, qu'aucun des énoncés présentés ici ne se rapproche du vôtre (dans ce cas vous pouvez, si vous le désirez, préciser en quelques mots, au bas de la page, votre propre point de vue).

Il n'existe pas de « bonne réponse ». Ceci n'est pas un test. Nous voulons seulement connaître votre point de vue sur un certain nombre de thèmes relatifs à la science, à la technologie et au travail scientifique.

VOSTS

Q. 1 On entend souvent dire qu'un mineur "découvre" un filon d'or alors que l'artiste "invente" une sculpture. Certaines personnes pensent que les scientifiques découvrent les LOIS scientifiques alors que d'autres pensent qu'ils et elles les inventent. Qu'en pensez-vous?

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Les scientifiques découvrent les lois scientifiques:

1. car les lois sont là dans la nature et les scientifiques n'ont qu'à les trouver.
2. car les lois scientifiques sont basées sur les faits expérimentaux.
3. toutefois les scientifiques inventent les méthodes pour trouver ces lois.
4. Certains scientifiques peuvent tomber sur une loi par chance et ainsi la découvrir. Mais d'autres scientifiques peuvent inventer une loi à partir des faits qu'ils et elles connaissent déjà.
5. Les scientifiques inventent les lois, car ils et elles interprètent les faits expérimentaux qu'ils découvrent. Les scientifiques n'inventent pas ce que fait la nature, mais ils et elles inventent effectivement les lois qui décrivent ce qu'elle fait.
6. Je ne comprends pas.
7. Je ne connais pas suffisamment le sujet pour effectuer un choix.
8. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 2 La recherche scientifique au Canada serait en meilleure situation si elle était plus étroitement contrôlée par les entreprises (comme les entreprises de haute technologie, de communication, de produits pharmaceutiques, de foresterie, de mines, ou les entreprises manufacturières).

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Les entreprises devraient assurer principalement le contrôle en science :

1. parce qu'un contrôle plus étroit par les entreprises rendrait la science plus utile et entraînerait des découvertes plus rapidement, grâce à une communication plus rapide, un meilleur financement et une plus grande concurrence.

2. afin d'améliorer la coopération entre la science et la technologie et, de cette façon, résoudre les problèmes en concertation.

3. mais le public ou les agences gouvernementales devraient avoir un mot à dire sur ce que la science cherche à accomplir.

Les entreprises ne devraient pas assurer le contrôle en science :

4. parce que si les entreprises exerçaient ce contrôle, les découvertes scientifiques seraient restreintes aux découvertes bénéfiques aux entreprises (comme celles faisant faire des profits). D'importantes découvertes scientifiques dont bénéficie le public sont faites par la science pure en l'absence de contraintes.

5. parce que si les entreprises exerçaient ce contrôle, elles entraveraient l'action des scientifiques dans l'investigation d'importants problèmes que les entreprises chercheraient à camoufler (par exemple, la pollution par les entreprises).

6. La science ne peut pas être sous le contrôle des entreprises. Personne, ni même le ou la scientifique, ne peut contrôler ce que la science découvrira.

7. Je ne comprends pas.

8. Je ne connais pas suffisamment le sujet pour effectuer un choix.

9. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 3 Les scientifiques qui sont formés dans différents pays ont des manières différentes d'appréhender un problème scientifique. Cela signifie que le système d'éducation d'un pays ou encore la culture peuvent avoir de l'influence sur les conclusions proposées par les scientifiques.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Le pays d'origine FAIT sûrement une différence:

1. car l'éducation et la culture influencent tous les aspects de la vie, y compris la formation des scientifiques et leur façon d'appréhender un problème scientifique.

2. car chaque pays a un système particulier d'enseignement des sciences. La façon dont un ou une scientifique apprend ainsi à résoudre des problèmes l'amènera à proposer des conclusions différentes.

3. car chaque pays et chaque industrie ne financeront que les projets de science qui correspondent à leurs besoins. Cela influence ce qu'étudiera un ou une scientifique.

4. Cela dépend. Le type de formation qu'un pays donne à ses scientifiques en influence un certain nombre. MAIS d'autres scientifiques appréhendent les problèmes de manière individuelle en fonction de leur point de vue personnel.

Le pays d'origine NE FAIT sûrement PAS une différence:

5. car les scientifiques appréhendent les problèmes de manière individuelle peu importe le pays où ils et elles ont été formés.

6. car tous les scientifiques de par le monde utilisent la même méthode scientifique qui conduit à des conclusions similaires.

7. Je ne comprends pas.

8. Je ne connais pas suffisamment le sujet pour effectuer un choix.

9. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 4 Les scientifiques publient les résultats de leurs découvertes dans les revues scientifiques. Ils et elles font cela principalement pour paraître crédibles aux yeux des autres scientifiques et des organismes subventionnaires; cela contribue ainsi à la promotion de leurs carrières.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Les scientifiques publient les résultats de leurs découvertes :

1. surtout pour obtenir la reconnaissance de leurs réalisations, pour se faire connaître davantage ou pour profiter d'un quelconque succès financier. Si les scientifiques ne pouvaient jouir de ces bénéfices personnels, la science cesserait de progresser.

2. à la fois pour bénéficier personnellement de la reconnaissance, de la gloire et de la fortune qu'une découverte apporte; et pour faire avancer la science et la technologie en partageant des idées, en s'appuyant ainsi sur le travail des uns et des autres.

3. surtout pour faire avancer la science et la technologie. En partageant publiquement leurs idées, les scientifiques prennent appui sur le travail des uns et des autres. Sans de tels échanges, la science cesserait de progresser.

4. surtout pour permettre aux autres scientifiques d'évaluer leur découverte. Cette forme de critique et de vérification assure que la science progresse à partir de résultats vrais.

5. pour partager publiquement leurs idées et pour que leur découverte soit jugée par d'autres scientifiques.

6. surtout pour aider les autres scientifiques de toutes les parties du monde. Ces publications préviennent une inutile duplication des efforts et, par conséquent, accélèrent l'avancement de la science.

7. pour faire avancer la science et la technologie grâce à des échanges publics et pour informer la population en général des plus récentes découvertes.

8. Je ne comprends pas.

9. Je ne connais pas suffisamment le sujet pour effectuer un choix.

10. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 5 La science et la technologie contribuent grandement à résoudre les problèmes sociaux tels que la pollution et la surpopulation.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. La science et la technologie peuvent certainement contribuer à résoudre ces problèmes. On pourrait tirer parti des nouvelles idées en science et des nouvelles inventions en technologie pour les solutionner.

2. La science et la technologie peuvent contribuer à résoudre certains problèmes sociaux, mais elles demeurent impuissantes face à certains d'entre eux.

3. La science et la technologie apportent des solutions à plusieurs problèmes sociaux, mais elles peuvent aussi contribuer à en créer.

4. La question n'est pas de savoir si la science et la technologie peuvent contribuer à résoudre ces problèmes, mais de savoir si les gens utilisent la science et la technologie à bon escient.

5. Il n'est pas évident que la science et la technologie puissent être d'un grand secours pour résoudre les problèmes sociaux. Les problèmes sociaux relèvent de la nature humaine et ils ont peu de rapport avec la science et la technologie.

6. La science et la technologie ne font qu'accentuer les problèmes sociaux. Mais c'est le prix du progrès dans ces domaines.

7. Je ne comprends pas.

8. Je ne m'y connais pas suffisamment sur le sujet pour répondre.

9. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 6 Les meilleurs hommes et femmes scientifiques sont toujours très ouverts d'esprit, logiques, sans préjugés et objectifs dans leur travail. Ces traits de personnalité sont nécessaires pour assurer l'excellence du travail scientifique.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. Les meilleurs scientifiques affichent ces traits de personnalité, autrement la science en souffrirait.
2. Les meilleurs scientifiques affichent ces traits de personnalité parce que, plus on fait preuve de ces traits, meilleur on est en science.
3. Ces traits de personnalité ne suffisent pas. Les meilleurs scientifiques ont aussi besoin d'autres qualités telles l'imagination, l'intelligence et l'honnêteté.

Les meilleurs scientifiques N'AFFICHENT PAS nécessairement ces traits de personnalité :

4. parce que les meilleurs scientifiques, quelquefois, deviennent si profondément engagés, intéressés et connaissants dans leur spécialité qu'ils et elles peuvent se révéler étroits d'esprit, remplis de préjugés, subjectifs et pas toujours logiques dans leur travail.
5. parce que cela dépend des individus. Quelques scientifiques sont toujours ouverts d'esprit, objectifs, etc., dans leur travail; tandis que d'autres peuvent devenir étroits d'esprit, subjectifs, etc., dans leur travail.
6. Les meilleurs scientifiques n'affichent pas plus ces traits de personnalité que la ou le scientifique moyen. Ces traits NE SONT PAS nécessaires pour bien faire.
7. Je ne comprends pas.
8. Je ne connais pas suffisamment le sujet pour effectuer un choix.
9. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 7 Lorsque les scientifiques font de la recherche, on dit qu'ils et elles suivent la méthode scientifique. La méthode scientifique c'est:

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. l'ensemble des méthodes ou des techniques de laboratoire, lesquelles sont écrites la plupart du temps dans un cahier de laboratoire par un ou une scientifique.
2. noter avec soin ses résultats de recherche.
3. contrôler minutieusement les variables en jeu dans une expérience de manière à ne laisser aucune place à l'interprétation.
4. un moyen efficace de rechercher des faits, des théories ou des hypothèses.
5. faire essai sur essai afin de prouver, hors de tout doute, la véracité ou la fausseté d'une chose.
6. imaginer d'abord une théorie et concevoir ensuite une expérience pour la prouver.
7. se questionner, faire des hypothèses, recueillir des données et tirer des conclusions.
8. une méthode logique et très reconnue de résolution de problèmes.
9. une attitude qui sert de guide dans le travail scientifique.
10. Si l'on prend en considération ce que les scientifiques font de nos jours, il n'y a pas à proprement parler de méthode scientifique.
11. Je ne comprends pas.
12. Je ne m'y connais pas suffisamment sur le sujet pour répondre.
13. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 8 Lorsque les scientifiques ne sont pas d'accord sur l'enjeu d'un problème (par exemple, si les radiations de faible intensité sont nocives ou non), leur désaccord tient surtout au fait que les parties en présence ne possèdent pas toutes les données. Cela n'a RIEN à voir avec des valeurs morales (de bien ou de mal) ou encore avec des motifs personnels (se mettre en valeur, plaire aux employeurs, plaire aux agences de financement des recherches).

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Des désaccords entre les scientifiques peuvent se produire:

1. parce que tous les faits ne sont pas encore connus. Une opinion scientifique est entièrement fondée sur des faits observables et sur leur interprétation scientifique.
2. parce que des scientifiques différents ne voient pas les faits de la même façon. Une opinion scientifique est entièrement fondée sur la manière dont un ou une scientifique voit les faits.
3. lorsque des scientifiques interprètent les faits différemment (ou leur accordent une importance différente). Cela découle de l'existence de théories scientifiques différentes et N'EST PAS relié à des motifs personnels ou à des valeurs morales.
4. surtout parce que les faits diffèrent ou sont incomplets, mais aussi en partie parce que les scientifiques ont des opinions personnelles, des valeurs morales ou des motifs personnels qui diffèrent entre eux.
5. pour plusieurs raisons parmi les suivantes: faits manquants, données fausses, théories différentes, opinions personnelles, valeurs morales, renommée, et influence de la part des compagnies ou des gouvernements.
6. lorsque des scientifiques différents interprètent les faits différemment (ou leur accordent une importance différente). Ceci découle principalement de l'existence d'opinions personnelles, de valeurs morales, de priorités personnelles ou d'opinions politiques. (Souvent le désaccord portera sur les avantages et les risques éventuels pour la société.)
7. parce que les scientifiques ont subi l'influence des compagnies privées ou des gouvernements.

8. Je ne comprends pas.
9. Je ne m'y connais pas suffisamment sur le sujet pour répondre.
10. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 9 La technologie peut compter sur son propre ensemble de connaissances. Il y a peu de développements technologiques qui dérivent directement de découvertes effectuées en science.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. La technologie progresse principalement par elle-même. Elle n'a pas nécessairement besoin des découvertes scientifiques.
2. La technologie progresse en s'appuyant à la fois sur son propre ensemble de connaissances et sur les découvertes scientifiques.
3. Les scientifiques et les technologues s'appuient sur le même ensemble de connaissances parce que la science et la technologie sont similaires.

Tout développement technologique s'appuie sur une découverte scientifique:

4. car on trouve toujours un usage pour les découvertes scientifiques, qu'il s'agisse de développements technologiques ou d'autres usages scientifiques.
5. car la science fournit l'information de base et les nouvelles idées pour la technologie.

6. Je ne comprends pas.
7. Je ne connais pas suffisamment le sujet pour effectuer un choix.
8. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 10 Il semble qu'il y ait deux types de personnes, celles qui comprennent les sciences et celles qui comprennent les arts (par exemple, la littérature, l'histoire, les affaires, le droit). Mais si tout le monde étudiait plus de science, alors tout le monde comprendrait les sciences.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. Ces deux types de personnes EXISTENT. Si les personnes qui comprennent les arts étudiaient plus de science, elles en arriveraient à comprendre la science aussi car, plus on étudie un sujet, plus on vient à l'aimer et à le comprendre.

Ces deux types de personnes EXISTENT. Mais si les personnes qui comprennent les arts étudiaient plus de science, elles N'arriveraient PAS nécessairement à mieux la comprendre.

2. car elles n'ont peut-être pas les habiletés ou le talent pour comprendre la science. L'étude de la science ne leur donnerait pas ces habiletés.

3. car elles ne sont peut-être pas intéressées par la science. L'étude de la science ne changera pas leur intérêt pour ce domaine.

4. car elles n'ont pas de penchant pour la science. L'étude de la science ne change pas le type de personne que nous sommes.

5. Il n'y a pas seulement deux types de personnes. Il y en a autant qu'il y a de préférences individuelles, y compris des personnes qui comprennent à la fois les arts et les sciences.

6. Je ne comprends pas.

7. Je ne connais pas suffisamment le sujet pour effectuer un choix.

8. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 11 La politique d'un pays influence les scientifiques de ce pays. Il en est ainsi parce que les scientifiques font partie de la société d'un pays (c'est-à-dire que les scientifiques ne sont pas isolés de la société).

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Les scientifiques SONT influencés par la politique de leur pays :

1. parce que le financement en science provient surtout des gouvernements qui assurent le contrôle des dépenses. Les scientifiques doivent quelquefois exercer des pressions pour obtenir des fonds.

2. parce que les gouvernements établissent leur politique scientifique en donnant de l'argent pour quelques projets de recherche et en refusant cet argent pour d'autres projets.

3. parce que les gouvernements établissent leur politique en fonction des nouveaux développements et des nouveaux projets, qu'ils subventionnent ces développements et ces projets ou non. La politique gouvernementale influence le type de projets sur lesquels les scientifiques travailleront.

4. parce que la politique limite et contrôle les scientifiques en leur disant quelle recherche entreprendre.

5. parce que les gouvernements peuvent obliger les scientifiques à travailler sur un projet avec lequel ils et elles sont en désaccord (par exemple, la recherche sur les armements) et, par conséquent, ils ne permettront pas aux scientifiques de travailler sur des projets bénéfiques pour la société.

6. parce que les scientifiques font partie de la société et sont influencés comme tout le monde.

7. parce que les scientifiques essaient de comprendre et d'aider la société et ainsi, étant donné leur engagement et leur importance dans la société, les scientifiques sont étroitement liés à celle-ci.

8. Cela dépend du pays, de sa stabilité ou de son type de gouvernement.

Les scientifiques NE SONT PAS influencés par la politique de leur pays :

9. parce que la recherche scientifique n'a rien à voir avec la politique.

10. parce que les scientifiques sont isolés de la société.

11. Je ne comprends pas
12. Je ne connais pas suffisamment le sujet pour effectuer un choix.
13. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 12 Des observations scientifiques effectuées par des scientifiques compétents seront habituellement différentes si ces scientifiques croient en des théories différentes.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. Oui, car les scientifiques expérimenteront de manière différente et noteront des choses différentes.
2. Oui, car les scientifiques penseront de manière différente et cela transformera leurs observations.
3. Les observations scientifiques ne différeront pas beaucoup même si les scientifiques croient en des théories différentes. En effet, si les scientifiques sont compétents, leurs observations seront similaires.
4. Non, car les observations sont aussi précises que possible. C'est de cette façon que la science a pu progresser.
5. Non, les observations correspondent exactement à ce que l'on voit, ni plus ni moins; ce sont les faits.
6. Je ne comprends pas.
7. Je ne connais pas suffisamment le sujet pour effectuer un choix.
8. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 13 Les meilleurs hommes et femmes scientifiques ont la patience et la détermination qui leur permettent de passer à travers des moments de frustration et d'ennui (par exemple, répéter la même expérimentation plusieurs fois pour obtenir des résultats fiables).

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. En effet, car les moments de frustration et d'ennui représentent pour les meilleurs scientifiques un stimulant à lutter et à travailler plus fort.
2. En effet, car la patience et la détermination font partie du métier. Sans cela, les scientifiques n'obtiendraient pas des résultats totalement fiables.
3. Non, car même certains des meilleurs scientifiques ne peuvent faire face à la frustration. La patience des scientifiques a des degrés variables, comme celle de tout le monde.
4. Non, car les meilleurs scientifiques ont l'ingéniosité nécessaire pour éviter la plupart des situations frustrantes ou ennuyeuses. La frustration et l'ennui rendent le succès difficile pour quiconque.
5. Je ne comprends pas.
6. Je ne connais pas suffisamment le sujet pour effectuer un choix.
7. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 14 Quand une nouvelle théorie scientifique est proposée, les scientifiques doivent décider si elles et ils l'acceptent ou non. Les scientifiques prennent cette décision en consensus; c'est-à-dire que les défenseurs de la théorie doivent convaincre une forte majorité de leurs collègues scientifiques afin qu'ils et elles croient en la nouvelle théorie.

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Les scientifiques qui défendent une théorie doivent convaincre les autres scientifiques :

1. en leur présentant une preuve décisive qui démontre la véracité de la théorie.
2. parce qu'une théorie est utile en science seulement quand la plupart des scientifiques y croient.
3. parce qu'en discutant la nouvelle théorie avec d'autres chercheurs et chercheuses, les scientifiques repenseront la théorie ou la compléteront. Bref, en établissant un consensus, les scientifiques rendront la théorie plus précise.

Les scientifiques qui défendent une théorie n'ont pas à convaincre les autres scientifiques :

4. parce que ce qui rend la théorie plausible est évident.
5. parce que les scientifiques décident, individuellement, de faire usage ou non de la théorie.
6. parce qu'un ou une scientifique peut appliquer une théorie, individuellement, aussi longtemps que la théorie explique les résultats et qu'elle est utile, peu importe ce à quoi croient les autres scientifiques.

7. Je ne comprends pas.
8. Je ne connais pas suffisamment le sujet pour effectuer un choix.
9. Aucun de ces énoncés ne correspond à mon véritable point de vue.

Q. 15 Les scientifiques sont en compétition pour l'obtention de fo recherche et la primauté des découvertes. Quelquefois, compétition féroce amène des scientifiques à agir en secret, à des idées aux autres scientifiques et à faire des pressions pour obtenir de l'argent. En d'autres mots, les scienti ignorent parfois l'idéal de la science (honnêteté, partag résultats, etc.).

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

Quelquefois les scientifiques ne font plus cas de l'idéal de la science:

1. car c'est la façon d'arriver au succès dans une situation de compétition. situation pousse les scientifiques à travailler avec plus d'ardeur.
2. dans le but d'obtenir des récompenses personnelles et financières. Lors scientifiques sont en compétition pour l'obtention de celles-ci, ils et elle tout ce qui est en leur pouvoir pour parvenir à leurs fins.
3. dans la recherche de la réponse. Pourvu qu'au bout du compte cette répo fonctionnelle, les moyens pour y parvenir importent peu.
4. Cela dépend. La science n'est pas différente des autres professions. Cer certaines ignorent l'idéal de la science pour parvenir à leur but et d'autres
5. La plupart des scientifiques ne sont pas en compétition. En réalité, et c'est assure le succès, ils et elles travaillent en coopération et en se conformant de la science.

6. Je ne comprends pas.
7. Je ne connais pas suffisamment le sujet pour effectuer un choix.
8. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

Q. 16 Il est difficile de définir ce qu'est la science parce qu'il s'agit d'une activité complexe, qui porte sur plusieurs sujets. Mais la science c'est PRINCIPALEMENT:

Choisissez un seul énoncé, celui qui exprime le mieux votre point de vue.

1. une étude des champs de connaissance, tels la biologie, la chimie, la physique.
2. un ensemble de connaissances, tels des principes, des lois et des théories, qui expliquent le monde qui nous entoure (matière, énergie et vie).
3. une exploration de l'inconnu et une découverte de nouvelles choses à propos de notre monde et de l'univers, ainsi que de leur mode de fonctionnement.
4. la réalisation d'expérimentations en vue de résoudre des problèmes qui suscitent de l'intérêt dans le monde qui nous entoure.
5. l'invention et la conception d'objets (par exemple, des coeurs artificiels, des ordinateurs, des véhicules spatiaux).
6. la découverte et l'utilisation du savoir en vue de faire de notre monde un meilleur lieu de vie (par exemple, guérir des maladies, éliminer la pollution et améliorer l'agriculture).
7. une organisation de personnes (appelées scientifiques) qui ont des idées et des techniques pour découvrir de nouvelles connaissances.
8. Personne ne peut vraiment définir la science.
9. Je ne comprends pas.
10. Je ne connais pas suffisamment le sujet pour effectuer un choix.
11. Aucun de ces énoncés ne correspond à l'essentiel de mon point de vue.

	TRÈS BIEN	PLUTÔT BIEN	PLUTÔT MAL	TRÈS MAL
Raisonneur	_____	_____	_____	_____
Rationnel	_____	_____	_____	_____
Réfléchi	_____	_____	_____	_____
Rigide	_____	_____	_____	_____
Sensible	_____	_____	_____	_____
Sérieux	_____	_____	_____	_____
Soucieux	_____	_____	_____	_____
Sûr de soi	_____	_____	_____	_____
Timide	_____	_____	_____	_____
Travailleur	_____	_____	_____	_____

Votre commentaire sur le questionnaire serait apprécié :

- Temps requis pour y répondre: _____
- Avez-vous l'impression que les aspects abordés dans ce questionnaire vous permettent d'exprimer l'essentiel de votre point de vue sur la science, la technologie et le travail scientifique? Sinon, qu'aimeriez-vous y ajouter?

German, P.J. (1988). Development of the attitude toward science in school assessment and its use to investigate the relationship between science achievement and attitude toward science in school. *Journal of Research in science teaching, 25*(8), 689-703.

Appendix: Attitude toward Science in School Assessment

Please use this scale to answer the following questions:

SA — Strongly agree
A — Agree
N — Neither agree nor disagree
D — Disagree
SD — Strongly disagree

(Circle one choice.)

(1)	SA	A	N	D	SD	Science is fun.
(2)	SA	A	N	D	SD	I do not like science and it bothers me to have to study it.
(3)	SA	A	N	D	SD	During science class, I usually am interested.
(4)	SA	A	N	D	SD	I would like to learn more about science.
(5)	SA	A	N	D	SD	If I knew I would never go to science class again, I would feel sad.
(6)	SA	A	N	D	SD	Science is interesting to me and I enjoy it.
(7)	SA	A	N	D	SD	Science makes me feel uncomfortable, restless, irritable, and impatient.
(8)	SA	A	N	D	SD	Science is fascinating and fun.
(9)	SA	A	N	D	SD	The feeling that I have towards science is a good feeling.
(10)	SA	A	N	D	SD	When I hear the word science, I have a feeling of dislike.
(11)	SA	A	N	D	SD	Science is a topic which I enjoy studying.
(12)	SA	A	N	D	SD	I feel at ease with science and I like it very much.
(13)	SA	A	N	D	SD	I feel a definite positive reaction to science.
(14)	SA	A	N	D	SD	Science is boring.

Fraser, B. J. (1981). Tosra: Test of science-related attitudes: Handbook. Australian Council for Educational Research.

TOSRA

TEST OF SCIENCE-RELATED ATTITUDES

Barry J. Fraser

DIRECTIONS

1 This test contains a number of statements about science. You will be asked what you yourself think about these statements. There are no 'right' or 'wrong' answers. Your opinion is what is wanted.

2 All answers should be given on the separate Answer Sheet. Please do not write on this booklet.

3 For each statement, draw a circle around

SA if you **STRONGLY AGREE** with the statement;

A if you **AGREE** with the statement;

N if you are **NOT SURE**;

D if you **DISAGREE** with the statement;

SD if you **STRONGLY DISAGREE** with the statement.

Practice Item

0 It would be interesting to learn about boats.

Suppose that you AGREE with this statement, then you would circle A on your Answer Sheet, like this:

0 SA (A) N D SD

4 If you change your mind about an answer, cross it out and circle another one.

5 Although some statements in this test are fairly similar to other statements, you are asked to indicate your opinion about all statements.

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1 Money spent on science is well worth spending.

2 Scientists usually like to go to their laboratories when they have a day off.

3 I would prefer to find out why something happens by doing an experiment than by being told.

4 I enjoy reading about things which disagree with my previous ideas.

5 Science lessons are fun.

6 I would like to belong to a science club.

7 I would dislike being a scientist after I leave school.

8 Science is man's worst enemy.

9 Scientists are about as fit and healthy as other people.

10 Doing experiments is not as good as finding out information from teachers.

11 I dislike repeating experiments to check that I get the same results.

12 I dislike science lessons.

13 I get bored when watching science programs on TV at home.

14 When I leave school, I would like to work with people who make discoveries in science.

15 Public money spent on science in the last few years has been used wisely.

16 Scientists do not have enough time to spend with their families.

17 I would prefer to do experiments than to read about them.

18 I am curious about the world in which we live.

19 School should have more science lessons each week.

20 I would like to be given a science book or a piece of scientific equipment as a present.

21 I would dislike a job in a science laboratory after I leave school.

22 Scientific discoveries are doing more harm than good.

23 Scientists like sport as much as other people do.

24 I would rather agree with other people than do an experiment to find out for myself.

25 Finding out about new things is unimportant.

26 Science lessons bore me.

27 I dislike reading books about science during my holidays.

28 Working in a science laboratory would be an interesting way to earn a living.

Page 3

29 The government should spend more money on scientific research.

30 Scientists are less friendly than other people.

31 I would prefer to do my own experiments than to find out information from a teacher.

32 I like to listen to people whose opinions are different from mine.

33 Science is one of the most interesting school subjects.

34 I would like to do science experiments at home.

35 A career in science would be dull and boring.

36 Too many laboratories are being built at the expense of the rest of education.

37 Scientists can have a normal family life.

38 I would rather find out about things by asking an expert than by doing an experiment.

39 I find it boring to hear about new ideas.

40 Science lessons are a waste of time.

41 Talking to friends about science after school would be boring.

42 I would like to teach science when I leave school.

43 Science helps to make life better.

44 Scientists do not care about their working conditions.

45 I would rather solve a problem by doing an experiment than be told the answer.

46 In science experiments, I like to use new methods which I have not used before.

47 I really enjoy going to science lessons.

48 I would enjoy having a job in a science laboratory during my school holidays.

49 A job as a scientist would be boring.

Glynn, S. M., Brickman, P., Armstrong, N., & Taasoobshirazi, G. (2011). Science Motivation Questionnaire II: Validation with science majors and nonscience majors. *Journal of Research in Science Teaching, 48*(10), 1159–1176. https://doi.org/10.1002/tea.20442

Science Motivation Questionnaire II © 2011 Shawn M. Glynn

In order to better understand what you think and how you feel about your college [or high school] science courses, please respond to each of the following statements from the perspective of "When I am in a college [or high school] science course…"

[Response Scale: ☐ Never ☐ Rarely ☐ Sometimes ☐ Usually ☐ Always]

01. The science I learn is relevant to my life.
02. I like to do better than other students on science tests.
03. Learning science is interesting.
04. Getting a good science grade is important to me.
05. I put enough effort into learning science.
06. I use strategies to learn science well.
07. Learning science will help me get a good job.
08. It is important that I get an "A" in science.
09. I am confident I will do well on science tests.
10. Knowing science will give me a career advantage.
11. I spend a lot of time learning science.
12. Learning science makes my life more meaningful.
13. Understanding science will benefit me in my career.
14. I am confident I will do well on science labs and projects.
15. I believe I can master science knowledge and skills.
16. I prepare well for science tests and labs.
17. I am curious about discoveries in science.
18. I believe I can earn a grade of "A" in science.
19. I enjoy learning science.
20. I think about the grade I will get in science.
21. I am sure I can understand science.
22. I study hard to learn science.
23. My career will involve science.
24. Scoring high on science tests and labs matters to me.
25. I will use science problem-solving skills in my career.

End. Thank you.

Pintrich, P.R., & De Groot, V. (1990). Motivational and Self-Regulated Learning Components of Classroom Academic Performance. *Journal of Educational Psychology, 82*(1), 35-40.

Motivated Strategies for Learning Questionnaire*

Please rate the following items based on your behavior in this class. Your rating should be on a 7-point scale where **1= not at all true of me** to **7=very true of me**.

1. I prefer class work that is challenging so I can learn new things.
2. Compared with other students in this class I expect to do well
3. I am so nervous during a test that I cannot remember facts I have learned
4. It is important for me to learn what is being taught in this class
5. I like what I am learning in this class
6. I'm certain I can understand the ideas taught in this course
7. I think I will be able to use what I learn in this class in other classes
8. I expect to do very well in this class
9. Compared with others in this class, I think I'm a good student
10. I often choose paper topics I will learn something from even if they require more work
11. I am sure I can do an excellent job on the problems and tasks assigned for this class
12. I have an uneasy, upset feeling when I take a test
13. I think I will receive a good grade in this class
14. Even when I do poorly on a test I try to learn from my mistakes
15. I think that what I am learning in this class is useful for me to know
16. My study skills are excellent compared with others in this class
17. I think that what we are learning in this class is interesting
18. Compared with other students in this class I think I know a great deal about the subject
19. I know that I will be able to learn the material for this class
20. I worry a great deal about tests
21. Understanding this subject is important to me
22. When I take a test I think about how poorly I am doing
23. When I study for a test, I try to put together the information from class and from the book
24. When I do homework, I try to remember what the teacher said in class so I can answer the questions correctly
25. I ask myself questions to make sure I know the material I have been studying
26. It is hard for me to decide what the main ideas are in what I read
27. When work is hard I either give up or study only the easy parts
28. When I study I put important ideas into my own words
29. I always try to understand what the teacher is saying even if it doesn't make sense.
30. When I study for a test I try to remember as many facts as I can
31. When studying, I copy my notes over to help me remember material
32. I work on practice exercises and answer end of chapter questions even when I don't have to
33. Even when study materials are dull and uninteresting, I keep working until I finish
34. When I study for a test I practice saying the important facts over and over to myself
35. Before I begin studying I think about the things I will need to do to learn
36. I use what I have learned from old homework assignments and the textbook to do new assignments
37. I often find that I have been reading for class but don't know what it is all about.
38. I find that when the teacher is talking I think of other things and don't really listen to what is being said
39. When I am studying a topic, I try to make everything fit together
40. When I'm reading I stop once in a while and go over what I have read
41. When I read materials for this class, I say the words over and over to myself to help me remember
42. I outline the chapters in my book to help me study
43. I work hard to get a good grade even when I don't like a class
44. When reading I try to connect the things I am reading about with what I already know.

ATTITUDES EN FORMATION DES ADULTES

Indiquez dans quelle mesure chacun des énoncés suivants correspond actuellement à l'une des raisons pour lesquelles vous suivez cette formation.

Ne correspond pas du tout 1	Correspond très peu 2	Correspond un peu 3	Correspond moyennement 4	Correspond assez 5	Correspond fortement 6	Correspond très fortement 7

POURQUOI SUIVEZ-VOUS À CETTE FORMATION ?

1. Parce qu'elle va me permettre de gagner davantage	1	2	3	4	5	6	7
2. Parce que ce type de formation fait partie intégrante de moi.	1	2	3	4	5	6	7
3. Parce que j'éprouve du plaisir et de la satisfaction à apprendre de nouvelles choses.	1	2	3	4	5	6	7
4. Parce que selon moi elle va m'aider dans la poursuite de ma carrière (ou pour ma future carrière).	1	2	3	4	5	6	7
5. Honnêtement, je ne le sais pas; j'ai vraiment l'impression de perdre mon temps en formation.	1	2	3	4	5	6	7
6. Pour me prouver à moi-même que je suis capable de suivre cette formation.	1	2	3	4	5	6	7
7. Pour pouvoir décrocher un emploi plus important.	1	2	3	4	5	6	7
8. Pour le plaisir que j'ai à découvrir de nouvelles choses jamais vues auparavant.	1	2	3	4	5	6	7
9. Parce qu'éventuellement cela va me permettre de travailler dans un domaine que j'aime.	1	2	3	4	5	6	7
10. J'ai déjà eu de bonnes raisons de suivre cette formation, mais maintenant je me demande si je devrais continuer à y aller.	1	2	3	4	5	6	7
11. Parce que cette formation me ressemble.	1	2	3	4	5	6	7
12. Parce que le fait de réussir cette formation me permet de me sentir important à mes propres yeux.	1	2	3	4	5	6	7
13. Parce que je veux pouvoir faire "la belle vie" plus tard.	1	2	3	4	5	6	7
14. Pour le plaisir d'en savoir plus long sur des sujets qui m'intéressent.	1	2	3	4	5	6	7
15. Parce que cela va m'aider dans le développement de ma carrière professionnelle.	1	2	3	4	5	6	7
16. Je ne parviens pas à voir pourquoi je suis cette formation et franchement je m'en fous pas mal.	1	2	3	4	5	6	7
17. Parce que cette formation est une partie de ce que je suis.	1	2	3	4	5	6	7
18. Pour me prouver que je suis une personne intelligente.	1	2	3	4	5	6	7
19. Pour avoir un meilleur salaire plus tard.	1	2	3	4	5	6	7
20. Parce que cette formation va me permettent de continuer à en apprendre sur une foule de choses qui m'intéressent.	1	2	3	4	5	6	7
21. Parce que je crois que cette formation va augmenter mon potentiel au travail.	1	2	3	4	5	6	7
22. Je ne le sais pas; je ne parviens pas à comprendre pourquoi.	1	2	3	4	5	6	7
23. Parce que je veux me prouver à moi-même que je suis capable de réussir cette formation.	1	2	3	4	5	6	7
24. Parce que cette formation est une expression de moi-même.	1	2	3	4	5	6	7

Fenouillet F., Heutte J., Vallerand R.-J. (2015). Validation of the Adult Education Motivation Scale, Fourth World Congress on Positive Psychology (IPPA), Orlando, FL.

CLÉ DE CODIFICATION

ÉMFA-24

 # 3, 8, 14, 20 Motivation intrinsèque à la connaissance (ÉMFA-MIC)

 # 2, 11, 17, 24 Motivation extrinsèque – Intégrée (ÉMFA-Intég.)

 # 4, 9, 15, 21 Motivation extrinsèque – identifiée (ÉMFA-Ident.)

 # 6, 12, 18, 23 Motivation extrinsèque – introjectée (ÉMFA-Introj.)

 # 1, 7, 13, 19 Motivation extrinsèque - régulation externe (ÉMFA-Ext.)

 # 5, 10, 16, 22 Amotivation (ÉMFA-AM)

FORMULE POUR CALCULER L'INDICE D'AUTODÉTERMINATION DE LA MOTIVATION EN FORMATION DES ADULTES (IAD-ÉMFA)

IAD-ÉMFA = (3 x ÉMFA-MIC) + (2 x ÉMFA-Intég.) + ÉMFA-Ident. - ÉMFA-Introj. - (2 x ÉMFA-Ext.) - (3 x ÉMFA-AM)

IAD-ÉMFA = (3 x score de la sous-échelle "Motivation intrinsèque à la connaissance") + (2 x score de la sous-échelle "Régulation Intégrée de la Motivation extrinsèque") + score de la sous-échelle "Régulation Identifiéede la Motivation extrinsèque" - score de la sous-échelle "Régulation Introjectéede la Motivation extrinsèque" - (2 x score de la sous-échelle "Régulation Externe de la Motivation extrinsèque") - (3 x score de la sous-échelle "Amotivation")

Appendix 1: the SMTSL questionnaire

Directions for students

This questionnaire contains statements about your willingness in participating in this science class. You will be asked to express your agreement on each statement. There are no "right " or "wrong" answers. Your opinion is what is wanted. Think about how well each statement describes your willingness in participating in this class.

Draw a circle around

1. if the statement you strong disagree
2. if the statement you disagree
3. if the statement you have no opinion
4. if the statement you agree
5. if the statement you strong agree

Be sure to give an answer for all questions. If you change your mind about an answer, just cross it out and circle another.

Some statements in this questionnaire are fairly similar to other statements. Don't worry about this. Simply give your opinion about all statements.

Your Name_____; Teacher's Name_____
School_____; Grade_____ ;Male_____ Female_____
Science Class; Biology_____ Physical Science_____

A. Self efficacy	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
1. Whether the science content is difficult or easy, I am sure that I can understand it.	1	2	3	4	5
2. I am not confident about understanding difficult science concepts.(–)	1	2	3	4	5
3. I am sure that I can do well on science tests.	1	2	3	4	5
4. No matter how much effort I put in, I cannot learn science.(–)	1	2	3	4	5
5. When science activities are too difficult, I give up or only do the easy parts.(–)	1	2	3	4	5
6. During science activities, I prefer to ask other people for the answer rather than think for myself. (–)	1	2	3	4	5
7. When I find the science content difficult, I do not try to learn it (–)	1	2	3	4	5

Tuan, H-L., Chin, C-C., & Shieh, S-H. (2005). The development of a questionnaire to measure students'motivation towards science learning. *International Journal of Science Education, 27*(6), 639-654.

B. Active learning strategies	Strong disagree	Disagree	No opinion	Agree	Strong agree
8. When learning new science concepts, I attempt to understand them.	1	2	3	4	5
9. When learning new science concepts, I connect them to my previous experiences.	1	2	3	4	5
10. When I do not understand a science concept, I find relevant resources that will help me.	1	2	3	4	5
11. When I do not understand a science concept, I would discuss with the teacher or other students to clarify my understanding.	1	2	3	4	5
12. During the learning processes, I attempt to make connections between the concepts that I learn.	1	2	3	4	5
13. When I make a mistake, I try to find out why.	1	2	3	4	5
14. When I meet science concepts that I do not understand, I still try to learn them.	1	2	3	4	5
15. When new science concepts that I have learned conflict with my previous understanding, I try to understand why.	1	2	3	4	5

C. Science Learning Value	Strong disagree	Disagree	No opinion	Agree	Strong agree
16. I think that learning science is important because I can use it in my daily life.	1	2	3	4	5
17. I think that learning science is important because it stimulates my thinking.	1	2	3	4	5
18. In science, I think that it is important to learn to solve problems.	1	2	3	4	5
19. In science, I think it is important to participate in inquiry activities.	1	2	3	4	5
20. It is important to have the opportunity to satisfy my own curiosity when learning science.	1	2	3	4	5
D. Performance Goal	**Strong disagree**	**Disagree**	**No opinion**	**Agree**	**Strong agree**
21. I participate in science courses to get a good grade. (–)	1	2	3	4	5
22. I participate in science courses to perform better than other students. (–)	1	2	3	4	5
23. I participate in science courses so that other students think that I'm smart.(–)	1	2	3	4	5
24. I participate in science courses so that the teacher pays attention to me.(–)	1	2	3	4	5
E. Achievement Goal	**Strong disagree**	**Disagree**	**No opinion**	**Agree**	**Strong agree**
25. During a science course, I feel most fulfilled when I attain a good score in a test.	1	2	3	4	5
26. I feel most fulfilled when I feel confident about the content in a science course.	1	2	3	4	5
27. During a science course, I feel most fulfilled when I am able to solve a difficult problem.	1	2	3	4	5
28. During a science course, I feel most fulfilled when the teacher accepts my ideas.	1	2	3	4	5
29. During a science course, I feel most fulfilled when other students accept my ideas.	1	2	3	4	5
F. Learning Environment Stimulation	**Strong disagree**	**Disagree**	**No opinion**	**Agree**	**Strong agree**
30. I am willing to participate in this science course because the content is exciting and changeable.	1	2	3	4	5
31. I am willing to participate in this science course because the teacher uses a variety of teaching methods.	1	2	3	4	5
32. I am willing to participate in this science course because the teacher does not put a lot of pressure on me.	1	2	3	4	5
33. I am willing to participate in this science course because the teacher pays attention to me.	1	2	3	4	5
34. I am willing to participate in this science course because it is challenging.	1	2	3	4	5
35. I am willing to participate in this science course because the students are involved in discussions.	1	2	3	4	5

Note: (–) represent reverse items.

ÉCHELLE DE MOTIVATION DANS LES ÉTUDES (ÉMÉ-U 28)

ÉTUDES UNIVERSITAIRES

Adaptée de l'ÉMÉ-C 28 - Études collégiales (CEGEP)

Robert J. Vallerand, Marc R. Blais, Nathalie M. Brière, Luc G. Pelletier, 1989

Revue canadienne des Sciences du comportement 21(3)

ATTITUDES FACE À VOS ÉTUDES UNIVERSITAIRES

Veuillez indiquer dans quelle mesure chacun des énoncés suivants correspond actuellement à l'une des raisons pour lesquelles vous allez à l'université.

Ne correspond pas du tout 1	Correspond très peu 2	Correspond un peu 3	Correspond moyennement 4	Correspond assez 5	Correspond fortement 6	Correspond très fortement 7

POURQUOI ALLEZ-VOUS A L'UNIVERSITE ?

1. Parce que juste avec un diplôme d'études collégiales je ne pourrais pas me trouver un emploi assez payant.	1	2	3	4	5	6	7
2. Parce que j'éprouve du plaisir et de la satisfaction à apprendre de nouvelles choses.	1	2	3	4	5	6	7
3. Parce que selon moi des études universitaires vont m'aider à mieux me préparer à la carrière que j'ai choisie.	1	2	3	4	5	6	7
4. Pour les moments intenses que je vis lorsque je suis en train de communiquer mes propres idées aux autres.	1	2	3	4	5	6	7
5. Honnêtement , je ne le sais pas; j'ai vraiment l'impression de perdre mon temps à l'université.	1	2	3	4	5	6	7
6. Pour le plaisir que je ressens à me surpasser dans mes études.	1	2	3	4	5	6	7
7. Pour me prouver à moi-même que je suis capable de faire mieux que juste un D.E.C. (diplôme d'étude collégiale).	1	2	3	4	5	6	7
8. Pour pouvoir décrocher un emploi plus prestigieux plus tard.	1	2	3	4	5	6	7
9. Pour le plaisir que j'ai à découvrir de nouvelles choses jamais vues auparavant.	1	2	3	4	5	6	7
10. Parce qu'éventuellement cela va me permettre d'aller sur le marché du travail dans un domaine que j'aime.	1	2	3	4	5	6	7
11. Pour le plaisir que je ressens à lire des auteurs intéressants.	1	2	3	4	5	6	7
12. J'ai déjà eu de bonnes raisons pour aller à l'université, mais maintenant je me demande si je devrais continuer à y aller.	1	2	3	4	5	6	7
13. Pour le plaisir que je ressens lorsque je suis en train de me surpasser dans une de mes réalisations personnelles.	1	2	3	4	5	6	7
14. Parce que le fait de réussir à l'université me permet de me sentir important à mes propres yeux.	1	2	3	4	5	6	7
15. Parce que je veux pouvoir faire "la belle vie" plus tard.	1	2	3	4	5	6	7
16. Pour le plaisir d'en savoir plus long sur les matières qui m'attirent.	1	2	3	4	5	6	7
17. Parce que cela va m'aider à mieux choisir mon orientation de carrière.	1	2	3	4	5	6	7
18. Pour le plaisir que je ressens à me sentir complètement absorbé-e par ce que certains auteurs ont écrit.	1	2	3	4	5	6	7
19. Je ne parviens pas à voir pourquoi je vais à l'université et franchement je m'en fous pas mal.	1	2	3	4	5	6	7
20. Pour la satisfaction que je vis lorsque je suis en train de réussir des activités scolaires difficiles.	1	2	3	4	5	6	7
21. Pour me prouver que je suis une personne intelligente.	1	2	3	4	5	6	7
22. Pour avoir un meilleur salaire plus tard.	1	2	3	4	5	6	7
23. Parce que mes études me permettent de continuer à en apprendre sur une foule de choses qui m'intéressent.	1	2	3	4	5	6	7
24. Parce que je crois que quelques années d'études supplémentaires vont augmenter ma compétence comme travailleur-se.	1	2	3	4	5	6	7
25. Parce que j'aime "tripper" en lisant sur différents sujets intéressants.	1	2	3	4	5	6	7
26. Je ne le sais pas; je ne parviens pas à comprendre ce que je fais à l'université.	1	2	3	4	5	6	7
27. Parce que l'université me permet de vivre de la satisfaction personnelle dans ma recherche de l'excellence dans mes études.	1	2	3	4	5	6	7
28. Parce que je veux me prouver à moi-même que je suis capable de réussir dans les études.	1	2	3	4	5	6	7

Vallerand, R.J., Blais, M.R., Brière, N.M., & Pelletier, L.G. (1989). Construction et validation de l'Échelle de Motivation en Éducation(EME). *Revue canadienne des sciences du comportement*, 21, 323-349.

Applied Learning Student Questionnaire (ALSQ): Technical Document

Introduction: The following survey asks about your attitudes and opinions. Some of the items in this survey use the word STEM. STEM means Science, Technology, Engineering, and Math. We want to find out about your experience in this program.

We are interested in comparing your attitudes at the beginning of this program to your attitudes now. Please take a few moments to think back on how you felt at the beginning of this program compared to how you feel now. For each item, please bubble in the number that most closely matches your agreement or disagreement both in the left column (Before) AND in the right column (Now).

PRE/POST (retrospective)	
CONSTRUCT	*ITEMS*
1. Motivation- Intrinsic Value PRE/POST	1. I prefer class work that is challenging so I can learn new things. 2. It is important to me to learn what is being taught in this program. 3. I like what I am learning in this program. 4. I think I will be able to use what I learn in this program in other classes. 5. Even when I do poorly on a test I try to learn from my mistakes. 6. I think that what I am learning in this program is useful for me to know. 7. I think that what we are learning in this program is interesting. 8. Understanding this subject is important to me. 9. I enjoy Science, Technology, Engineering, or Math (STEM) in general.
2. Self-Management/Self-Regulation PRE/POST[1]	10. I turn all my assignments in on time. 11. I miss class often. (n) 12. I am often late for class. (n) 13. I set aside time to do my homework and study. 14. When I promise to help with a project, I follow through. 15. I am a hard worker. 16. I finish whatever I begin.
3. Intent to Persist PRE/POST	17. I am considering a career in Science, Technology, Engineering, or Math (STEM). 18. I intend to get a college degree in a Science, Technology, Engineering, or Math (STEM). 19. I can see myself working as a STEM professional. 20. Someday, I would like to have a career in STEM. 21. I intend to graduate from high school.

Note. (n)=negatively worded items. All items will be assessed on a 5-point likert scale (1, strongly disagree; 3, neither agree nor disagree; 5, strongly agree)

Instructions for Post only items: Please think about the activities and projects that you did in this class. For each item, please bubble in the number that most closely matches your agreement or disagreement now. For these items we are only interested in your thoughts and opinions now.

POST ONLY	
CONSTRUCT	*ITEMs*
4. Problem Solving POST ONLY	22. (In this program, my teacher(s)…)Tells me how to improve my work. 23. (In this program, my teacher(s)…))Lets us choose our own topics or projects to investigate. 24. (In this program…)I work out explanations on my own. 25. (In this program …)I have opportunities to explain my ideas. 26. (In this program …) We plan and do our own projects and/or experiments. 27. (In this program …) We work on real-world problems. *(added)* 28. (In this program …) We have class discussions. 29. (In this program …) We investigate to see if our ideas are right. 30. (In this program …) We need to be able to think and ask questions. 31. (In this program …) We are expected to understand and explain ideas.
5. Implementation Activities POST ONLY	32. (In this program, my teacher(s) Takes notice of students' ideas. 33. (In this program, my teacher(s) Shows us how new information relates to what we have already learned. 34. (In this program …) We learn what scientists/mathematicians/other STEM professionals do. 35. (In this program …) We do our work in groups. 36. (In this program …) We interact with scientists/technicians/engineers/mathematicians or other STEM professionals.

Note. (n)=negatively worded items. All items will be assessed on a 5-point likert scale (1, strongly disagree; 3, neither agree nor disagree; 5, strongly agree)

Reeve, J.(2013). How Students Create Motivationally Supportive Learning Environments Themselves: The Concept of Agentic Engagement. *Journal of Educational Psychology*, *105*(3), 323-349.

Behavioral Engagement items
- When I'm in this class, I listen very carefully.
- I pay attention in this class.
- I try hard to do well in this class.
- In this class, I work as hard as I can.
- When I'm in this class, I participate in class discussions.

Agentic Engagement (candidate) items
- I let my teacher know what I need and want.
- I let my teacher know what I am interested in.
- During this class, I express my preferences and opinions.
- During class, I ask questions to help me learn.
- When I need something in this class, I'll ask the teacher for it.
- I adjust whatever we are learning so I can learn as much as possible.
- I try to make whatever we are learning as interesting as possible.

Cognitive Engagement items
- When I study for this class, I try to connect what I am learning with my own experiences.
- I try to make all the different ideas fit together and make sense when I study for this class.
- When doing work for this class, I try to relate what I'm learning to what I already know.
- I make up my own examples to help me understand the important concept I study for this class.

Emotional Engagement items
- When we work on something in this class, I feel interested.
- This class is fun.
- I enjoy learning new things in this class.
- When I'm in this class, I feel good.
- When we work on something in this class, I get involved.

THE STUDENT COURSE ENGAGEMENT QUESTIONNAIRE

"To what extent do the following behaviors, thoughts, and feelings describe you, in this course. Please rate each of them on the following scale: 1 = *not at all characteristic of me*, 2 = *not really characteristic of me*, 3 = *moderately characteristic of me*, 4 = *characteristic of me*, 5 = *very characteristic of me*."

Making sure to study on a regular basis
Putting forth effort
Doing all the homework problems
Staying up on the readings
Looking over class notes between classes to make sure I understand the material
Being organized
Taking good notes in class
Listening carefully in class
Coming to class every day
Finding ways to make the course material relevant to my life
Applying course material to my life
Finding ways to make the course interesting to me
Thinking about the course between class meetings

Really desiring to learn the material
Raising my hand in class
Asking questions when I don't understand the instructor
Having fun in class
Participating actively in small-group discussions
Going to the professor's office hours to review assignments or tests or to ask questions
Helping fellow students
Getting a good grade
Doing well on the tests
Being confident that I can learn and do well in the class

Handelsman, M.M., Briggs, W.L., Sullivan, N., & Towler, A. (2014). A measure of College Student Course Engagement. *Journal of Educational Research*, *98*(3), 184-192.

Miller, R.B., Greene, B.A., Montalvo, G.P., Ravindran, B., & Nichols, J.D. (1996). Engagement in Academic Work: The Role of Learning Goals, Future Consequences, Pleasing Others, and Perceived Ability. *Contemporary educational Psychology, 21*(28), 388-422.

TABLE 2
ITEMS AND CRONBACH α RELIABILITIES FOR THE COGNITIVE ENGAGEMENT SUBSCALES USED IN STUDIES 1 AND 2

Subscale
Self-regulation subscale (α = .80/.78)
Before a quiz or exam, I plan out how I will study the material.
It is easy for me to establish goals for learning in this class.
When I study I take note of the material I have or have not mastered.
I organize my study time well for this class.
I have a clear idea of what I am trying to accomplish in this class.
When I read a problem, I make sure I know what I am asked to do before I begin.
When I finish working a problem I check my answer to see if it is reasonable.
I try to organize an approach in my mind before I actually start problems.
When I finished working on practice problems I check my work for errors.
Deep strategy use subscale (α = .63/.69)
When studying, I try to combine different pieces of information from course material in new ways.
I draw pictures or diagrams to help me solve some problems.
I work several examples of the same type of problem when studying mathematics so I can understand the problems better.
I work practice problems to check my understanding of new concepts or rules.
I examine example problems that have already been worked to help me figure out how to do similar problems on my own.
I classify problems into categories before I begin to work them.
When I work a problem, I analyze it to see if there is more than one way to get the right answer.
Shallow processing strategy use subscale (α = .65/.73)
I try to memorize the steps for solving problems presented in the text or in class.
When I study for tests I review my class notes and look at solved problems.
When I study for tests I use solved problems in my notes or in the book to help me memorize the steps involved.
I find reviewing previously solved problems to be a good way to study for a test.
Persistence subscale: (α = .75/.81)
If I have trouble understanding a problem, I go over it again until I understand it.
I try to complete homework assignments as fast as possible without checking my accuracy. (R)
If I have trouble solving a problem, I'm more likely to guess at the answer than to look at examples in the book to try to figure things out. (R)
If I have trouble solving a homework problem in the book, I copy down the answer in the back of the book if it is available. (R)
If I have trouble solving a problem, I'll try to get someone else to solve it for me. (R)
When I read something in the book that doesn't make sense, I skip it and hope that the teacher explains it in class. (R)
When I run into a difficult homework problem, I keep working at it until I think I've solved it.
When I run into a difficult homework problem, I usually give up and go on to the next problem. (R)

Note. (R) indicates reverse scoring of the item.

TABLE 1

ITEMS, FACTOR LOADINGS, AND CRONBACH α RELIABILITIES FOR THE GOAL AND PERCEIVED ABILITY SUBSCALES USED IN STUDIES 1 AND 2

Subscales	Factor loading
Learning goal (α = .80/.82)	
. . . I like to understand really complicated ideas.	(.77)
. . . I like to work hard to solve challenging problems.	(.66)
. . . I like learning interesting things.	(.56)
. . . I like to understand the material I study.	(.48)
Future consequences (α = .69/.65)	
. . . good grades lead to other things that I want (e.g., money, graduation, college acceptance or scholarships, eligibility for extracurricular activities).	(.65)
. . . my grades have a personal payoff for me (e.g., rewards from my family, graduation, scholarships, college acceptance).	(.63)
. . . I get some reward or recognition for doing well.	(.30)
. . . if I do well I get praise or rewards from other people.	(.25)
Performance goals (α = .87/.86)	
. . . I want look smart to my friends.	(.81)
. . . I don't want others to think I'm not smart.	(.69)
. . . I can show people that I am smart.	(.63)
. . . I like to do better than other students.	(.61)
. . . I don't want to be the only one who cannot do the work well.	(.58)
. . . I don't want to look foolish or stupid to my friends, family, or teachers.	(.57)
. . . I like to score higher than other students.	(.54)
. . . I don't want to be embarrassed about not being able to do the work.	(.49)
Pleasing the teacher (α = .68/.70)	
. . . that is what the teacher asked me to do.	(.60)
. . . that is what school is all about.	(.50)
. . . I don't want my teacher to be unhappy with what I've done.	(.47)
. . . I want the teacher to think I am a good student.	(.43)
. . . that is what I'm supposed to do.	(.40)
Pleasing the family (α = .75/.76)	
. . . that is what my family expected me to do.	(.72)
. . . I want my family to think I am a good student.	(.64)
. . . I don't want to make my family unhappy.	(.59)
Perceived ability subscale (α = .93/.93)	
I have a good understanding of the mathematical concepts I've been taught.	(.75)
I am confident I have the ability to understand the ideas taught in this course.	(.72)
I am certain I understand the math presented in this class.	(.80)
I am confident about my ability to do the mathematical computations in this class.	(.71)
Compared with other students in this class my skills are weak. (R)	(.73)
I think I am doing better than other students in this class.	(.74)
Relative to others in this class, I think I am good at mathematics.	(.83)
I am confident I can perform as well or better than others in this class.	(.78)

Note. Each goal item was prefaced with the phrase "I do the work assigned in this class because. . ." (R) indicates reverse scoring of the item.

PES = public engagement with science

1- strongly disagree, 2- moderately disagree, 3- mildly disagree, 4- mildly agree, 5- moderately agree, 6- strongly agree

1. I am good at listening to participants during PES activities.
2. I am good at leaving time for discussion during PES activities.
3. I find it difficult to remove scientific jargon when talking with non-scientists.*
4. I am able to create props/activities/demonstrations that participants find engaging.
5. I have a hard time finding PES topics that people connect with.*
6. I am good at helping people think about the ways that science applies to them.
7. I find it difficult to leave time for people to share their perspectives during PES activities.*
8. I have a hard time finding the right words to convey my message during PES activities.*
9. I am good at thinking together with PES attendees about science topics.
10. I am good at knowing when to inform and when to listen during my PES activities.
11. I have a hard time communicating about scientific results with non-scientists.*
12. I am able to figure out how to improve PES activities based on the kinds of questions the public asks.
13. am able to engage in critical discussion about science topics with non-scientists.
14. am able to moderate discussions with participants, even when they include a wide range of perspectives.
15. am good at reading the audience during PES activities, and making adjustments as needed.
16. I am good at finding ways to approach difficult topics.
17. I have a hard time answering questions from non-scientists in ways they understand.*
18. I am able to moderate discussions that allow participants to engage with me and with each other.
19. I am able to explain a scientific idea in many different ways.

*These items are negatively worded, therefore lower scores indicate higher self-efficacy.

Robertson Evia, J., Peterman, K., Cloyd, E., & Besley, J. (2017). Validating a scale that measures scientists' self-efficacy for public engagement with science, *International Journal of Science Education, Part B*.

Chen, G., Gully, S.M., & Eden, D. (2001). Validation of a New General Self-Efficacy. *Organizational Research Methods, 4*(1), 62-83.

APPENDIX
New General Self-Efficacy Scale

1. I will be able to achieve most of the goals that I have set for myself.
2. When facing difficult tasks, I am certain that I will accomplish them.
3. In general, I think that I can obtain outcomes that are important to me.
4. I believe I can succeed at most any endeavor to which I set my mind.
5. I will be able to successfully overcome many challenges.
6. I am confident that I can perform effectively on many different tasks.
7. Compared to other people, I can do most tasks very well.
8. Even when things are tough, I can perform quite well.

Vera et al. (2011). Self-Efficacy among university faculty: how to develop an adjusted scale. *Anales de Psicologia, 27*(3), 800-807.

Appendix

With regard to the TEACHING I undertake at University, I can:

1. Determine contents of academic training even when I must decide from among a considerable number those which are fundamental and those that are additional.
2. Transmit knowledge even when material means are not sufficiently appropriate.
3. Communicate with students even when the characteristics of the group of students are not favourable.
4. Assess the students' learning even when it is difficult to appreciate all its aspects (e.g. competences).

With regard to the scientific RESEARCH I undertake at University, I can:

5. Update the main research results even when there are a considerable number.
6. Update the use of research methodologies from my own speciality even when it is difficult to me to gain access to them.
7. Research with high scientific quality.
8. Collaborate with teams inside and outside the university even when access to other research groups is difficult.
9. Train new researchers even when the economic means are insufficient.
10. Prepare research projects to diffuse the research results even when I am not a member of top research groups.

With regard to the MANAGEMENT I undertake at University, I can:

11. Carry out tasks inherent to the academic management of my subject or subjects even when the system is excessively bureaucratic.
12. Carry out tasks inherent to the management of research projects which I participate in even when the regulating conditions change.
13. Carry out tasks inherent to the administrative management of the present situation even when I depend on the work of others to complete them.

Answer scale:

0	Not at all
1	Hardly
2	Very slightly
3	Slightly
4	Somewhat
5	Sufficiently
6	Fairly
7	Considerably
8	Most considerably
9	Absolutely

Table 4 The construct validities and reliabilities of the faculty teaching efficacy questionnaire

Factor	Item	λ	%	α
CD	Have sufficient professional ability to teach the courses I am teaching	.78	14	.91
	Establish comprehensive teaching objectives	.79		
	Select appropriate teaching material	.81		
	Arrange appropriate timeline for the curricular progress	.79		
	Prepare my teaching material before class sessions	.74		
IS	Teach according to students' various levels of readiness	.65	14	.88
	Utilize effective teaching methods to improve students' grades	.66		
	Modify my teaching activities during class sessions in order to sustain students' attention	.77		
	Have confidence in inspiring and maintaining students' learning motivation	.80		
	Utilize various inquiring skills to stimulate students' higher level thinking skills and discussions	.68		
TU	Know how to utilize technology to enhance my teaching	.58	12	.93
	Select appropriate teaching media to enhance my teaching	.60		
	Know how to produce relevant teaching media	.81		
	Employ software relevant to my teaching	.73		
	Operate various types of teaching apparatuses such as overhead projectors and experimental equipments	.81		
CM	Promote a democratic environment in class	.80	14	.90
	Nurture a pleasant learning environment	.79		
	Maintain a good relationship with my students	.87		
	Share my personal experiences with students in order to promote emotional bonding between the students and myself	.88		
	Listen to my students in order to understand their thoughts	.81		
IR	Provide assistance to students whenever they encounter difficulties in learning	.79	9	.86
	Co-assess learning results with my students and advise them on improvement	.78		
	Provide appropriate assistance to my students if they are incapable of completing the assignments	.75		
LA	Utilize a variety of assessment methods to evaluate students' learning results	.69	11	.87
	Believe the assessment methods I use agree with my teaching objectives	.75		
	Provide students the opportunities for exercise in order to refine the concept they have learned	.65		
	Assess students' performance with positive methods	.65		
	Improve my teaching according to assessment results	.62		
Total			74	.95

CD Course design, *IS* Instructional strategy, *TU* Technology usage, *CM* Classroom management, *IR* Interpersonal relation, *LA* Learning assessment

Chang et al. (2010). Faculty perceptions of teaching support and teaching efficacy in Taiwan. *Higher Education, 59*(2), 207-220.

Le sentiment d'efficacité

Hasni, A., & Potvin, P. (2015). Enquête sur l'intérêt des jeunes à l'égard des sciences et de la technologie (S&T).

Comparé à mes amis, je considère que je suis…	Très faible à l'école	Faible à l'école	Plus ou moins faible à l'école	Plus ou moins bon à l'école	Bon à l'école	Très bon à l'école
	☐	☐	☐	☐	☐	☐
Comparé à tous les autres élèves, je considère que je suis…	Très faible en S&T	Faible en S&T	Plus ou moins faible en S&T	Plus ou moins bon en S&T	Bon en S&T	Très bon en S&T
	☐	☐	☐	☐	☐	☐
Pour les notes que j'obtiens en S&T, je suis…	Très insatisfait	Moyennement insatisfait	Un peu insatisfait	Un peu satisfait	Moyennement satisfait	Fortement satisfait
	☐	☐	☐	☐	☐	☐
Comparé à mes amis, je comprends les S&T…	Très difficilement	Difficilement	Plus ou moins difficilement	Plus ou moins facilement	Facilement	Très facilement
	☐	☐	☐	☐	☐	☐
Lorsque je ne comprends pas en S&T, je trouve toujours des moyens pour arriver à comprendre	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Lorsque je ne comprends pas en S&T, je me décourage facilement	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Les notes que je reçois en S&T me découragent	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐

Les études et les métiers associés aux Sciences et Technologie

Connaissance des métiers et des études en Sciences et Technologie

Je considère que je connais très bien les études qu'il me sera possible de faire dans l'avenir	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Je considère que je connais très bien les métiers qu'on peut faire après les études	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Je considère que je connais très bien les métiers qu'on peut faire si on fait des études en S&T	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐

La perception de l'intérêt des métiers en Sciences et Technologie

Selon moi, les gens qui pratiquent des métiers en S&T sont mieux payés que ceux qui pratiquent d'autres métiers	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Selon moi, faire des études qui mènent à un métier en S&T doit être très stimulant	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Selon moi, les gens qui pratiquent les métiers en S&T ont une vie intéressante	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
Je pense qu'il est important d'avoir une formation en S&T pour avoir un bon travail	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐

Hasni, A., & Potvin, P. (2015). Enquête sur l'intérêt des jeunes à l'égard des sciences et de la technologie (S&T).

Hasni, A., & Potvin, P. (2015). Enquête sur l'intérêt des jeunes à l'égard des sciences et de la technologie (S&T).

L'accessibilité des études et des métiers en Sciences et Technologie

	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
Selon moi, il faut avoir un talent naturel pour faire des études qui conduisent à un métier en S&T	☐	☐	☐	☐	☐	☐
Selon moi, n'importe qui pourrait faire et réussir des études en S&T	☐	☐	☐	☐	☐	☐
Selon moi, faire des études qui mènent à un métier en S&T est très difficile	☐	☐	☐	☐	☐	☐

L'intention de poursuivre des études ou de faire un métier en Sciences et Technologie

	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
J'ai l'intention d'en apprendre davantage sur les métiers en S&T	☐	☐	☐	☐	☐	☐
Je n'ai pas envie qu'on m'informe davantage sur les métiers en S&T	☐	☐	☐	☐	☐	☐
J'ai l'intention de faire des études en S&T	☐	☐	☐	☐	☐	☐
Il est hors de question que je poursuive des études en S&T	☐	☐	☐	☐	☐	☐
J'ai l'intention de pratiquer un métier en S&T plus tard	☐	☐	☐	☐	☐	☐
Il est hors de question que je pratique un métier en S&T plus tard	☐	☐	☐	☐	☐	☐

La préférence pour les méthodes d'enseignement courantes

Hasni, A., & Potvin, P. (2015). Enquête sur l'intérêt des jeunes à l'égard des sciences et de la technologie (S&T).

Les méthodes d'enseignement basées sur l'investigation ouverte et le recours aux ressources externes

En S&T, j'aimerais qu'on passe plus de temps à faire des observations, des manipulations et des expériences	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais qu'on passe plus de temps à faire des projets	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais qu'on fasse plus de sorties (musées, parcs, etc.)	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais que des personnes invitées viennent plus souvent nous parler des S&T et des métiers	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais que nous visionnions plus souvent des documentaires	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐

Les méthodes d'enseignement qualifiées de traditionnelles

En S&T, j'aimerais qu'on passe plus de temps à écouter l'enseignant qui explique en avant	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais qu'on passe plus de temps à consulter des manuels ou les sites Internet	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais qu'on passe plus de temps à faire des exercices sur des feuilles à remplir ou dans un cahier	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐
En S&T, j'aimerais que nous fassions plus souvent des calculs mathématiques	Fortement en désaccord	Moyennement en désaccord	Un peu en désaccord	Un peu en accord	Moyennement en accord	Fortement en accord
	☐	☐	☐	☐	☐	☐

Échelle de sentiment d'efficacité personnelle des enseignants (ESEPE)

Ce questionnaire est conçu pour aider à mieux comprendre les facteurs qui créent des difficultés aux (futurs) enseignants dans leurs activités scolaires. Lisez attentivement chaque phrase et répondez sur l'échelle située en face en entourant un nombre correspondant le mieux à ce que vous pensez. 1 = pas du tout d'accord à 9 = tout à fait d'accord.

pas du tout d'accord		pas d'accord		Neutre		d'accord		tout à fait d'accord
1	2	3	4	5	6	7	8	9

[strongly disagree] <----------> [totally agree]

J'estime pouvoir mobiliser les ressources …

01	… pour faire face aux élèves les plus difficiles.	1	2	3	4	5	6	7	8	9
02	… pour aider mes élèves à penser de façon critique.	1	2	3	4	5	6	7	8	9
03	… pour contrôler les comportements perturbateurs en classe.	1	2	3	4	5	6	7	8	9
04	… pour motiver les élèves qui montrent peu d'intérêt pour le travail scolaire.	1	2	3	4	5	6	7	8	9
05	… pour rendre claires mes attentes vis-à-vis du comportement des élèves.	1	2	3	4	5	6	7	8	9
06	… pour faire comprendre aux élèves qu'ils peuvent bien s'en sortir à l'école.	1	2	3	4	5	6	7	8	9
07	… pour répondre aux questions difficiles de mes élèves.	1	2	3	4	5	6	7	8	9
08	… pour établir des routines pour assurer le bon déroulement de mes activités.	1	2	3	4	5	6	7	8	9
09	… pour aider mes élèves à valoriser leur apprentissage.	1	2	3	4	5	6	7	8	9
10	… pour mesurer le niveau de compréhension des élèves par rapport à l'enseignement que j'ai dispensé.	1	2	3	4	5	6	7	8	9
11	… pour concevoir de bonnes questions pour mes élèves.	1	2	3	4	5	6	7	8	9
12	… pour favoriser la créativité de mes élèves.	1	2	3	4	5	6	7	8	9
13	… pour faire en sorte que les élèves respectent les règles de vie/travail de la classe.	1	2	3	4	5	6	7	8	9
14	… pour améliorer la compréhension d'un élève en situation d'échec.	1	2	3	4	5	6	7	8	9
15	… pour calmer un élève perturbateur ou bruyant.	1	2	3	4	5	6	7	8	9
16	… pour établir un mode de gestion de la classe efficace avec chaque groupe-classe auquel j'enseigne.	1	2	3	4	5	6	7	8	9
17	… pour ajuster mes leçons au niveau des élèves.	1	2	3	4	5	6	7	8	9
18	… pour utiliser des stratégies d'évaluation variées.	1	2	3	4	5	6	7	8	9
19	… pour éviter qu'un petit nombre d'élèves ne perturbe l'entièreté d'une leçon.	1	2	3	4	5	6	7	8	9
20	… pour proposer une explication alternative quand les élèves sont un peu perdus.	1	2	3	4	5	6	7	8	9
21	… pour répondre aux élèves qui me « testent ».	1	2	3	4	5	6	7	8	9
22	… pour assister les familles afin qu'elles aident leur enfant à bien s'en sortir à l'école.	1	2	3	4	5	6	7	8	9
23	… pour mettre en œuvre des stratégies alternatives dans mes classes.	1	2	3	4	5	6	7	8	9
24	… pour proposer des défis appropriés aux élèves particulièrement compétents/avancés	1	2	3	4	5	6	7	8	9

De Stercke, J., Temperman, G., De Lièvre, B., & Lacocque, J. (2014). *Echelle de sentiment d'efficacité personnelle des enseignants : traduction francophone de la Teachers' Sense of Efficacy Scale*. Service de Pédagogie Générale et des Médias Educatifs, Université de Mons.

Codification :

SEP dans l'engagement des élèves (des apprenants) : items 1, 2, 4, 6, 9, 12, 14, 22
SEP dans les stratégies d'enseignement (de formation) : items 7, 10, 11, 17, 18, 20, 23, 24
SEP dans la gestion de classe (du groupe d'apprenant) : items 3, 5, 8, 13, 15, 16, 19, 21

Le scoring des sous-échelles s'effectue à l'aide de moyennes non pondérées. Une moyenne est calculée par sous-échelle (soit trois moyennes, chacune de 8 items), et une autre renvoie au score global (moyenne des 24 items de l'échelle).

Échelle d'auto efficacité personnelle au travail

(SEP T, Follenfant & Meyer, 2003, adaptation de Schwarzer & Jerusalem, 1995)

Lisez attentivement chaque phrase et répondez sur l'échelle située en face en entourant un nombre correspondant le mieux à ce que vous pensez. 1 = pas du tout d'accord à 7 = tout à fait d'accord.

pas du tout d'accord	très peu d'accord	un peu d'accord	moyennement d'accord	assez d'accord	fortement d'accord	tout à fait d'accord
1	2	3	4	5	6	7

[strongly disagree] <----------[totally agree]

SEP-01	01	Dans mon travail, je parviens toujours à résoudre les problèmes difficiles si je m'en donne la peine.	1 2 3 4 5 6 7
SEP-02	02	Si quelqu'un me fait obstacle dans le cadre de mon travail, je peux trouver un moyen pour obtenir ce que je veux.	1 2 3 4 5 6 7
SEP-03	03	Il est facile pour moi de maintenir mes intentions et d'accomplir mes objectifs professionnels.	1 2 3 4 5 6 7
SEP-04	04	Dans le cadre de mon travail, j'ai confiance en moi pour faire face efficacement aux évènements inattendus.	1 2 3 4 5 6 7
SEP-05	05	Grâce à mes compétences, je sais gérer des situations professionnelles inattendues.	1 2 3 4 5 6 7
SEP-06	06	Je peux résoudre la plupart de mes problèmes professionnels si je fais les efforts nécessaires.	1 2 3 4 5 6 7
SEP-07	07	Je reste calme lorsque je suis confronté·e à des difficultés professionnelles, car je peux me reposer sur ma capacité à maitriser les problèmes.	1 2 3 4 5 6 7
SEP-08	08	Lorsque je suis confronté·e à un problème dans mon travail, je peux habituellement trouver plusieurs idées pour le résoudre.	1 2 3 4 5 6 7
SEP-09	09	Si j'ai un problème professionnel, je sais toujours quoi faire.	1 2 3 4 5 6 7
SEP-10	10	Quoiqu'il arrive au travail, je sais généralement faire face.	1 2 3 4 5 6 7

Codification :
Faire la moyenne des items puisqu'il n'y a qu'une dimension.

Follenfant, A., & Meyer, T. (2003). Pratiques déclarées, sentiment d'avoir appris et auto-efficacité au travail. Résultats de l'enquête quantitative par questionnaires. Dans Carré, P., & Charbonnier, O., (Éd.), *Les apprentissages professionnels informels* (pp. 185-246). Paris : L'Harmattant.

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio*. Causal and control beliefs (pp. 35-37). Windsor, UK: NFERNELSON

Échelle de Motivation en Formation des adultes (EMFA-24)

Consigne : Indiquez dans quelle mesure chacun des énoncés suivants correspond actuellement à l'une des raisons pour lesquelles vous suivez des formations.

Mesure : Échelle de Likert en cinq points (1 : Pas du tout d'accord, 2 : Pas vraiment d'accord, 3 : Moyennement d'accord, 4 : Plutôt d'accord, 5 : Tout à fait d'accord)

Fenouillet, F., Heutte, J., & Vallerand, R. (2015). *Validation of the Adult Education Motivation Scale,* Fourth World Congress on Positive Psychology (IPPA), Orlando, Floride, USA.

1) Parce qu'elle va me permettre de gagner davantage.
2) Parce que ce type de formation fait partie intégrante de moi.
3) Parce que j'éprouve du plaisir et de la satisfaction à apprendre de nouvelles choses.
4) Parce que selon moi elle va m'aider dans la poursuite de ma carrière.
5) Honnêtement, je ne le sais pas ; j'ai vraiment l'impression de perdre mon temps en formation.
6) Pour me prouver à moi-même que je suis capable de suivre cette formation.
7) Pour pouvoir décrocher un emploi plus important.
8) Pour le plaisir que j'ai à découvrir de nouvelles choses jamais vues auparavant.
9) Parce qu'elle devrait me permettre de travailler dans un domaine que j'aime.
10) J'ai déjà eu de bonnes raisons pour suivre cette formation, mais maintenant je me demande si je devrais continuer.
11) Parce que cette formation me ressemble.
12) Parce que le fait de réussir à suivre cette formation me permet de me sentir important à mes propres yeux.
13) Parce que je veux pouvoir mener « la belle vie » plus tard.
14) Pour le plaisir d'en savoir plus long sur les sujets qui m'intéressent.
15) Parce que cela va m'aider dans le développement de ma carrière professionnelle.
16) Je ne parviens pas à voir pourquoi je suis cette formation et franchement je m'en fous pas mal.
17) Parce que cette formation est une partie de ce que je suis.
18) Pour me prouver que je suis une personne intelligente.
19) Pour avoir un meilleur salaire plus tard.
20) Parce que cette formation va me permettre de continuer à en apprendre sur une foule de choses qui m'intéressent.
21) Parce que je crois que cette formation va augmenter mon potentiel au travail.
22) Je ne le sais pas ; je ne parviens pas à comprendre pourquoi je suis cette formation.
23) Parce que je veux me prouver à moi-même que je suis capable de réussir cette formation.
24) Parce que cette formation est une expression de moi-même.

Légende :

- Items 3, 8, 14, 20 : Motivation intrinsèque à la connaissance
- Items 2,11, 17, 24 : Motivation extrinsèque - intégrée
- Items 4, 9, 15, 21 : Motivation extrinsèque - identifiée
- Items 6, 12, 18, 23 : Motivation extrinsèque - introjectée
- Items 1, 7, 13, 19 : Motivation extrinsèque - régulation externe
- Items 5, 10, 16, 22 : Amotivation

The High School Chemistry Self-Efficacy Scale (HCSS)

Directions: This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for students in chemistry. Please indicate your opinion about each of the statements below. Please do not skip any item. Your answers are confidential.

THANKS FOR YOUR HELP ☺

		very poorly		poorly		average		well		very well
1.	To what extent can you explain chemical laws and theories?	1	2	3	4	5	6	7	8	9
2.	How well can you choose an appropriate formula to solve a chemistry problem?	1	2	3	4	5	6	7	8	9
3.	How well can you carry out experimental procedures in the chemistry laboratory?	1	2	3	4	5	6	7	8	9
4.	How well can you use the equipment in the chemistry laboratory?	1	2	3	4	5	6	7	8	9
5.	How well can you establish the relationship between chemistry and other sciences?	1	2	3	4	5	6	7	8	9
6.	How well can you describe the structure of an atom?	1	2	3	4	5	6	7	8	9
7.	How well can you interpret data during the laboratory sessions?	1	2	3	4	5	6	7	8	9
8.	How well can you describe the properties of elements by using periodic table?	1	2	3	4	5	6	7	8	9
9.	How well can you read the formulas of elements and compounds?	1	2	3	4	5	6	7	8	9
10.	How well can you interpret chemical equations?	1	2	3	4	5	6	7	8	9
11.	How well can you explain the particulate nature of matter?	1	2	3	4	5	6	7	8	9
12.	How well can you construct laboratory apparatus?	1	2	3	4	5	6	7	8	9
13.	How well can you define the fundamental concepts in chemistry?	1	2	3	4	5	6	7	8	9
14.	How well can you interpret graphs/charts related to chemistry?	1	2	3	4	5	6	7	8	9
15.	How well can you collect data during the chemistry laboratory?	1	2	3	4	5	6	7	8	9
16.	How well can you write a laboratory report summarizing main findings?	1	2	3	4	5	6	7	8	9

Aydin, Y. Ç., & Uzuntiryaki, E. (2009). Development and Psychometric Evaluation of the High School Chemistry Self-Efficacy Scale, *Educational and Psychological Measurement, 69(*5), 868-880.

Echelle de type Likert en 5 points
1-Strongly disagree, 5- strongly agree

Jang, H., Kim, E.J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction, 43*, 27-38.

The 67 questionnaire items on the study questionnaire designed to assess the multiple aspects of perceived motivating style, motivation, and engagement (grouped by the 16 different scales).

Perceived autonomy support
1. My teacher provides me with choices and options.
2. I feel understood by my teacher.
3. My teacher conveys confidence in my ability to do well in this course.
4. My teacher encourages me to ask questions.
5. My teacher listens to how I would like to do things.
6. My teacher tries to understand how I see things before suggesting a new way to do things.

Perceived teacher control
1. My teacher tries to control everything I do.
2. My teacher is inflexible.
3. My teacher uses forceful language.
4. My teacher puts a lot of pressure on me.

Autonomy need satisfaction
1. In this class, I feel free.
2. I feel free to be my "true self" in this class.
3. I get to do interesting things in this class.

Competence need satisfaction
1. In this class, I feel successful in terms of completing difficult tasks and projects.
2. I like and accept the hard challenges in this class.
3. I do well in this class, even on the hard things.

Relatedness need satisfaction
1. I feel a close sense of connection with people in this class.
2. I feel close and connected with people in this class.
3. I feel a strong sense of intimacy with people in this class.

Autonomy need frustration
1. People in this class boss me around and tell me what I have to do.
2. In this class, I feel a lot of aversive pressure.
3. I have to do things against my will in this class.

Competence need frustration
1. In this class, I expect failure and to feel incompetent.
2. I feel incompetent in this class.
3. I struggle with tasks that I should be good at in this class.

Relatedness need frustration
1. In this class, I feel lonely.
2. I feel unappreciated by people in this class.
3. I have disagreements and conflicts with people in this class.

Behavioral engagement
1. When I'm in this class, I listen very carefully.
2. I pay attention in this class.
3. I try hard to do well in this class.
4. In this class, I work as hard as I can.
5. When I'm in this class, I participate in class discussions.

Emotional engagement
1. When we work on something in this class, I feel interested.
2. This class is fun.
3. I enjoy learning new things in this class.
4. When I'm in this class, I feel good.
5. When we work on something in this class, I get involved.

Agentic engagement
1. I let my teacher know what I need and want.
2. I let my teacher know what I am interested in.
3. During this class, I express my preferences and opinions.
4. During class, I ask questions to help me learn.
5. When I need something in this class, I'll ask the teacher for it.

Cognitive engagement
1. When reading for this class, I try to explain the key concepts in my own words.
2. When learning about a new topic in this course, I usually try to summarize it in my own words.
3. When reading for this class, I try to connect the ideas I am reading about with what I already know.
4. When thinking about the concepts in this class, I try to generate examples to help me understand them better.

Behavioral disengagement
1. When I'm in this class, I just act like I'm working.
2. I don't try very hard in this class.
3. In this class, I do just enough to get by.
4. When I'm in this class, I think about other things.
5. When I'm in this class, my mind wanders.

Emotional disengagement
1. When we work on something in this class, I feel bored.
2. This class is no fun for me.
3. When I am in this class, I feel bad.
4. When I'm in this class, I feel worried.
5. When we work on something in this class, I feel discouraged.

Agentic disengagement
1. Most of the time in this class, I am passive.
2. Most of the time in this class, I am silent and unresponsive.
3. During this class, I hide from the teacher what I am thinking about.
4. In this class, I avoid asking any questions.
5. In this class, I do only what I am told to do—nothing more.

Cognitive disengagement
1. I find it difficult to develop a study plan for this course.
2. In this course, I often find that I don't know what to study or where to start.
3. I'm not sure how to study for this course.
4. In this course, I find it difficult to organize my study time effectively.
5. When I study for this course, I have trouble figuring out what to do to learn the material

Echelle de type Likert en 5 points

Item Statements on the Procrastination Scale and Corresponding Factor Loadings

Item Statements*	Factor Loadings
1. I needlessly delay finishing jobs, even when they're important.	.63
2. I postpone starting in on things I don't like to do.	.47
3. When I have a deadline, I wait till the last minute.	.65
4. I delay making tough decisions.	.40
5. I stall on initiating new activities.	.39
6. I'm on time for appointments.	−.21
7. I keep putting off improving my work habits.	.59
8. I get right to work, even on life's unpleasant chores.	−.39
9. I manage to find an excuse for not doing something.	.56
10. I avoid doing those things which I expect to do poorly.	.19
11. I put the necessary time into even boring tasks, like studying.	−.53
12. When I get tired of an unpleasant job, I stop.	.04
13. I believe in "keeping my nose to the grindstone."	−.32
14. When something's not worth the trouble, I stop.	.24
15. I believe that things I do not like doing should not exist.	.22
16. I consider people who make me do unfair and difficult things to be rotten.	.21
17. When it counts, I can manage to enjoy even studying.	−.02
18. I am an incurable time waster.	.70
19. I feel that it's my absolute right to have other people treat me fairly.	.16
20. I believe that other people don't have the right to give me deadlines.	.21
21. Studying makes me feel entirely miserable.	.37
22. I'm a time waster now but I can't seem to do anything about it.	.75
23. When something's too tough to tackle, I believe in postponing it.	.51
24. I promise myself I'll do something and then drag my feet.	.71
25. Whenever I make a plan of action, I follow it.	−.53
26. I wish I could find an easy way to get myself moving.	.39
27. When I have trouble with a task, it's usually my own fault.	.06
28. Even though I hate myself if I don't get started, it doesn't get me going.	.59
29. I always finish important jobs with time to spare.	−.57
30. When I'm done with my work, I check it over.	−.35
31. I look for a loophole or shortcut to get through a tough task.	.38
32. I get stuck in neutral even though I know how important it is to get started.	.67
33. I never met a job I couldn't "lick."	−.31
34. Putting something off until tomorrow is not the way I do it.	−.60
35. I feel that work burns me out.	.25

Tuckman, B.W. (1991). The Development and Concurrent Validity of the Procrastination Scale. *Educational and Psychological Measurement, 51*, 473-480.

Schraw, G., Bendixen, L.D., & Dunkle, M.E. (2002). Development and validation of the Epistemic Belief Inventory (EBI). In B.K. Hofer & P.R Pintrich (Eds.), *Personal epistemology. The psychology of beliefs about knowledge and knowing* (pp.261-275). Lawrence Erlbaum Associates Publishers.

Beliefs Inventory (EBI)

1. Most things worth knowing are easy to understand.
2. What is true is a matter of opinion.
3. Students who learn things quickly are the most successful.
4. People should always obey the law.
5. People's intellectual potential is fixed at birth.
6. Absolute moral truth does not exist.
7. Parents should teach their children all there is to know about life.
8. Really smart students don't have to work as hard to do well in school.
9. If a person tries too hard to understand a problem, they will most likely end up being confused.
10. Too many theories just complicate things.
11. The best ideas are often the most simple.
12. Instructors should focus on facts instead of theories.
13. Some people are born with special gifts and talents.
14. How well you do in school depends on how smart you are.
15. If you don't learn something quickly, you won't ever learn it.
16. Some people just have a knack for learning and others don't.
17. Things are simpler than most professors would have you believe.
18. If two people are arguing about something, at least one of them must be wrong.
19. Children should be allowed to question their parents' authority.
20. If you haven't understood a chapter the first time through, going back over it won't help.
21. Science is easy to understand because it contains so many facts.
22. The more you know about a topic, the more there is to know.
23. What is true today will be true tomorrow.
24. Smart people are born that way.
25. When someone in authority tells me what to do, I usually do it.
26. People shouldn't question authority.
27. Working on a problem with no quick solution is a waste of time.
28. Sometimes there are no right answers to life's big problems.

Epistemological Beliefs

1 There isn't much you can do to make yourself smarter as your ability is fixed at birth.
2 Our abilities to learn are fixed at birth.
3 One's innate ability limits what one can do.
4 Some people are born good learners; others are just stuck with limited abilities.
5 Some children are born incapable of learning well in certain subjects.
6 The ability to learn is innate/inborn.
7 Students who begin school with "average" ability remain 'average' throughout school.
8 The really smart students don't have to work hard to do well in school.
9 If people can't understand something right away, they should keep on trying.
10 Knowing how to learn is more important than the acquired facts.
11 One learns little if one does not work hard.
12 Understanding course materials and thinking process are more important than acquiring knowledge/facts.
13 Everyone needs to learn how to learn.
14 People will learn better if they focus more on the process of understanding rather than the facts to be acquired
15 Learning something really well takes a long time or much effort.
16 How much you get from your learning depends mostly on your effort.
17 Getting ahead takes a lot of work.
18 If one tries hard enough, then one will understand the course material.
19 Wisdom is not knowing the answers, but knowing how to find the answers.
20 Sometimes I don't believe the facts in textbooks written by authorities.
21 Even advice from experts should often be questioned.
22 I often wonder how much experts really know.
23 I am very aware that teachers/lecturers know a lot more than I do and so I agree with what they say is important is important rather than rely on my own judgment.
24 I still believe in what the experts say even though it differs from what I know.
25 I have no doubts in whatever the experts say.
26 Scientists will ultimately get to the truth if they keep searching for it.
27 If scientists try hard enough, they can find the truth to almost anything.
28 Anyone can figure out difficult concepts if one works hard enough.
29 I believe there should exist a teaching method applicable to all learning situations.
30 Scientific knowledge is certain and does not change.

Chan, K.-W., & Elliott, R.G. (2004). Relational analysis of personal epistemology and conceptions about teaching and learning. *Teaching and Teacher Education, 20*, 817-831.

	Question item	Factor 1	Factor 2
B34	It is important that a teacher understands the feelings of the students	.67	
B22	Good teachers always encourage students to think for answers themselves	.66	
B35	Learning means students have ample opportunities to explore, discuss and express their ideas	.65	
B19	In good classrooms there is a democratic and free atmosphere which stimulates students to think and interact	.63	
B21	Every child is unique or special and deserves an education tailored to his or her particular needs	.62	
B7	Effective teaching encourages more discussion and hands on activities for students	.58	
B23	The focus of teaching is to help students construct knowledge from their learning experience instead of knowledge communication	.55	
B32	Instruction should be flexible enough to accommodate individual differences among students	.54	
B25	Different objectives and expectations in learning should be applied to different students	.53	
B13	Students should be given many opportunities to express their ideas	.44	
B1	The ideas of students are important and should be carefully considered	.40	
B31	Good teachers always make their students feel important	.34	
B16	A teacher's major task is to give students knowledge/information, assign them drill and practice, and test their recall		.59
B5	During the lesson, it is important to keep Students confined to the textbooks and the desks		.56
B14	learning means remembering what the teacher has taught		.56
B18	Good students keep quiet and follow teacher's instruction in class		.55
B20	The traditional/lecture method for teaching is best because it covers more information/knowledge		.53
B24	It is best if teachers exercise as much authority as possible in the classroom		.52
B11	Good teaching occurs when there is mostly teacher talk in the classroom		.52
B17	Learning mainly involves absorbing as much information as possible		.50
B12	Students have to be called on all the time to keep them under control		.49
B26	Teaching is to provide students with accurate and complete knowledge rather than encourage them to discover it		.46
B27	A teacher's task is to correct learning misconceptions of students right away instead of verify them for themselves		.43
B30	No learning can take place unless students are controlled		.43
B6	Teachers should have control over what students do all the time		.43
B28	Learning to teach simply means practicing the ideas from lecturers without questioning them		.38
B9	I have really learned something when I can remember it later		.37
B8	Teaching is simply telling, presenting or explaining the subject matter		.37
B2	The major role of a teacher is to transmit knowledge to students.36		
B4	Learning occurs primarily from drilling and practice		.33

Macaskill, A., & Taylor, E. (2004). The development of a brief measure of learner autonomy in university students. *Studies in Higher Education, 35*(3), 351-359.

a 5-point Likert scale
5-*Very like me* 1- *Not at all like me* at the other.

[12]	I enjoy new learning experiences
[7]	I am open to new ways of doing familiar things
[8]	I enjoy being set a challenge
[1]	I enjoy finding information about new topics on my own
[6]	Even when tasks are difficult I try to stick with them
[10]	I tend to be motivated to work by assessment deadlines
[11]	I take responsibility for my learning experiences
[4]	My time management is good
[3]	I am good at meeting deadlines
[9]	I plan my time for study effectively
[2]	I frequently find excuses for not getting down to work
[5]	I am happy working on my own

Lafrenière, M-A., K., Verner-Filion, J., & Vallerant, R., J. (2012). Development and validation of the Gaming Motivation Scale (GAMS). *Personality and Individual Differences, 53*, 827-831.

Scale items
Intrinsic motivation
1. Because it is stimulating to play
2. For the pleasure of trying/experiencing new game options (e.g., classes, characters, teams, races, equipment)
3. For the feeling of efficacy I experience when I play
Integrated regulation
1. Because it is an extension of me
2. Because it is an integral part of my life
3. Because it is aligned with my personal values
Identified regulation
1. Because it is a good way to develop important aspects of myself
2. Because it is a good way to develop social and intellectual abilities that are useful to me
3. Because it has personal significance to me
Introjected regulation
1. Because I feel that I must play regularly
2. Because I must play to feel good about myself
3. Because otherwise I would feel bad about myself
External regulation
1. To acquire powerful and rare items (e.g., armors, weapons) and virtual currency (e.g., gold pieces, gems) or to unlock hidden/restricted elements of the game (e.g., new characters, equipment, maps)
2. For the prestige of being a good player
3. To gain in-game awards and trophies or character/avatar's levels and experiences points
Amotivation
1. It is not clear anymore; I sometimes ask myself if it is good for me
2. I used to have good reasons, but now I am asking myself if I should continue
3. Honestly, I don't know; I have the impression that I'm wasting my time

Tschannen-Moran, M., & Woolfolk Hoy, A. (2001). Teacher Efficacy: Capturing an Elusive Construct. *Teaching and Teacher Education, 17*(7), 783-805.

Ohio State teacher efficacy scale (OSTES)	24 items	12 items
Factor 1: *Efficacy for instructional strategies*		
1. To what extent can you use a variety of assessment strategies?	0.72	0.73
2. To what extent can you provide an alternative explanation or example when students are confused?	0.70	0.75
3. To what extent can you craft good questions for your students?	0.68	0.63
4. How well can you implement alternative strategies in your classroom?	0.66	0.73
5. How well can you respond to difficult questions from your students?	0.66	
6. How much can you do to adjust your lessons to the proper level for individual students?	0.59	
7. To what extent can you gauge student comprehension of what you have taught?	0.57	
8. How well can you provide appropriate challenges for very capable students?	0.55	
Factor 2: *Efficacy for classroom management*		
9. How much can you do to control disruptive behavior in the classroom?	0.78	0.83
10. How much can you do to get children to follow classroom rules?	0.69	0.66
11. How much can you do to calm a student who is disruptive or noisy?	0.66	0.63
12. How well can you establish a classroom management system with each group of students?	0.66	0.61
13. How well can you keep a few problem students from ruining an entire lesson?	0.62	
14. How well can you respond to defiant students?	0.61	
15. To what extent can you make your expectation clear about student behavior?	0.53	
16. How well can you establish routines to keep activities running smoothly?	0.50	
Factor 3: *Efficacy for student engagement*		
17. How much can you do to get students to believe they can do well in schoolwork?	0.75	0.75
18. How much can you do to help your students value learning?	0.70	0.69
19. How much can you do to motivate students who show low interest in schoolwork?	0.66	0.64
20. How much can you assist families in helping their children do well in school?	0.63	0.62
21. How much can you do to improve the understanding of a student who is failing?	0.57	
22. How much can you do to help your students think critically?	0.56	
23. How much can you do to foster student creativity?	0.50	
24. How much can you do to get through to the most difficult students?	0.47	

Teachers' Sense of Efficacy Scale[1] (long form)

Teacher Beliefs Directions: This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.	How much can you do? Nothing		Very Little		Some Influence		Quite A Bit		A Great Deal
1. How much can you do to get through to the most difficult students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2. How much can you do to help your students think critically?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3. How much can you do to control disruptive behavior in the classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4. How much can you do to motivate students who show low interest in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5. To what extent can you make your expectations clear about student behavior?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6. How much can you do to get students to believe they can do well in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7. How well can you respond to difficult questions from your students ?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8. How well can you establish routines to keep activities running smoothly?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
9. How much can you do to help your students value learning?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10. How much can you gauge student comprehension of what you have taught?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11. To what extent can you craft good questions for your students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12. How much can you do to foster student creativity?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
13. How much can you do to get children to follow classroom rules?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
14. How much can you do to improve the understanding of a student who is failing?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
15. How much can you do to calm a student who is disruptive or noisy?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
16. How well can you establish a classroom management system with each group of students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
17. How much can you do to adjust your lessons to the proper level for individual students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
18. How much can you use a variety of assessment strategies?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
19. How well can you keep a few problem students form ruining an entire lesson?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
20. To what extent can you provide an alternative explanation or example when students are confused?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
21. How well can you respond to defiant students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
22. How much can you assist families in helping their children do well in school?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
23. How well can you implement alternative strategies in your classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
24. How well can you provide appropriate challenges for very capable students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Teachers' Sense of Efficacy Scale[1] (short form)

Teacher Beliefs Directions: This questionnaire is designed to help us gain a better understanding of the kinds of things that create difficulties for teachers in their school activities. Please indicate your opinion about each of the statements below. Your answers are confidential.	How much can you do? Nothing		Very Little		Some Influence		Quite A Bit		A Great Deal
1. How much can you do to control disruptive behavior in the classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
2. How much can you do to motivate students who show low interest in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
3. How much can you do to get students to believe they can do well in school work?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
4. How much can you do to help your students value learning?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
5. To what extent can you craft good questions for your students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
6. How much can you do to get children to follow classroom rules?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
7. How much can you do to calm a student who is disruptive or noisy?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
8. How well can you establish a classroom management system with each group of students?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
9. How much can you use a variety of assessment strategies?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
10. To what extent can you provide an alternative explanation or example when students are confused?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
11. How much can you assist families in helping their children do well in school?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
12. How well can you implement alternative strategies in your classroom?	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Long Form

Efficacy in Student Engagement:	Items 1, 2, 4, 6, 9, 12, 14, 22
Efficacy in Instructional Strategies:	Items 7, 10, 11, 17, 18, 20, 23, 24
Efficacy in Classroom Management:	Items 3, 5, 8, 13, 15, 16, 19, 21

Short Form

Efficacy in Student Engagement:	Items 2, 3, 4, 11
Efficacy in Instructional Strategies:	Items 5, 9, 10, 12
Efficacy in Classroom Management:	Items 1, 6, 7, 8

Frenzel et al. (2009). Emotional Transmission in the Classroom: Exploring the Relationship Between Teacher and Student Enjoyment. *Journal of Educational Psychology, 101*(3), 705-716.

Measures

Teacher enjoyment. Due to the lack of scales measuring teacher enjoyment, we developed a teacher enjoyment scale for the present study. Items were formulated such that they referred to the group of students participating in the study (5 items; "I really enjoy teaching mathematics in this class," "I look forward to lessons in this class," "My teaching in this class is so enjoyable that I like lecturing and preparing my lessons for this class," "When teaching this class, I am good humored," and "Teaching in this class gives me many reasons to be pleased"). Items were answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency of this scale was high (Cronbach's $\alpha = .90$).

Student enjoyment. We used the class-related enjoyment items of the Achievement Emotions Questionnaire—Mathematics (Pekrun, Goetz, & Frenzel, 2005) to assess students' enjoyment during mathematics classes. Instructions ask students to indicate how they typically feel about attending class (4 items; e.g., "I look forward to my mathematics class," "I enjoy my mathematics class"). Items were answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The scale was highly internally consistent (Cronbach's $\alpha = .89$ and .88 in Grades 7 and 8, respectively).

Student-perceived teacher enthusiasm. To assess students' perception of teacher enthusiasm, we used a four-item scale ("Our mathematics teacher teaches with enthusiasm," "Our mathematics teacher is humorous during teaching," "Our mathematics teacher tries to get students excited about the subject of mathematics," and "Our mathematics teacher really seems to take pleasure in teaching"). Item formulations were based on existing scales from teaching evaluation studies (Jackson et al., 1999; Marsh, 1982). Items were answered on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency was high (Cronbach's $\alpha = .85$).

Frenzel et al. (2016). Measuring teachers'enjoyment, anger, and anxiety: The Teacher Emotions Scales (TES). *Contemporary Educational Psychology,* 148-163.

Appendix A: English and German Items of the TES

		English	German
	Short name	General Scales	
Instruction		Below you find a list of statements describing your experiences as a teacher. Please indicate your personal response to each of these statements by circling the number that best represents your answer.	Im Folgenden finden Sie eine Reihe von Aussagen, die sich auf Ihre Erfahrungen als Lehrkraft beziehen. Bitte kreuzen Sie diejenige Antwort an, die Ihr persönliches Erleben am besten beschreibt.
Enjoyment	joy1	I generally enjoy teaching.	Im Allgemeinen macht mir Unterrichten Freude.
	joy2	I generally have so much fun teaching that I gladly prepare and teach my lessons.	Im Allgemeinen macht mir Unterrichten so viel Spaß, dass ich den Unterricht gerne vorbereite und durchführe.
	joy3	I often have reasons to be happy while I teach.	Während des Unterrichts habe ich oft Grund, mich zu freuen.
	joy4	I generally teach with enthusiasm.	Im Allgemeinen unterrichte ich mit Begeisterung.
Anger	ang1	I often have reasons to be angry while I teach.	Während des Unterrichtens habe ich oft Grund, mich zu ärgern.
	ang2	I often feel annoyed while teaching.	Während des Unterrichtens bin ich oft genervt.
	ang3	Sometimes I get really mad while I teach.	Beim Unterrichten werde ich gelegentlich richtig sauer.
	ang4	Teaching generally frustrates me.	Im Allgemeinen frustriert mich das Unterrichten.
Anxiety	anx1	I generally feel tense and nervous while teaching.	Beim Unterrichten bin ich in der Regel angespannt und nervös.
	anx2	I am often worried that my teaching isn't going so well.	Ich mache mir oft Sorgen, dass das Unterrichten nicht so richtig klappt.
	anx3	Preparing to teach often causes me to	Die Vorbereitung des Unterrichts bereitet

Please indicate the degree to which you agree or disagree with each statement below by circling the appropriate letters to the right of each statement.

SA = Strongly Agree
A = Agree
UN = Uncertain
D = Disagree
SD = Strongly Disagree

1. When a student does better than usual in science, it is often because the teacher exerted a little extra effort.	SA A UN D SD
2. I am continually finding better ways to teach science.	SA A UN D SD
3. Even when I try very hard, I don't teach science as well as I do most subjects.	SA A UN D SD
4. When the science grades of students improve, it is most often due to their teacher having found a more effective teaching approach.	SA A UN D SD
5. I know the steps necessary to teach science concepts effectively.	SA A UN D SD
6. I am not very effective in monitoring science experiments.	SA A UN D SD
7. If students are underachieving in science, it is most likely due to ineffective science teaching.	SA A UN D SD
8. I generally teach science ineffectively.	SA A UN D SD
9. The inadequacy of a student's science background can be overcome by good teaching.	SA A UN D SD
10. The low science achievement of some students cannot generally be blamed on their teachers.	SA A UN D SD
11. When a low achieving child progresses in science, it is usually due to extra attention given by the teacher.	SA A UN D SD
12. I understand science concepts well enough to be effective in teaching elementary science.	SA A UN D SD
13. Increased effort in science teaching produces little change in some students' science achievement.	SA A UN D SD
14. The teacher is generally responsible for the achievement of students in science.	SA A UN D SD
15. Students' achievement in science is directly related to their teacher's effectiveness in science teaching.	SA A UN D SD
16. If parents comment that their child is showing more interest in science at school, it is probably due to the performance of the child's teacher.	SA A UN D SD
17. I find it difficult to explain to students why science experiments work.	SA A UN D SD
18. I am typically able to answer students' science questions.	SA A UN D SD
19. I wonder if I have the necessary skills to teach science.	SA A UN D SD
20. Effectiveness in science teaching has little influence on the achievement of students with low motivation.	SA A UN D SD
21. Given a choice, I would not invite the principal to evaluate my science teaching.	SA A UN D SD
22. When a student has difficulty understanding a science concept, I am usually at a loss as to how to help the student understand it better.	SA A UN D SD
23. When teaching science, I usually welcome student questions.	SA A UN D SD
24. I don't know what to do to turn students on to science.	SA A UN D SD
25. Even teachers with good science teaching abilities cannot help some kids learn science.	SA A UN D SD

Riggs et Enochs (1990). Toward the Development of an Elementary Teacher 's Science Teaching Efficacy Belief Instrument. *Science Education,* 74(6),625-637.

Ang, R, P. (2005). Development and Validation of the Teacher-Student Relationship Inventory Using Exploratory and Confirmatory Factor Analysis. *The Journal of Experimental Education, 74*(1), 55-73.

TABLE 1. Rotated Factor Pattern and Structure Matrices for the Teacher–Student Relationship Inventory and Communalities of the Measured Variables

Item	Factor 1 Satisfaction		Factor 2 Instrumental Help		Factor 3 Conflict	
	Pattern	Structure	Pattern	Structure	Pattern	Structure
1. I enjoy having this student in my class.	**.86**	.92	–.03	–.12	–.12	–.57
2. If the student has a problem at home, he/she is likely to ask for my help.	.01	–.07	**.90**	.90	–.12	.04
3. I would describe my relationship with this student as positive.	**.95**	.92	.07	–.03	.05	–.43
4. This student frustrates me more than most other students in my class.	–.15	–.53	–.02	.05	**.73**	.81
5. If this student is absent, I will miss him/her.	**.93**	.88	–.15	–.24	.12	–.37
6. The student shares with me things about his/her personal life.	.01	–.08	**.91**	.91	–.02	.05
7. I cannot wait for this year to be over so that I will not need to teach this student next year.	.05	–.41	–.11	–.04	**.92**	.89
8. If this student is absent, I feel relieved.	.19	–.32	.11	.17	**.95**	.87
9. If this student needs help, he/she is likely to ask me for help.	–.01	–.12	**.90**	.91	.04	.12
10. The student turns to me for a listening ear or for sympathy.	–.06	–.16	**.94**	.95	–.01	.11
11. If this student is not in my class, I will be able to enjoy my class more.	–.22	–.61	.02	.11	**.75**	.86
12. The student depends on me for advice or help.	.05	–.07	**.93**	.92	.03	.08
13. I am happy with my relationship with this student.	**.97**	.94	.05	–.05	.06	–.43
14. I like this student.	**.87**	.93	.04	–.06	–.13	–.58

Note. Pattern coefficients with values of .40 or greater are in bold type.

Schraw, G., & Dennison, R.S. (1994). Assessing Metacognitive Awareness. *Contemporary Educational Psychology, 19*, 460-475.

Knowledge of Cognition

1. Declarative knowledge: knowledge about one's skills, intellectual resources, and abilities as a learner.
2. Procedural knowledge: knowledge about *how* to implement learning procedures (e.g., strategies).
3. Conditional knowledge: knowledge about *when* and *why* to use learning procedures.

Regulation of Cognition

1. Planning: planning, goal setting, and allocating resources *prior* to learning.
2. Information management: skills and strategy sequences used on-line to process information more efficiently (e.g., organizing, elaborating, summarizing, selective focusing).
3. Monitoring: assessment of one's learning or strategy use.
4. Debugging: strategies used to correct comprehension and performance errors.
5. Evaluation: analysis of performance and strategy effectiveness after a learning episode.

Ratings for each item were made on a 100-mm, bi-polar scale adapted from the multidimensional scaling literature. The right end of each scale indicated the statement was false about the individual; the left end indicated the statement was true. Continuous scales were used in place of Likert scales for several reasons. First, continuous scales provide a better approximation to interval data compared to Likert scales. Second, scoring responses on a 100-point scale compared to a 5- or 7-point scale was expected to increase response variation which in turn should enhance the reliability of the instrument. Subjects recorded their responses by drawing a slash across the rating scale at a point that best corresponded to how true or false the statement was about them.

1. I ask myself periodically if I am meeting my goals. (M)
2. I consider several alternatives to a problem before I answer. (M)
3. I try to use strategies that have worked in the past. (PK)
4. I pace myself while learning in order to have enough time. (P)
5. I understand my intellectual strengths and weaknesses. (DK)
6. I think about what I really need to learn before I begin a task. (P)
7. I know how well I did once I finish a test. (E)
8. I set specific goals before I begin a task. (P)
9. I slow down when I encounter important information. (IMS)
10. I know what kind of information is most important to learn. (DK)
11. I ask myself if I have considered all options when solving a problem. (M)
12. I am good at organizing information. (DK)
13. I consciously focus my attention on important information. (IMS)
14. I have a specific purpose for each strategy I use. (PK)
15. I learn best when I know something about the topic. (CK)
16. I know what the teacher expects me to learn. (DK)
17. I am good at remembering information. (DK)
18. I use different learning strategies depending on the situation. (CK)
19. I ask myself if there was an easier way to do things after I finish a task. (E)
20. I have control over how well I learn. (DK)
21. I periodically review to help me understand important relationships. (M)
22. I ask myself questions about the material before I begin. (P)
23. I think of several ways to solve a problem and choose the best one. (P)
24. I summarize what I've learned after I finish. (E)
25. I ask others for help when I don't understand something. (DS)
26. I can motivate myself to learn when I need to. (CK)
27. I am aware of what strategies I use when I study. (PK)
28. I find myself analyzing the usefulness of strategies while I study. (M)

29. I use my intellectual strengths to compensate for my weaknesses. (CK)
30. I focus on the meaning and significance of new information. (IMS)
31. I create my own examples to make information more meaningful. (IMS)
32. I am a good judge of how well I understand something. (DK)
33. I find myself using helpful learning strategies automatically. (PK)
34. I find myself pausing regularly to check my comprehension. (M)
35. I know when each strategy I use will be most effective. (CK)
36. I ask myself how well I accomplished my goals once I'm finished. (E)
37. I draw pictures or diagrams to help me understand while learning. (IMS)
38. I ask myself if I have considered all options after I solve a problem. (E)
39. I try to translate new information into my own words. (IMS)
40. I change strategies when I fail to understand. (DS)
41. I use the organizational structure of the text to help me learn.
42. I read instructions carefully before I begin a task. (P)
43. I ask myself if what I'm reading is related to what I already know. (IMS)
44. I reevaluate my assumptions when I get confused. (DS)
45. I organize my time to best accomplish my goals. (P)
46. I learn more when I am interested in the topic. (DK)
47. I try to break studying down into smaller steps. (IMS)
48. I focus on overall meaning rather than specifics. (IMS)
49. I ask myself questions about how well I am doing while I am learning something new. (M)
50. I ask myself if I learned as much as I could have once I finish a task. (E)
51. I stop and go back over new information that is not clear. (DS)
52. I stop and reread when I get confused. (DS)

Note. DK, declarative knowledge; PK, procedural knowledge; CK, conditional knowledge; P, planning; IMS, information management strategies; M, monitoring; DS, debugging strategies; and E, evaluation.

Wagener, B. (2011). *Développement et transmission de la métacognition.* Psychology. Université d'Angers.

METACOGNITIVE ASSESMENT INVENTORY (MAI)

Consignes

Veuillez s'il vous plaît répondre à l'ensemble de ces questions en indiquant à quel point l'affirmation est vraie dans votre cas. Par exemple, si l'affirmation est toujours vraie (5), cochez la case correspondante à droite de celle-ci. Vos réponses étant enregistrées anonymement, veuillez répondre aussi honnêtement que possible.

		Toujours faux	Parfois faux	Neutre	Parfois vrai	Toujours vrai
1	Je me demande régulièrement si j'atteins mes objectifs.	1	2	3	4	5
2	Je prends en compte plusieurs alternatives avant de donner une réponse à un problème.	1	2	3	4	5
3	J'essaye d'utiliser des stratégies qui ont déjà fonctionné avant.	1	2	3	4	5
4	Lors d'un apprentissage je régule mon travail et m'organise afin d'avoir suffisamment de temps.	1	2	3	4	5
5	Je comprends mes forces et faiblesses intellectuelles.	1	2	3	4	5
6	Je réfléchis à ce que j'ai vraiment besoin d'apprendre avant de commencer une tâche.	1	2	3	4	5
7	Je sais à quel point j'ai réussi un test lorsque je l'ai terminé.	1	2	3	4	5
8	J'établis des objectifs spécifiques avant de commencer une tâche.	1	2	3	4	5
9	Je ralentis mon rythme de travail quand je trouve une information importante.	1	2	3	4	5
10	Je sais quel type d'information est le plus important à apprendre.	1	2	3	4	5
11	Je me demande si j'ai envisagé toutes les options lorsque je résous un problème.	1	2	3	4	5
12	Je suis bon pour organiser l'information.	1	2	3	4	5
13	Je concentre consciemment mon attention sur les informations importantes.	1	2	3	4	5
14	Chaque stratégie que j'utilise a son utilité spécifique.	1	2	3	4	5
15	J'apprends au mieux quand je connais déjà quelque chose sur le sujet de l'apprentissage.	1	2	3	4	5
16	Je sais ce que l'enseignant veut que j'apprenne.	1	2	3	4	5

		Toujours faux	Parfois faux	Neutre	Parfois vrai	Toujours vrai
17	Je suis bon pour le rappel d'informations.	1	2	3	4	5
18	J'utilise des stratégies d'apprentissage différentes selon la situation.	1	2	3	4	5
19	Après avoir réalisé une tâche, je me demande s'il y avait une manière plus facile de faire les choses.	1	2	3	4	5
20	Je maîtrise le degré de qualité avec lequel j'apprends.	1	2	3	4	5
21	Je réexamine les choses périodiquement pour m'aider à comprendre les liens importants.	1	2	3	4	5
22	Je me pose des questions sur le matériel à étudier avant de commencer.	1	2	3	4	5
23	J'envisage différentes manières de résoudre un problème et choisis la meilleure.	1	2	3	4	5
24	Je résume ce que j'ai appris après avoir terminé.	1	2	3	4	5
25	Je demande de l'aide aux autres quand je ne comprends pas quelque chose.	1	2	3	4	5
26	Je peux me motiver à apprendre quand j'en ai besoin.	1	2	3	4	5
27	Je suis conscient des stratégies que j'utilise quand j'étudie.	1	2	3	4	5
28	Quand j'étudie, je me retrouve à analyser l'utilité des stratégies employées.	1	2	3	4	5
29	J'utilise mes forces intellectuelles pour compenser mes faiblesses.	1	2	3	4	5
30	Je me concentre sur le sens et l'importance de nouvelles informations.	1	2	3	4	5
31	Je crée mes propres exemples pour donner plus de sens à l'information.	1	2	3	4	5
32	Je suis bon juge du degré avec lequel je comprends quelque chose.	1	2	3	4	5
33	Je me retrouve à appliquer des stratégies d'apprentissage utiles automatiquement.	1	2	3	4	5
34	Je me retrouve à faire régulièrement des pauses pour vérifier ma compréhension.	1	2	3	4	5
35	Je sais, pour chaque stratégie que j'utilise, quand elle sera la plus efficace.	1	2	3	4	5
36	Je me demande à quel point j'ai atteint mes objectifs une fois que j'ai terminé.	1	2	3	4	5
37	Je fais des dessins ou des diagrammes pour m'aider à comprendre quand j'apprends.	1	2	3	4	5

		Toujours faux	Parfois faux	Neutre	Parfois vrai	Toujours vrai
38	Je me demande si j'ai considéré toutes les options après avoir résolu un problème.	1	2	3	4	5
39	J'essaye de traduire toute information nouvelle en mes propres mots.	1	2	3	4	5
40	Je change de stratégies quand je n'arrive pas à comprendre.	1	2	3	4	5
41	J'utilise la structure organisationnelle du texte pour m'aider à apprendre.	1	2	3	4	5
42	Je lis les instructions attentivement avant de commencer une tâche.	1	2	3	4	5
43	Je me demande si ce que je lis a un lien avec ce que je sais déjà.	1	2	3	4	5
44	Je réévalue mes suppositions quand je suis embrouillé.	1	2	3	4	5
45	J'organise mon temps pour atteindre mes objectifs au mieux.	1	2	3	4	5
46	J'apprends plus quand le sujet m'intéresse.	1	2	3	4	5
47	J'essaye de diviser mon travail en étapes plus petites.	1	2	3	4	5
48	Je me concentre sur le sens global plutôt que sur les détails.	1	2	3	4	5
49	Je me pose des questions sur la qualité de mon activité quand j'apprends quelque chose de nouveau.	1	2	3	4	5
50	Je me demande si j'ai appris autant que j'aurais pu une fois la tâche terminée.	1	2	3	4	5
51	Je m'arrête et reviens sur les éléments nouveaux qui ne sont pas clairs.	1	2	3	4	5
52	Je m'arrête et relis quand je commence à m'embrouiller.	1	2	3	4	5

Balçıkanlı, C.(2011). Metacognitive Awareness Inventory for Teachers (MAIT). *Electronic Journal of Research in Educational Psychology*,*9*(3), 1309-1332.

5-point Likert-type response format.
The degree of agreement was from 'strongly disagree' (1) to 'strongly agree' (5).
Score is provided as follows : « Strongly Disagree » (1) refers to 1, « Disagree » (2), « Neutral » (3), « Agree » (4), « Strongly Agree » (5).

Statements
Factor I- Declarative Knowledge
1- I am aware of the strengths and weaknesses in my teaching.
7- I know what skills are most important in order to be a good teacher.
13- I have control over how well I teach.
19- I know what I am expected to teach.
Factor II- Procedural Knowledge
2- I try to use teaching techniques that worked in the past.
8- I have a specific reason for choosing each teaching technique I use in class.
14. I am aware of what teaching techniques I use while I am teaching.
20. I use helpful teaching techniques automatically.
Factor III- Conditional Knowledge
3- I use my strengths to compensate for my weaknesses in my teaching.
9- I can motivate myself to teach when I really need to teach.
15- I use different teaching techniques depending on the situation.
21- I know when each teaching technique I use will be most effective.
Factor IV- Planning
4- I pace myself while I am teaching in order to have enough time.
10- I set my specific teaching goals before I start teaching.
16- I ask myself questions about the teaching materials I am going to use.
22- I organize my time to best accomplish my teaching goals.
Factor V- Monitoring
5- I ask myself periodically if I meet my teaching goals while I am teaching.
11- I find myself assessing how useful my teaching techniques are while I am teaching.
17- I check regularly to what extent my students comprehend the topic while I am teaching.
23- I ask myself questions about how well I am doing while I am teaching.
Factor VI- Evaluating
6- I ask myself how well I have accomplished my teaching goals once I am finished.
12- I ask myself if I could have used different techniques after each teaching experience.
18- After teaching a point. I ask myself if I'd teach it more effectively next time.
24- I ask myself if I have considered all possible techniques after teaching a point.

Mc Nally, B., Chipperfield, J., Dorsett, P., Fabbro, L.D., Frommolt, V., Goetz, S., …& Rung, A. (2016). Flipped classroom experiences: student preferences and flip strategy in a higher education context. *Higher Education, 73*(2).

Please circle the most relevant response

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
Pre-class activities in this course (e.g. reading, lecture videos, quizzes, workbook):					
Were helpful to my learning	1	2	3	4	5
Motivated me to learn more	1	2	3	4	5
Enabled me to learn at my own pace	1	2	3	4	5
Prepared me for in-class activities	1	2	3	4	5
The *in-class* sessions helped me:					
Clarify what I had learned in pre-class activities	1	2	3	4	5
Apply what I had learned in pre-class activities	1	2	3	4	5
Develop problem-solving skills	1	2	3	4	5
Improve my group work skills	1	2	3	4	5
Develop better learning and study skills	1	2	3	4	5
Improve my communication skills	1	2	3	4	5

Please indicate your preference, and level of preference, by circling the most relevant response. I.e. If you prefer a statement on the right, circle a number closer to the right

If I could choose, I would like:					
Lectures delivered live and in person only	1	2	3	4	Lectures available online only
In-class activities to deal with teaching new content	1	2	3	4	In-class activities to deal with practical and applied problems
The first time I learn about content to happen in-class	1	2	3	4	The first time I learn about content to happen at home before class
To avoid technology in my learning	1	2	3	4	To use technology to assist my learning
To be quizzed on content only after it has been discussed in class	1	2	3	4	To be quizzed at the beginning of class on content available before class
To learn everything I have to learn in class	1	2	3	4	To have required learning before I go to class
To not participate in class but only listen	1	2	3	4	To be active and collaborate with other students in class
Readings, videos, and/or other pre-class activities to be optional	1	2	3	4	Readings, videos, and/or other pre-class activities to be required

To have new content delivered in lectures and laboratories/tutorials with more practical exercises assigned to outside of class (e.g. in assignments)	1	2	3	4	To have materials (pre-recorded lectures, readings) available prior to class and have in-class activities be practical and focus on problem solving

Soleimani, N. (2020). FELT teachers' epistemological beliefs and dominant teaching style: a mixed method research. *Asian-Pacific Journal of Second and Foreign Language Education, 5*(12).

Teaching Style Inventory (TSI)

Respond to each of the items below in terms of how you teach General English. Try to answer as honestly and as objectively as you can. Resist the temptation to respond as you believe you should or ought to think or behave, or in terms of what you believe is the expected or proper thing to do.

five-point Likert scale which is rated from 1 (strongly disagree) to 5 (strongly agree)

items	1	2	3	4	5
1. Facts, concepts, and principles are the most important things that studentsShould acquire.					
2. I set high standards for students in this class.					
3. What I say and do models appropriate ways for students to think about issues in the content.					
4. My teaching goals and methods address a variety of student learning styles.					
5. Students typically work on course projects alone with little supervision form me.					
6. Sharing my knowledge and expertise with students is very important to me.					
7. I give students negative feedback when their performance is unsatisfactory.					
8. Students are encouraged to emulate the example I provide.					
9. I spend time consulting with students on how to improve their work on Individual and/or group projects.					
10. Activities in this class encourage students to develop their own ideas about Content issues.					
11. What I have to say about a topic is important for students to acquire a broader Perspective on the issues in that area.					
12. Students would describe my standards and expectations as somewhat strict and rigid.					
13. I typically show students how and what to do in order to master course content.					
14. Small group discussions are employed to help students develop their ability to think critically.					
15. Students design one of more self-directed learning experiences.					
16. I want students to leave this course well prepared for further work in this area.					
17. It is my responsibility to define what students must learn and how they Should learn it.					
18. Examples from my personal experiences often are used to illustrate points about the material.					
19. I guide students' work on course projects by asking questions, exploring options, and suggesting alternative ways to do things.					
20. Developing the ability of students to think and work independently is an important goal.					
21. Lecturing is a significant part of how I teach each of the class sessions.					
22. I provide very clear guidelines for how I want tasks completed in this course.					
23. I often show students how they can use various principles and concepts.					
24. Course activities encourage students to take initiative and responsibility for their learning.					
25. Students take responsibility for teaching part of the class sessions.					

items	1	2	3	4	5
26. My expertise is typically used to resolve disagreements about content issues.					
27. This course has very specific goals and objectives that I want to accomplish.					
28. Students receive frequent verbal and/or written comments on their performance.					
29. I solicit student advice about how and what to teach in this course.					
30. Students set their own pace for completing independent and/or group projects.					
31. Students might describe me as a "storehouse of knowledge" who dispenses thefacts, principles, and concepts they need.					
32. My expectations for what I want students to do in this class are clearly defined in the syllabus.					
33. Eventually, many students begin to think like me about course content.					
34. Students can make choices among activities in order to complete course requirements.					
35. My approach to teaching is similar to a manager of a work group who delegates tasks and responsibilities to subordinates.					
36. There is more material in this course than I have time available to cover it					
37. My standards and expectations help students develop the discipline they need to learn					
38. Students might describe me as a "coach" who works closely with someone to correct problems in how they think and behave.					
39. I give students a lot of personal support and encouragement to do well in this course.					
40. I assume the role of a resource person who is available to students whenever they need help.					

Drummond, C., & Fischhoff, B. (2015). Development and Validation of the Scientific Reasoning Scale. *Journal of Behavioral Decision Making*, *30*(1), 26-38.

SCIENTIFIC REASONING SCALE ITEMS

Concept	Test item	Correct answer
Blind/double blind	In a taste test, a researcher puts Brand A coffee in a cup with white tape on it and Brand B coffee in an identical cup with black tape on it. A lab assistant gives tasters one of the cups, while the researcher watches their facial expressions. True or False? The lab assistant should not watch the cups being filled.	True
Causality	A researcher finds that American states with larger parks have fewer endangered species. True or False? These data show that increasing the size of American state parks will reduce the number of endangered species.	False
Confounding variables	A researcher has subjects put together a jigsaw puzzle either in a cold room with a loud radio or in a warm room with no radio. Subjects solve the puzzle more quickly in the warm room with no radio. True or False? The scientist cannot tell if the radio caused subjects to solve the puzzle more slowly.	True
Construct validity	An education researcher wants to measure the general math ability of a sample of high-performing math students. All the students have taken classes in geometry and pre-calculus. True or False? The education researcher can measure general math ability by giving the students a geometry test.	False
Control group	Two scientists test an anti-acne cream on teenagers with acne. Scientist A wants to give the cream to all the teenagers in the study. Scientist B wants to give the cream to half the teenagers and give a cream without anti-acne ingredients to the other half. True or False? Both ways of testing the cream are equally good.	False
Ecological validity	A researcher has a group of subjects play a competitive game. Each subject's goal is to make money by buying and selling tokens. Subjects are paid a flat fee for participating in the experiment. True or False? The researcher can confidently state that the behavior in the experiment reflects real-life buying and selling behavior.	False
History	A randomly selected sample of Americans is surveyed about disease A before and after a 6-month media campaign about the disease. Mid-way through the media campaign, a famous celebrity dies of Disease A. The survey data indicate that knowledge of Disease A is higher after the campaign. True or False? The media campaign may not have increased knowledge of Disease A.	True
Maturation	Subjects in an experiment must press a button whenever a blue dot flashes on their computer screen. At first, the task is easy for subjects. But as they continue to perform the task, they make more and more errors. True or False? The blue dot must flash more quickly as the task progresses.	False
Random assignment to condition	Researchers want to see whether a health intervention helps school children to lose weight. School children are sorted into either an intervention or control group. True or False? The researchers should assign the overweight children to the intervention group.	False
Reliability	A researcher develops a new method for measuring the surface tension of liquids. This method is more consistent than the old method. True or False? The new method must also be more accurate than the old method.	False
Response bias	Two researchers are developing a survey to measure consumers' feelings about customer service. Researcher A wants customers to rate their agreement with the statement "I am satisfied with customer service" on a 5-point scale, where 1 = *strongly agree* and 5 = *strongly disagree*. Researcher B wants customers to rate customer service on a 5-point scale, where 1 = *not dissatisfied at all* and 5 = *highly dissatisfied*. True or False? These questions are equally good for measuring how consumers feel about customer service.	False

Frederick, S. (2005). Cognitive Reflection and Decision Making *Journal of Economic Perspectives, 19*(4), 25-42.

The Cognitive Reflection Test (CRT)

(1) A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost? _____ cents

(2) If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? _____ minutes

(3) In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? _____ days

Vallerand, R.J., & Bissonnette, R. (1990). Construction et validation de l'Echelle de Satisfaction dans les Etudes (ESDE). *Canadian Journal of Behavioural Science, 22*(3), 295-306.

Fortement en désaccord	En désaccord	Légèrement en désaccord	Ni en désaccord ni en accord	Légèrement en accord	En accord	Fortement en accord
1	2	3	4	5	6	7

	Encercle
1. En général, ma vie académique correspond de près à mes idéaux	1 2 3 4 5 6 7
2. Mes conditions de vie scolaire sont excellentes	1 2 3 4 5 6 7
3. Je suis satisfait(e) de ma vie académique	1 2 3 4 5 6 7
4. Jusqu'à maintenant, j'ai obtenu les choses importantes que je voulais dans le monde scolaire	1 2 3 4 5 6 7
5. Si je pouvais recommencer mes études, je n'y changerais presque rien	1 2 3 4 5 6 7

Échelle de flow en contexte éducatif v.2 (EduFlow-2)

Lisez attentivement chaque phrase et répondez, sur l'échelle située en face, en entourant un nombre correspondant le mieux à ce que vous pensez 1 = pas du tout d'accord à 7 = tout à fait d'accord.

pas du tout d'accord	très peu d'accord	un peu d'accord	Moyennement d'accord	Assez d'accord	Fortement d'accord	tout à fait d'accord
1	2	3	4	5	6	7

[strongly disagree] <----------> [totally agree]

En général, *quand je suis dans une activité (formation en ligne, travail en classe ou devoirs à la maison...) à contextualiser en fonction de l'activité... [During a learning activity...]*

01 D1a	Je me sens capable de faire face aux exigences élevées de la situation	1 2 3 4 5 6 7
02 D2a	Je suis totalement absorbé·e par ce que je fais	1 2 3 4 5 6 7
03 D3a	Je ne suis pas préoccupé·e par ce que les autres pourraient penser de moi	1 2 3 4 5 6 7
04 D4a	J'ai le sentiment de vivre un moment enthousiasmant	1 2 3 4 5 6 7
05 D1b	Je sens que je contrôle parfaitement mes actions	1 2 3 4 5 6 7
06 D2c	Je ne vois pas le temps passer	1 2 3 4 5 6 7
07 D3b	Je ne suis pas préoccupé·e par le jugement des autres	1 2 3 4 5 6 7
08 D4b	Cette activité me procure beaucoup de bien-être	1 2 3 4 5 6 7
09 D1c	A chaque étape, je sais ce que je dois faire	1 2 3 4 5 6 7
10 D2b	Je suis profondément concentré·e sur ce que je fais	1 2 3 4 5 6 7
11 D3c	Je ne suis pas inquiet·e de ce que les autres peuvent penser de moi	1 2 3 4 5 6 7
12 D4c	Quand j'évoque ces activités, je ressens une émotion que j'ai envie de partager	1 2 3 4 5 6 7

- FlowD1 : Contrôle cognitif/Cognitive control
- FlowD2 : Immersion et altération de la perception du temps/Immersion and Time transformation
- FlowD3 : Absence de préoccupation à propos du soi/Loss of self-consciousness
- FlowD4 : Expérience autotélique (Bien-être procuré par l'activité)/Autotelic experience (well-being provided by the activity)

Note : FlowD1+FlowD2+FlowD3 = Absorption cognitive/Cognitive absorption

Heutte, J., Fenouillet, F., Martin-Krumm, C., Gute, G., Raes, A. Gute, D., Bachelet, R. & Csikszentmihalyi, M. (2021). Optimal Experience in Adult Learning: Conception and Validation of the Flow in Education Scale (EduFlow-2) *Frontiers in Psychology, section Educational Psychology, 12*, 1-12.

1. College grades most often reflect the effort you put into classes.
2. I came to college because it was expected of me.
3. I have largely determined my own career goals.
4. Some people have a knack for writing, while others will never write well no matter how hard they try.
5. I have taken a course because it was an easy good grade at least once.
6. Professors sometimes make an early impression of you and then no matter what you do, you cannot change that impression.
7. There are some subjects in which I could never do well.
8. Some students, such as student leaders and athletes, get free rides in college classes.
9. I sometimes feel that there is nothing I can do to improve my situation.
10. I never feel really hopeless—there is always something I can do to improve my situation.
11. I would never allow social activities to affect my studies.
12. There are many more important things for me than getting good grades.
13. Studying every day is important.
14. For some courses it is not important to go to class.
15. I consider myself highly motivated to achieve success in life.
16. I am a good writer.
17. Doing work on time is always important to me.
18. What I learn is more determined by college and course requirements than by what I want to learn.
19. I have been known to spend a lot of time making decisions which others do not take seriously.
20. I am easily distracted.
21. I can be easily talked out of studying.
22. I get depressed sometimes and then there is no way I can accomplish what I know I should be doing.
23. Things will probably go wrong for me some time in the near future.
24. I keep changing my mind about my career goals.
25. I feel I will someday make a real contribution to the world if I work hard at it.
26. There has been at least one instance in school where social activity impaired my academic performance.
27. I would like to graduate from college, but there are more important things in my life.
28. I plan well and I stick to my plans.

True or False

Curtis, N.A., & Trice, A.D. (2013). A revision of the academic locus of control scale for college students. *Perceptual & Motor Skills: Physical Development & Measurement, 116*(3), 817-829.

Mendo-Lázaro, S., Polo-del-Rio, M., Iglesias-Gallego, D., Felipe-Castaño, E., & León-del-Barco, B. (2017). Construction and Validation of a Measurement Instrument for Attitudes towards Teamwork, *Frontiers in Psychology, 8*.

	Items
1	Working in a team increases my interest and motivation for the topics covered
2	The quality of the work improves when performed in a group
3	My grades improve when I work in a team
4	Teamwork is important for my training
5	Teamwork seems a waste of time to me*
6	I learn more when working alone than in a team*
7	I feel useful and appreciated by my teammates
8	I feel comfortable working with my classmates on team activities
9	Teamwork favors friendly relations
10	I am confident that my teammates will fulfill their share of the work
11	Teamwork helps me to know my classmates better
12	Consensus among the team members helps to make better decisions

León-del-Barco, B., Mendo-Lázaro, S., Felipe-Castaño, E., Fajardo- -Bullón, F., & Iglesias-Gallego, D., & (2018). Measuring Responsibility and Cooperation in Learning Teams in the University Setting: Validation of a Questionnaire. *Frontiers in Psychology, 9.*

Items of the instrument

(1) My teammates have put out maximum effort
(2) My teammates have worked hard on the team
(3) My teammates have performed well as a work team
(4) My teammates have behaved responsibly
(5) My teammates have worked responsibly so the group will reach the goals and perform the tasks
(6) My teammates have organized and coordinated themselves efficiently
(7) My teammates have prepared their share of the work efficaciously
(8) My teammates have contributed important information to the group
(9) My teammates have encouraged the others
(10) My teammates have positively solved the conflicts and problems in the group
(11) My teammates have accepted criticism and suggestions positively
(12) My teammates have acted with solidarity and a high degree of cohesion.
(13) My teammates have collaborated simultaneously in the performance of the tasks
(14) My teammates have cooperated with each other

Échelle du sentiment d'efficacité collective

(SEC, Heutte, 2011, adaptation de Schwarzer et Jerusalem, 1995)

Lisez attentivement chaque phrase et répondez, sur l'échelle située en face, en entourant un nombre correspondant le mieux à ce que vous pensez 1 = pas du tout d'accord à 7 = tout à fait d'accord.

pas du tout d'accord	très peu d'accord	un peu d'accord	Moyennement d'accord	Assez d'accord	Fortement d'accord	tout à fait d'accord
1	2	3	4	5	6	7

Généralement quand nous œuvrons ensemble...

01	Dans notre groupe, nous parvenons toujours à résoudre les problèmes difficiles si nous nous en donnons la peine.	1 2 3 4 5 6 7
02	Si quelqu'un nous fait obstacle, nous pouvons trouver un moyen pour obtenir ce que nous volons.	1 2 3 4 5 6 7
03	Il est facile pour nous de maintenir nos intentions et d'accomplir nos objectifs.	1 2 3 4 5 6 7
04	Dans notre groupe, nous avons confiance en nous pour faire face efficacement aux événements inattendus.	1 2 3 4 5 6 7
05	Grâce à nos compétences, nous savons gérer des situations inattendues.	1 2 3 4 5 6 7
06	Nous pouvons résoudre la plupart de nos problèmes si nous faisons les efforts nécessaires.	1 2 3 4 5 6 7
07	Nous restons calme lorsque nous sommes confrontés à des difficultés car nous pouvons nous reposer sur notre capacité à maîtriser les problèmes.	1 2 3 4 5 6 7
08	Lorsque nous sommes confrontés à un problème, nous pouvons habituellement trouver plusieurs idées pour le résoudre.	1 2 3 4 5 6 7
09	Si nous avons un problème, nous savons toujours quoi faire.	1 2 3 4 5 6 7
10	Quoiqu'il arrive, nous savons généralement faire face.	1 2 3 4 5 6 7

Heutte, J. (2011). *La part du collectif dans la motivation et son impact sur le bien-être comme médiateur de la réussite des étudiants : Complémentarités et contributions entre l'autodétermination, l'auto-efficacité et l'autotélisme.* Thèse de doctorat non publiée. Paris Ouest-Nanterre-La Défense (Paris X), Nanterre.

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35-37). Windsor, UK: NFERNELSON.

Échelle du sentiment d'efficacité collective au travail

Lisez attentivement chaque phrase et répondez sur l'échelle située en face en entourant un nombre correspondant le mieux à ce que vous pensez. 1 = pas du tout d'accord à 7 = tout à fait d'accord.

pas du tout d'accord	très peu d'accord	un peu d'accord	moyennement d'accord	assez d'accord	fortement d'accord	tout à fait d'accord
1	2	3	4	5	6	7

[strongly disagree] <----------> [totally agree]

SECcp - 01	01	Dans notre groupe, nous parvenons toujours à résoudre les problèmes difficiles si nous nous en donnons la peine.	1 2 3 4 5 6 7
SECcp - 02	02	Si quelqu'un nous fait obstacle, nous pouvons trouver un moyen pour obtenir ce que nous voulons.	1 2 3 4 5 6 7
SECcp - 03	03	Il est facile pour nous de maintenir nos intentions et d'accomplir nos objectifs.	1 2 3 4 5 6 7
SECcp - 04	04	Dans notre groupe, nous avons confiance en nous pour faire face efficacement aux événements inattendus.	1 2 3 4 5 6 7
SECcp - 05	05	Grâce à nos compétences, nous savons gérer des situations inattendues.	1 2 3 4 5 6 7
SECcp - 06	06	Nous pouvons résoudre la plupart de nos problèmes si nous faisons les efforts nécessaires.	1 2 3 4 5 6 7
SECcp - 07	07	Nous restons calmes lorsque nous sommes confrontés à des difficultés car nous pouvons nous reposer sur notre capacité à maîtriser les problèmes.	1 2 3 4 5 6 7
SECcp - 08	08	Lorsque nous sommes confrontés à un problème, nous pouvons habituellement trouver plusieurs idées pour le résoudre.	1 2 3 4 5 6 7
SECcp - 09	09	Si nous avons un problème, nous savons toujours quoi faire.	1 2 3 4 5 6 7
SECcp - 10	10	Quoiqu'il arrive, nous savons généralement faire face.	1 2 3 4 5 6 7

Catherine Piguet. *Autonomie dans les pratiques infirmières hospitalières, contribution à une théorie agentique du développement professionnel.* Education. Université de Nanterre – Paris X, 2008. Français.

Codification :
Faire la moyenne des items puisqu'il n'y a qu'une dimension.

Tapia, M. & Marsh, G. E. (2004). An Instrument to Measure Mathematics Attitudes. *Academic Exchange Quarterly, 8*(2), 16-21.

ATTITUDES TOWARD MATHEMATICS INVENTORY

Name _____ *School* _____

Teacher _____

Directions: This inventory consists of statements about your attitude toward mathematics. There are no correct or incorrect responses. Read each item carefully. Please think about how you feel about each item. Enter the letter that most closely corresponds to how each statement best describes your feelings. Please answer every question.

PLEASE USE THESE RESPONSE CODES:

A – Strongly Disagree
B – Disagree
C – Neutral
D – Agree
E – Strongly Agree

1.	Mathematics is a very worthwhile and necessary subject.	
2.	I want to develop my mathematical skills.	
3.	I get a great deal of satisfaction out of solving a mathematics problem.	
4.	Mathematics helps develop the mind and teaches a person to think.	
5.	Mathematics is important in everyday life.	
6.	Mathematics is one of the most important subjects for people to study.	
7.	High school math courses would be very helpful no matter what I decide to study.	
8.	I can think of many ways that I use math outside of school.	
9.	Mathematics is one of my most dreaded subjects.	
10.	My mind goes blank and I am unable to think clearly when working with mathematics.	
11.	Studying mathematics makes me feel nervous.	
12.	Mathematics makes me feel uncomfortable.	
13.	I am always under a terrible strain in a math class.	
14.	When I hear the word mathematics, I have a feeling of dislike.	
15.	It makes me nervous to even think about having to do a mathematics problem.	
16.	Mathematics does not scare me at all.	
17.	I have a lot of self-confidence when it comes to mathematics.	
18.	I am able to solve mathematics problems without too much difficulty.	
19.	I expect to do fairly well in any math class I take.	
20.	I am always confused in my mathematics class.	
21.	I feel a sense of insecurity when attempting mathematics.	
22.	I learn mathematics easily.	
23.	I am confident that I could learn advanced mathematics.	
24.	I have usually enjoyed studying mathematics in school.	
25.	Mathematics is dull and boring.	
26.	I like to solve new problems in mathematics.	
27.	I would prefer to do an assignment in math than to write an essay.	
28.	I would like to avoid using mathematics in college.	
29.	I really like mathematics.	
30.	I am happier in a math class than in any other class.	
31.	Mathematics is a very interesting subject.	
32.	I am willing to take more than the required amount of mathematics.	
33.	I plan to take as much mathematics as I can during my education.	
34.	The challenge of math appeals to me.	
35.	I think studying advanced mathematics is useful.	
36.	I believe studying math helps me with problem solving in other areas.	
37.	I am comfortable expressing my own ideas on how to look for solutions to a difficult problem in math.	
38.	I am comfortable answering questions in math class.	
39.	A strong math background could help me in my professional life.	
40.	I believe I am good at solving math problems.	

Alexander, L., & Martray, C. (1989). The Development of an Abbreviated Version of the Mathematics Anxiety Rating Scale. *Measurement And Evaluation In Counseling And Development, 22*(3), 143-50.

ABBREVIATED MATHEMATICS ANXIETY RATING SCALE (A-MARS) QUESTIONNAIRE

Please indicate the level of your anxiety in the following situations. Please choose ONE box on each line.

		Not at all	A little	A fair amount	Much	Very much
1.	Studying for a math test.	☐	☐	☐	☐	☐
2.	Taking math section of the college entrance exam.	☐	☐	☐	☐	☐
3.	Taking an exam (quiz) in a math course.	☐	☐	☐	☐	☐
4.	Taking an exam (final) in a math course.	☐	☐	☐	☐	☐
5.	Picking up math textbook to begin working on a homework assignment.	☐	☐	☐	☐	☐
6.	Being given homework assignments of many difficult problems that are due the next class meeting.	☐	☐	☐	☐	☐
7.	Thinking about an upcoming math test 1 week before.	☐	☐	☐	☐	☐
8.	Thinking about an upcoming math test 1 day before.	☐	☐	☐	☐	☐
9.	Thinking about an upcoming math test 1 hour before.	☐	☐	☐	☐	☐
10.	Realizing you have to take a certain number of math classes to fulfill requirements.	☐	☐	☐	☐	☐
11.	Picking up math textbook to begin a difficult	☐	☐	☐	☐	☐

Andamon, J.C., & Tan, D.A. (2018). Conceptual Understanding, Attitude And Performance In Mathematics Of Grade 7 Students. *International Journal of Scientific & Technology Research, 7(8).*

Students' attitude towards Mathematics.

1. I am sure that I can learn math.
2. I am sure of myself when I do math.
3. I think I can handle more difficult math.
4. I can get good grades in math.
5. I know I can do well in math
6. I am sure I can do advance work in math.
7. I don't think I could do advance in math *
8. Math is hard for me *
9. I'm not the type to do well in math*
10. Math has been my worst subject
11. Most subjects I can handle OK but I just can't do a good job with math *
12. I'm no good in math*
13. Knowing mathematics will help me earn a living
14. I'll need mathematics for my future work
15. Math is a worthwhile, necessary subject
16. I will use mathematics in many ways as an adult
17. I'll need a good understanding of math for my future work
18. I study math because I know how useful it is
19. Math will not be important to me in my life's work *
20. I don't expect to use math when I get out of school *
21. Taking math is a waste of time*
22. I see mathematics as something I won't use very often when I get out of high school *
23. Doing well in math is not important for my future*
24. Males are naturally better than females in math
25. Women can do just as well as men in math
26. Females are as good as males in Geometry
27. Women certainly are smart enough to do well in math
28. Studying math is just as good for women as for men
29. I would trust a female just as much as I would trust a male to solve math problems
30. It's hard to believe a female could be a genius in math
31. When a women has to solve a math problem , she should ask a man for help *
32. 32.I would have more faith in the answer for math problems solved by a man than a woman*
33. Women who enjoy studying math are little strange*
34. I would expect a woman mathematician to be a forceful type of person *
35. Males are not naturally better than females in math*
36. My teacher have been interested in my progress in math
37. I would talk to my math teachers about a career on math
38. It's hard to get math teachers to respect me
39. 39. My teacher have encouraged me to study more in math
40. 40. Math teachers have made me feel I have the ability to go on mathematics.
41. 41. My teachers want me to take all the math that I can
42. My teachers think I'm a person who could do well in math *
43. Getting a teacher to teach seriously in math is a problem *
44. I have a hard time getting teachers to talk seriously with me about math*
45. My teachers think advance math is a waste of time for me*
46. I feel that math teachers ignore me when I try to talk about something serious*
47. My teachers would not take me seriously if I told them I was interested in a career in math*

*- Negative indicators (Scoring was reversed)

Legend:

RATING	SCALE	QUALITATIVE DESCRIPTION	INTERPRETATION
5	4.50 – 5.00	Strongly agree	Highly positive
4	3.50 – 4.49	Agree	Positive
3	2.50 – 3.49	Uncertain	Moderately positive
2	1.50 – 2.49	Disagree	Negative
1	1.00 – 1.49	Strongly disagree	Highly negative

Vallières, E.F., & Vallerand, R.J. (1990). Traduction et Validation Canadienne-Française de L'échelle de L'estime de Soi de Rosenberg, *International Journal of Psychology, 25*, 305-316.

PERCEPTION PERSONNEL

Pour chacune des caractéristiques ou descriptions suivantes, indiquez à quel point chacune est vraie pour vous en encerclant le chiffre approprié.

Tout à fait en désaccord	Plutôt en désaccord	Plutôt en accord	Tout à fait en accord
1	2	3	4

1. Je pense que je suis une personne de valeur, au moins égale à n'importe qui d'autre.	1	2	3	4
2. Je pense que je possède un certain nombre de belles qualités.	1	2	3	4
3. Tout bien considéré, je suis porté-e à me considérer comme un-e raté-e.	1	2	3	4
4. Je suis capable de faire les choses aussi bien que la majorité des gens.	1	2	3	4
5. Je sens peu de raisons d'être fier-e de moi.	1	2	3	4
6. J'ai une attitude positive vis-à-vis moi-même.	1	2	3	4
7. Dans l'ensemble, je suis satisfait-e de moi.	1	2	3	4
8. J'aimerais avoir plus de respect pour moi-même.	1	2	3	4
9. Parfois je me sens vraiment inutile.	1	2	3	4
10. Il m'arrive de penser que je suis un-e bon-ne à rien.	1	2	3	4

CLÉ DE CODIFICATION

ÉES-10

 # 1, 2, 3*, 4, 5*, 6, 7, 8*, 9*, 10* Estime de soi

*** Énoncé formulé négativement, inverser la cote d'évaluation**

Schutte, N.S., Malouff, J.M., Hall, L.E., Haggerty, D.J., Cooper, J.T., Golden, C.J., & Dornheim, L. (1998). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25*, 167-177.

The 33-item emotional intelligence scale

(1) I know when to speak about my personal problems to others
(2) When I am faced with obstacles, I remember times I faced similar obstacles and overcame them
(3) I expect that I will do well on most things I try
(4) Other people find it easy to confide in me
(5) I find it hard to understand the non-verbal messages of other people*
(6) Some of the major events of my life have led me to re-evaluate what is important and not important
(7) When my mood changes, I see new possibilities
(8) Emotions are one of the things that make my life worth living
(9) I am aware of my emotions as I experience them
(10) I expect good things to happen
(11) I like to share my emotions with others
(12) When I experience a positive emotion, I know how to make it last
(13) I arrange events others enjoy
(14) I seek out activities that make me happy
(15) I am aware of the non-verbal messages I send to others
(16) I present myself in a way that makes a good impression on others
(17) When I am in a positive mood, solving problems is easy for me
(18) By looking at their facial expressions, I recognize the emotions people are experiencing
(19) I know why my emotions change
(20) When I am in a positive mood, I am able to come up with new ideas
(21) I have control over my emotions
(22) I easily recognize my emotions as I experience them
(23) I motivate myself by imagining a good outcome to tasks I take on
(24) I compliment others when they have done something well
(25) I am aware of the non-verbal messages other people send
(26) When another person tells me about an important event in his or her life, I almost feel as though I have experienced this event myself
(27) When I feel a change in emotions, I tend to come up with new ideas
(28) When I am faced with a challenge, I give up because I believe I will fail*
(29) I know what other people are feeling just by looking at them
(30) I help other people feel better when they are down
(31) I use good moods to help myself keep trying in the face of obstacles
(32) I can tell how people are feeling by listening to the tone of their voice
(33) It is difficult for me to understand why people feel the way they do*

Note: The authors permit free use of the scale for research and clinical purposes.
*These items are reverse scored.

The Schutte Self Report Emotional Intelligence Test (SSEIT)

Instructions: Indicate the extent to which each item applies to you using the following scale:

1 = strongly disagree
2 = disagree
3 = neither disagree nor agree
4 = agree
5 = strongly agree

1- Completely Disagree 7- Completely Agree

Cooper, A., & Petrides, K. V. (2010). A Psychometric Analysis of the Trait Emotional Intelligence Questionnaire-Short Form (TEIQue-SF) Using Item Response Theory. *Journal of Personality Assessment, 92*, 449-457.

Items

1. Expressing my emotions with words is not a problem for me.
2. I often find it difficult to see things from another person's viewpoint.
3. On the whole, I'm a highly motivated person.
4. I usually find it difficult to regulate my emotions.
5. I generally don't find life enjoyable.
6. I can deal effectively with people.
7. I tend to change my mind frequently.
8. Generally, I find it difficult to know exactly what emotion I'm feeling.
9. On the whole, I'm comfortable with the way I look.
10. I often find it difficult to stand up for my rights.
11. I'm usually able to influence the way other people feel.
12. On the whole, I have a gloomy perspective on most things.
13. Those close to me often complain that I don't treat them right.
14. I often find it difficult to adjust my life according to the circumstances.
15. On the whole, I'm able to deal with stress.
16. I often find it difficult to show my affection to those close to me.
17. I'm normally able to "get into someone's shoes" and experience their emotions.
18. I normally find it difficult to keep myself motivated.
19. I'm usually able to find ways to control my emotions when I want to.
20. On the whole, I'm pleased with my life.
21. I would describe myself as a good negotiator.
22. I tend to get involved in things I later wish I could get out of.
23. I'm generally aware of my emotions as I experience them.
24. Given my circumstances, I feel good about myself.
25. I tend to "back down" even if I know I'm right.
26. I don't seem to have any power at all over other people's feelings.
27. I generally believe that things will work out fine in my life.
28. I find it difficult to bond well even with those close to me.
29. Generally, I'm able to adapt to new environments.
30. Others admire me for being relaxed.

Questions 1-30 measure trait emotional intelligence using the Trait Emotional Intelligence Questionnaire—Short Form (TEIQue-SF) (Petrides & Furnham, 2006). Questions 1-30 provide scores for four factors: Well-being, self-control, emotionality, and sociability. Well-being is comprised of questions 5, 20, 9, 24, 12, and 27. Self-control is comprised of questions 4, 19, 7, 22, 15, and 30. Emotionality is comprised of questions 1, 16, 2, 17, 8, 23, 13, and 28. Sociability is comprised of 6, 21, 10, 25, 11, and 26. Questions 2, 4, 5, 7, 8, 10, 12, 13, 14, 16, 18, 22, 25, 26, and 28 are reverse-coded. Questions 3, 14, 18, and 29 contribute only to the global trait EI score.

Well being: 5*, 20, 9, 24, 12*, and 27

Self-control: 4*, 19, 7*, 22*, 15, and 30

Emotionality: 1, 16*, 2*, 17, 8*, 23, 13*, and 28*

Sociability: 6, 21, 10*, 25*, 11, and 26*

*** Reverse code = [7 – Answer]**

For example, if the answer of question 26 is 2, the reverse code is 7-2 = 5

Pour chaque énoncé ci-dessous, veuillez indiquer si vous êtes en accord ou en désaccord en entourant le chiffre correspondant à votre réponse selon l'échelle suivante :

1	–	2	–	3	–	4	–	5	–	6	–	7
Fortement en désaccord						Neutre						Fortement en accord

(Plus le chiffre est grand, plus la proposition s'applique à vous)

1. Exprimer mes émotions avec des mots n'est pas un problème pour moi. **1 2 3 4 5 6 7**
2. Je trouve souvent difficile de voir les choses du point de vue d'une autre personne. **1 2 3 4 5 6 7**
3. Dans l'ensemble, je suis une personne hautement motivée. **1 2 3 4 5 6 7**
4. D'habitude, je trouve difficile de réguler mes émotions. **1 2 3 4 5 6 7**
5. Je ne trouve généralement pas la vie agréable. **1 2 3 4 5 6 7**
6. Je m'y prends efficacement avec les gens. **1 2 3 4 5 6 7**
7. J'ai tendance à changer d'avis fréquemment. **1 2 3 4 5 6 7**
8. Souvent, je n'arrive pas à discerner quelle émotion je ressens exactement. **1 2 3 4 5 6 7**
9. Je pense avoir un certain nombre de qualités. **1 2 3 4 5 6 7**
10. Il m'et habituellement difficile de défendre mes droits. **1 2 3 4 5 6 7**
11. Je suis habituellement capable d'influencer la manière dont les autres se sentent. **1 2 3 4 5 6 7**
12. Dans l'ensemble, j'ai une perspective sombre sur la plupart des choses. **1 2 3 4 5 6 7**
13. Mes proches se plaignent souvent du fait que je ne les traite pas comme il faut. **1 2 3 4 5 6 7**
14. Je trouve souvent difficile d'adapter ma vie en fonction des circonstances. **1 2 3 4 5 6 7**
15. Dans l'ensemble, je suis capable de faire face au stress. **1 2 3 4 5 6 7**

Petrides, K. V., & Furnham, A. (2009). Technical manual for the trait emotional intelligence questionnaires (TEIQue). Lond Lond Psychom Lab.

16. Je trouve souvent difficile de montrer de l'affection à ceux qui me sont proches. **1 2 3 4 5 6 7**
17. Je suis habituellement capable de « me mettre dans la peau » des gens et ressentir leurs émotions. **1 2 3 4 5 6 7**
18. Je trouve habituellement difficile de me maintenir motivé(e). **1 2 3 4 5 6 7**
19. Je suis, la plupart du temps, capable de trouver des moyens pour contrôler mes émotions quand je le souhaite. **1 2 3 4 5 6 7**
20. Dans l'ensemble, je suis content(e) de ma vie. **1 2 3 4 5 6 7**
21. Je me décrirais comme un(e) bon(ne) négociateur/trice. **1 2 3 4 5 6 7**
22. J'ai tendance à m'impliquer dans des choses dont je voudrais ensuite pouvoir me sortir. **1 2 3 4 5 6 7**
23. Je prends souvent le temps de réfléchir à ce que je ressens. **1 2 3 4 5 6 7**
24. Je crois que je suis plein(e) de ressources personnelles. **1 2 3 4 5 6 7**
25. J'ai tendance à me laisser faire, même si je sais que j'ai raison. **1 2 3 4 5 6 7**
26. Apparemment, je n'ai aucun pouvoir du tout sur les sentiments des autres. **1 2 3 4 5 6 7**
27. Je crois, en général, que les choses se déroulent bien dans ma vie. **1 2 3 4 5 6 7**
28. Je trouve difficile de me lier tout à fait, même avec ceux qui me sont proches. **1 2 3 4 5 6 7**
29. Généralement, je suis capable de m'adapter à des nouveaux environnements. **1 2 3 4 5 6 7**
30. Les autres m'admirent d'être quelqu'un de détendu. **1 2 3 4 5 6 7**

3. In my interactions with students in this subject I try to develop a conversation with them about the topics we are studying
6. I set aside some teaching time so that the students can discuss, among themselves, key concepts and ideas in this subject
8. I encourage students to restructure their existing knowledge in terms of the new way of thinking about the subject that they will develop
9. In teaching sessions for this subject, I deliberately provoke debate and discussion
14. I make available opportunities for students in this subject to discuss their changing understanding of the subject
15. It is better for students in this subject to generate their own notes rather than copy mine
16. A lot of teaching time in this subject should be used to question students' ideas
18. I see teaching as helping students develop new ways of thinking in this subject
19. In teaching this subject it is important for me to monitor students' changed understanding of the subject matter
22. Teaching in this subject should help students question their own understanding of the subject matter
23. Teaching in this subject should include helping students find their own learning resources
1. In this subject students should focus their study on what I provide them
2. It is important that this subject should be completely described in terms of specific objectives that relate to formal assessment items
4. It is important to present a lot of facts to students so that they know what they have to learn for this subject
7. In this subject I concentrate on covering the information that might be available from key texts and readings
10. I structure my teaching in this subject to help students to pass the formal assessment items
11. I think an important reason for running teaching sessions in this subject is to give students a good set of notes
12. In this subject, I provide the students with the information they will need to pass the formal assessments
13. I should know the answers to any questions that students may put to me during this subject
17. In this subject my teaching focuses on the good presentation of information to students
21. My teaching in this subject focuses on delivering what I know to the students
25. I present material to enable students to build up an information base in this subject

Trigwell, K., Prosser, M. & Ginns, P. (2005). Phenomenographic pedagogy and a revised Approaches to teaching inventory. *Higher Education Research & Development, 24(4)*, 349-360,

Monestès, J.-L., Villatte, M., Mouras, H., Loas, G., & Bond, F. W. (2009). Traduction et validation française du questionnaire d'acceptation et d'action (AAQ-II). *Revue européenne de psychologie appliquée, 59,* 301-308.

AAQ-2 Version Française

Voici une liste d'affirmations. Merci d'évaluer à quel point chaque affirmation est vraie pour vous en entourant le chiffre qui correspond à votre réponse.

1	2	3	4	5	6	7
jamais vrai	très rarement vrai	rarement vrai	parfois vrai	souvent vrai	presque toujours vrai	Toujours vrai

1.	Si j'ai un souvenir désagréable, je le laisse venir.	1	2	3	4	5	6	7
2.	Mes expériences et mes souvenirs douloureux me gênent pour conduire ma vie comme il me tiendrait à cœur de le faire. 'I'	1	2	3	4	5	6	7
3.	J'ai peur de mes émotions. 'I'	1	2	3	4	5	6	7
4.	J'ai peur ne pas être capable de contrôler mes inquiétudes et mes émotions. 'I'	1	2	3	4	5	6	7
5.	Mes souvenirs douloureux m'empêchent de m'épanouir dans la vie. 'I'	1	2	3	4	5	6	7
6.	J'ai le contrôle de ma vie.	1	2	3	4	5	6	7
7.	Les émotions sont une source de problèmes dans ma vie. 'I'	1	2	3	4	5	6	7
8.	J'ai l'impression que la plupart des gens gèrent leur vie mieux que moi. 'I'	1	2	3	4	5	6	7
9.	Mes soucis m'empêchent de réussir. 'I'	1	2	3	4	5	6	7
10.	Mes pensées et mes émotions ne m'empêchent pas de vivre ma vie comme je le veux.	1	2	3	4	5	6	7

1) I strongly disagree, 2) I moderately disagree, 3) I slightly disagree, 4) I slightly agree, 5) I moderately agree, 6) I strongly agree

Pennycook, G., Cheyne, J.A., Koehler, D.J., & Fugelsang, J.A. (2020). On the belief that beliefs should change according to evidence: Implications for conspiratorial, moral, paranormal, political, religious, and science beliefs, *Judgment and Decision Making, 15*(4), 476-498.

TABLE 1: The Actively Open-minded Thinking about Evidence (AOT-E) scale. Items 3, 4, 5, 7 & 8 are reverse scored.

#	Item	AOT Subscale
1	A person should always consider new possibilities.	AOT
2	People should always take into consideration evidence that goes against their beliefs.	AOT
3	It is important to persevere in your beliefs even when evidence is brought to bear against them. (rev)	Belief Identification
4	Certain beliefs are just too important to abandon no matter how good a case can be made against them. (rev)	Belief Identification
5	One should disregard evidence that conflicts with your established beliefs. (rev)	Belief Identification
6	Beliefs should always be revised in response to new information or evidence.	Belief Identification
7	No one can talk me out of something I know is right. (rev)	Dogmatism
8	I believe that loyalty to one's ideals and principles is more important than "open-mindedness". (rev)	Openness-Values

TABLE 7: A revised Actively Open-minded Thinking about Evidence (AOT-E) scale that asks about "opinions" instead of "beliefs".

Original AOT-E	Revised AOT-E
A person should always consider new possibilities.	A person should always consider new information.
People should always take into consideration evidence that goes against their beliefs.	People should always take into consideration evidence that goes against their opinions.
It is important to persevere in your beliefs even when evidence is brought to bear against them. (rev)	It is important to persevere in your opinions even when evidence is brought to bear against them. (rev)
Certain beliefs are just too important to abandon no matter how good a case can be made against them. (rev)	Certain opinions are just too important to abandon no matter how good a case can be made against them. (rev)
One should disregard evidence that conflicts with your established beliefs. (rev)	One should disregard evidence that conflicts with your established opinions. (rev)
Beliefs should always be revised in response to new information or evidence.	Opinions should always be revised in response to new information or evidence.
No one can talk me out of something I know is right. (rev)	It is possible for someone to convince me to change my mind.
I believe that loyalty to one's ideals and principles is more important than "open-mindedness". (rev)	I believe that loyalty to one's ideals and principles is more important than "open-mindedness". (rev)

responded on a 7-point scale from 1) Strongly disagree to
7) Strongly agree

Science beliefs.

Name	Item
Global warming	Global warming is at least partly caused by human activity and is a serious problem for the environment.
Big Bang	The big bang theory is, generally speaking, the best explanation we have so far for the origin of our universe.
Evolution	Evolution is the best explanation so far for our origins.
Old Earth	The universe is billions of years old.
Stem Cells	Stem cell research is a productive enterprise.
Vaccines/Autism	Vaccines can cause autism in children. (rev)
Modern Medicine	Modern medicine is the most effective means of treating most diseas
Genetics	An individual's genes play an important role in their life success.
Detoxing	It is possible (and advisable) to "detox" the body from chemicals. (re
IQ Heritability	Human intelligence is moderately heritable (that is, intelligence is partly determined by genetics).
Tech Problems	Technology causes more problems than it helps solve. (rev)
GMO/Health	Genetically modified foods are hazardous to human health. (rev)
Nuclear Power	Nuclear power is a safe and viable source of energy.

From totally disagree (score 1) to totally agree (score 5).

Van Aalderen-Smeets, S., & van der Molen, J.W. (2013). Measuring Primary Teachers' Attitudes Toward Teaching Science: Development of the Dimensions of Attitude Toward Science (DAS) Instrument, *International Journal of Science Education*.

Code	Items
S2	I am well able to deal with questions from pupils about science
S1	I have enough knowledge of the content of science to teach these subjects well in primary school
S3	I have a sufficient command of the material to be able to support children well in investigating and designing in class
S4	If primary school children do not reach a solution during assignments about science, I think I can succeed in helping them make further progress
R2	I think that science must be anchored in primary education as early as possible
R1	I think that science education is essential for primary school children's development
R3	I think that science education is essential for making primary school pupils more involved in technological problems in society
R5	I think that science education in the primary school is essential for pupils to be able to make good choices about their studies (e.g. profile choice and choice of a course)
R4	Science education is so important in the primary school that inexperienced teachers should receive additional training in this area
G2	I think that male primary school teachers experience more enjoyment in teaching science than female teachers
G5	I think that boys at primary school would be more likely than girls to choose assignments that are concerned with science
G1	I think that male primary school teachers can do an investigation or technical assignment with pupils more easily than female teachers
G4	I think that boys in primary schools are more enthusiastic about experimenting with materials and chemical substances than girls are
G3	I think that I would unconsciously be more likely to choose a boy for a science demonstration than a girl
A4	I feel tense while teaching science in class
A3	I feel nervous while teaching science
A1	Teaching science makes me nervous
A2	I feel stressed when I have to teach science in my class
D2	I think that most primary school teachers find it difficult to teach subjects concerning science
D3	I think that most primary school teachers find science a difficult subject to teach in terms of content
D1	I think that teachers find the topics that come up in science complicated
C2	For me, the availability of a ready-to-use existing package of materials (e.g. *Techniektorens*) is essential to teaching science in class
C1	For me, the availability of a science teaching method (e.g. *Natuniek*, *Leefwereld*) is decisive for whether or not I will teach science in class
C3	For me, the support of my colleagues and the school is decisive for whether or not I will teach science in class[b]
E3	I feel happy while teaching science
E4	Teaching science makes me cheerful
E2	I enjoy teaching science very much
E1	Teaching science makes me enthusiastic

Pourquoi voulez-vous bien réussir au test d'évaluation (formative ou sommatif) ?

1- Par ce que j'aime toujours bien réussir un test.
2- Je ressens un plaisir à réussir chaque question du test.
3- Parce que je crois qu'il est de mon intérêt de bien réussir au test.
4- Parce que grâce aux bonnes notes, je pourrai choisir ma future profession.
5- Parce que les entreprises recherchent les élèves qui ont de très bonnes notes pour assurer la relève.
6- Je le saurai peut-être un jour.
7- Parce que ça me met toujours de bonne humeur.
8- Parce que je ressens un réel plaisir à faire les tests.
9- Parce que cela m'encourage à poursuivre mes études.
10- Franchement, je n'ai aucune idée.
11- Parce que ma réussite dépend de ma bonne réussite aux tests.
12- Parce que j'adore vérifier mes connaissances dans les tests.
13- Parce qu'il me faut de bonnes notes pour aller où je voudrais poursuivre ma carrière professionnelle.
14- Parce que cela me permet d'entrer dans les cégeps réputés.
15- Je fais ce que j'ai à faire, un point c'est tout.
16- Parce que cela me prépare à un bon emploi.
17- Il n'existe pas de raison pour qui que ce soit.
18- Parce que pour moi, répondre à un test c'est le meilleur moment de la vie à l'école.
19- Parce que je me sens bien dans ma peau après.
20- Parce que j'ai toujours eu de bonnes notes, cela doit continuer.
21- Parce que pour faire de longues études, je dois avoir de bonnes notes.
22- Il est difficile de dire pourquoi.
24- Pour le plaisir que je ressens quand je me donne à 100% dans un test.
25- C'est plus fort que moi, c'est un plaisir inexplicable de bien réussir un test.
26- C'est sans importance pour moi.
27- Pour prouver à moi-même que je suis capable de bien réussir un test.
28- Parce que c'est très stimulant de répondre correctement à chaque question du test.
29- Au fond, je ne sais pas pourquoi.
30- Parce que mes parents apprécient souvent mon bon résultat.
32- Il n'y a aucune raison évidente (claire) à mes yeux.

Ndinga, P., & Frenette, E. (2010). Elaboration et validation de l'Echelle de motivation à bien réussir un test (ÉMRT). *Mesure et évaluation en éducation, 33*(3), 99-123.

Motivation extrinsèque : items 1, 2, 8, 12, 18, 24, 25 et 28. Motivation extrinsèque autodéterminée : items 3, 7, 9, 11, 16, 19, 20 et 27. Motivation extrinsèque non autodéterminée : items 4, 5, 13, 14,21 et 30. Amotivation : items 6, 10, 15, 17, 22, 26, 29 et 32.

Échelle d'apprentissage autorégulé en ligne (EAREL)

Ce questionnaire a pour but de mieux connaître vos méthodes de travail en ligne, celles que vous utilisez habituellement pour étudier un cours, réaliser les travaux demandés ou vous préparer à un examen. Il n'y a pas de bonne réponse, chacun a sa façon de faire personnelle et plusieurs méthodes peuvent mener au succès. Lisez attentivement chaque phrase et répondez, sur l'échelle située en face, en entourant un nombre de 1 = pas du tout à 7 = tout à fait.

pas du tout	très peu	un peu	moyennement	assez	fortement	tout à fait
1	2	3	4	5	6	7

[strongly disagree] <----------->[totally agree]

Vos méthodes de travail en ligne

01	Quand j'étudie un cours en ligne, je commence par prendre des notes à partir des différents documents fournis.	1	2	3	4	5	6	7
02	Il m'est très difficile de faire un planning de travail sur mes activités en ligne et de m'y tenir.	1	2	3	4	5	6	7
03	Je sais où je peux étudier le plus efficacement pour les cours en ligne.	1	2	3	4	5	6	7
04	Je vais sur les forums pour partager mes problèmes avec les autres étudiants.	1	2	3	4	5	6	7
05	Quand je ne vois vraiment pas comment m'y prendre dans mes cours en ligne, je demande conseil à d'autres étudiants.	1	2	3	4	5	6	7
06	Je choisis un moment où je pense ne pas être trop distrait pour étudier sur mes cours en ligne.	1	2	3	4	5	6	7
07	Sur mes activités en ligne me mettre au travail me demande en général beaucoup d'efforts.	1	2	3	4	5	6	7
08	Quand j'ai un cours en ligne à étudier, j'imagine à quel moment je devrais le faire pour être le plus efficace possible	1	2	3	4	5	6	7
09	Je cherche à m'approprier le contenu des cours en ligne en prenant des notes.	1	2	3	4	5	6	7
10	Je discute avec d'autres étudiants de certains points de cours qui ne sont pas clairs	1	2	3	4	5	6	7
11	Je me mets dans un endroit confortable pour étudier en ligne.	1	2	3	4	5	6	7
12	Je n'arrive pas à me motiver pour travailler sur mes cours en ligne.	1	2	3	4	5	6	7
13	J'échange avec les autres étudiants pour savoir si nous avons compris la même chose.	1	2	3	4	5	6	7
14	Je fais des brefs résumés ou des schémas pour organiser les connaissances lorsque j'étudie un cours en ligne.	1	2	3	4	5	6	7
15	J'ai du mal à rester concentré et à aller jusqu'au bout lorsque j'étudie un cours en ligne.	1	2	3	4	5	6	7
16	Pour étudier en ligne, je choisis un endroit qui me protège des distractions.	1	2	3	4	5	6	7
17	Je vais sur les réseaux sociaux pour partager mes problèmes avec les autres étudiants.	1	2	3	4	5	6	7
18	Je fais un résumé de ce que j'ai appris dans les cours en ligne afin de vérifier ma compréhension des cours.	1	2	3	4	5	6	7
19	Sur mes activités en ligne, souvent j'éprouve un tel sentiment d'ennui en pensant au travail à faire que je n'arrive pas à m'y mettre.	1	2	3	4	5	6	7
20	J'arrange l'endroit où je vais étudier en ligne pour qu'il soit agréable.	1	2	3	4	5	6	7

Cosnefroy, L., Fenouillet, F., & Heutte, J. (2020). Construction et validation de l'échelle d'autorégulation des apprentissages en ligne (EAREL). Canadian Journal of Behavioral Science/Revue Canadienne des Sciences du Comportement, 52(3), 255-260.

21	Je copie les parties des documents que je trouve intéressantes pour les intégrer dans mes notes.	1	2	3	4	5	6	7
22	Quand j'étudie un cours en ligne, je relis mes notes encore et encore pour m'aider à me souvenir du contenu.	1	2	3	4	5	6	7
23	Sur mes activités en ligne je recule sans cesse le moment d'étudier et fais tout au dernier moment quelle que soit la discipline.	1	2	3	4	5	6	7
24	J'échange avec les autres étudiants pour savoir comment s'y prendre dans les cours en ligne.	1	2	3	4	5	6	7

Codification :
Procrastination (PROC) → items renversés/contraires (PROC(r)) : items 2, 7, 12, 15, 19, 23
Contrôle du contexte d'apprentissage (CTXTE) : items 3, 6, 8, 11, 16, 20
Stratégies d'apprentissage (STRAT) : items 1, 9, 14, 18, 21, 22
Soutient des pairs (PAIRS) : items 4, 5, 10, 13, 17, 24

Sanquirgo, N., Oberlé, D., & Chekroun, P. (2012).L'échelle de besoin d'appartenance : validation française et rôle dans les réactions à la déviance. *L'Année psychologique, 112*(1), 85-113.

Échelle de satisfaction en formation en ligne (ESEL)

Lisez attentivement chaque phrase et répondez sur l'échelle située en face en entourant un nombre correspondant le mieux à ce que vous pensez. 1 = pas du tout d'accord à 7 = tout à fait d'accord.

pas du tout d'accord	très peu d'accord	un peu d'accord	moyennement d'accord	assez d'accord	fortement d'accord	tout à fait d'accord
1	2	3	4	5	6	7

[strongly disagree] <----------->[totally agree]

Les termes en *italique* peuvent être modifié afin de contextualiser l'échelle.

ESEL-UP1	01	Cette formation va influencer positivement ma capacité à être efficace dans mon travail *(ou dans mon futur travail).*	1 2 3 4 5 6 7
ESEL-DP1	02	J'ai trouvé cette formation difficile à suivre.	1 2 3 4 5 6 7
ESEL-FOR1	03	À mon avis, au regard du programme de la formation, le contenu était pertinent.	1 2 3 4 5 6 7
ESEL-METH2	04	Le déroulé de la formation ou les exposés ou les cas pratiques m'ont permis de prendre une part active dans la formation.	1 2 3 4 5 6 7
ESEL-DP2	05	J'ai trouvé que les questions abordées durant la formation étaient difficiles.	1 2 3 4 5 6 7
ESEL-UP2	06	Cette formation a une grande valeur pratique pour mon travail *(ou pour mon futur travail).*	1 2 3 4 5 6 7
ESEL-METH8	07	Le déroulé de la formation ou les exposés ou les cas pratiques m'ont permis un partage enrichissant avec les autres personnes en formation sur les pratiques *des organisations (administration, entreprise, établissement...).*	1 2 3 4 5 6 7
ESEL-FOR2	09	L'animation de la formation était d'une grande qualité.	1 2 3 4 5 6 7
ESEL-METH3	10	Le déroulé de la formation ou les exposés ou les cas pratiques employés m'ont permis de partager des expériences professionnelles *avec d'autres personnes en formation.*	1 2 3 4 5 6 7

Yennek, N., Fenouillet, F. & Heutte, J. (2015, juin), *Proposition d'une échelle de satisfaction en formation en ligne (ESEL),* Colloque international e-Formation des Adultes et Jeunes Adultes, Lille, France.

ESEL-UP5	11	Cette formation va me permettre d'améliorer mes compétences professionnelles dans mon travail *(ou dans mon futur travail).*	1 2 3 4 5 6 7
ESEL-FOR4	12	*Les animateurs, personnes ressources et les tuteurs* ont été à l'écoute des questions *des personnes en formation.*	1 2 3 4 5 6 7
ESEL-DP8	13	Suivre cette formation m'a demandé beaucoup d'effort.	1 2 3 4 5 6 7
ESEL-INT4	14	Si j'ai besoin de me former pour développer mes compétences professionnelles, j'ai l'intention d'avoir à nouveau recours à un dispositif semblable à *ce MOOC* si cela m'est possible.	1 2 3 4 5 6 7
ESEL-INT6	15	J'ai l'intention de suivre d'autres formations via *un MOOC* chaque fois que cela me sera possible.	1 2 3 4 5 6 7
ESEL-INT7	16	Je préfère avoir recours à *un MOOC* si je dois suivre une formation en lien avec mon activité professionnelle.	1 2 3 4 5 6 7
ESEL-INT8	17	Je pense recommander les formations réalisées dans *un MOOC* à d'autres personnes.	1 2 3 4 5 6 7

Codification :

Satisfaction :

- Dimension Utilité perçue (UP) : items 1, 6, 11
- Dimension Difficulté perçue (DP) : items 2, 5, 13
- Dimension Formateur (FOR) : items 3, 9, 12
- Dimension Méthodes pédagogiques (METH) : items 4, 7, 10

Intentionnalité de réutiliser un MOOC (INT) : items 14, 15, 16, 17

(Le cas échéant, il est possible d'adapter l'échelle en remplaçant le terme « ce/un MOOC » pour un contexte lié à un autre dispositif de formation en ligne)

Échelle de perception de qualité dans les MOOC (QualFAD)

Ce questionnaire a pour but de connaître la perception des apprenants quant à la qualité dans les MOOC ou en formation à distance. Pour la version formation à distance, merci de simplement remplacer MOOC par cours. Lisez attentivement chaque phrase et répondez, sur l'échelle située en face, en entourant un nombre de 1 = très en désaccord à 6 = tout à fait en accord.

pas du tout	très peu	un peu	moyennement	assez	fortement
1	2	3	4	5	6

[strongly disagree] <----------->[totally agree]

01	L'environnement d'apprentissage était facile d'utilisation.	1	2	3	4	5	6
02	La navigation dans le MOOC était claire et facile.	1	2	3	4	5	6
03	Les vidéos étaient faciles à comprendre.	1	2	3	4	5	6
04	Les questions des quiz et exercices étaient d'un niveau adéquat.	1	2	3	4	5	6
05	Des possibilités de collaborer avec d'autres étudiants étaient présentes.	1	2	3	4	5	6
06	Les renseignements donnés sur le MOOC m'ont permis de bien planifier mon cheminement.	1	2	3	4	5	6
07	Les questions soumises après les vidéos m'ont incité à m'engager dans les activités.	1	2	3	4	5	6
08	Le matériel et les activités d'apprentissage proposées favorisaient un engagement actif de ma part.	1	2	3	4	5	6
09	Du personnel d'encadrement était disponible pour répondre aux questions sur le MOOC.	1	2	3	4	5	6
10	Les renseignements donnés sur le MOOC étaient bien structurés.	1	2	3	4	5	6
11	Les ressources du MOOC sont facilement accessibles par différents moyens.	1	2	3	4	5	6
12	En cas de problème technique, du soutien était disponible.	1	2	3	4	5	6
13	Les enseignants dans les vidéos maitrisent bien les contenus présentés.	1	2	3	4	5	6
14	Le choix des sujets des vidéos était pertinent.	1	2	3	4	5	6
15	En cas de problème technique, je pouvais obtenir un soutien approprié.	1	2	3	4	5	6
16	Les enseignants de ce MOOC étaient crédibles.	1	2	3	4	5	6
17	Les questions incorporées dans les vidéos m'ont incité à m'engager dans les activités.	1	2	3	4	5	6
18	La compétence des enseignants de ce MOOC était manifeste.	1	2	3	4	5	6
19	Les exemples utilisés étaient clairs et pertinents.	1	2	3	4	5	6
20	Si j'éprouvais de la difficulté sur le plan de la compréhension de certains aspects du MOOC, je pouvais obtenir un soutien approprié.	1	2	3	4	5	6
21	Il était possible d'identifier facilement d'autres participants du MOOC.	1	2	3	4	5	6
22	Il était facile de communiquer avec d'autres participants du MOOC	1	2	3	4	5	6
23	Des exemples étaient fournis pour aider à comprendre la théorie.	1	2	3	4	5	6
24	L'environnement d'apprentissage était facile d'utilisation.	1	2	3	4	5	6
25	La navigation dans le MOOC était claire et facile.	1	2	3	4	5	6
26	Des possibilités de communiquer avec d'autres étudiants étaient présentes.	1	2	3	4	5	6
27	Dans ce MOOC, l'évaluation des apprentissages était juste et équitable.	1	2	3	4	5	6

Poellhuber, B et Roy, N. (2018). Satisfaction des adultes et perceptions de la qualité en formation donnée par les MOOC. Dans A. Jézégou, P.-A. Caron et J. Heutte *Actes du Colloque e Formation des jeunes et des adultes 2018*. Lille (France), mars 2018.

28	Des moyens d'accéder aux contenus autres que la vidéo étaient offerts.	1	2	3	4	5	6
29	Les rétroactions données dans les corrigés étaient utiles.	1	2	3	4	5	6
30	Les vidéos étaient engageantes.	1	2	3	4	5	6
31	Les vidéos étaient d'une longueur adéquate.	1	2	3	4	5	6
32	L'accès à l'environnement du MOOC était toujours disponible.	1	2	3	4	5	6
33	Les questions des quiz et exercices étaient claires et sans pièges.	1	2	3	4	5	6
34	Les renseignements donnés sur le MOOC étaient clairs.	1	2	3	4	5	6
35	Si j'éprouvais de la difficulté sur le plan de la compréhension des exigences du MOOC, je pouvais obtenir un soutien approprié.	1	2	3	4	5	6
36	Les rétroactions données dans les quiz étaient éclairantes.	1	2	3	4	5	6

Codification :

Dimensions Clarté :

- Clarté – accès : items 11, 28, 32
- Clarté – information : items 6, 10, 34
- Clarté – navigation : items 1, 2, 24, 25

Dimensions Communication :

- Communication – collaboration : items 5, 21, 22, 26
- Communication – soutien : items 9, 12, 15, 20, 35

Dimensions Interactivité :

- Interactivité – engagement : items 7, 8, 17
- Interactivité – évaluations : items 4, 27, 33
- Interactivité – rétroactions : items 29, 36

Dimensions Contenus :

- Contenus – exemples : items 19, 23
- Contenus – formateurs : items 13, 16, 18
- Contenus – vidéos : items 3, 14, 30, 31

Formule pour calculer l'échelle de perception de qualité dans les MOOC (QualFAD)

Chaque sous-échelle se calcule en faisant la moyenne des 2 à 5 items qui la composent

Chaque échelle se calcule à partir non pas de la moyenne des sous-échelles, mais de la moyenne de l'ensemble des items constituant les sous-échelles

Variante de l'échelle :

Cette échelle a également été validée avec une version « Importance accordée à », avec comme objectif de pouvoir faire un test T avec données appariées pour comparer la perception de qualité avec l'importance accordée aux critères de qualité.

Il suffit de conserver les mêmes items et de proposer une deuxième échelle de réponse, de 1 = Peu important pour moi à 6 = Très important pour moi.

Jézégou, A. (2010). Le dispositif GEODE pour évaluer l'ouverture d'un environnement éducatif. *Journal of Distance Education / Revue de l'Éducation à Distance, 24* (2), 83-108.

N° de composante GEODE	Modalité 1 d'apprentissage de 'environnement leducatif :		Pas du tout libre	Pas vrai-ment libre	Moyenn-ement libre	Plutôt libre	Tout à fait libre
1	L'accès	L'apprenant est-il libre d'accéder à la formation au moment qui lui convient le mieux ?					
2	Le lieu	L'apprenant est-il libre de choisir les (le) lieu(x) les plus adaptés à ses possibilités pour se former ?					
3	Le temps	L'apprenant est-il libre de choisir ses horaires en fonction de ses disponibilités ?					
4	Le rythme	L'apprenant est-il libre de choisir le rythme qui lui convient le mieux pour se former ?					
5	Les objectifs	L'apprenant est-il libre de choisir les objectifs à atteindre au travers de sa formation et de ses apprentissages ?					
6	Le cheminement	L'apprenant est-il libre de choisir le cheminement d'apprentissage qui lui convient le mieux ?					
7	La séquence	L'apprenant est-il libre de choisir le séquencement ou l'ordre de succession des activités pédagogiques ?					
8	Les méthodes	L'apprenant est-il libre de choisir les méthodes pédagogiques qui lui conviennent le mieux (conventionnelles, actives, etc.)?					
9	Le format	L'apprenant est-il libre de choisir de travailler seul, à deux ou en groupe ?					
10	Les contenus	L'apprenant est-il libre de choisir les contenus théoriques et/ou pratiques qui lui conviennent le mieux ?					
11	Les supports	L'apprenant est-il libre de choisir les supports d'apprentissage qui lui conviennent le mieux (polycopiés, ouvrages, textes numérisés, vidéo et/ou audio en ligne ou non, etc.) ?					
12	L'évaluation	L'apprenant est-il libre de choisir les modalités d'évaluation de sa formation et de ses apprentissages ?					
13	Les outils de communication	L'apprenant est-il libre de choisir les outils qui lui conviennent le mieux pour, si besoin, communiquer et interagir avec les formateurs et les autres apprenants (téléphone, messagerie, forum, chat, wiki, etc.) ?					
14	Les personnes-ressources	L'apprenant est-il libre de choisir les personnes-ressources qui lui conviennent le mieux pour l'aider dans sa formation et dans ses apprentissages ?					

Lors de la passation du questionnaire GEODE, chaque formateur estime donc sur une échelle de Likert le degré de liberté de choix ouvert au regard de chacune des quatorze composantes. À chaque réponse possible est codifié un degré de liberté de choix (DLC) :

Tableau 5. Codification des degrés de liberté de choix ou d'ouverture

Réponses possibles	DLC : Degré de Liberté de Choix
L'apprenant n'est **pas du tout libre** de choisir	0
L'apprenant n'est **pas vraiment libre** de choisir	1
L'apprenant est **moyennement libre** de choisir	2
L'apprenant est **plutôt libre** de choisir	3
L'apprenant est **tout à fait libre** de choisir	4

La deuxième phase du protocole GEODE consiste à traiter, par étapes successives, les données ainsi recueillies en appliquant des bases de calcul spécifiques :

Tableau 6. GEODE : les cinq étapes de traitement des données

GEODE : étapes de traitement des données		
Étape 1	Calcul du DLC moyen par composante et ceci pour chacune des modalités d'apprentissage	Données du questionnaire GEODE **Base de calcul :** *DLC moyen de la composante = ∑ DLC attribués par les formateurs / nb de formateurs* Résultat à arrondir au 0,1 supérieur
Étape 2	Calcul du score GEODE de chacune des quatorze composantes de l'environnement éducatif	**Base de calcul :** *Score de la composante = [(Proportion de la modalité 1 x DLC moyen) + (Proportion de la modalité 2 x DLC moyen) + (Proportion de la modalité N x DLC moyen)] x coefficient de pondération de la composante* Proportion des différences modalités à exprimer en centième en fonction du pourcentage de volume horaire obtenu Coefficient de la composante : voir tableau de compilation GEODE (Tableau 7 en annexe 2 dans cet article) Résultat à arrondir l'unité supérieure
Étape 3	Calcul du degré d'ouverture en % de chacune des quatorze composantes	**Base de calcul :** *Degré d'ouverture de la composante en % = [score de la composante/score maximum possible] x 100* Score maximum possible : coefficient de la composante x 4. Voir tableau de compilation GEODE (Tableau 7 en annexe 2 dans cet article) Résultat à arrondir l'unité supérieure
Étape 4	Si besoin, calcul du degré d'ouverture en % de chacune des trois catégories de composantes	**Base de calcul :** *Degré d'ouverture d'une catégorie de composantes en % = [∑ des scores des composantes liées à cette catégorie / ∑ des scores maximum possibles liés à ces mêmes composantes[4]] x 100.* Résultat à arrondir à l'unité supérieure Catégorisation de chacune des trois catégories de composantes (Tableau 8 ci-après)
Étape 5	Calcul du degré d'ouverture en % de l'environnement étudié	**Base de calcul :** *Degré d'ouverture de l'environnement éducatif en % = [∑ scores des 14 composantes / 157,6] x 100* Résultat à arrondir à l'unité supérieure Typologie des environnements éducatifs en fonction de leur degré d'ouverture (Tableau 8 ci-après)

Tableau 8. Typologie des environnements éducatifs en fonction de leur degré d'ouverture d'après Jézégou (2005)

Degré d'ouverture en %	Typologie d'environnement éducatif
100 ≥ score > 90	hautement ouvert +
90 ≥ score > 80	hautement ouvert
80 ≥ score > 70	hautement ouvert -
70 ≥ score > 60	moyennement ouvert +
60 ≥ score > 50	moyennement ouvert
50 ≥ score > 40	moyennement ouvert -
40 ≥ score > 30	peu ouvert +
30 ≥ score > 20	peu ouvert
20 ≥ score > 10	peu ouvert -
10 ≥ score	Fermé

Ciarocco, N. J., & Strohmetz, D. B. (2018). The Employable Skills Self-Efficacy Survey: An assessment of skill confidence for psychology undergraduates. *Scholarship of Teaching and Learning in Psychology, 4*(1), 1–15.

Employable Skills Self-Efficacy Survey

Please indicate your level of agreement with the following statements using these options:

1	2	3	4	5	6
Strongly Disagree	*Disagree*	*Somewhat Disagree*	*Somewhat Agree*	*Agree*	*Strongly Agree*

_____ 1. I feel comfortable working in group settings.
_____ 2. I would rather be the person who gets to lead a group project.
_____ 3. People easily understand what I mean when I am talking to them.
_____ 4. I struggle to manipulate numbers in a spreadsheet.
_____ 5. Writing is not a strong skill for me.
_____ 6. I can easily think of ways for testing my research questions.
_____ 7. I prefer not to volunteer for more than I have to already do.
_____ 8. I can persuasively present my ideas through my writing.
_____ 9. My mind seems to go blank when I have to speak in front of a group of people.
_____ 10. I have difficulty delegating when working in groups.
_____ 11. I feel uncomfortable in professional settings.
_____ 12. I have trouble evaluating the quality of information I get from publications.
_____ 13. I struggle to gather the information from reliable sources.
_____ 14. People often misunderstand my point when reading my writing.
_____ 15. I have difficulty planning a project from start to finish.
_____ 16. I typically remember all information I read.
_____ 17. Others sometimes believe that I can be somewhat unreliable in meeting deadlines.
_____ 18. My mind tends to wander when someone is verbally telling me what needs to be done.
_____ 19. It is easy for me to follow written directions.
_____ 20. I can easily use software to create tables and graphs to effectively display information.
_____ 21. I am eager to learn new information.
_____ 22. When I have multiple projects, I can easily set priorities.
_____ 23. I do what it takes to finish a project even if I do not find it enjoyable.
_____ 24. I often have difficulty verbally expressing my thoughts to others.
_____ 25. I can easily fit into any group work setting.
_____ 26. It is easy for me to use the scientific approach when solving problems.
_____ 27. Professional writing is easy for me.
_____ 28. I am easily overwhelmed by data.
_____ 29. It is difficult for me to remember information I only hear.
_____ 30. I am confident whenever I need to a lead a group project.
_____ 31. I know where to find relevant information from good sources when I need it.
_____ 32. It is easy for me to find the information that I need using search engines such as Google.
_____ 33. It is easy for me to follow verbal directions.
_____ 34. I am an effective leader in group settings.
_____ 35. I usually understand information that I read.
_____ 36. I like having opportunities to improve my leadership skills.
_____ 37. I am comfortable learning to use new technology when working on a project.
_____ 38. I am not sure what it means to dress "professionally."
_____ 39. I typically comprehend information that someone tells me verbally.
_____ 40. It is easy for me to integrate information from a wide of variety of sources.
_____ 41. I struggle to manage my time.
_____ 42. I rarely procrastinate when working on projects.
_____ 43. I prefer to work alone on projects.
_____ 44. It is easy for me to use data when making decisions.
_____ 45. I have trouble working in groups successfully.
_____ 46. I struggle with being self-motivated in my work.
_____ 47. I have the analytical skills to work with data.
_____ 48. I often feel lost when trying to read professional publications.
_____ 49. I can persuasively present my ideas in talking with others.
_____ 50. I think I do some of my best work in group settings.
_____ 51. I can easily organize information into a database.

SCORING KEY *(NOTE: "r" indicates the item rating should first be reverse-coded)*

Communication Skills

Writing Skills Subscore: _____ (Take mean of 5r, 8, 14r, & 27)

Speaking Skills Subscore: _____ (Take mean of Items 3, 9r, 24r, & 49)

Reading Skills Subscore: _____ (Take mean of Items 16, 19, 35, & 48r)

Listening Skills Subscore: _____ (Take mean of Items 18r, 29r, 33, & 39)

Overall Communication Skills Score: _____
(Take mean of writing skills, speaking skills, reading, and listening skills items)

Analytical Inquiry Skills

Research Skills Subscore: _____ (Take mean of Items 6, 26, 28r, 44, & 47)

Information Literacy Skills Subscore: _____ (Take mean of Items 12r, 13r, 31, & 40)

Overall Analytical Inquiry Skills Score: _____
(Take mean of research skills and information literacy skills items)

Collaboration Skills

Working in Groups Skills Subscore: _____ (Take mean of Items 1, 25, 43r, 45r, & 50)

Leadership Skills Subscore: _____ (Take mean of Items 2, 10, 30, 34, & 36)

Overall Collaboration Skills Score: _____
(Take mean of working in groups skills and leadership skills items)

Professional Development Skills

Self-Management Skills Subscore: _____ (Take mean of Items 21, 22, 41r, & 42)

Professional Skills Subscore: _____ (Take mean of Items 7r, 11r, 15r, 17r, 23, 38r, & 46r)

Technology Skills Subscore: _____ (Take mean of Items 4r, 20, 32, 37, & 51)

Overall Professional Development Skills Score: _____
(Take mean of working in self-management skills, professional skills, and technology skills items)

Eurobaromètre de la Commission européenne

1. Le soleil tourne autour de la Terre
2. Le centre de la terre est très chaud
3. L'oxygène que nous respirons vient des plantes
4. Le lait radioactif peut être rendu sain en le faisant bouillir
5. Les électrons sont plus petits que les atomes
6. Les continents se déplacent depuis des millions d'années et continueront à se déplacer dans le futur
7. Ce sont les gènes de la mère qui déterminent si le bébé est un garçon ou une fille
8. Les premiers êtres humains vivaient à la même époque que les dinosaures
9. Les antibiotiques tuent les virus ainsi que les bactéries
10. Les lasers fonctionnent en faisant converger des ondes sonores
11. Toute radioactivité résulte de l'action de l'homme
12. L'être humain s'est développé à partir d'espèces animales plus anciennes
13. La Terre fait le tour du soleil en un mois

1. Faux (66%) - 2. Vrai (86%) - 3. Vrai (82%) - 4. Faux (75%) - 5. Vrai (46%) - 6. Vrai (87%) - 7. Faux (64%) - 8. Faux (66%) - 9. Faux (46%) - 10. Faux (47%) - 11. Faux (59%) - 12. Vrai (70%) - 13. Faux (66%)

Introduction

Here are a number of statements that may or may not describe your beliefs about learning physics. You are asked to rate each statement by circling a number between 1 and 5 where the numbers mean the following:

1. Strongly Disagree
2. Disagree
3. Neutral
4. Agree
5. Strongly Agree

Choose one of the above five choices that best expresses your feeling about the statement. If you don't understand a statement, leave it blank. If you understand, but have no strong opinion, choose 3.

Survey

1. A significant problem in learning physics is being able to memorize all the information I need to know.

Strongly Disagree	1	2	3	4	5	Strongly Agree

2. When I am solving a physics problem, I try to decide what would be a reasonable value for the answer.

Strongly Disagree	1	2	3	4	5	Strongly Agree

3. I think about the physics I experience in everyday life.

Strongly Disagree	1	2	3	4	5	Strongly Agree

4. It is useful for me to do lots and lots of problems when learning physics.

Strongly Disagree	1	2	3	4	5	Strongly Agree

5. After I study a topic in physics and feel that I understand it, I have difficulty solving problems on the same topic.

Strongly Disagree	1	2	3	4	5	Strongly Agree

Adams, W., Perkins, K., Podolefsky, N., Dubson, M., Finkelstein, N., & Wieman, C. (2006). New Instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey, *Phys. Rev. ST Phys. Educ. Res, 2*(1).

6. Knowledge in physics consists of many disconnected topics.

Strongly Disagree	1	2	3	4	5	Strongly Agree

7. As physicists learn more, most physics ideas we use today are likely to be proven wrong.

Strongly Disagree	1	2	3	4	5	Strongly Agree

8. When I solve a physics problem, I locate an equation that uses the variables given in the problem and plug in the values.

Strongly Disagree	1	2	3	4	5	Strongly Agree

9. I find that reading the text in detail is a good way for me to learn physics.

Strongly Disagree	1	2	3	4	5	Strongly Agree

10. There is usually only one correct approach to solving a physics problem.

Strongly Disagree	1	2	3	4	5	Strongly Agree

11. I am not satisfied until I understand why something works the way it does.

Strongly Disagree	1	2	3	4	5	Strongly Agree

12. I cannot learn physics if the teacher does not explain things well in class.

Strongly Disagree	1	2	3	4	5	Strongly Agree

13. I do not expect physics equations to help my understanding of the ideas; they are just for doing calculations.

Strongly Disagree	1	2	3	4	5	Strongly Agree

14. I study physics to learn knowledge that will be useful in my life outside of school.

Strongly Disagree	1	2	3	4	5	Strongly Agree

15. If I get stuck on a physics problem my first try, I usually try to figure out a different way that works.

Strongly Disagree	1	2	3	4	5	Strongly Agree

16. Nearly everyone is capable of understanding physics if they work at it.

Strongly Disagree	1	2	3	4	5	Strongly Agree

17. Understanding physics basically means being able to recall something you've read or been shown.

Strongly Disagree	1	2	3	4	5	Strongly Agree

18. There could be two different correct values to a physics problem if I use two different approaches.

Strongly Disagree	1	2	3	4	5	Strongly Agree

19. To understand physics I discuss it with friends and other students.

Strongly Disagree	1	2	3	4	5	Strongly Agree

20. I do not spend more than five minutes stuck on a physics problem before giving up or seeking help from someone else.

Strongly Disagree	1	2	3	4	5	Strongly Agree

21. If I don't remember a particular equation needed to solve a problem on an exam, there's nothing much I can do (legally!) to come up with it.

Strongly Disagree	1	2	3	4	5	Strongly Agree

22. If I want to apply a method used for solving one physics problem to another problem, the problems must involve very similar situations.

Strongly Disagree	1	2	3	4	5	Strongly Agree

23. In doing a physics problem, if my calculation gives a result very different from what I'd expect, I'd trust the calculation rather than going back through the problem.

Strongly Disagree	1	2	3	4	5	Strongly Agree

24. In physics, it is important for me to make sense out of formulas before I can use them correctly.

Strongly Disagree	1	2	3	4	5	Strongly Agree

25. I enjoy solving physics problems.

Strongly Disagree	1	2	3	4	5	Strongly Agree

26. In physics, mathematical formulas express meaningful relationships among measurable quantities.

Strongly Disagree	1	2	3	4	5	Strongly Agree

27. It is important for the government to approve new scientific ideas before they can be widely accepted.

Strongly Disagree	1	2	3	4	5	Strongly Agree

28. Learning physics changes my ideas about how the world works.

Strongly Disagree	1	2	3	4	5	Strongly Agree

29. To learn physics, I only need to memorize solutions to sample problems.

Strongly Disagree	1	2	3	4	5	Strongly Agree

30. Reasoning skills used to understand physics can be helpful to me in my everyday life.

Strongly Disagree	1	2	3	4	5	Strongly Agree

31. We use this statement to discard the survey of people who are not reading the questions. Please select agree-option 4 (not strongly agree) for this question to preserve your answers.

Strongly Disagree	1	2	3	4	5	Strongly Agree

32. Spending a lot of time understanding where formulas come from is a waste of time.

Strongly Disagree	1	2	3	4	5	Strongly Agree

33. I find carefully analyzing only a few problems in detail is a good way for me to learn physics.

Strongly Disagree	1	2	3	4	5	Strongly Agree

34. I can usually figure out a way to solve physics problems.

Strongly Disagree	1	2	3	4	5	Strongly Agree

35. The subject of physics has little relation to what I experience in the real world.

Strongly Disagree	1	2	3	4	5	Strongly Agree

36. There are times I solve a physics problem more than one way to help my understanding.

Strongly Disagree	1	2	3	4	5	Strongly Agree

37. To understand physics, I sometimes think about my personal experiences and relate them to the topic being analyzed.

Strongly Disagree	1	2	3	4	5	Strongly Agree

38. It is possible to explain physics ideas without mathematical formulas.

Strongly Disagree	1	2	3	4	5	Strongly Agree

39. When I solve a physics problem, I explicitly think about which physics ideas apply to the problem.

Strongly Disagree	1	2	3	4	5	Strongly Agree

40. If I get stuck on a physics problem, there is no chance I'll figure it out on my own.

Strongly Disagree	1	2	3	4	5	Strongly Agree

41. It is possible for physicists to carefully perform the same experiment and get two very different results that are both correct.

Strongly Disagree	1	2	3	4	5	Strongly Agree

42. When studying physics, I relate the important information to what I already know rather than just memorizing it the way it is presented.

Strongly Disagree	1	2	3	4	5	Strongly Agree

Views About Science Survey
IBD - Physics

Please carefully read the following instructions before answering the survey questions:

Each survey question presents a given issue about the *physics course in which you are currently enrolled*, with two viewpoints (a) and (b) that you need to contrast on a 5-point scale. For example:

My physics course covers:

	1	2	3	4	5	
(a) abstract themes;	a>>b	a>b	a=b	b>a	b>>a	(b) practical applications.

You might favor one viewpoint over the other, or regard both viewpoints equally. Please indicate your position by choosing one, and *only one*, of the five responses shown in the middle, between alternatives (a) and (b). Responses 1 and 2 favor, to different extents, viewpoint (**a**) over viewpoint (b). In contrast, responses 4 and 5 favor, to different extents, viewpoint (**b**) over viewpoint (a). Response 3 regards viewpoints (a) and (b) equally. More specifically, the five response choices mean the following:

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. (a) < (b): More (b) than (a), or (b) more often than (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 applications.

2. My physics course covers *more* abstract themes *than* practical applications.

3. My physics course covers *as much* abstract themes *as* practical applications.

4. My physics course covers *more* practical applications *than* abstract themes.

5. My physics course covers *mostly* practical applications and *rarely* any abstract themes.

Halloun, I., & Hestenes, D. (1998). Interpreting VASS dimensions and profiles for physics students, *Sci. & Educ, 7*(6), 553.

1. Studying this course is for me:

	1	2	3	4	5	
(a) a frustrating experience;	a>>b	a>b	a=b	b>a	b>>a	(b) an enjoyable experience.

2. Learning this course requires:

	1	2	3	4	5	
(a) a special talent;	a>>b	a>b	a=b	b>a	b>>a	(b) a serious effort.

3. I put enough effort in this course to:

	1	2	3	4	5	
(a) pass my exams;	a>>b	a>b	a=b	b>a	b>>a	(b) understand the covered material.

4. My understanding of topics in this course depends on:

	1	2	3	4	5	
(a) how well the teacher explains things in class;	a>>b	a>b	a=b	b>a	b>>a	(b) how much effort I put into studying.

5. Going over this course material at home before discussing it in class:

	1	2	3	4	5	
(a) gets me confused;	a>>b	a>b	a=b	b>a	b>>a	(b) helps develop my reasoning skills.

6. Seeking information about this course in sources other than my textbook:

	1	2	3	4	5	
(a) gets me confused;	a>>b	a>b	a=b	b>a	b>>a	(b) helps develop my reasoning skills.

7. When I experience difficulty while studying this course:

	1	2	3	4	5	
(a) I seek help or put the matter of difficulty aside until we discuss it in class;	a>>b	a>b	a=b	b>a	b>>a	(b) I try to figure things out on my own.

8. When my classmates present an idea that is different from mine in this course:

	1	2	3	4	5	
(a) I do not pay attention to their idea;	a>>b	a>b	a=b	b>a	b>>a	(b) I check whether their idea could be better than mine.

9. Working together in a group with classmates in this course helps me:

	1	2	3	4	5	
(a) complete the assigned task;	a>>b	a>b	a=b	b>a	b>>a	(b) develop my reasoning skills.

10. When I first started working on this course, I was:

(a)	1	2	3	4	5	(b)
afraid that I would not understand covered material;	a>>b	a>b	a=b	b>a	b>>a	confident that I would understand covered material.

11. At this point, I am:

(a)	1	2	3	4	5	(b)
not sure that I understand covered material;	a>>b	a>b	a=b	b>a	b>>a	confident that I understand covered material.

12. When studying this course:

(a)	1	2	3	4	5	(b)
I look for important information and memorize it as presented;	a>>b	a>b	a=b	b>a	b>>a	I reconstruct the material in my own way so that I can make sense of it.

13. As I go from one step to another while solving any problem in this course:

(a)	1	2	3	4	5	(b)
I do so without justifying why I have done things the way I did;	a>>b	a>b	a=b	b>a	b>>a	I try to justify why I have done things the way I did.

14. After I answer all questions in any problem given in this course:

(a)	1	2	3	4	5	(b)
I stop working on the problem;	a>>b	a>b	a=b	b>a	b>>a	I check my answers and the way I obtained them.

15. My success in solving a problem in this course depends on my ability to:

(a)	1	2	3	4	5	(b)
recall the solution of a similar problem done in class or textbook;	a>>b	a>b	a=b	b>a	b>>a	come up with an appropriate plan for solving the problem.

16. After successfully solving a problem in this course:

(a)	1	2	3	4	5	(b)
I memorize the successful method in case I need it for solving similar exam problems;	a>>b	a>b	a=b	b>a	b>>a	I try to figure out under what conditions I can apply the same method to other problems.

17. When I fail to answer a question or solve a problem on my own in this course, I expect the teacher to provide:

(a)	1	2	3	4	5	(b)
the correct answer or solution;	a>>b	a>b	a=b	b>a	b>>a	guidelines for getting to the correct answer.

18. After the teacher presents the correct solution to a problem for which I got a wrong solution in this course:

(a)	1	2	3	4	5	(b)
I discard my solution and learn the correct one;	a>>b	a>b	a=b	b>a	b>>a	I try to figure out how my solution differs from the correct one.

19. In order to realize the utility of what I learn in this course, I need to:

(a)	1	2	3	4	5	(b)
solve, on paper, exercises and problems given in the course;	a>>b	a>b	a=b	b>a	b>>a	apply what I learn in real life situations.

20. My exam performance in this course helps me figure out:

(a)	1	2	3	4	5	(b)
where I stand relative to my classmates;	a>>b	a>b	a=b	b>a	b>>a	what I need to do in order to better understand the covered material.

21. In this course, it is important for me to:

(a)	1	2	3	4	5	(b)
memorize technical terms and formulas;	a>>b	a>b	a=b	b>a	b>>a	relate things to each other in particular ways.

22. In order to decide whether a new problem in this course can be solved like a certain familiar problem, the first thing I do is to:

(a)	1	2	3	4	5	(b)
check whether the new problem involves the same variables as the familiar problem;	a>>b	a>b	a=b	b>a	b>>a	find relevant information in the new problem and represent it in ways to make sense of it.

23. Solving a problem in more than one way in this course:

(a)	1	2	3	4	5	(b)
gets me confused;	a>>b	a>b	a=b	b>a	b>>a	helps develop my reasoning skills.

24. Ways followed to solve problems in this course are good for solving:

(a)	1	2	3	4	5	(b)
similar problems pertaining to this particular course;	a>>b	a>b	a=b	b>a	b>>a	problems in other areas of physics.

25. Mathematical representations used in this course (like graphs, diagrams or formulas) help me:

(a)	1	2	3	4	5	(b)
find numerical answers to some problems;	a>>b	a>b	a=b	b>a	b>>a	relate concepts in meaningful ways.

26. When different kinds of representation (like graphs, diagrams, or formulas) can be used to depict information in any given problem:

(a)	1	2	3	4	5	(b)
I concentrate on one particular kind;	a>>b	a>b	a=b	b>a	b>>a	I use and compare different kinds.

27. Mathematical representations (like graphs, diagrams or formulas) used in this course should be interpreted:

(a)	1	2	3	4	5	(b)
differently by different people;	a>>b	a>b	a=b	b>a	b>>a	the same way by different people.

28. Carrying out, on my own, the derivation of one concept from another in this course:

(a)	1	2	3	4	5	(b)
gets me confused;	a>>b	a>b	a=b	b>a	b>>a	helps develop my reasoning skills.

29. Graphing calculators or computers help me in this course:

(a)	1	2	3	4	5	(b)
find numerical answers to problems;	a>>b	a>b	a=b	b>a	b>>a	develop my reasoning skills.

30. With regard to this course, graphing calculators or computers are good for doing things that normally:

(a)	1	2	3	4	5	(b)
can be done on paper;	a>>b	a>b	a=b	b>a	b>>a	cannot be done on paper.

31. What I have learned in this course is good for:

(a)	1	2	3	4	5	(b)
physics;	a>>b	a>b	a=b	b>a	b>>a	science and other areas.

32. What I have learned in my other science courses is good for:

(a)	1	2	3	4	5	(b)
the respective science;	a>>b	a>b	a=b	b>a	b>>a	physics.

33. What I have learned in this course is:

(a)	1	2	3	4	5	(b)
good for physicists;	a>>b	a>b	a=b	b>a	b>>a	helpful in everyday life.

Lederman, N., Abd-El-Khalick, F., Bell,, R., & and Schwartz, R. (2002). Views of Nature of Science Questionnaire: Toward Valid and Meaningful Assessment of Learners' Conceptions of Nature of Science, *J. Res. Sci. Teaching,*, *39*(6), 497.

VIEWS OF NATURE OF SCIENCE

(VNOS D +)

Name: _____

Date: / /

Instructions

- Please answer each of the following questions. You can use all the space provided and the backs of the pages to answer a question.
- Some questions have more than one part. Please make sure you write answers for each part.
- This is not a test and will not be graded. There are no "right" or "wrong" answers to the following questions. I am only interested in your ideas relating to the following questions.

1. What is science?

2. What makes science (or a scientific discipline such as physics, biology, etc.) different from other subject/disciplines (art, history, philosophy, etc.)?

3. Scientists produce scientific knowledge. Do you think this knowledge may change in the future? Explain your answer and give an example.

4. (a) How do scientists know that dinosaurs really existed? Explain your answer.

(b) How certain are scientists about the way dinosaurs looked? Explain your answer.

(c) Scientists agree that about 65 millions of years ago the dinosaurs became extinct (all died away). However, scientists disagree about what had caused this to happen. Why do you think they disagree even though they all have the same information?

(d) If a scientist wants to persuade other scientists of their theory of dinosaur extinction, what do they have to do to convince them? Explain your answer.

5. In order to predict the weather, weather persons collect different types of information. Often they produce computer models of different weather patterns.
(a) Do you think weather persons are certain (sure) about the computer models of the weather patterns?

(b) Why or why not?

6. The model of the inside of the Earth shows that the Earth is made up of layers called the crust, upper mantle, mantle, outer core and the inner core. Does the model of the layers of the Earth *exactly* represent how the inside of the Earth looks? Explain your answer.

7. Scientists try to find answers to their questions by doing investigations / experiments. Do you think that scientists use their imaginations and creativity when they do these investigations / experiments?

a. If **NO**, explain why.

b. If **YES**, in what part(s) of their investigations (planning, experimenting, making observations, analysis of data, interpretation, reporting results, etc.) do you think they use their imagination and creativity? Give examples if you can.

8. Is there a difference between a scientific theory and a scientific law? Illustrate your answer with an example.

9. After scientists have developed a scientific theory (e.g., atomic theory, evolution theory), does the theory ever change? Explain and give an example.

10. Is there a relationship between science, society, and cultural values? If so, how? If not, why not? Explain and provide examples.

Mason, A., & Singh, C. (2010). Surveying graduate students' attitudes and approaches to problem solving, *Phys. Rev. ST Phys. Educ. Res, 6*(2), 020124.

Attitudes and Approaches to Problem Solving Survey

by Andrew Mason and Chandralekha Singh

To what extent do you agree with each of the following statements when you solve physics problems?

Answer with a single letter as follows:
A) Strongly Agree
B) Agree Somewhat
C) Neutral or Don't Know
D) Disagree Somewhat
E) Strongly Disagree

1. If I'm not sure about the right way to start a problem, I'm stuck unless I go see the teacher/TA or someone else for help.
2. When solving physics problems, I often make approximations about the physical world.
3. In solving problems in physics, being able to handle the mathematics is the most important part of the process.
4. In solving problems in physics, I always identify the physics principles involved in the problem first before looking for corresponding equations.
5. "Problem solving" in physics basically means matching problems with the correct equations and then substituting values to get a number.
6. In solving problems in physics, I can often tell when my work and/or answer is wrong, even without looking at the answer in the back of the book or talking to someone else about it.
7. To be able to use an equation to solve a problem (particularly in a problem that I haven't seen before), I think about what each term in the equation represents and how it matches the problem situation.
8. There is usually only one correct way to solve a given problem in physics.
9. I use a similar approach to solving all problems involving conservation of linear momentum even if the physical situations given in the problems are very different.
10. If I am not sure about the correct approach to solving a problem, I will reflect upon physics principles that may apply and see if they yield a reasonable solution.
11. Equations are not things that one needs to understand in an intuitive sense; I routinely use equations to calculate numerical answers even if they are non-intuitive.
12. Physics involves many equations each of which applies primarily to a specific situation.
13. If I used two different approaches to solve a physics problem and they gave different answers, I would spend considerable time thinking about which approach is more reasonable.
14. When I solve physics problems, I always explicitly think about the concepts that underlie the problem.
15. When solving physics problems, I often find it useful to first draw a picture or a diagram of the situations described in the problems.
16. When answering conceptual physics questions, I mostly use my "gut" feeling rather than using the physics principles I usually think about when solving quantitative problems.
17. I am equally likely to draw pictures and/or diagrams when answering a multiple-choice question or a corresponding free-response (essay) question.
18. I usually draw pictures and/or diagrams even if there is no partial credit for drawing them.
19. I am equally likely to do scratch work when answering a multiple-choice question or a corresponding free-response (essay) question.
20. After I solve each physics homework problem, I take the time to reflect and learn from the problem solution.
21. After I have solved several physics problems in which the same principle is applied in different contexts, I should be able to apply the same principle in other situations.
22. If I obtain an answer to a physics problem that does not seem reasonable, I spend considerable time thinking about what may be wrong with the problem solution.
23. If I cannot solve a physics problem in 10 minutes, I give up on that problem.
24. When I have difficulty solving a physics homework problem, I like to think through the problem with a peer.
25. When I do not get a question correct on a test or homework, I always make sure I learn from my mistakes and do not make the same mistakes again.
26. It is more useful for me to solve a few difficult problems using a systematic approach and learn from them rather than solving many similar easy problems one after another.
27. I enjoy solving physics problems even though it can be challenging at times.
28. I try different approaches if one approach does not work.
29. If I realize that my answer to a physics problem is not reasonable, I trace back my solution to see where I went wrong.
30. It is much more difficult to solve a physics problem with symbols than solving an identical problem with a numerical answer.
31. While solving a physics problem with a numerical answer, I prefer to solve the problem symbolically first and only plug in the numbers at the very end.
32. Suppose you are given two problems. One problem is about a block sliding down an inclined plane with no friction present. The other problem is about a person swinging on a rope. Air resistance is negligible. You are told that both problems can be solved using the concept of conservation of mechanical energy of the system. Which one of the following statements do you MOST agree with? (Choose only one answer.)
    A) The two problems can be solved using very similar methods.
    B) The two problems can be solved using somewhat similar methods.
    C) The two problems must be solved using somewhat different methods.
    D) The two problems must be solved using very different methods.
    E) There is not enough information given to know how the problems will be solved.
33. Suppose you are given two problems. One problem is about a block sliding down an inclined plane. There is friction between the block and the incline. The other problem is about a person swinging on a rope. There is air resistance between the person and air molecules. You are told that both problems can be solved using the concept of conservation of total (not just mechanical) energy. Which one of the following statements do you MOST agree with? (Choose only one answer.)
    A) The two problems can be solved using very similar methods.
    B) The two problems can be solved using somewhat similar methods.
    C) The two problems must be solved using somewhat different methods.
    D) The two problems must be solved using very different methods.
    E) There is not enough information given to know how the problems will be solved.

16-Item Version of the SIMS* (Guay, Vallerand, & Blanchard, 2000)

Directions: Read each item carefully. Using the scale below, please circle the number that best describes the reason why you are currently engaged in this activity. Answer each item according to the following scale: 1 = correspond not at all; 2 = correspond a very little; 3 = correspond a little; 4 = correspond moderately; 5 = correspond enough; 6 = correspond a lot; 7 = correspond exactly.

Why are you currently engaged in this activity?

Because I think that this activity is interesting.	7	6	5	4	3	2	1
Because I am doing it for my own good.	7	6	5	4	3	2	1
Because I am supposed to do it.	7	6	5	4	3	2	1
There may be good reasons to do this activity, but personally I don't see any.	7	6	5	4	3	2	1
Because I think that this activity is pleasant.	7	6	5	4	3	2	1
Because I think this activity is good for me.	7	6	5	4	3	2	1
Because it is something that I have to do.	7	6	5	4	3	2	1
I do this activity but I am not sure if it is worth it.	7	6	5	4	3	2	1
Because this activity is fun.	7	6	5	4	3	2	1
By personal decision.[a]	7	6	5	4	3	2	1
Because I don't have any choice.[b]	7	6	5	4	3	2	1
I don't know; I don't see what the activity brings me.	7	6	5	4	3	2	1
Because I feel good when doing this activity.	7	6	5	4	3	2	1
Because I believe this activity is important for me.	7	6	5	4	3	2	1
Because I feel that I have to do it.	7	6	5	4	3	2	1
I do this activity, but I am not sure it is a good thing to pursue it.	7	6	5	4	3	2	1

Note: Items 10 and 11 (superscripts [a] and [b]) are omitted in the 14-item measure.
* Used with permission.

Acknowledgment

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Guay, F., Vallerand, R.J., & Blanchard, C. (2000). On the assessment of state intrinsic and extrinsic motivation: The situational motivation scale (SIMS). *Motivation and Emotion*, 24, 175-213.

Bauer C., (2008), Attitude towards chemistry: a semantic differential instrument for assessing curriculum impacts, *J. Chem. Educ.*, *85*(10), 1440–1445.

CHEMISTRY IS:

1.	easy	1 2 3 4 5 6 7	hard
2.	worthless	1 2 3 4 5 6 7	beneficial
3.	exciting	1 2 3 4 5 6 7	boring
4.	complicated	1 2 3 4 5 6 7	simple
5.	confusing	1 2 3 4 5 6 7	clear
6.	good	1 2 3 4 5 6 7	bad
7.	satisfying	1 2 3 4 5 6 7	frustrat
8.	scary	1 2 3 4 5 6 7	fun
9.	comprehensible	1 2 3 4 5 6 7	incomp
10.	challenging	1 2 3 4 5 6 7	not cha
11.	pleasant	1 2 3 4 5 6 7	unpleas
12.	interesting	1 2 3 4 5 6 7	dull
13.	disgusting	1 2 3 4 5 6 7	attracti
14.	comfortable	1 2 3 4 5 6 7	uncom
15.	worthwhile	1 2 3 4 5 6 7	useless
16.	work	1 2 3 4 5 6 7	play
17.	chaotic	1 2 3 4 5 6 7	organiz
18.	safe	1 2 3 4 5 6 7	dangerous
19.	tense	1 2 3 4 5 6 7	relaxed

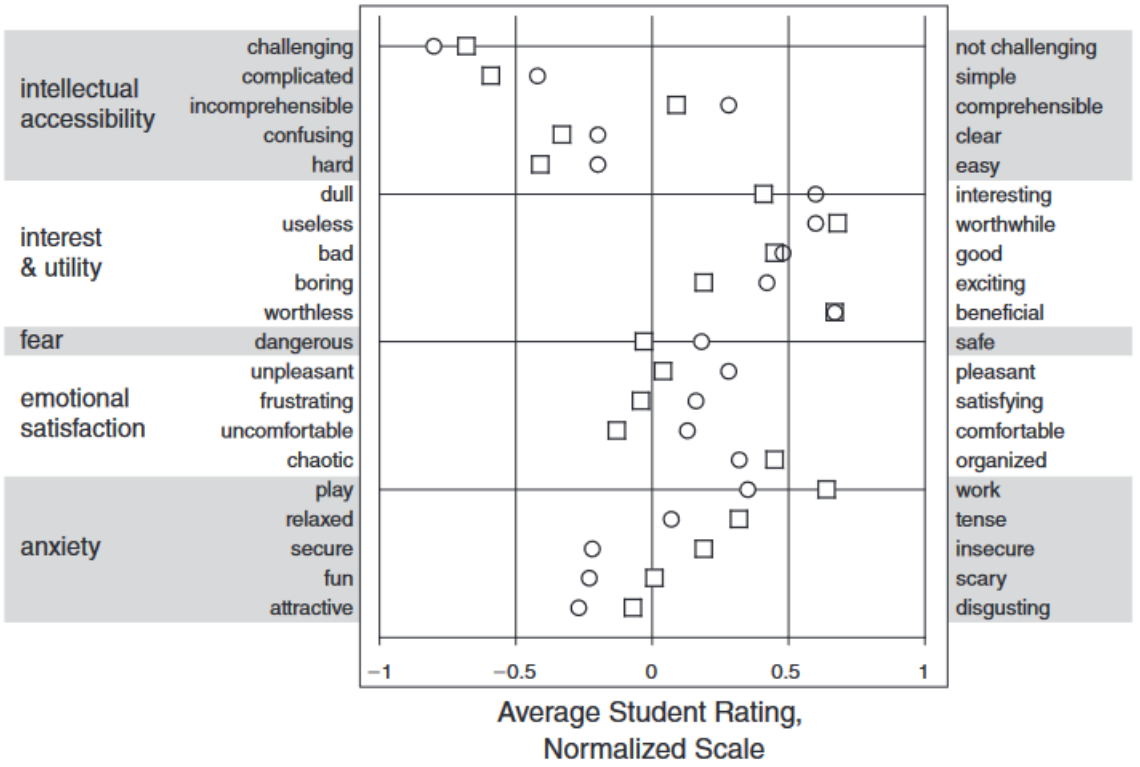

Figure 1. Attitude the Subject of C Inventory results for in the Chemi Society course, sh each survey iten (squares) and end of the course (I

Bowen, C. W. (1999). Development and Score Validation of a Chemistry Laboratory Anxiety Instrument (CLAI) for College Chemistry Students.*Educational and Psychological Measurement,59*(1),171-187.

APPENDIX
Revised Chemistry Laboratory Anxiety Instrument (CLAI): A Survey on Chemistry Laboratory Experiences

The purpose of this survey is to collect data on how you feel about various aspects of your laboratory experiences in chemistry. Circle your response according to how much you agree or disagree with the statement.

	Strongly disagree		Neutral		Strongly agree
1. I am anxious when I use chemicals during lab.	SD	D	N	A	SA
2. When I work in the chemistry lab, I feel at ease using the equipment.	SD	D	N	A	SA
3. When I get ready for lab, I get concerned about recording the data we will generate.	SD	D	N	A	SA
4. When I work in the chemistry lab, I feel nervous working with other students.	SD	D	N	A	SA
5. I worry about whether I have enough time to complete the lab.	SD	D	N	A	SA
6. When I get ready for chemistry lab, I get concerned about the chemicals we will use.	SD	D	N	A	SA
7. When working in the chemistry lab, I feel nervous carrying out the lab procedures.	SD	D	N	A	SA
8. I am anxious when I record data during lab.	SD	D	N	A	SA
9. I feel comfortable working with other students when I am in lab.	SD	D	N	A	SA
10. When working in the lab, I am nervous about the time it will take.	SD	D	N	A	SA
11. I am comfortable being near chemicals when I am in lab.	SD	D	N	A	SA
12. I am anxious when I carry out a lab procedure.	SD	D	N	A	SA
13. When working in the chemistry lab, I feel nervous about recording the data I will need.	SD	D	N	A	SA
14. I feel anxious when I work with other students during lab.	SD	D	N	A	SA
15. When preparing for lab, I am concerned about the time available for doing the experiment.	SD	D	N	A	SA
16. When working in the chemistry lab, I feel nervous being around the chemicals.	SD	D	N	A	SA
17. I feel anxious when I use equipment during lab.	SD	D	N	A	SA

APPENDIX Continued

	Strongly disagree		Neutral		Strongly agree
18. When working in the chemistry lab, I feel at ease recording the necessary data.	SD	D	N	A	SA
19. When I get ready for chemistry lab, I get concerned about working with other students.	SD	D	N	A	SA
20. I am comfortable with the amount of time available for doing the lab.	SD	D	N	A	SA

Note. SD = strongly disagree; D = disagree; N = neutral; A = agree; SA = strongly agree. To obtain anxiety scale scores, code SD = 1, D = 2, N = 3, A = 4, and SA = 5 for each item in the scale. For Items 2, 9, 11, 18, and 20 (written in a comfort orientation), reverse score the item (e.g., SA = 1). Sum the values for each of the items comprising the scales (range is 4 to 20 for each scale). Scales (and item numbers) are: Working With Chemicals (Items 1, 6, 11, and 16); Using Equipment and Procedures (Items 2, 7, 12, and 17); Collecting Data (Items 3, 8, 13, and 18); Working With Other Students (Items 4, 9, 14, and 19); Having Adequate Time (Items 5, 10, 15, and 20).

PHYSICS LABORATORY ATTITUDE QUESTIONNAIRE

The following scale was designed to learn your thoughts. Choose only one item from each statement. Correct answer of each statement changes from person to person. So the answer you choose must reflect your views. Read each statement carefully and tick off your choice.

1 means never
2 means partly
3 means undecided
4 means sometimes
5 means agree

Male Female Age:

		1	2	3	4	5
1	Physics laboratory does not frighten me					
2	Physics laboratory lesson is among my likes					
3	I like to study physics laboratory lesson in advance					
4	I will use the things learnt during physics laboratory in my life					
5	I feel tense while studying physics laboratory					
6	I feel confortable when I solve a new problem in physics laboratory					
7	Trying to understand physics laboratory experiments is waste of time					
8	There is no incentive side of physics laboratory studies					
9	It is worth doing to learn physics laboratory experiments					
10	It is not attractive to solve physics laboratory problems					
11	Facing problems in physics laboratory, I try to solve them until I find the answer					
12	I do not understand why some students enjoy physics laboratory					
13	I do not take physics laboratory lesson if it is optional					
14	While studying physics laboratory, I do not want to stop studying it					
15	I usuly take high marks from physics laboratory examinations					
16	I am not worried about studying physics laboratory					
17	I think that I can not do physics laboratory experiment by myself					
18	Succeeding in physics laboratory lesson is important for me					
19	I rely on my knowledge about physics laboratory lesson					
20	I enjoy talking about physics laboratory with others					
21	I enjoy physics laboratory lesson					
22	I do not want to hear even the name of physics laboratory					
23	I do not want to take physics laboratory lesson					
24	Tha lessons other than physics laboratory are more important for me					
25	The topics in the physics laboratory confuse my mind					
26	Physics laboratory is a boring lesson					
27	Physics laboratory is one of the frightening lessons					
28	I feel helpless while studying physics laboratory					
29	Physics laboratory is not an interesting lesson for me					
30	I would take more physics laboratory if I had that opportunity					
31	I enjoy doing physics laboratory experiment by myself					
32	Physics laboratory becomes more enjoyable if teachers do experiment					
33	I hate physics laboratory lesson					
34	I want to have an education based on physics laboratory					

Yeşilyurt, M., (2004). Student teachers' attitudes about basic physics laboratory, *The Turkish Online Journal of Educational Technology, 3*(4), 49-57.

Lopatto, D., (2004). Survey of Undergraduate Research Experiences (SURE): First Findings, *Cell Biology Education, 3*, 270-77.

; from the undergraduate research experience

Item
Understanding of the research process
Readiness for more demanding research
Understanding how scientists work on real problems
Learning lab techniques
Tolerance for obstacles
Learning to work independently
Skill in the interpretation of results
Ability to analyze data
Understanding how knowledge is constructed
Becoming part of the learning community
Ability to integrate theory and practice
Understanding primary literature
Assertions require supporting evidence
Understanding science
Understanding how scientists think
Self-confidence
Clarification of a career path
Skill in oral presentation
Skill in science writing
Learning ethical conduct

Responses were on a scale of 1 (no gain) to 5 (very large gain).

Corwin, L.A., Runyon, C., Robinson, A., & Dolan, E.L. (2015). The Laboratory Course Assessment Survey: A Tool to Measure Three Dimensions of Research-Course Design, *Cell Biology Education – Life Sciences Education, 14*, 1-11.

In this course, I was encouraged to …		Collaboration	Discovery and relevance	Iteration
C1	discuss elements of my investigation with classmates or instructors.	0.767	—	—
C2	reflect on what I was learning.	0.694	—	—
C3	contribute my ideas and suggestions during class discussions.	0.893	—	—
C4	help other students collect or analyze data.	0.708	—	—
C5	provide constructive criticism to classmates and challenge each other's interpretations.	0.617	—	—
C6	share the problems I encountered during my investigation and seek input on how to address them.	0.954	—	—
In this course, I was expected to …				
DR1	generate novel results that are unknown to the instructor and that could be of interest to the broader scientific community or others outside the class.	—	0.938	—
DR2	conduct an investigation to find something previously unknown to myself, other students, and the instructor.	—	0.592	—
DR3	formulate my own research question or hypothesis to guide an investigation.	—	0.421	—
DR4	develop new arguments based on data.	—	0.462	0.306
DR5	explain how my work has resulted in new scientific knowledge.	—	0.701	—
In this course, I had time to …				
I1	revise or repeat work to account for errors or fix problems.[b]	—	—	0.822
I2	change the methods of the investigation if it was not unfolding as predicted.	—	—	0.589
I3	share and compare data with other students.	—	—	0.451
I4	collect and analyze additional data to address new questions or further test hypotheses that arose during the investigation.	—	—	0.702
I5	revise or repeat analyses based on feedback.	—	—	0.764
I6	revise drafts of papers or presentations about my investigation based on feedback.	—	—	0.779
Cronbach's alpha		0.8	0.82	0.85
Factor correlations				
C		—		
DR		0.409	—	
I		0.453	0.528	—

[a]Factor loadings less than 0.25 were omitted. All collaboration items had four response options: "never," "one or two times," "monthly," and "weekly." All other items had six response options ranging from "strongly disagree" to "strongly agree." All items also included additional response options of "I don't know" and "prefer not to respond."

[b]For item I1, the item stem is "In this course, I was expected to ...," unlike the other items in this set.

Hanauer, D.I., Dolan, E.L. (2014)The Project Ownership Survey: Measuring Differences in Scientific Inquiry Experiences, *Cell Biology Education – Life Sciences Education, 13*(1), 149-158.

Table 4. Final version of the POS

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
My research will help to solve a problem in the world.					
My findings were important to the scientific community.					
I faced challenges that I managed to overcome in completing my research project.					
I was responsible for the outcomes of my research.					
The findings of my research project gave me a sense of personal achievement.					
I had a personal reason for choosing the research project I worked on.					
The research question I worked on was important to me.					
In conducting my research project, I actively sought advice and assistance.					
My research project was interesting.					
My research project was exciting.					
	Very strongly	Considerably	Moderate	Slightly	Very slightly
To what extent does the word *delighted* describe your experience of the laboratory course?					
To what extent does the word *happy* describe your experience of the laboratory course?					
To what extent does the word *joyful* describe your experience of the laboratory course?					
To what extent does the word *astonished* describe your experience of the laboratory course?					
To what extent does the word *surprised* describe your experience of the laboratory course?					
To what extent does the word *amazed* describe your experience of the laboratory course?					

Individual items on the PITS survey	ICC	Factor 1 Project ownership–emotion	2 Science community values	3 Self-efficacy	4 Networking	5 Project ownership–content	6 Science identity
Joyful	0.04	**0.927**					
Delighted	0.03	**0.883**					
Happy	–0.02	**0.824**					
Amazed	0.01	**0.71**				0.13	
Astonished	–0.05	**0.675**					
Surprised	0.01	**0.558**					
A person who thinks it is valuable to conduct research that builds the world's scientific knowledge.	–0.003		**0.875**				
A person who thinks discussing new theories and ideas between scientists is important.	–0.01		**0.784**				
A person who thinks that scientific research can solve many of today's problems.	0.01		**0.772**				
A person who feels discovering something new in the sciences is thrilling.	0.01		**0.755**				
The daily work of a scientist is appealing to me.	–0.05	0.13	**0.445**				0.32
I derive great personal satisfaction from working on a team that is doing important research.	–0.03	0.22	**0.33**	–0.14	0.16		0.12
I am confident that I can create explanations for the results of the study.	–0.04			**–0.864**			
I am confident that I can figure out what data/observations to collect and how to collect them.	0.01			**–0.834**			
I am confident that I can develop theories (integrate and coordinate results from multiple studies).	–0.04			**–0.797**			0.11
I am confident that I can generate a research question to answer.	–0.05			**–0.765**	0.11		
I am confident that I can use scientific literature and reports to guide my research.	–0.01			**–0.751**			
I am confident that I can use technical science skills (use of tools, instruments, and techniques).	–0.05		0.13	**–0.633**		0.14	
I have discussed my research in this course with my friends.	-0.04	0.13			**0.854**	–0.12	–0.11
I have discussed my research in this course with students who are not in my class but in my institution.	–0.03				**0.842**		
I have discussed my research with students who are not at my institution.	–0.001			0.1	**0.655**		
I have discussed my research in this course with my parents (or guardians).	–0.03				**0.562**	0.12	
I have discussed my research in this course with professors other than my course instructor.	–0.03				**0.377**	0.14	0.33
My research was interesting.	–0.01	0.28	0.13			**0.709**	
My research was exciting.	–0.04	0.32	0.11			**0.651**	
The research question I worked on was important to me.	–0.03	0.13				**0.646**	0.2
My research will help to solve a problem in the world.	0.02					**0.627**	0.12

(Continues)

Hanauer, D.I., Graham, M.J., Hatfull, G. F. (2016). A Measure of College Student Persistence in the Sciences (PITS), *Cell Biology Education – Life Sciences Education, 15*(4), ar54.

Individual items on the PITS survey	ICC	Factor 1 Project ownership–emotion	2 Science community values	3 Self-efficacy	4 Networking	5 Project ownership–content	6 Science identity
My findings were important to the scientific community.	0.05					**0.613**	0.17
The findings of my research project gave me a sense of personal achievement.	0.05	0.18			0.12	**0.609**	
I faced the challenges that I managed to overcome in completing my research project.	0.02			–0.19	0.12	**0.57**	–0.1
In conducting my research project, I actively sought advice and assistance.	0.01		0.11	–0.12		**0.557**	–0.15
I had a personal reason for choosing the research project I worked on.	0.05	0.1	–0.1			**0.552**	0.25
I was responsible for the outcomes of my research.	0.05			–0.23	0.12	**0.519**	–0.15
I feel like I belong in the field of science.	0.01		0.36	–0.15			**0.404**
I have come to think of myself as a "scientist."	0.01	0.18	0.18	–0.23			**0.391**
I have a strong sense of belonging to the community of scientists.	–0.05	0.19		–31		0.12	**0.387**

Bolded values specify the survey items considered to be members of a specified factor.

Jones, B.D. *User Guide for Assessing the Components of the MUSIC Model of Motivation ;* 2022.

MUSIC Inventory (College Student version, present tense)
(to be administered near the beginning or middle of a course)

Instructions

Please rate the items in this section using the following scale:

1	2	3	4	5	6
Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

Note that the word "coursework" refers to anything that you do in the course, including assignments, activities, readings, etc.

_____ 1. The coursework holds my attention.
_____ 2. I have the opportunity to decide for myself how to meet the course goals.
_____ 3. In general, the coursework is useful to me.
_____ 4. The instructor is available to answer my questions about the coursework.
_____ 5. The coursework is beneficial to me.
_____ 6. The instructional methods used in this course hold my attention.
_____ 7. I am confident that I can succeed in the coursework.
_____ 8. I have the freedom to complete the coursework my own way.
_____ 9. I enjoy the instructional methods used in this course.
_____ 10. I feel that I can be successful in meeting the academic challenges in this course.
_____ 11. The instructional methods engage me in the course.
_____ 12. I have options in how to achieve the goals of the course.
_____ 13. I enjoy completing the coursework.
_____ 14. I am capable of getting a high grade in this course.
_____ 15. The coursework is interesting to me.
_____ 16. The instructor is willing to assist me if I need help in the course.
_____ 17. I have control over how I learn the course content.
_____ 18. Throughout the course, I have felt that I could be successful on the coursework.
_____ 19. I find the coursework to be relevant to my future.
_____ 20. The instructor cares about how well I do in this course.
_____ 21. I will be able to use the knowledge I gain in this course.
_____ 22. The instructor is respectful of me.
_____ 23. The knowledge I gain in this course is important for my future.
_____ 24. The instructor is friendly.
_____ 25. I believe that the instructor cares about my feelings.
_____ 26. I have flexibility in what I am allowed to do in this course.

MUSIC Inventory (College Student version, past tense)
(to be administered near the end of a course)

Instructions

Please rate the items in this section using the following scale:

1	2	3	4	5	6
Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree

Note that the word "coursework" refers to anything that you did in the course, including assignments, activities, readings, etc.

_____ 1. The coursework held my attention.
_____ 2. I had the opportunity to decide for myself how to meet the course goals.
_____ 3. In general, the coursework was useful to me.
_____ 4. The instructor was available to answer my questions about the coursework.
_____ 5. The coursework was beneficial to me.
_____ 6. The instructional methods used in this course held my attention.
_____ 7. I was confident that I could succeed in the coursework.
_____ 8. I had the freedom to complete the coursework my own way.
_____ 9. I enjoyed the instructional methods used in this course.
_____ 10. I felt that I could be successful in meeting the academic challenges in this course.
_____ 11. The instructional methods engaged me in the course.
_____ 12. I had options in how to achieve the goals of the course.
_____ 13. I enjoyed completing the coursework.
_____ 14. I was capable of getting a high grade in this course.
_____ 15. The coursework was interesting to me.
_____ 16. The instructor was willing to assist me if I needed help in the course.
_____ 17. I had control over how I learned the course content.
_____ 18. Throughout the course, I felt that I could be successful on the coursework.
_____ 19. I found the coursework to be relevant to my future.
_____ 20. The instructor cared about how well I did in this course.
_____ 21. I will be able to use the knowledge I gained in this course.
_____ 22. The instructor was respectful of me.
_____ 23. The knowledge I gained in this course is important for my future.
_____ 24. The instructor was friendly.
_____ 25. I believe that the instructor cared about my feelings.
_____ 26. I had flexibility in what I was allowed to do in this course.

Instructions for Scoring the MUSIC Inventory (College Student version)

To obtain a score for each scale, average the values for the items in the scales as shown below.

Empowerment score = (item 2 + item 8 + item 12 + item 17 + item 26) / 5
Usefulness score = (item 3 + item 5 + item 19 + item 21 + item 23) / 5
Success score = (item 7 + item 10 + item 14 + item 18) / 4
Interest score = (item 1 + item 6 + item 9 + item 11 + item 13 + item 15) / 6
Caring score = (item 4 + item 16 + item 20 + item 22 + item 24 + item 25) / 6

Other important notes:

- Do not sum or average all 26 items because this produces a meaningless value. It is inconsistent with the principles of the MUSIC model to assume that motivation is the sum of empowerment, usefulness, success, interest, and caring. Although this may be true in some cases, it is possible that a student is highly motivated and engaged when she is high on only one or two of the MUSIC components and low on the others.

Scales	Items by Scale (past-tense college version)
Empowerment	• I had the opportunity to decide for myself how to meet the course goals. • ** I had the freedom to complete the coursework my own way. • ** I had options in how to achieve the goals of the course. • ** I had control over how I learned the course content. • ** I had flexibility in what I was allowed to do in this course.
Usefulness	• ** In general, the coursework was useful to me. • ** The coursework was beneficial to me. • ** I found the coursework to be relevant to my future. • I will be able to use the knowledge I gained in this course. • ** The knowledge I gained in this course is important for my future.
Success	• ** I was confident that I could succeed in the coursework. • ** I felt that I could be successful in meeting the academic challenges in this course. • ** I was capable of getting a high grade in this course. • ** Throughout the course, I felt that I could be successful on the coursework.
Interest	• The coursework held my attention. • ** The instructional methods used in this course held my attention. • ** I enjoyed the instructional methods used in this course. • The instructional methods engaged me in the course. • ** I enjoyed completing the coursework. • ** The coursework was interesting to me.
Caring	• The instructor was available to answer my questions about the coursework. • ** The instructor was willing to assist me if I needed help in the course. • ** The instructor cared about how well I did in this course. • ** The instructor was respectful of me. • ** The instructor was friendly. • I believe that the instructor cared about my feelings.

** Items with the double asterisk (**) are part of the short-form version. Pilot testing indicates that they produce valid scores and further evaluation is ongoing.

Originating from original studies by Ryan, 1982 and Ryan, Mims & Koestner, 1983; See also Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner & Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994).
Plus d'infos ici : https://selfdeterminationtheory.org/intrinsic-motivation-inventory/

THE POST-EXPERIMENTAL INTRINSIC MOTIVATION INVENTORY
(Below are listed all 45 items that can be used depending on which are needed.)

For each of the following statements, please indicate how true it is for you, using the following scale:

1 2 3 4 5 6 7

not at all true — somewhat true — very true

Interest/Enjoyment

I enjoyed doing this activity very much
This activity was fun to do.
I thought this was a boring activity. (R)
This activity did not hold my attention at all. (R)
I would describe this activity as very interesting.
I thought this activity was quite enjoyable.
While I was doing this activity, I was thinking about how much I enjoyed it.

Perceived Competence
I think I am pretty good at this activity.
I think I did pretty well at this activity, compared to other students.
After working at this activity for awhile, I felt pretty competent.
I am satisfied with my performance at this task.
I was pretty skilled at this activity.
This was an activity that I couldnÕt do very well. (R)

Effort/Importance
I put a lot of effort into this.
I didnÕt try very hard to do well at this activity. (R)
I tried very hard on this activity.
It was important to me to do well at this task.
I didnÕt put much energy into this. (R)

Pressure/Tension
I did not feel nervous at all while doing this. (R)
I felt very tense while doing this activity.
I was very relaxed in doing these. (R)
I was anxious while working on this task.
I felt pressured while doing these.

Perceived Choice
I believe I had some choice about doing this activity.
I felt like it was not my own choice to do this task. (R)
I didnÕt really have a choice about doing this task. (R)
I felt like I had to do this. (R)
I did this activity because I had no choice. (R)
I did this activity because I wanted to.
I did this activity because I had to. (R)

Value/Usefulness
I believe this activity could be of some value to me.
I think that doing this activity is useful for _____
I think this is important to do because it can _____
I would be willing to do this again because it has some value to me.
I think doing this activity could help me to _____
I believe doing this activity could be beneficial to me.
I think this is an important activity.

Relatedness
I felt really distant to this person. (R)
I really doubt that this person and I would ever be friends. (R)
I felt like I could really trust this person.
IÕd like a chance to interact with this person more often.
IÕd really prefer not to interact with this person in the future. (R)
I donÕt feel like I could really trust this person. (R)
It is likely that this person and I could become friends if we interacted a lot.
I feel close to this person.

Constructing the IMI for your study. First, decide which of the variables (factors) you want to use, based on what theoretical questions you are addressing. Then, use the items from those factors, randomly ordered. If you use the value/usefulness items, you will need to complete the three items as appropriate. In other words, if you were studying whether the person believes an activity is useful for improving concentration, or becoming a better basketball player, or whatever, then fill in the blanks with that information. If you do not want to refer to a particular outcome, then just truncate the items with its being useful, helpful, or important.

Scoring information for the IMI. To score this instrument, you must first reverse score the items for which an (R) is shown after them. To do that, subtract the item response from 8, and use the resulting number as the item score. Then, calculate subscale scores by averaging across all of the items on that subscale. The subscale scores are then used in the analyses of relevant questions.

Originating from original studies by Ryan, 1982 and Ryan, Mims & Koestner, 1983; See also Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner & Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994).
Plus d'infos ici : https://selfdeterminationtheory.org/intrinsic-motivation-inventory/

The following is a 22 item version of the scale that has been used in some lab studies on intrinsic motivation. It has four subscales: interest/enjoyment, perceived choice, perceived competence, and pressure/tension. The interest/enjoyment subscale is considered the self-report measure of intrinsic motivation; perceived choice and perceived competence are theorized to be positive predictors of both self-report and behavioral measures of intrinsic motivation. Pressure tension is theorized to be a negative predictor of intrinsic motivation. Scoring information is presented after the questionnaire itself.

TASK EVALUATION QUESTIONNAIRE

For each of the following statements, please indicate how true it is for you, using the following scale:

1	2	3	4	5	6	7
not at all true			somewhat true			very true

1. While I was working on the task I was thinking about how much I enjoyed it.
2. I did not feel at all nervous about doing the task.
3. I felt that it was my choice to do the task.
4. I think I am pretty good at this task.
5. I found the task very interesting.
6. I felt tense while doing the task.
7. I think I did pretty well at this activity, compared to other students.
8. Doing the task was fun.
9. I felt relaxed while doing the task.
10. I enjoyed doing the task very much.
11. I didnÕt really have a choice about doing the task.
12. I am satisfied with my performance at this task.
13. I was anxious while doing the task.
14. I thought the task was very boring.
15. I felt like I was doing what I wanted to do while I was working on the task.
16. I felt pretty skilled at this task.
17. I thought the task was very interesting.
18. I felt pressured while doing the task.
19. I felt like I had to do the task.
20. I would describe the task as very enjoyable.
21. I did the task because I had no choice.
22. After working at this task for awhile, I felt pretty competent.

Scoring information. Begin by reverse scoring items # 2, 9, 11, 14, 19, 21. In other words, subtract the item response from 8, and use the result as the item score for that item. This way, a higher score will indicate more of the concept described in the subscale name. Thus, a higher score on pressure/tension means the person felt more pressured and tense; a higher score on perceived competence means the person felt more competent; and so on. Then calculate subscale scores by averaging the items scores for the items on each subscale. They are as follows. The (R) after an item number is just a reminder that the item score is the reverse of the participantÕs response on that item.

Interest/enjoyment:	1, 5, 8, 10, 14(R), 17, 20
Perceived competence:	4, 7, 12, 16, 22
Perceived choice:	3, 11(R), 15, 19(R), 21(R)
Pressure/tension:	2(R), 6, 9(R), 13, 18

The subscale scores can then be used as dependent variables, predictors, or mediators, depending on the research questions being addressed.

Originating from original studies by Ryan, 1982 and Ryan, Mims & Koestner, 1983; See also Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner & Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994).
Plus d'infos ici : https://selfdeterminationtheory.org/intrinsic-motivation-inventory/

The next version of the questionnaire was used for a study of internalization with an uninteresting computer task (Deci et al., 1994).

ACTIVITY PERCEPTION QUESTIONNAIRE

The following items concern your experience with the task. Please answer all items. For each item, please indicate how true the statement is for you, using the following scale as a guide:

1	2	3	4	5	6	7
not at all true			somewhat true			very true

1. I believe that doing this activity could be of some value for me.
2. I believe I had some choice about doing this activity.
3. While I was doing this activity, I was thinking about how much I enjoyed it.
4. I believe that doing this activity is useful for improved concentration.
5. This activity was fun to do.
6. I think this activity is important for my improvement.
7. I enjoyed doing this activity very much.
8. I really did not have a choice about doing this activity.
9. I did this activity because I wanted to.
10. I think this is an important activity.
11. I felt like I was enjoying the activity while I was doing it.
12. I thought this was a very boring activity.
13. It is possible that this activity could improve my studying habits.
14. I felt like I had no choice but to do this activity.
15. I thought this was a very interesting activity.
16. I am willing to do this activity again because I think it is somewhat useful.
17. I would describe this activity as very enjoyable.
18. I felt like I had to do this activity.
19. I believe doing this activity could be somewhat beneficial for me.
20. I did this activity because I had to.
21. I believe doing this activity could help me do better in school.
22. While doing this activity I felt like I had a choice.
23. I would describe this activity as very fun.
24. I felt like it was not my own choice to do this activity.
25. I would be willing to do this activity again because it has some value for me.

Scoring information. Begin by reverse scoring items # 8, 12, 14, 18, 20, and 24 by subtracting the item response from 8 and using the result as the item score for that item. Then calculate subscale scores by averaging the items scores for the items on each subscale. They are shown below. The (R) after an item number is just a reminder that the item score is the reverse of the participantÕs response on that item.

Interest/enjoyment:	3, 5, 7, 11, 12(R), 15, 17, 23
Value/usefulness:	1, 4, 6, 10, 13, 16, 19, 21, 25
Perceived choice:	2, 8(R), 9, 14(R), 18(R), 20(R), 22, 24(R)

TEXT MATERIAL QUESTIONNAIRE I

For each of the following statements, please indicate how true it is for your, using the following scale as a guide:

1 2 3 4 5 6 7

not at all true	somewhat true	very true

1. While I was reading this material, I was thinking about how much I enjoyed it.
2. I did not feel at all nervous while reading.
3. This material did not hold my attention at all.
4. I think I understood this material pretty well.
5. I would describe this material as very interesting.
6. I think I understood this material very well, compared to other students.
7. I enjoyed reading this material very much.
8. I felt very tense while reading this material.
9. This material was fun to read.

Scoring information. Begin by reverse scoring items # 2 and 3. In other words, subtract the item response from 8, and use the result as the item score for that item. This way, a higher score will indicate more of the concept described in the subscale name. Then calculate subscale scores by averaging the items scores for the items on each subscale. They are shown below. The (R) after an item number is just a reminder that the item score is the reverse of the participantOs response on that item.

Interest/enjoyment: 1, 3(R), 5, 7, 9
Perceived competence: 4, 6,
Pressure/tension: 2(R), 8

Originating from original studies by Ryan, 1982 and Ryan, Mims & Koestner, 1983; See also Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner & Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994).
Plus d'infos ici : https://selfdeterminationtheory.org/intrinsic-motivation-inventory/

Factor 1: Research Experience

Prompt: "Please describe how active you have been in the following science related activities while you've been an undergraduate. We are interested in science-related activities that occurred OUTSIDE of your regular coursework."

1. I worked on a research project in which I figured out what data to collect and how to collect it
2. I reported my research results in an oral presentation or written report
3. I learned scientific language and terminology
4. I related my research results and explanations to the work of others
5. I used scientific literature to guide a research project
6. I had the opportunity to generate my own research question to answer
7. I learned technical science skills
8. I took a leadership role in a scientific research team

Factor 2: Science Self-Efficacy

Prompt: "Indicate the extent to which you are confident that you can complete the following tasks."

1. Relate results and explanations to the work of others
2. Generate a research question to answer
3. Use scientific literature to guide research
4. Create explanations for the results of the study
5. Develop theories (integrate results from multiple studies)
6. Use scientific language and terminology
7. Use technical science skills

Factor 3: Identity as a Scientist

Prompt: "The following questions ask how you think about yourself and your personal identity. We want to understand how much you think that being a scientist is part of who you are."

1. In general, being a scientist is an important part of my self-image
2. Being a scientist is an important reflection of who I am
3. I feel like I belong in the field of science
4. I have a strong sense of belonging to the community of scientists
5. I am a scientist

Robnett, R.D., Chemers, M.M., Zurbriggen, E.L. (2015) Longitudinal Associations Among Undergraduates'Research Experience, Self-Efficacy, and Identity. *Journal of Research in Science Teaching, 52*(6), 847-867

Questionnaire Instrument Validity of Critical Thinking Ability

Indicator	Question
Interpretation	I can determine the cause of the problem that I'm facing (Q1)
	I can mention statement including facts (reality) or opinions (Q15)
	I can determine whether an opinion said by someone is true or not (Q17)
	I respect the opinions of others despite differing opinions (Q18)
	I speak with easy-to-understand sentences (Q21)
	I convey information clearly (Q22)
	I understand the information that other people give (Q23)
	I dare to express my opinion in front of the class (Q24)
Analysis	I associate one thing with another to solve a difficulty (Q2)
	I can sort out what problems that I am facing (Q6)
	I am able to estimate the consequences that will occur if I am in trouble (Q7)
	I can distinguish between facts (reality) and opinions (Q10)
	I will check the truth, when I doubt someone else's answer (Q20)
	I made a backup answer to a question (Q3)
	I can choose correctly when I am faced with several choices (Q8)
Evaluation	I discuss difficulties with others to get the right answer (Q9)
	I summarize a number of issues into one of the most important issues (Q11)
	I want to listen to criticisms and suggestions from others (Q25)
Inference	I feel that every difficulty must have a solution (Q4)
	I can provide evidence when arguing (Q5)
	I solve the problem one by one, not simultaneously (Q12)
	I can tell some answers that are appropriate for a question (Q13)
	I am not ashamed to ask other people if I am having trouble (Q14)
	I look for the truth, when there is uncertain news (Q16)
	In my opinion, every answer must have a basis (Q19)

Marni, S., Aliman, M., Roekhan, S., & Harsiati, T. (2020) Students' Critical Thinking Skills Based on Gender and Knowledge Group. *Journal of Turkish Science Education, 17*(4), 544-560.