

# Junior Cycle Science

## Guidelines for the Classroom-Based Assessments and Assessment Task

For use with CBAs from October 2018





# Contents

Introduction	5
Classroom-Based Assessments: General Information	6
Classroom-Based Assessments in Science	10
Classroom-Based Assessment 1: Extended Experimental Investigation	12
Getting ready	13
Completing the Extended Experimental Investigation	15
Deciding on the level of achievement	18
Next steps	21
Classroom-Based Assessment 2: Science in Society Investigation	23
Getting ready	24
Completing the Science in Society Investigation	26
Deciding on the level of achievement	30
Next steps	33
Appendix 1	36
Investigation Plan for CBA 1	36
Appendix 2	37
Evaluating the suitability of a topic for investigation for CBA2	37

# Introduction

This document, *Junior Cycle Science: Guidelines for the Classroom-Based Assessments and Assessment Task* provides:

- General information on Classroom-Based Assessments
- Detail of the nature and scope of the two Classroom-Based Assessments described in the curriculum specification for science
- The Features of Quality used to decide the level of achievement in each Classroom-Based Assessment
- Guidelines for schools, teachers and students on completing the Classroom-Based Assessments in science
- Details of the Assessment Task in science and how the school supports its completion.

These guidelines should be used in conjunction with the curriculum specification for *Junior Cycle Science* and the NCCA's online support material for junior cycle, which includes further details of the Subject Learning and Assessment Review process and other aspects of junior cycle assessment set out in these guidelines.

All documentation can be accessed at <http://www.curriculumonline.ie/Junior-cycle/Junior-Cycle-Subjects/Science>. An outline of assessment in junior cycle can be found in the *Framework for Junior Cycle 2015* which can be accessed at <http://www.education.ie/en/Publications/Policy-Reports/Framework-for-Junior-Cycle-2015.pdf>.

# Classroom-Based Assessments: General Information

Classroom-Based Assessments (CBAs) are best described as the occasions when the teacher assesses the students using the specific tasks set out in the curriculum specification for each subject. They are completed within the time allocated for science, which is a minimum of 200 hours. The CBAs and the Features of Quality, which support teacher judgement, are set out in these guidelines. The assessment is similar to the ongoing assessment that occurs every day in every class. In the case of Classroom-Based Assessment the teacher's judgement is recorded for the purpose of subject learning and assessment review, and for the school's reporting to parents and students. Students prepare for the Classroom-Based Assessment over specified periods of time in second and third year. The results of other projects, homework, or tests undertaken by the students in the course of their normal classwork do not add up to the award of a descriptor for the Classroom-Based Assessment.

## Deciding the level of achievement for the Classroom-Based Assessments

There are four level descriptors of achievement for each Classroom-Based Assessment: *Exceptional*, *Above expectations*, *In line with expectations*, and *Yet to meet expectations*. All work submitted is judged to fit one of these four descriptors.

Teachers use the Features of Quality, set out in these guidelines (p19 and 31), to decide the level of achievement in each Classroom-Based Assessment. The Features of Quality are the criteria used to assess the student work as best fitting one of the following Descriptors:

- **Exceptional** describes a piece of work that reflects the Features of Quality for the Classroom-Based Assessment to a very high standard. While not necessarily perfect, the strengths of the work far outstrip its flaws, which are minor. Suggestions for improvement are easily addressable by the student.
- **Above expectations** describes a piece of work that reflects the Features of Quality for the Classroom-Based Assessment very well. The student shows a clear understanding of how to complete each area of activity of the investigation, and the work is praised for its rigour.

Feedback from the teacher might point to the necessity to address some aspect of the work in need of further attention or polishing, but, on the whole the work is of a high standard.

- **In line with expectations** describes a piece of work that reflects most of the Features of Quality for the Classroom-Based Assessment well. It shows a good understanding of the task in hand and is free from significant error. Feedback might point to areas needing further attention or correction, but the work is generally competent and accurate.
- **Yet to meet expectations** describes a piece of work that falls somewhat short of the demands of the Classroom-Based Assessment and its associated Features of Quality. Perhaps the student has made a good attempt, but the task has not been grasped clearly or is marred by significant lapses. Feedback will draw attention to fundamental errors that need to be addressed.

When using the Features of Quality to assess the level of student achievement in a Classroom-Based Assessment, teachers use 'on-balance' judgement. The teacher should read the Features of Quality (starting with *Yet to meet expectations*) until they reach a descriptor that best describes the work being assessed. Where it is not clearly evident which descriptor should apply, teachers must come to a judgement based on the evidence from the student's work to select the descriptor that best matches the student's work overall. This 'best fit' approach allows teachers to select the descriptor that 'on balance' describes the work being assessed.

Teachers should not assume that the results of a group of students being assessed will follow any particular distribution pattern, as the work is being judged only against the Features of Quality rather than other students' performances.

Teacher judgements about the quality of student work, with the aim of arriving at a shared understanding of standards and expectations, are supported by annotated examples of student work published on <https://www.curriculumonline.ie/Junior-cycle/Junior-Cycle-Subjects/Science>; by the features of quality in these guidelines; and by collaboration and discussion with colleagues during Subject Learning and Assessment Review meetings.

## The autonomy of the school in preparing students for the Classroom-Based Assessments

These guidelines provide schools with the autonomy to complete the Classroom-Based Assessments so that they can suit the particular needs, contexts, and circumstances of students and the school. A variety of possibilities are presented on the investigation topics that can be chosen. Similarly, variation might occur in the range of formats used by students to present evidence of their learning.

## How the school supports the completion of the assessments.

The school supports the completion of the assessments by:

- Ensuring that the NCCA *Guidelines for the Classroom-Based Assessments and Assessment Task* are provided to teachers
- Supporting teachers in recording the level Descriptors awarded to each student
- Retaining records and pieces of work, as appropriate, for the purposes of Subject Learning and Assessment Review
- Applying the guidelines for Subject Learning and Assessment Review set out in this document
- Supporting teachers and students in the completion of the Assessment Task
- Following set arrangements for the transfer of the completed Assessment Tasks to the State Examinations Commission for marking
- Applying inclusive assessment practices as set out in these guidelines
- Reporting the outcomes of Classroom-Based Assessments to students and their parents/guardians as part of the school's on-going reporting procedures and through the Junior Cycle Profile of Achievement (JCPA).

Further information can be found <http://juniorcycle.ie/Assessment>.



## Reasonable support

To facilitate developmental feedback to students during their engagement with the task, the process of completing the Classroom-Based Assessment should be viewed as part of teaching and learning, and not solely for assessment purposes. It is envisaged that teachers will guide and supervise throughout the process through 'reasonable support'. If a student requires more than what is deemed to be 'reasonable support', the teacher can make a note of the level of assistance provided. The level of initiative demonstrated by students is an element of the Features of Quality used to decide the level of achievement of the student's work.

Reasonable support may include:

- Clarifying the requirements of the task
- Using annotated examples of student work provided by NCCA to clarify the meaning and interpretation of the Features of Quality to students
- Providing instructions at strategic intervals to facilitate the timely completion of the investigation and report
- Providing supports for students with special educational needs (SEN) as outlined below.

It is not envisaged that this level of support involved requires teachers to edit draft reports, or to provide model text or answers to be used in the student's evidence of learning.

## Inclusive assessment practice

Schools facilitate inclusive assessment practices whether as part of ongoing assessment or Classroom-Based Assessments. Where a school judges that a student has a specific physical or learning difficulty, reasonable supports may be put in place to remove, as far as possible, the impact of the disability on the student's performance in Classroom-Based Assessments and the Assessment Task. These supports e.g. the support provided by a special needs assistant or the support of assistive technologies or the use of Irish Sign Language, should be in line with the arrangements the school has put in place to support the student's learning throughout the year.

# Classroom-Based Assessments in Science

There are two Classroom-Based Assessments in Science. They are assessed at Common Level. They relate to specified learning outcomes and link to important aspects of the development of students' science knowledge, understanding, skills, and values. Both Classroom-Based Assessments relate to

*priorities for learning and teaching such as **investigating**, and **communicating** in science, while at the same time developing their **knowledge** and **understanding** of science, which are vital to working like a scientist.*

(Specification for Junior Cycle Science, p22)

They are scheduled to be undertaken by students in a defined time period within class contact time to a national timetable (as advised by the NCCA) in the school calendar. This timetable for Classroom-Based Assessments for all subjects will be provided on an annual basis at [www.ncca.ie/junior-cycle](http://www.ncca.ie/junior-cycle) and at [www.curriculumonline.ie/Junior-cycle](http://www.curriculumonline.ie/Junior-cycle). Following the second of these assessments, students, in Year Three, will complete an Assessment Task which is marked by the State Examinations Commission as part of the state-certified examination in Science. The Classroom-Based Assessments for science are outlined in Fig 1 below.

**Table 1: Classroom-Based Assessments: Science**

Classroom-Based Assessments	Format	Student preparation
<b>Extended Experimental Investigation (EEI)</b>	A report may be presented in a wide range of formats	A student will, over a three-week period <sup>1</sup> , formulate a scientific hypothesis, plan and conduct an experimental investigation to test their hypothesis, generate and analyse primary data, and reflect on the process, with support/guidance from the teacher.
<b>Science in Society Investigation (SSI)</b>	A report may be presented in a wide range of formats	A student will, over a three-week period <sup>2</sup> , research a socio-scientific issue, analyse the information/secondary data collected, evaluate the claims and opinions studied, and draw evidence-based conclusions about the issues involved, with support/guidance from the teacher.

<sup>1</sup> The date range during which it is advised the three-week period for the EEI should be allocated, is provided on page 14

<sup>2</sup> The date range during which it is advised the three-week period for the SSI should be allocated, is provided on page 24

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## Assessment Task

The Assessment Task is a written task completed by students during class time. It is not marked by the class teacher, but is sent to the State Examinations Commission for marking. The Assessment Task is specified by the NCCA and is related to the learning outcomes on which the second Classroom-Based Assessment is based. In the case of science, this is the Science in Society Investigation. Details relating to the Assessment Task are set out in Fig 2 below.

**Table 2: The Assessment Task: Science**

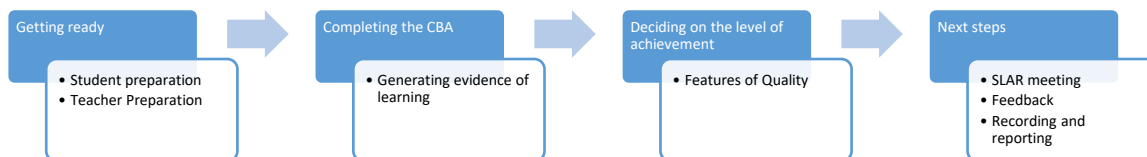
<b>Format</b>	<b>Student preparation</b>	<b>Completed</b>
Students complete a specified written task which is sent to the SEC for marking.	The Assessment Task will link to the Science in Society Investigation.	Following completion of the second Classroom-Based Assessment in Year Three.

# Classroom-Based Assessment 1: Extended Experimental Investigation

The Extended Experimental Investigation (EEI) gives students an opportunity to research a question they have about some science-related phenomena they have come across in the course of the three years of their studies. The development of inquiry, collaborative, practical, recording and reporting skills will be central here, such as posing questions and making predictions, working with others, designing experiments, conducting experiments, generating and recording primary data, processing and analysing the data to make valid conclusions, and communicating the method used, data recorded, findings, and reflections on the investigation.

The EEI comprises of four areas of activity: *questioning and predicting, planning and conducting, processing and analysing, and reflecting and reporting*. It is encouraged, but not required, that students collaborate with classmates, except where it is indicated that students must work on their own. Teachers should ensure that each student is able to individually produce evidence related to the Features of Quality of this assessment. Under normal circumstances each student/group should complete a different investigation.

**Figure 1: Process for conducting the EEI**



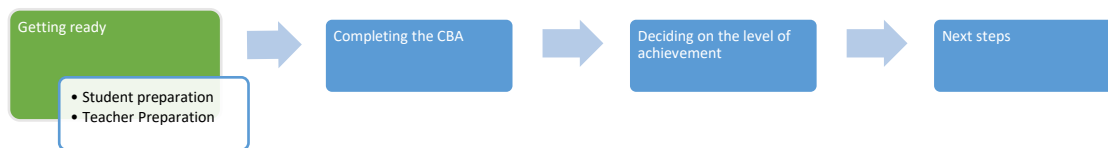
The Extended Experimental Investigation promotes student engagement through:

- Choice about the topic on which to focus
- Choice about communication formats
- The possibilities for student collaboration.

The main learning outcomes assessed by the Extended Experimental Investigation are:

Nature of Science	1, 2, 3, 4, 5 and 7
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# Getting ready



## Student preparation

Students should have developed sufficient knowledge, skills and understanding over the course of first and second year to undertake an EEI. As part of ongoing teaching, learning and assessment of the learning outcomes for Junior Cycle Science, students should have opportunities to develop inquiry and practical skills, including skills to manipulate and use laboratory equipment safely as they realise various learning outcomes. As students progress through junior cycle, they should be encouraged to identify scientific concepts, ideas and applications that they want to know more about, or investigations encountered that they would like to extend by introducing some degree of complexity. While the Classroom-Based Assessment is summative, it is envisaged that throughout junior cycle, formative assessment by teachers, the students themselves and their peers is used to allow students, teachers and parents to aid their development and track their progress. From an early stage, students should be familiar with and understand the Features of Quality used to judge the quality of their investigation. This is best achieved when students use success criteria for ongoing assessments throughout first, second, and third year.

## Teacher preparation

It is important to set the times and dates for implementation as early as possible. The key date to establish at the outset is the timing of the *Subject Learning and Assessment Review* meeting for the EEI. In setting this date the school will be guided by its own local circumstances bearing in mind that the EEI assessment must be completed by the end of Year Two, and the Key Dates for Classroom-Based Assessments provided by the NCCA at <https://www.curriculumonline.ie/Junior-cycle> and <https://www.ncca.ie/en/junior-cycle/assessment-and-reporting/slar-meetings>. Once the school has decided on this date the teachers and students can plan for the completion of the Classroom-Based Assessment.

In order to become familiar with the assessment of the EEI, it will be helpful to:

- Review all the documents outlined in the introduction to these guidelines
- Download and view annotated examples of EEIs on [www.curriculumonline.ie](http://www.curriculumonline.ie)
- Discuss the assessment of the EEI with your colleagues and plan any teaching and revision that may be required.

# Completing the Extended Experimental Investigation



Over the course of three weeks, students will engage in four activities which contribute to the generation of their evidence of learning and achievement in the Extended Experimental Investigation

- A. Questioning and predicting
- B. Planning and conducting
- C. Processing and analysing
- D. Reflecting and reporting

It is not intended to present the activities as a rigid and linear process. Each activity may be revisited at different times as students complete the investigation.

## A. Questioning and predicting

For this part of the investigation students may work individually or in small groups. Each student must contribute to the work of the group.

- Choose the topic:

The topic options are:

Water	The Earth / Moon / Sun system	Food	Plant growth and behaviour
Chemical reactions	Plastics	Forces	Energy conservation

- Decide the research question

Once a student has decided the topic they would like to investigate, they will need to formulate a research question. The question to be tested should meet the following criteria:

- It is driven by the scientific understandings of one or more of the above topics.

- It is open-ended
- It lends itself to a testable hypothesis

Students should be given time to collect information on the background theory related to the research question in order to refine their question and to help with the justification of their hypothesis/prediction. This information can be summarised in their research records. It is important for students to record the sources of information to ensure that they can be referenced in the report.

- Writing the hypothesis/prediction

Once students have decided the research question they are advised to form a hypothesis, which should meet the following criteria:

- It defines and links the variables
- It is testable
- Its testing is manageable

If the investigation is more of a 'trial and error' nature, then students may choose a more general statement, a prediction, rather than a hypothesis.

## **B. Planning and conducting**

For this part of the investigation students may work individually or in groups. Each student must contribute to the collection of data.

- Planning the investigation

Students should be given time to have hands-on experience in the laboratory to plan and refine their experimental design, decide what equipment and materials will be necessary, and assess any possible risks. Teachers should remind students about safe working while carrying out the investigation.

**Note:** At the end of this planning session students should work on their own to write their Investigation Plan (Appendix 2), which they submit individually for investigation approval. This should take no more than a single class period to complete. Students should not proceed until their teacher has given approval. Where a teacher has to provide assistance in the design of the investigation—because, for example, the proposed method was dangerous, incomplete, or unworkable—this should be recorded by the teacher for consideration when judging the level of achievement of the work. However, where a method is good, but unworkable or unmanageable for logistical reasons, the teacher may suggest changes, and this should not affect the ultimate level of achievement awarded to the work.

- Conducting the investigation



Once again, teachers should remind students about safe working while carrying out the investigation. Where a teacher has to provide assistance to ensure the safe assembly and use of equipment, this should be recorded by the teacher. There is no specified time period for this stage of the investigation. As a rule of thumb, it should be possible to complete the practical work and data collection in approximately half the time allocated for the EEI.

Students should note in their research records all data, problems and changes to method used during any preliminary trials. Likewise, all data and problems encountered during the final experiments should be recorded.

### **C. Processing and analysing**

For this part of the investigation students must work individually to analyse their own data, perform any necessary calculations, consider how to best represent and analyse their data, identify patterns and relationships in the data, explain any anomalous data, describe the relationships between the variables, draw conclusions, and consider if their hypothesis or prediction has or has not been supported.

### **D. Reflecting and reporting**

Students may work individually or in groups to reflect on their work. They should be encouraged to critically discuss various aspects of their investigation, such as the design of the experiment and possible improvements, the limitations of their data, any possible theoretical or practical implications of their findings, and further related investigations that they might conduct and why.

Students must work individually to compile the report of their investigation, using the information/data they have recorded in their research throughout the investigation.

## **Evidence of learning**

The following evidence is required:

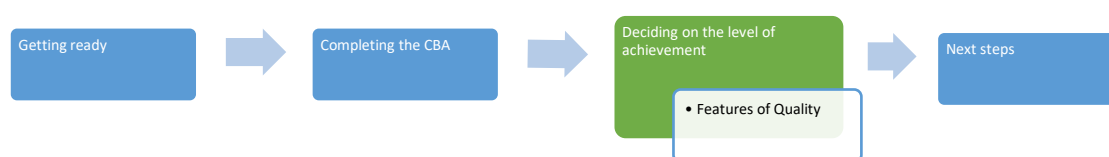
- A report
- Student research records.

Students will report their research and findings in a format of their choice. The report can be completed at the end of the investigation. If a typed or hand-written report is the format of their choice, the total

length of the report would typically be in the 400-600 words range (excluding tables, graphs, reference list and research records), but this should not be regarded as a rigid requirement. EEIs may be effectively presented in other formats but care must be taken that all the work can be judged on the final product alone. For example, a poster presentation may allow students to show that they can select and present highlights of their investigation, but it may be prudent to include a short written report to communicate any work related to the investigation that is not represented on the poster. When planning the content of their report, students should be familiar with the Features of Quality used to judge the level of achievement which will be awarded to their work.

The teacher can review their own notes to check whether a student required more than what is deemed 'reasonable support' (see page 8) in formulating hypotheses/predictions, planning and conducting the investigation.

## Deciding on the level of achievement



### Features of Quality

Key Features of Quality in support of student and teacher judgement for the Extended Experimental Investigation are described here. The Features of Quality are the criteria used to assess the student work as best fitting one of the four Descriptors. Before using the Features of Quality below it may be helpful to review the information on:

- Making 'on-balance' judgements (page 7)
- Reasonable support (page 15).

## Features of Quality for the Extended Experimental Investigation

### Exceptional

Investigating

- Forms a testable hypothesis or prediction with justification
- Describes considerations related to reliability and fairness
- Outlines appropriate safety considerations, and describes the method used to accurately collect and record good quality, reliable data in a manner that could be easily repeated
- Uses an innovative approach that truly enhances the work
- Records a sufficient amount of good quality data

Communicating

- Presents data in the most appropriate way using relevant scientific terminology and informative representations; calculations, if any, are performed to a high degree of accuracy
- Describes the relationships between the variables

Knowledge and understanding

- Provides a justified conclusion supported by the data; identifies and explains any anomalous data
- Uses relevant science knowledge to assess and describe whether the hypothesis has/has not been supported
- Describes in detail the strengths and weaknesses of their own investigations, including appropriate improvements and or refinements, or explains fully why no further improvements could reasonably be achieved

### Above expectations

- Forms a testable hypothesis or prediction with justification
- Identifies the variable to be measured and the variable to be changed
- Outlines appropriate safety considerations, and describes the method and equipment used to collect and record data
- Records a sufficient amount of good quality data

- Displays data neatly and accurately, using relevant scientific terminology and informative representations; calculations, if any, are performed to a high degree of accuracy
- Describes the relationships between the variables
- Draws a conclusion consistent with the data and comments on whether the conclusion supports the hypothesis
- Identifies the strengths and weaknesses of the investigation and suggests appropriate improvements, or explains why the procedures were of sufficient quality

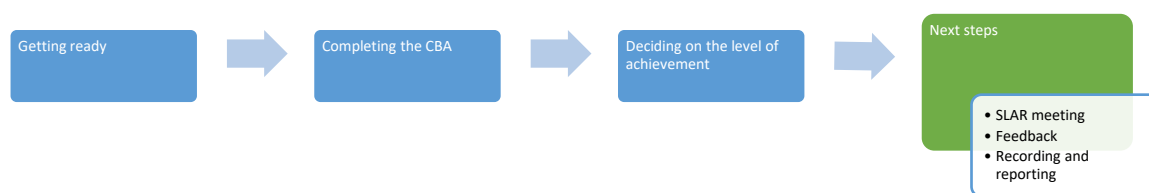
### **In line with expectations**

- With limited guidance, forms a testable hypothesis/prediction
- Describes a safe method used to collect data-some of the steps are understandable but lack some detail
- Records raw/primary data
- Displays data on simple tables, charts or graphs, allowing for some errors in scaling or plotting
- States a relationship between the variables
- Draws a conclusion based on data collected, identifies some features of the investigation that could be improved and suggests improvements

### **Yet to meet expectations**

- Uses a given investigation question
- Is directed in using equipment to collect and record data
- Data collection method described is not repeatable
- Displays data on incomplete tables, charts or graphs, allowing for significant errors in scaling or plotting
- Comments on the investigation without making a conclusion/refinement to the investigation

## Next steps



## Subject Learning and Assessment Review meeting

Shared understanding of standards within junior cycle will arise through professional discussion in Subject Learning and Assessment Review meetings where staff bring their own examples of student work and compare their judgements with other colleagues, with annotated examples of student work and with specifications provided by the NCCA. Over time, this process will help develop a greater understanding of standards and ensure consistency of judgement about student performance.

Samples of the Extended Experimental Investigation by students will be gathered/recorded for discussion at the Subject Learning and Assessment Review meetings. In preparation for the Subject Learning and Assessment Review meeting, each teacher will identify one sample of students' work for each descriptor, where feasible, and will have these available for discussion at the meeting. Any audio or audio-visual recording device, such as a tablet, mobile phone, laptop or video camera, available in the school can be used for this purpose. School rather than personal devices should be used. The recording should take place with cognisance of child protection guidelines and in line with the school's acceptable use and data protection policies. [This only applies to subjects where students will be recorded]

Further details on managing the Subject Learning and Assessment Review meeting are available online at can be accessed at <https://www.ncca.ie/en/junio9rcycle/assessment-and-reporting/slar-meetings>

The key date to establish at the outset is the date to be set aside for the Subject Learning and Assessment Review. In setting the date the school should be guided by the Key Dates for Classroom-Based Assessments provided by the NCCA at <https://www.curriculumonline.ie/Junior-cycle> and <https://www.ncca.ie/en/junior-cycle/assessment-and-reporting/slar-meetings>. Once the school has decided on this date the teachers and students can plan for the completion of the Classroom-Based Assessment.

## Recording and reporting for the JCPA

Following the Subject Learning and Assessment Review each individual teacher re-considers the judgement they had made of their student's work, based on the outcomes of the meeting, and where necessary makes the appropriate adjustments to the level of achievement awarded to the work. The descriptors awarded are used in reporting progress and achievement to parents and students as part of the school's ongoing reporting procedures and through the Junior Cycle Profile of Achievement (JCPA).

Where it arises that a student does not submit any work for their Classroom-Based Assessment, a descriptor cannot be awarded, as there is no work to discuss against the Features of Quality. In such cases, 'Not reported' should be selected when inputting results for the JCPA. Further information in relation to reporting Classroom-Based Assessment descriptors for the JCPA is available from the DES at the following link: <https://www.education.ie/en/Schools-Colleges/Services>Returns/Post-Primary-Online-Database-P-POD-Project/>

## Using Feedback

Providing effective feedback is a crucial step in using the EEI to support learning in science. Students will be informed of the Descriptor they have been awarded once the SLAR meeting has taken place and its outcomes have been processed. However, effective feedback goes beyond the naming of the Descriptor awarded. Feedback on the strengths of the student's work, and on areas for improvement can be used to support their future learning. Information gathered during the completion of the EEI, and from the Subject Learning and Assessment Review meeting can be used to inform planning for future teaching and learning.

## Querying a result

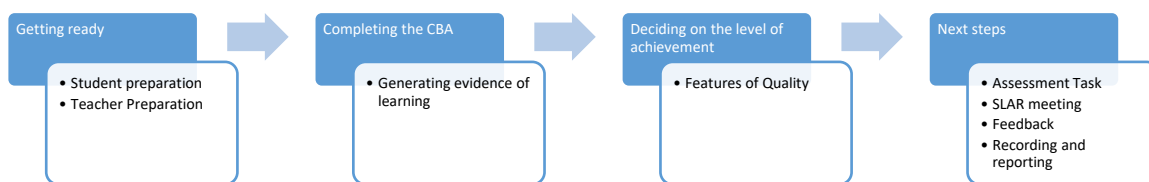
Queries in relation to the EEI, where they arise, will be dealt with by the school.

# Classroom-Based Assessment 2: Science in Society Investigation

The Science in Society Investigation (SSI) gives students an opportunity to explore a scientific topic or issue. The development of research and reporting skills are central here, for example searching for information, discriminating between sources, documenting sources used, presenting evidence in a report, applying knowledge of science to new situations and analysing different points of view on the issue, drawing conclusions and communicating personal opinion(s) based on the evidence.

The SSI is an individual research project comprising of three activities: *initiating research*, *communicating*, and *evaluating*. Students may collaborate with classmates in gathering relevant information and data, but each student must individually produce evidence to meet the Features of Quality of this assessment.

**Figure 2: Process for conducting the SSI**



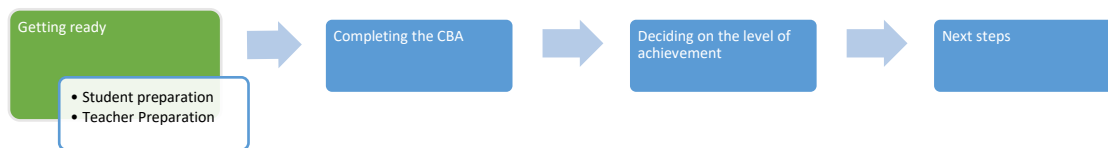
Science in Society Investigations promote student engagement through:

- Choice about the scientific topic or issue on which to focus
- Choice about communication formats
- The possibilities for student collaboration.

The main learning outcomes assessed by the **Science in Society Investigation** are:

Nature of Science	1, 2, 4, 6, 7, 8, 9 and 10
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# Getting ready



## Student preparation

Students should have developed sufficient knowledge, skills and understanding over the course of first, second, and third year to undertake an SSI in the middle of third year. As part of ongoing teaching, learning and assessment of the learning outcomes for Junior Cycle Science, students should have opportunities to develop research skills, including skills to report on and evaluate information as they realise various learning outcomes. While the Classroom-Based Assessment is summative, it is envisaged that, throughout junior cycle, formative assessment by teachers, the students themselves and their peers is used to allow students, teachers and parents to aid their development and track their progress. From an early stage, students should be familiar with and understand the Features of Quality used to judge the quality of their investigation. This is best achieved when students use success criteria for ongoing assessments throughout first and second year.

## Teacher preparation

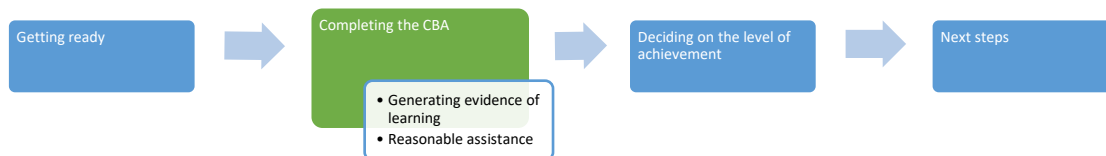
It is important to set the times and dates for implementation as early as possible. The key date to establish at the outset is the timing of the *Subject Learning and Assessment Review* meeting for the SSI. In setting this date the school will be guided by its own local circumstances bearing in mind that the SSI assessment must be completed by the end of Year Three, and the Key Dates for Classroom-Based Assessments provided by the NCCA at <https://www.curriculumonline.ie/Junior-cycle> and <https://www.ncca.ie/en/junior-cycle/assessment-and-reporting/slar-meetings>. Once the school has decided on this date the teachers and students can plan for the completion of the Classroom-Based Assessment.



In order to become familiar with the assessment of the SSI, it will be helpful to:

- Review all the documents outlined in the introduction to these guidelines
- Download and view annotated examples of SSIs (which will be made available on [www.curriculumonline.ie](http://www.curriculumonline.ie) in Autumn 2018)
- Discuss the assessment of the SSI with your colleagues, and plan any teaching and revision that may be required.

# Completing the Science in Society Investigation



Over

the course of three weeks, students will be engaged in three activities that contribute to the generation of their evidence of learning and achievement in the Science in Society Investigation:

- A. Initiating research
- B. Communicating findings
- C. Evaluating the information to respond to the chosen research question.

Students must work individually to conduct this investigation but they should be encouraged to discuss, in small groups, various aspects of their investigation.

## A. Initiating research

- Choose the topic

The SSI requires students to investigate a scientific topic or issue and its impact (positive or negative) on society and/or the environment. The chosen topic may be directly related to specific course content or students may decide to study an issue of personal or local relevance, provided it is related to the areas outlined below. It is important that the topic chosen can be researched, has a sound base of scientific understanding and ideas, and can be turned into a question. In many SSIs there may be two or more views of the topic or issue, and students should be encouraged to consider more than one point of view. Appendix 2 includes material to assist in the evaluation of the suitability of a topic for investigation.

The chosen topics should relate to the following areas:

- A technological application of science
- An application of science that has an effect on human health
- An application of science that has an effect on the environment
- An application of science that has an effect on society.

- Decide the specific research question

Research should be focused on a response to a clearly-defined research question. It may be useful to do some background reading of the chosen topic. The research question may be revised or changed as the student begins researching for information on the chosen topic.

To help students develop their research question, they could:

- Decide what they want to know about the chosen topic
- Turn what they want to know into a question
- Check to make sure that the question can be answered – that it's not too broad or too narrow.

It is advisable to avoid questions which:

- Might relate to a good science topic, but are not issue-based, e.g. What is nuclear power?, How do electronic passports work?
- Have little or no evidence for or against the issue.

- Gather and record research information

Once students have sufficiently developed their research question, they begin to gather data/information from the internet, newspapers, science journals/magazines, or any other appropriate source e.g. a survey to support their research findings, or observations of experiments/investigations undertaken by the student.

It is important for students to record the source of all the information gathered in order to assess its reliability and quality (relevance, accuracy and bias) and to ensure that the sources of information used can be referenced in the report.

## **B. Communicating findings**

- Select relevant information from selected sources

Students will select information (e.g. written text, audio/visual recording, interview notes, charts, tables, survey responses, observations, diagrams) relevant to developing a response to the stated research question. Information will be selected to:

- Position the topic as science in society and discuss the impact of the topic on society and/or the environment, and/or its personal or local relevance
- Explain, in the student's own words, scientific knowledge and ideas relevant to the chosen topic
- Explain in their own words different viewpoints and sides of the argument.

Information should not be taken verbatim from sources; it is important for students to be able to explain the information in their own words to demonstrate their personal understanding of the knowledge and ideas relevant to the chosen topic.

### **C. Evaluating the information to respond to the chosen research question**

The following steps can support students in developing a personal opinion that is justified on the basis of the selected information:

- Check which sources agree/disagree with each other
- Consider the information from different points of view
- Make judgements about how the information supports, or does not support, a particular response to the research question.

Students must work individually to compile the report of their investigation.

## **Evidence of learning**

The following evidence is required:

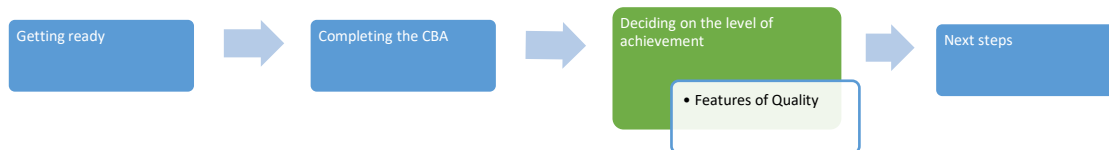
- A report
- Student research records.

Students will report their research and findings in a format of their choice. The report can be completed at the end of the investigation or at the end of each main area of activity as outlined above. If a typed or hand-written report is the format of their choice, the total length of a written report would typically be in the 650-800 words range (excluding reference list and research notes), but this should not be regarded as a rigid requirement. SSIs may be effectively presented in other formats (e.g. posters, podcasts, or multimedia), but care must be taken that all the research can be judged on the final product alone. For example, a poster presentation may allow students to show that they can select and present

highlights of their research, but it may be prudent to include a written report of approximately 400 words to convey the deeper research underpinning it. Depending on the chosen format, some reports may involve fewer words, but nonetheless they will present all the research and findings using other media. When planning the content of their report, students should be familiar with the Features of Quality used to judge the level of achievement which will be awarded to their work.

The teacher can review their own notes to check whether a student required more than what is deemed 'reasonable support' (see page 8) in choosing a topic for investigation, deciding a specific research question, or finding and recording information.

# Deciding on the level of achievement



## Features of Quality

Key Features of Quality in support of student and teacher judgement for the Science in Society Investigation are described here. The Features of Quality are the criteria used to assess the student work as best fitting one of the four Descriptors. Before using the Features of Quality below it may be helpful to review the information on:

- Making 'on-balance' judgements (page 7)
- Reasonable support (page 15).

## Features of Quality for The Science in Society Investigation

### Exceptional

Investigating

- Chooses an interesting or novel topic and research question
- Finds information about the topic from a large number of varied and balanced sources, and gives a complete reference list
- Evaluates the reliability (relevance, accuracy and bias) of the sources

Communicating

- Clearly positions the topic as science in society; explains the relevant science and the impact of the topic on society and/or the environment
- Presents the investigation in a very well-structured way (that is clear and easy to read) using relevant scientific terminology and informative representations; uses an innovative approach that truly enhances the work
- Explains different sides of the argument in detail

Knowledge and understanding

- Views on the chosen topic are considered and discussed in depth
- Gives a justified personal opinion informed by research, linking the information to the argument and using science explanations

### Above expectations

- Chooses an interesting or novel topic and research question
- Finds information about the topic from a number of balanced sources, and gives a complete reference list
- Considers the reliability and quality (relevance, accuracy and bias) of the sources

- Positions the topic as science in society; explains the relevant science and the impact of the topic on society and/or the environment
- Presents the investigation in a well-structured way (that is clear and easy to read), using relevant scientific terminology and informative representations
- Considers information from different sides of the argument

- Gives a personal opinion informed by research linking the information to the argument and using science explanations

### **In line with expectations**

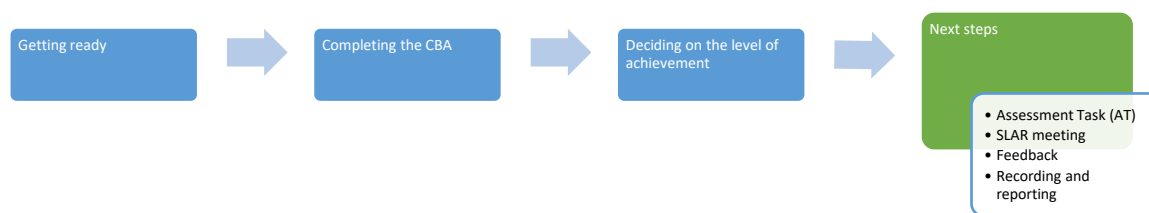
- Chooses a topic and research question with some teacher guidance
- Finds some useful sources of information about the topic and gives some references
- Gives some consideration to the reliability or quality (relevance, accuracy and bias) of the sources
- Mentions in passing the impact of the topic on society and/or the environment.
- Presents the investigation in a structured way using relevant scientific terminology
- Provides information on different sides of the argument
- Gives a personal opinion informed by research with some explanation

### **Yet to meet expectations**

- Chooses a topic but is given the research question
- Is directed to sources of information about the topic
- Uses very few sources with little evidence of what the sources are
- Presents the investigation using some scientific terminology
- Presents the investigation in a way that is somewhat structured
- Gives a personal opinion without explanation or a link to the original question



## Next steps



## Completing the Assessment Task

Students undertake a written Assessment Task to be submitted to the State Examinations Commission for marking as part of the state-certified examination for Science. It will be allocated 10% of the marks used to determine the grade awarded by the SEC. The Assessment Task links to the principal objective of the SSI, which is to analyse the information/secondary *data collected, evaluate the claims and opinions studied, and draw evidence-based conclusions about the issues involved*. The knowledge and skills developed by students during this Classroom-Based Assessment emerge from their growing awareness of *scientific inquiry*.

The Assessment Task will comprise of **some or all** of the following:

- Engagement with a short stimulus in written, audio, audio-visual or multi-modal format in preparation for the written task
- A written task that tests the students in:
  - their ability to engage critically in a balanced review of scientific texts: evaluate reliability of sources, analyse and evaluate data, information and evidence, and draw valid conclusions
  - their ability to apply their learning to unseen contexts and scenarios
  - their capacity to reflect on the skills they have developed

The Assessment Task is offered at a Common Level and the questions posed will take into account the broad cohort of students taking the assessment. Including the engagement with the stimulus material, the Assessment Task takes approximately two class periods (a minimum of 80 minutes) to complete. The student response is written into a pro-forma booklet and the school forwards the completed student booklets for the Assessment Task in accordance with arrangements set out by the SEC. The mark awarded for the Assessment Task will be aggregated by the SEC with the mark awarded for the examination to determine the overall grade for the state-certified final examination in Science.

Where a student is absent for the completion of all or part of the Assessment Task, schools should make local arrangements in the school to allow the student to complete the task as close as possible to the timeframe scheduled for completion.

Examples of Assessment Tasks and guidelines on how to organise and manage the Assessment Task will be made available at [www.curriculumonline.ie](http://www.curriculumonline.ie) and in the *Assessment Toolkit*.

## Subject Learning and Assessment Review meeting

Shared understanding of standards within junior cycle will arise through professional discussion in Subject Learning and Assessment Review meetings where staff bring their own examples of student work and compare their judgements with other colleagues, with annotated examples of student work and with specifications provided by the NCCA. Over time, this process will help develop a greater understanding of standards and ensure consistency of judgement about student performance.

Samples of the Extended Experimental Investigation by students will be gathered/recorded for discussion at the Subject Learning and Assessment Review meetings. In preparation for the Subject Learning and Assessment Review meeting, each teacher will identify one sample of students' work for each descriptor, where feasible, and will have these available for discussion at the meeting. Any audio or audio-visual recording device, such as a tablet, mobile phone, laptop or video camera, available in the school can be used for this purpose. School rather than personal devices should be used. The recording should take place with cognisance of child protection guidelines and in line with the school's acceptable use and data protection policies. [This only applies to subjects where students will be recorded]

Further details on managing the Subject Learning and Assessment Review meeting are available online at can be accessed at <https://www.ncca.ie/en/juniorcycle/assessment-and-reporting/slar-meetings>

The key date to establish at the outset is the date to be set aside for the Subject Learning and Assessment Review. In setting the date the school should be guided by the Key Dates for Classroom-Based Assessments provided by the NCCA at <https://www.curriculumonline.ie/Junior-cycle> and <https://www.ncca.ie/en/junior-cycle/assessment-and-reporting/slar-meetings>. Once the school has decided on this date the teachers and students can plan for the completion of the Classroom-Based Assessment.

## Recording and reporting for the JCPA

Following the Subject Learning and Assessment Review each individual teacher re-considers the judgement they had made of their student's work, based on the outcomes of the meeting, and where necessary makes the appropriate adjustments to the level of achievement awarded to the work. The descriptors awarded are used in reporting progress and achievement to parents and students as part of the school's ongoing reporting procedures and through the Junior Cycle Profile of Achievement (JCPA).

Where it arises that a student does not submit any work for their Classroom-Based Assessment, a descriptor cannot be awarded, as there is no work to discuss against the Features of Quality. In such cases, 'Not reported' should be selected when inputting results for the JCPA. Further information in relation to reporting Classroom-Based Assessment descriptors for the JCPA is available from the DES at the following link: <https://www.education.ie/en/Schools-Colleges/Services>Returns/Post-Primary-Online-Database-P-POD-Project/>

## Using Feedback

Providing effective feedback is a crucial step in using the EEI to support learning in science. Students will be informed of the Descriptor they have been awarded once the SLAR meeting has taken place and its outcomes have been processed. However, effective feedback goes beyond the naming of the Descriptor awarded. Feedback on the strengths of the student's work, and on areas for improvement can be used to support their future learning. Information gathered during the completion of the EEI, and from the Subject Learning and Assessment Review meeting can be used to inform planning for future teaching and learning.

## Appealing or querying a result

Student appeals regarding the state-certified examination grade, inclusive of the Assessment Task, will be processed as per the current appeal arrangements. Queries in relation to SSI, where they arise, will be dealt with by the school.

# Appendix 1

## Investigation Plan for Classroom-Based Assessment 1

Student name:	Date:
	Class:
Research question:	
Equipment and materials request:	
Proposed method:	
Approved by:	Date:

## Appendix 2

### Evaluating the suitability of a topic for investigation for Classroom-Based Assessment 2

Sample topic 1: Nuclear power plants	
Is this topic course-related, an issue of personal interest, or one with local relevance?	Course-related (ES6, PW8) and possibly an issue of personal interest.
Can the topic be researched?	There is enough available information at the appropriate level of cognitive demand for students.
Is there a sound base of scientific understanding and ideas?	Yes
Are there two or more sides to the story?	There are many scientific and societal arguments for and against nuclear power plants.
Can it turned into a specific research question?	Yes
<b>Conclusion:</b> This is a suitable topic to choose as a basis for CBA2.	

Sample topic 2: Electronic passports	
Is this topic course-related, an issue personal interest, or one with local relevance?	Students may find through research that the electronics aspects are beyond the scope of Junior Cycle Science, but may pursue it as a science-related societal issue of personal interest.
Can the topic be researched?	There is enough available information at the appropriate level of cognitive demand for students.
Is there a sound base of scientific understanding and ideas?	Yes
Are there two or more sides to the story?	One would expect mainly societal arguments for and against electronic passports to feature in this SSI.
Can it turned into a specific research question?	Yes
<b>Conclusion:</b> This is a suitable topic to choose as a basis for CBA2.	

# Appendix 3:

## Support for teacher judgement: Subject Learning and Assessment Review

Subject Learning and Assessment Review meetings enable teachers to collaboratively reach consistency in their judgments of student work against common, externally-set Features of Quality. Greater understanding of standards and expectations will develop over time as teachers come together in professional discussion to reflect on the quality of their own students' work, informed by the subject specification, assessment guidelines and other support material including annotated examples of students' work provided by the NCCA.

### Overview

The review process is centred on teachers discussing student work at structured meetings. It will play an important role in helping teachers to develop an understanding of standards and expectations by enabling them to reflect on the evidence of students' work and to share the learning and teaching strategies supporting that work.

The objectives of the review process are to achieve

- greater consistency of teachers' judgement
- better feedback to students
- greater alignment of judgements with expected standards

and to assure parents and others that students are receiving appropriate recognition of their achievements in line with standards and expectations.

The time for review meetings will be provided for in the school calendar from the allocated 22 hours of professional time for each full-time teacher each year. One teacher of each subject will be allocated two additional hours by school management to prepare for and coordinate each review meeting. This role will normally be rotated among the relevant teachers.

Each meeting will

- be subject-specific

- be approximately two hours long
- take place at a time as near as possible to the completion of the Classroom-Based Assessment
- involve the review of student work related to a specific Classroom-Based Assessment.

Where there is a single teacher of a subject in a school, the teacher can be facilitated to participate in a Subject Learning and Assessment Review meeting in another school. In the case of an Irish-medium school, the single teacher of a subject can participate in a Subject Learning and Assessment Review meeting in another Irish-medium school.

## Facilitator's guide

Teachers will fulfil the role of facilitator during Subject Learning and Assessment Review meetings on a rotational basis. The facilitator will model effective questioning during the discussion of the samples of student work focusing on how well students' work matches the Features of Quality. During review meetings, where it is not clearly evident which descriptor should apply, the group should look for the evidence in the student's work that matches all or nearly all of the Features of Quality associated with a particular descriptor. This 'best fit' approach allows teachers at the review meeting to select the descriptor that 'on-balance' best matches the work being assessed. The facilitator will submit a short report (see Appendix 4) of the review meeting to the school principal.

Teachers should not assume that the results of a group of students being assessed will follow any particular distribution plan as the student's work is being judged only against the Features of Quality rather than other students' performance.

### **Before the meeting**

As a first step, teachers may find it helpful to review some of the relevant NCCA-annotated examples prior to coming to decisions about their own students' work.

Once students have completed their Classroom-Based Assessment, the teacher will carry out a provisional assessment of the students' work based on the Features of Quality. These provisional assessments may be modified in light of the discussions that take place at the Subject Learning and Assessment Review meeting.

The teacher will make a note of the descriptor allocated to each student and any other point they may wish or find useful to refer to during and after the Subject Learning and Assessment Review meeting. This note will be for the teacher's own use.

In preparation for the Subject Learning and Assessment Review meeting, each teacher will identify one sample of student's work for each descriptor, where feasible, and will have these available for discussion at the meeting.

### **During the meeting**

The facilitator leads the meeting and keeps the record of the decisions made in a template, which is used to generate the report of the meeting (see Appendix 4). It is recommended that the meeting should generally follow this sequence:

- The facilitator explains that the purpose of the meeting is to support consistency of judgement about students' work and to develop a common understanding about the quality of student learning. The value of the meeting in providing feedback to students on how they might improve their work should also be highlighted.
- The facilitator asks one member of staff to introduce a sample of work they have assessed as Yet to reach expectations.
- Following a short introduction by the teacher, the facilitator leads a general discussion on the extent to which the student's work matches the relevant Features of Quality. If the meeting affirms the judgement, this is noted in the meeting record by the facilitator.
- Where there is a lack of agreement, the facilitator should refer to relevant annotated examples of student work provided by the NCCA and, if appropriate, a couple of examples of student work that other teachers in the group have assessed and awarded that descriptor to.
- The facilitator should look to establish consensus during the discussion of examples but the emphasis should be on developing teachers' professional knowledge and skills rather than on seeking unanimous agreement over every Feature of Quality in every example.
- The emphasis in affirming judgements during the review meetings should always be on a 'best fit' approach which allows teachers to agree the descriptor that 'on-balance' is most appropriate for the work being assessed.
- While reasonable time should be allowed for discussion, the facilitator should use his/her professional judgement to decide when it would be appropriate to proceed to the next sample.



- If possible, there should be discussion of at least two samples for each descriptor and the facilitator should ensure that each teacher has at least one of their samples discussed during the meeting.
- The process is repeated, in turn, with samples assessed as In line with expectations, Above expectations and Exceptional being discussed and shared in the group. At the end of the meeting, the facilitator briefly summarises the key points from the discussion.
- It is important that each teacher notes the implications of the decisions made during the meeting for the rest of the student work they have already assessed, particularly in the case of descriptors where their judgement did not align with the view of the majority of teachers at the meeting.

### **After the meeting**

After the meeting, each teacher considers the assessment of their students' work based on the outcomes of the meeting and, where it is considered necessary, makes the appropriate adjustments to their provisional assessments. Following the Subject Learning and Assessment Review meeting, the facilitator submits their report from the meeting focusing on the outcomes of the discussion of student work at the meeting and submits it to the school principal.

The facilitator may also ask teachers, should they wish, to contribute some student work to a bank of examples

- to support the induction of new teachers
- to support future Subject Learning and Assessment Review meetings
- to use with students and parents in demonstrating the standard of work achieved.

# Appendix 4:

## Subject Learning and Assessment Review Meeting: Facilitator's Report

Subject:	Date/time:
Attendance	
Key decisions taken	
Points of note for future review meetings	
Any further comment?	
Facilitator  Date	

