Junior Cycle Science

Guidelines for the Classroom-Based Assessments and Assessment Task

Second Edition: For use with CBA 1 April- May 2018

NCCA

Contents

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 *Assessment Toolkit* 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*

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 all of 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 someway 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.

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 reporting procedures and through the Junior Cycle Profile of Achievement (JCPA).

Further information can be found https://www.ncca.ie/en/junior-cycle/assessment-and-reporting

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

Special provisions may be put in place for a student with a specific physical or learning difficulty to remove as far as possible the impact of the disability on the student's performance in both Classroom-Based Assessments and the Assessment Task so that he or she can demonstrate his or her level of achievement. The accommodations – for example, the use of Irish Sign Language, support provided by a Special Needs Assistant, or the support of assistive technologies – should be in line with the arrangements the school has put in place to support the student's learning throughout the school year and are not designed to compensate for a possible lack of achievement arising from a disability.

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. 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	Completed
Extended Experimental Investigation (EEI)	A report may be presented in a wide range of formats	A student will, over a three-week period[1], 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.	Towards the end of Year Two
Science in Society Investigation (SSI)	A report may be presented in a wide range of formats	A student will, over a three-week period[2], 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.	Year Three

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

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

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

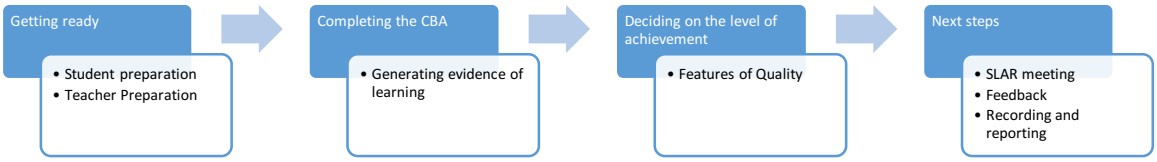
Format	Student preparation	Completed
Students complete a specified written task which is sent to the SEC for marking.	The Assessment Task will link to the Science in Society Investigation.	Following completion of the second Classroom-Based Assessment in Year Three.

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



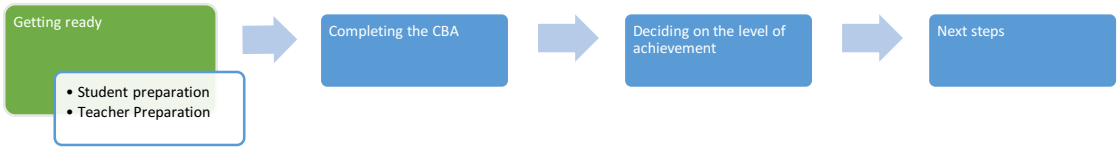
The Extended Experimental Investigation promotes student engagement through:

- 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

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. Once the school has decided on this date the teachers and students can plan for the completion of the EEI. The timing of the process may vary from school to school as the timeline in Table 3 offers a degree of flexibility for schools to schedule the CBA to a time within the specified time period.

Table 3: Completion of Classroom-Based Assessment 1: Extended Experimental Investigation

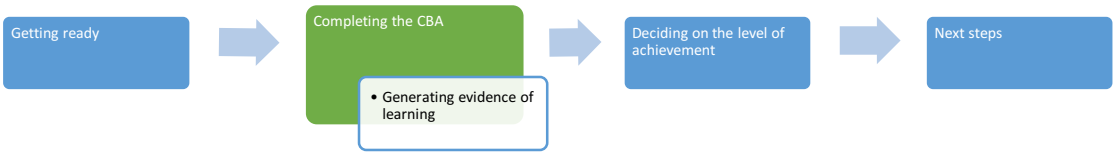
Period[3] for work on and completion of EEI	Friday 20th April 2018 to Friday May 18th 2018
Latest date for provisional award of Descriptors by the teacher	Thursday 24th May 2018
Latest date for Subject Learning and Assessment Review	Monday May 28th 2018

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

- Review all the documents outlined in the iintroduction to these guidelines
- Download and view annotated examples of EEIs (which will be made available on www.curriculumonline.ie in Spring 2018).
- Discuss the assessment of the EEI with your colleagues and plan any teaching and revision that may be required.

[3] To be completed over a three-week period within this date range.

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

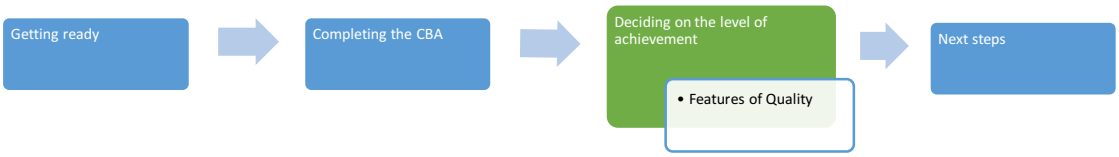
The following evidence is required:

- 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

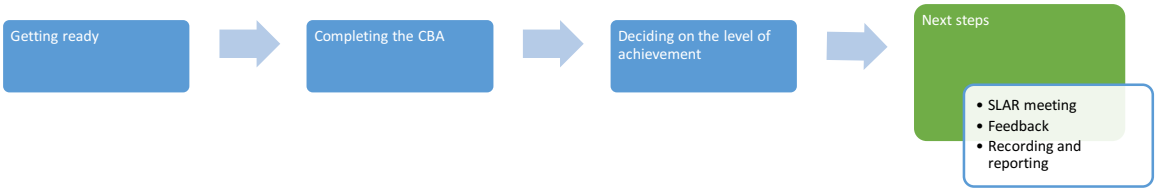
Key Features of Quality in support of student and teacher judgement for the Extended Experimental Investigation are described here. The Features of Quality are the criteria used to assess the student work as best fitting one of the four Descriptors. Before using the Features of Quality below it may be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

In preparation for this meeting, teachers select examples of assessed work to present at the review meeting; one example from each of the three levels of achievement. The examples should not carry the student's name. Further details on managing the Subject Learning and Assessment Review process can be accessed at https://www.ncca.ie/en/junior-cycle/assessment-and-reporting

After the meeting, each individual teacher re-considers the judgement 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.

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.

Recording and reporting for the JCPA

Following the Subject Learning and Assessment Review (SLAR) meeting in a school, subject teachers will maintain a record of their students' achievements in CBA's in line with schools existing reporting practices.

Each EEI submitted by students will be awarded one of the four level descriptors of achievement for: *Exceptional, Above expectations, In line with expectations*, and *Yet to meet expectations*. If a student does not submit an EEI, there is no descriptor to award and 'Not reported' will appear on the JCPA.

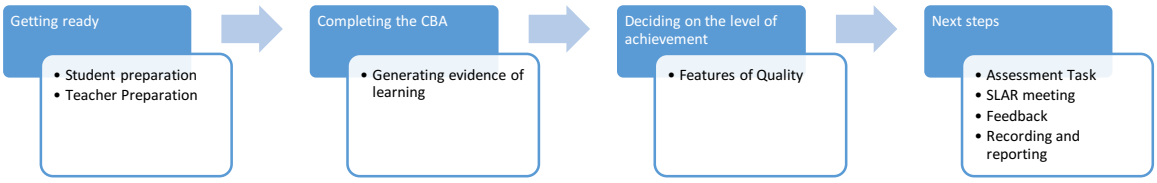
Further details on how to complete the JCPA is provided in the *JUNIOR CYCLE PROFILE OF ACHIEVEMENT (JCPA) Handbook for Schools*, which can be assessed here: www.education.ie

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



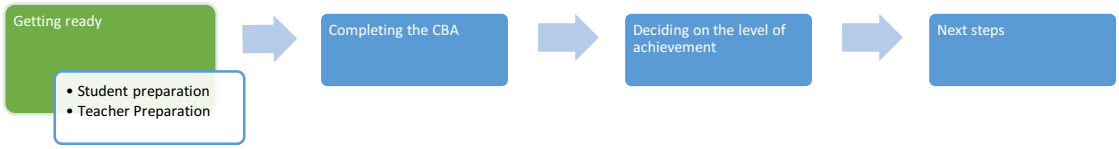
Science in Society Investigations promote student engagement through:

- 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

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 during a defined period in Year Three. Once the school has decided on this date the teachers and students can plan for the completion of the SSI. The timing of the process may vary from school to school as the timeline in Table 4 offers a degree of flexibility for schools to schedule the CBA to a time within the specified time period.

Table 4: Completion of Classroom-Based Assessment 2: Science in Society Investigation

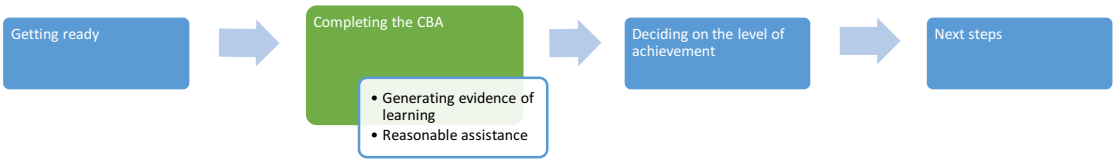
Period[4] for work on and completion of the SSI	Friday 7th December 2018 to Friday 25th January 2019
Window for completion of the Assessment Task	Monday 28th January - Friday 1st February 2019
Latest date for award of provisional descriptors by the teacher	Thursday 7th February 2019
Latest date for completion of Subject Learning and Assessment Review	Monday 11th February

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

- Review all the documents outlined in the iintroduction to these guidelines
- Download and view annotated examples of SSIs (which will be made available on 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.

[4] To be completed over a three-week period within this date range.

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:

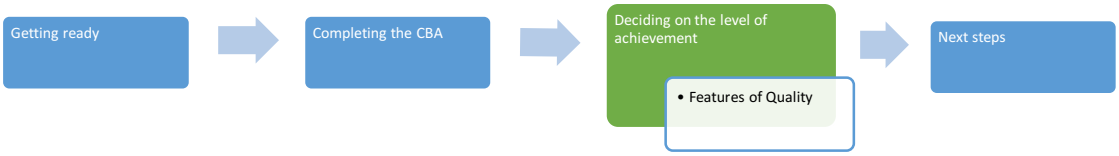
- A report
- Student research records.

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

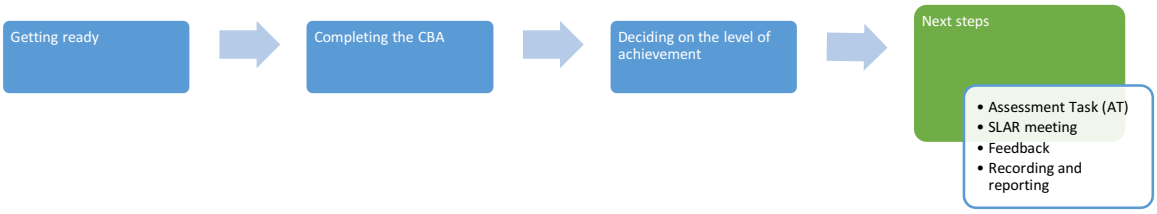
Key Features of Quality in support of student and teacher judgement for the Science in Society Investigation are described here. The Features of Quality are the criteria used to assess the student work as best fitting one of the four Descriptors. Before using the Features of Quality below it may be helpful 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 ▪ Considers the quality of the information collected from the different 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	▪ Evaluates all the information; views on the chosen topic are considered and discussed in depth ▪ Links the information to the topic under investigation ▪ Reviews all the information using science explanations ▪ Gives a personal opinion which is justified by referring to the information evaluated
	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 ▪ Discusses 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 (that is clear and easy to read), using relevant scientific terminology and informative representations ▪ Explains different sides of the argument
▪ Evaluates most of the information, understanding how particular sources might bias scientific practices and knowledge ▪ Links the information to the topic under investigation ▪ Reviews most of the information using science explanations ▪ Gives a personal opinion linking the information to the argument
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 a complete reference list ▪ 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 ▪ Explains different sides of the argument
▪ Evaluates most of the information, understanding that particular sources might bias scientific practices ▪ Gives a personal opinion 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
▪ Evaluates some of the information ▪ 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 senarios
    - 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 and in the *Assessment Toolkit* in Autumn 2018.

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.

In preparation for this meeting, teachers select examples of assessed work to present at the review meeting; one example from each of the three levels of achievement. The examples should not carry the student's name. Further details on managing the Subject Learning and Assessment Review process can be accessed at http://www.juniorcycle.ie/Assessment/Review-Meeting

After the meeting, each individual teacher re-considers the judgement 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.

Using Feedback

Providing effective feedback is a crucial step in using the SSI 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 SSI, 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
Conclusion: 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
Conclusion: This is a suitable topic to choose as a basis for CBA2.	

NCCA