



Should we do more to save Cultural Monuments from Corrosion ?

Assessment of student gains and progress is important. The following suggestions are directly based on the learning objectives/competencies, or their breakdown into specific learning outcomes for individual lessons. Although three different approaches are given to illustrate how student assessment can be tackled, it must be stressed that there is no expectation that a teacher

1. uses all three approaches at the same time
2. assesses all students in every lesson
3. assesses all students in the same respects
4. undertakes individual assessment, if group assessment is preferred
5. assesses students when clearly the teacher's time is better spent guiding students in a teaching mode.

The three approaches are :

- Part A is related to assessment directed at the learning skills to be acquired.
- Part B is related to assessment per lesson (as it is suggested in the module).
- Part C is related to assessment per teacher strategy adopted by the teacher (i.e. marking written work; observation of students; oral communication with students)

The suggested emphasis is on 'assessment for learning' so that the assessment is carried out to help students more than it is a measure of attainment. This emphasis is intended to guide the teacher as to where future emphasis needs to be placed in the teaching and to guide the students to appreciate their strengths and weaknesses. Finally, stress is placed on the fact that the three approaches are suggested strategies and not definitive.

Part A Assessment by Skills (Formative Assessment strategy)

Able to award a social value grade (objective 1)

The teacher observes the group discussions

- x Unable to appreciate the problem and make a decision.
- √ Recognises that the corrosion of monuments is a problem and can make a decision on action which should be taken to stop the corrosion.
- √√. Appreciates the cultural importance of preserving monuments. Able to make a justified decision and willing to support restoration once a solution has been found to the corrosion problem.



Able to award a science method grade (objective 2)

The teacher listens to the group discussions. The teacher asks questions in the group as appropriate.

- x Students can put forward few ideas of how to investigate the problem, but is able to follow experimental instructions.
- √ Students can make suggestions to investigate the corrosion problem based on ideas of redox.
- √√ Students appreciate that the problem is linked to an electrochemical process and can suggest a range of experiments to be undertaken to investigate the problem.

Able to award a personal skill grade (objectives 3 and 4)

The teacher observes the students in their groups

- x Group cooperation was not well organised. At best only partial interest in carrying out the investigation.
- √ Able to follow the experimental instructions and set up the experiments. Group willing to cooperate together, but the cooperation is not efficient, as measured by the time involved in setting up the range of experiments.
- √√. The group work well together and are able to carry out all planning and experimental stages smoothly and efficiently.

Able to award a science concept grade (objective 5)

The teacher observes the groupwork and the group presentation. The teacher asks questions as appropriate.

- x Poor interpretation of the experimental results. Very superficial suggestions for solving the problem.
- √ Able to interpret the results obtained for the experiments and recognise the corrosion problem when copper is in contact with iron and the role played by salt in the corrosion of copper.
- √√ Able to interpret the experiments, appreciate the role of salt in aiding corrosion and put forward a range of interesting and novel ways of solving the problem.



Summative Assessment strategies

Able to award a social value grade (objective 1)

The teacher reads the answers to the questions posed

- x Only superficial reasons are put forward as to why protect the monuments i.e. to make them look nice.
- √ Able to suggest why the protection of monuments are important from a societal viewpoint.
- √√ Able to consider the protection of monuments from a number of viewpoints and suggest the importance of protection the monuments from these positions.

Able to award a science method grade (objective 2)

The teacher reads the solutions given in the presentation by the group.

- x Few recommendations offered and presented in a very vague manner.
- √ At least one recommendation is given for the iron-copper corrosion problem and the corrosion of the copper in the air, but the solutions tend to overlap.
- √√ A number of interesting and diverse recommendations are given that could have practical application.

Able to award personal skills grade (objective 4)

The teachers reads the material used of the presentation by the group.

- x Materials not logically presented. Observations not systematically recorded. Explanations missing. Not able to comment on possible changes in the environment that are dangerous for monuments.
- √ Material presented well, with observations given systematically and explanations offered. Able to suggest what changes in the environment are dangerous for monuments.
- √√ Use of communication approaches beyond the written word included to aid comprehension of the material. Very clearly able to indicate the environmental dangers to monuments and how these are created.

Able to award a science conceptual grade (objective 5)

The teacher reads the observations and explanations offered in the presentation by the group.

- x Poor recording of the observations. No explanations offered for the observations made.

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- √ Observations recorded well. Explanations offered in each case for the corrosion, but the role of the salt is not fully understood.
- √√ Good recording of the observations and the explanations. Good understanding shown for the role played by the salt in the reactions.

Part B Assessment by Lesson

Lesson 1

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Writes a plan or report 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.	
		Puts forward an appropriate prediction/hypotheses.	
		Develops an appropriate procedure (including apparatus/chemicals required and safety procedures required) and indicates variables to control.	
2	Record experimental data collected	Makes and Records observations/data collected appropriately (in terms of numbers of observations deemed acceptable/accuracy recorded/errors given)	
3	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.	
4	Answers questions	Provides correct written answers to questions given orally or in written format.	
		Provides answers in sufficient detail especially when called upon to give an opinion or decision .	

Lesson 2

	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.	
		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	Presenting the investigation or experiment orally	Presents the activity in a clear and practical manner with justified decisions.	
		Presents by illustrating knowledge and understanding of the subject.	
		Uses precise and appropriate scientific terms and language.	
		Presents with clarity and confidence using an audible voice.	



Lesson 3

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Presenting the results orally	Presents the results in a clear and practical manner with justified decisions.	
		Presents by illustrating knowledge and understanding of the subject.	
		Uses precise and appropriate scientific terms and language.	
		Presents with clarity and confidence using an audible voice.	
2	Performing the investigation or experiment	Understands the objectives of the investigation/experimental work and understand the role of the multimeter.	
		Performs the experiments according to the instructions/plan created.	
		Uses the multimeter in an appropriate manner.	
3	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.	

Lesson 4

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	Gives explanations	Provides correct explanations based on the electrochemical series	
2	Scientific or socio-scientific reasoning	Illustrates creative thinking/procedures in suggesting whether it is appropriate to save cultural monuments	
		Gives a justified socio-scientific decision to an issue or concern, correctly highlighting the scientific component	

Part C Assessment by Teacher Strategy

Student assessment tool based on the Teacher's Marking of Written Material

	Dimension	Criteria for evaluation The student:	Mark/grade given (x,√,√√)
1	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	
		Puts forward an appropriate prediction/hypotheses	
		Develops an appropriate procedure (including apparatus/chemicals required and safety procedures required) and indicates variables to control	

2	Record experimental data collected	Makes and Records observations/data collected appropriately (in terms of numbers of observations deemed acceptable/accuracy recorded/errors given)	
3	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	
4	Answers questions	Provides correct written answers to questions given orally or in written format	
		Provides answers in sufficient detail especially when called upon to give an opinion or decision	
5	Scientific or socio-scientific reasoning	Illustrates creative thinking/procedures in solving problems	
		Gives a justified socio-scientific decision to an issue or concern, correctly highlighting the scientific component	

Student 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.	
		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	Presenting the investigation or experiment orally	Presents the activity in a clear and practical manner with justified decisions.	
		Presents by illustrating knowledge and understanding of the subject.	
		Uses precise and appropriate scientific terms and language.	
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