



Which is the Best Fuel?



Assessment

This guide to assessment strategies is put forward from different perspectives. In part A the assessment is based on the skill to be developed in the student. Part B is based on the assessment strategies to use in each lesson, whereas part C illustrates the assessment by the 3 different approaches which a teacher may use for formative assessment – observation, by oral communication, or by marking of written work. Summative assessment strategies are not shown, but these could relate to viva type oral communication and/or to the marking of written tests/examination questions.

Part A Assessment by Application of Skills

Award of social value grade (objective 1)

Teachers listens to the debate

- x Not able to take part meaningfully in the discussion and suggest a meaningful decision
- √ Takes part in the discussion but is not able to justify any meaningful decision to be taken on which is the best fuel
- √√ Is able to play a major role in the discussion and in making meaningful and justified decisions related to the best fuel

Award scientific method grade (objective 2)

Teacher observes the students and notes the observations recorded

- x Carries out the experiment, but the observations are either not accurate or inappropriate
- √ Able to carry out the experiment and make meaningful observations
- √√ Able to carry out the experiment, taking sufficient repeat observations to make the experiment meaningful and reliable

Award of a personal skill grade (objectives 3 and 4)

Teacher observes the students and notes the observations recorded

- x Carries out the experiment, but the observations are either not accurate or inappropriate
- √ Able to carry out the experiment and make meaningful observations
- √√ Able to carry out the experiment, taking sufficient repeat observations to make the experiment meaningful and reliable

Developer: Jack Holbrook

Institute: ICASE
Country: UK

Part B Assessment by Lesson

Lesson 1

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)			
1	Understands the issue	Able to explain the meaning of fuel and give examples.				
2	Writes a plan of an investigation	Puts forward an appropriate research/ scientific question and/or knows the purpose of the investigation/experiment.				
		Creates an appropriate investigation or experimental plan to the level of detail required by the teacher suggesting suitable fuels to use.				
		Puts forward an appropriate prediction/hypotheses.				
		Develops an appropriate procedure (including apparatus/chemicals required and safety procedures required) and indicates variables to control.				

Lesson 2

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)			
1	Workable plan	Puts forward an appropriate plan for carrying out the experiments				
		Develops an appropriate procedure (including apparatus/chemicals required and safety procedures required) and indicates variables to control				
2	Determines from data collected	Interprets data collected to determine the calorific value of the fuel.				
		Able to calculate the head of combustion.				

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Lesson 3

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)		
1	Carrying out the experiment	Contributes to the group discussion during the inquiry phases (raising questions, planning investigation/experiment, putting forward hypotheses/predictions, analyzing data, drawing conclusions, making justified decisions).			
		Cooperates with others in a group and fully participates in the work of the group.			
		Illustrates leadership skills – guiding the group by thinking creatively and helping those needing assistance (cognitive or psychomotor); summarising outcomes.			
		Shows tolerance with, and gives encouragement to, the group members.			
		Performs the investigation/experiment according to the instructions/plan created.			
		Behaves in a safe manner with respect to him/herself and to others.			
2	Record experimental data collected	Makes and Records observations/data collected appropriately (in terms of numbers of observations deemed acceptable/accuracy recorded/errors given).			
		Draws appropriate conclusions related to the research/scientific question.			
		Gives a justified socio-scientific decision as to the best fuel, correctly highlighting the scientific component.			

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Lesson 4

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Writes a report of the investigation	Creates an appropriate experimental report to the level of detail required by the teacher.	
2	Scientific or socio-scientific reasoning	Illustrates creative thinking/procedures in suggesting the best fuel.	
		Gives a justified socio-scientific decision as to the best fuel, correctly highlighting the scientific component.	

Part C Assessment by Teacher Strategy

Assessment Tool based on the Teacher's Marking of Written Material

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Interpret or calculate from data collected and making conclusions	Interprets data collected in a justifiable manner including the use of appropriate graphs, tables and symbols	
		Draws appropriate conclusions related to the research/scientific question	

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Assessment Tool based on the Teacher's Oral Questioning

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Questions to individuals in a Whole Class setting	Answers questions at an appropriate cognitive level using appropriate scientific language on the meaning of fuel	
		Shows interest and a willingness to answer	
		Willing and able to challenge/support answers by others, as appropriate	
2	Questions to the group	Able to explain the work of the group and the actions undertaken by each member	
		Understands and can explain the science involved using appropriate language	
		Willing to support other members in the group in giving answers when required	
		Thinks in a creative manner, exhibits vision and can make justified decisions	
3	Questions to individuals in the group	Able to explain the work of the group and actions taken by each member	
		Understands the purpose of the work and shows knowledge and understanding of the subject using appropriate scientific language	
		Can exhibit non-verbal activity (demonstrate) in response to the teacher's questions, as appropriate	

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Assessment Tool based on the Teacher's Observations

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Functioning in the group during experimentation or discussion	Contributes to the group discussion during the inquiry phases (raising questions, planning investigation/experiment, putting forward hypotheses/predictions, analyzing data, drawing conclusions, making justified decisions).	
		Cooperates with others in a group and fully participates in the work of the group.	
		Illustrates leadership skills – guiding the group by thinking creatively and helping those needing assistance (cognitive or psychomotor); summarising outcomes.	
		Shows tolerance with, and gives encouragement to, the group members.	
2	Performing the investigation or experiment	Understands the objectives of the investigation/experimental work and knows which tests and measurements to perform.	
		Performs the investigation/experiment according to the instructions/plan created. And undertakes sufficient repeat observations	
		Uses lab tools and the measurement equipment in a safe and appropriate manner.	
		Behaves in a safe manner with respect to him/herself and to others.	
		Maintains an orderly and clean work table.	
3	Scientific or socio-scientific reasoning	Illustrates creative thinking/procedures in suggesting the best fuel	
		Gives a justified socio-scientific decision as to the best fuel, correctly highlighting the scientific component	

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