



Oide

Tacú leis an bhFoghlaim
Ghairmiúil i measc Ceannairí
Scoile agus Múinteoirí

Supporting the Professional
Learning of School Leaders
and Teachers

Leaving Certificate Biology

Empowering Teaching, Learning and
Assessment through Scientific Inquiry

Professional Learning Experience – Day 3



Oide

The Oide Science Team



Helen Van
Eesbeck
Senior Leader



The Biology Team



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Burke**



**Martin
Farrelly**



**Tracey
Mason**



**Dee
Cahill**



**Michelle
Wallace**



**Jennie
O'Flaherty**



**Emma
Griffin**



**Carol
Madigan**



Range of Support provided by Oide

Collaboratives

Webinars

Oide.ie /
Oide technology in
education.ie

Half Day
Professional
Learning
Experiences

Scoilnet.ie

Full Day
Professional
Learning
Experiences

School Support
Visits

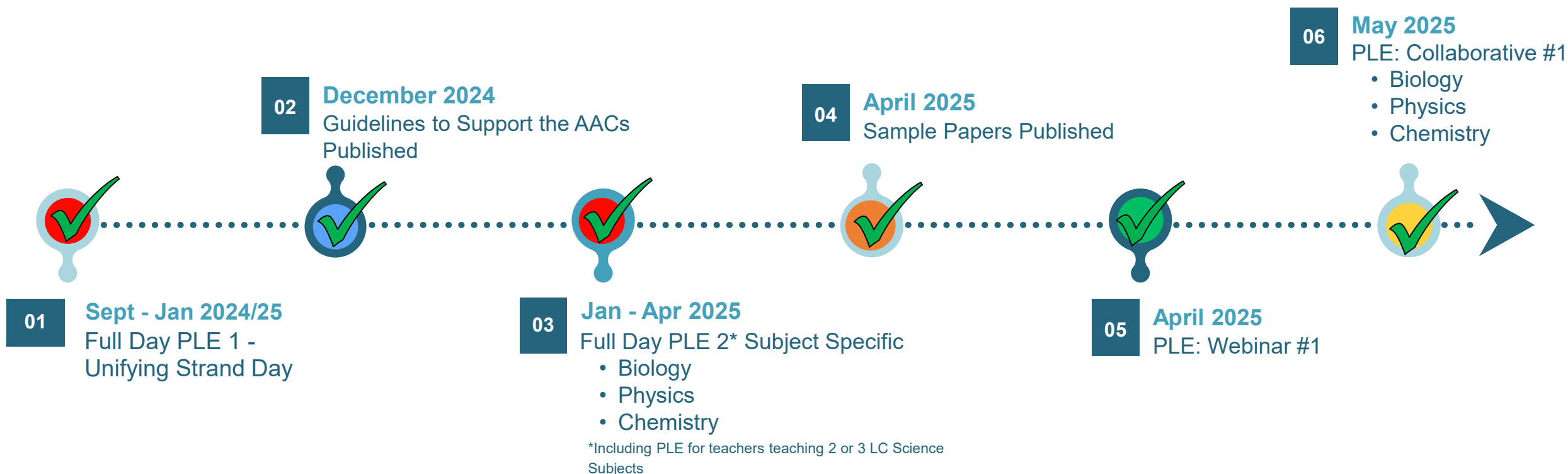


Senior Cycle Redevelopment - Science Timeline



Oide

Year 1 - 2024/2025



Full Day PLE



Collaborative



Webinar



Half Day PLE



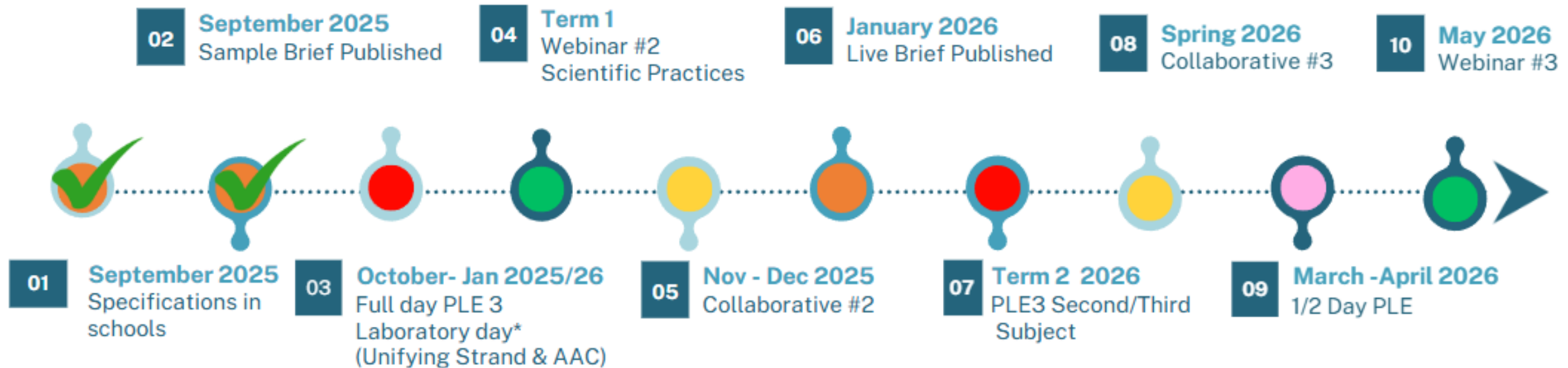
SEC Publications



AAC Publications

Senior Cycle Redevelopment - Science PLE Timeline

Year 2 - 2025/2026



Schedule

Session 1 9:15 – 11:00	Exploration of the Biology in Practice Guidelines
11:00 – 11:20	Tea/Coffee
Session 2 11:20 – 13:00	Inquiry in Senior Cycle: Biology Investigations
13:00 – 14:00	Lunch
Session 3 14:00 – 15:45	Preparing for the Biology in Practice Investigation: Investigative Log and Digital Learning Platforms.

Shared Expectations

Be present



Engage



Collaborate respectfully



Minimise Distractions



Take Care



Give yourself permission to step away from school business for the day.

Your experiences and insights enrich discussions.

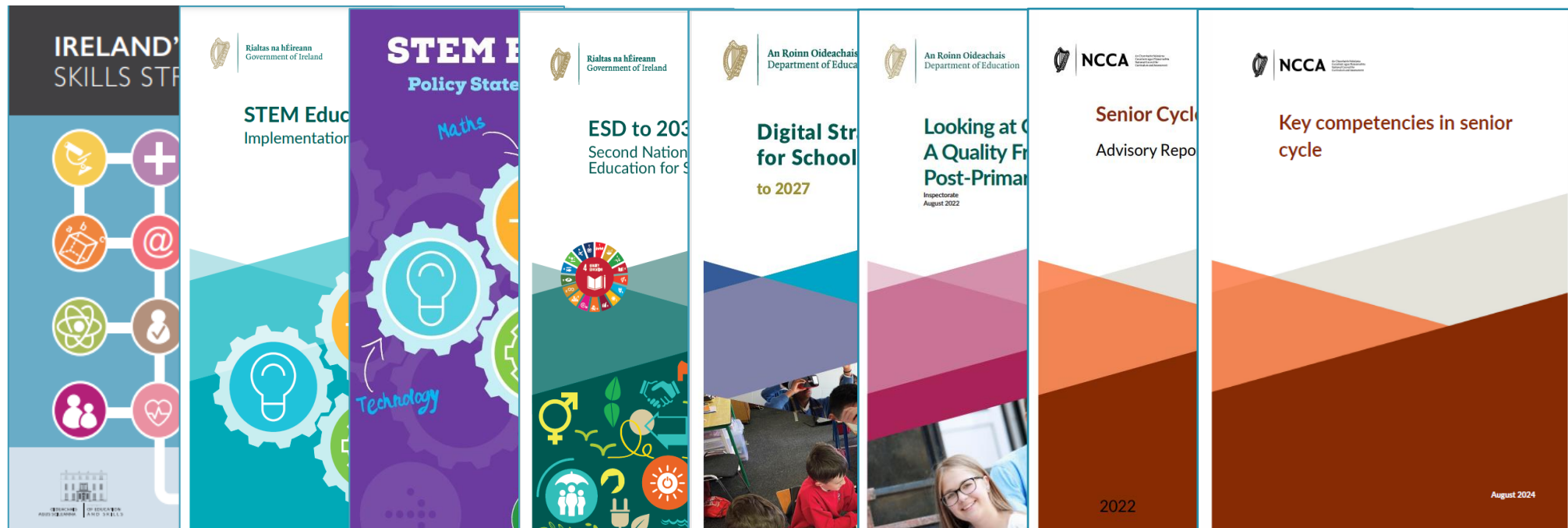
Listen, share and support each other as professionals.

Where possible, keep laptops and phones for workshop use only.

Use breaks to check in with school matters if needed.

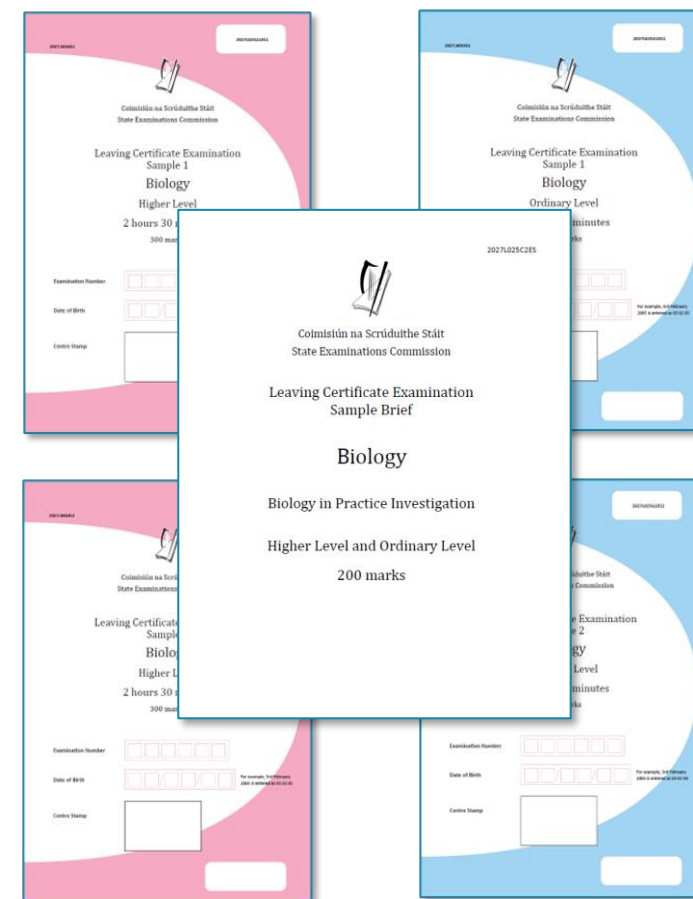
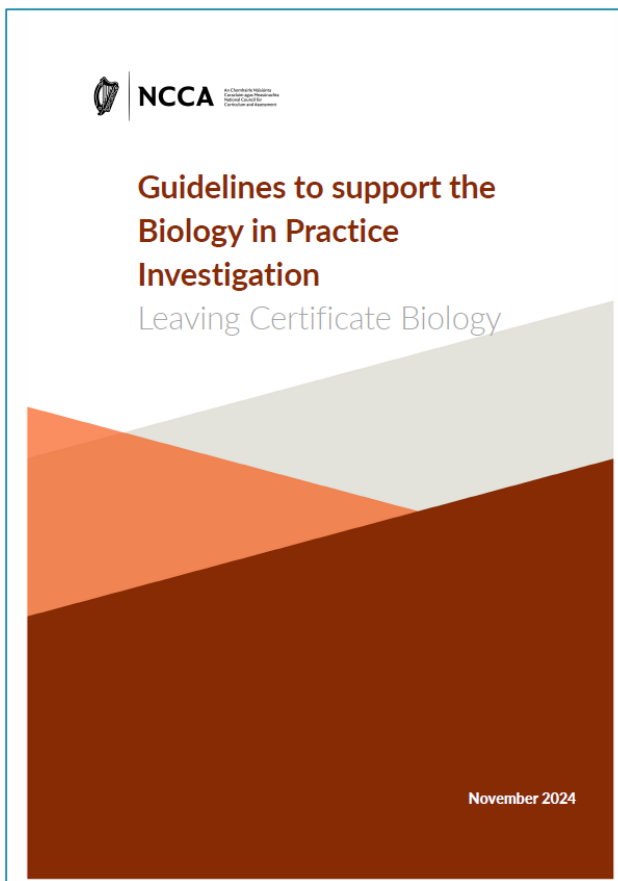
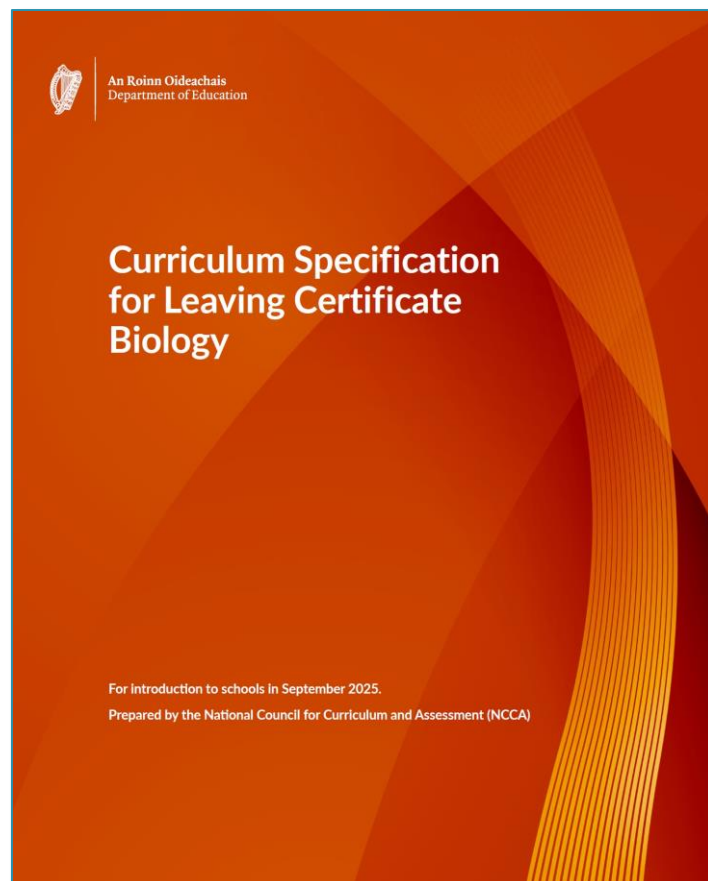


Key Supporting Documents





Key Documents





Need more hardcopy specifications?

scr_info@education.gov.ie

Please share this address with teachers if they did not receive hard copies of the specification or if more copies are required.



Key Messages

Through engagement with the learning outcomes set out in the Unifying strand of Biology, key competencies are developed which are required to engage with the Biology in Practice Investigation.

An approach to teaching, learning and assessment to highlight the importance of investigations in the Senior Cycle Biology classroom and explore opportunities within the specification to develop scientific skills and progress along the continuum of inquiry.

The use of written and digital learning platforms to enhance teaching, learning and assessment in the senior cycle Biology classroom.



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Supporting the Professional
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Session 1

Exploration of the Biology in Practice Guidelines



Participant Learning Intentions for Session 1

By the end of this session participants will have:

- explored the *Guidelines to support the Biology in Practice Investigation Leaving Certificate Biology*.



PLE Day 1 and 2 Recap

Teaching,
Learning and
Assessment



Contextual Strands
through the Nature
of Science

Cross Cutting Themes

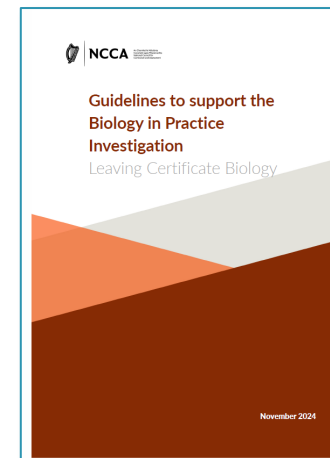


The Biology in Practice Investigation

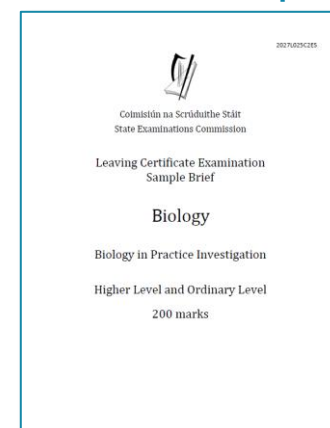
"The Biology in Practice Investigation provides an opportunity for students to display evidence of their learning throughout the course, in particular, the learning set out as outcomes in the unifying strand"

"It involves students completing a piece of work during the course and, in Year 2, submitting for marking to the State Examinations Commission (SEC), evidence of their ability to conduct scientific research on a particular issue and to use appropriate primary data to investigate aspects of that issue"

"It has been designed to be naturally integrated into the flow of teaching and learning and to exploit its potential to be motivating and relevant for students, to draw together the learning outcomes and cross-cutting themes of the course and to highlight the relevance of learning in Biology to their lives"



(NCCA, 2024, p. 2)





Science is a Process

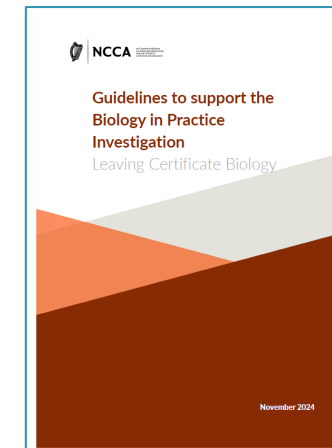
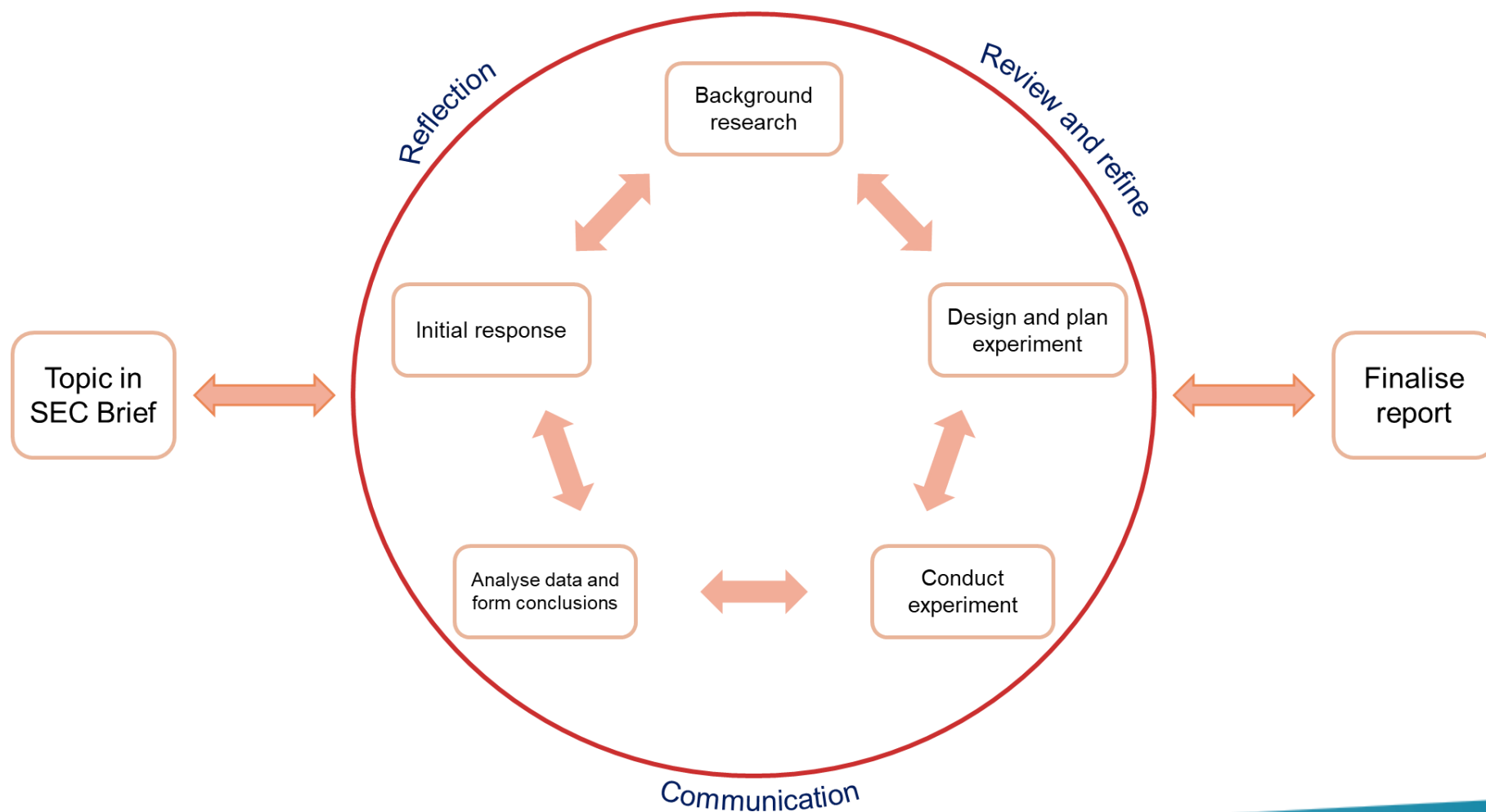
Professor Teresa Lambe

PhD, OBE, FMedSci

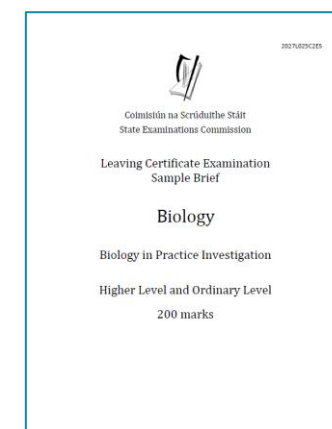




Biology in Practice Investigation



(NCCA, 2024, p. 5)





Engagement with Guidelines for the Biology in Practice Investigation

Speed Learning Carousel

1. Explain the key learning in this extract.
2. Identify which learning outcomes from the unifying strand are being engaged with at this stage.

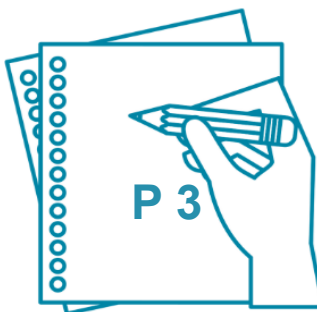


**Action Verbs
Specification pg. 47/48**



Reflection

How would you actively engage your students in each of the six stages of the Additional Assessment Component?



10 minutes



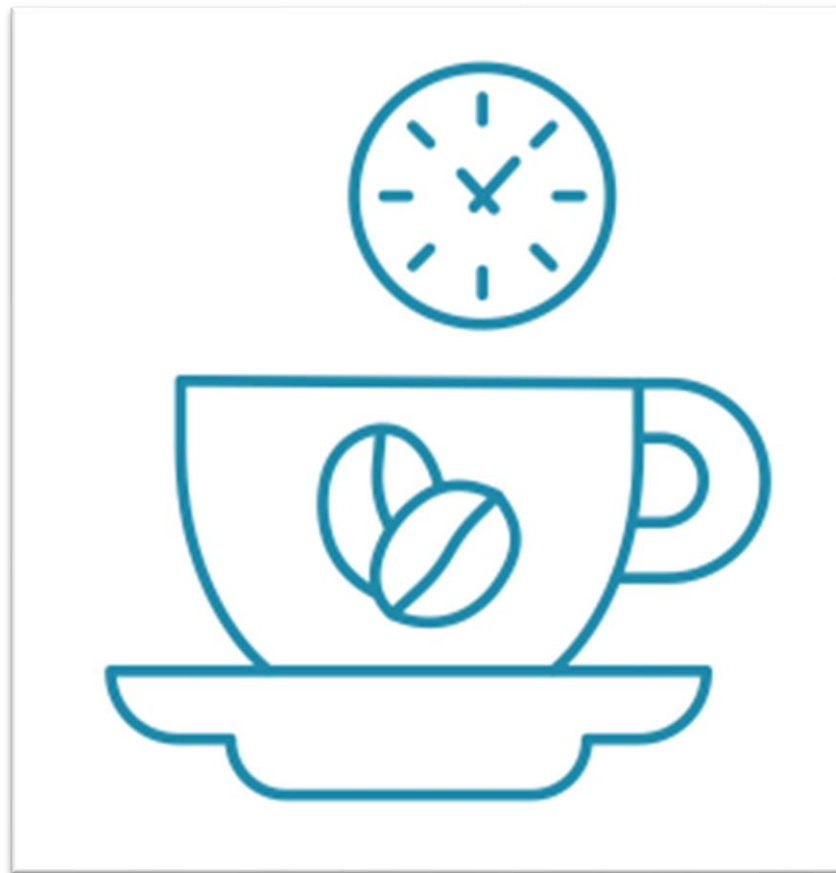
Participant Learning Intentions for Session 1

By the end of this session participants will have:

- explored the *Guidelines to support the Biology in Practice Investigation Leaving Certificate Biology*.



Tea/Coffee





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Supporting the Professional
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and Teachers

Session 2

Inquiry-based Investigations



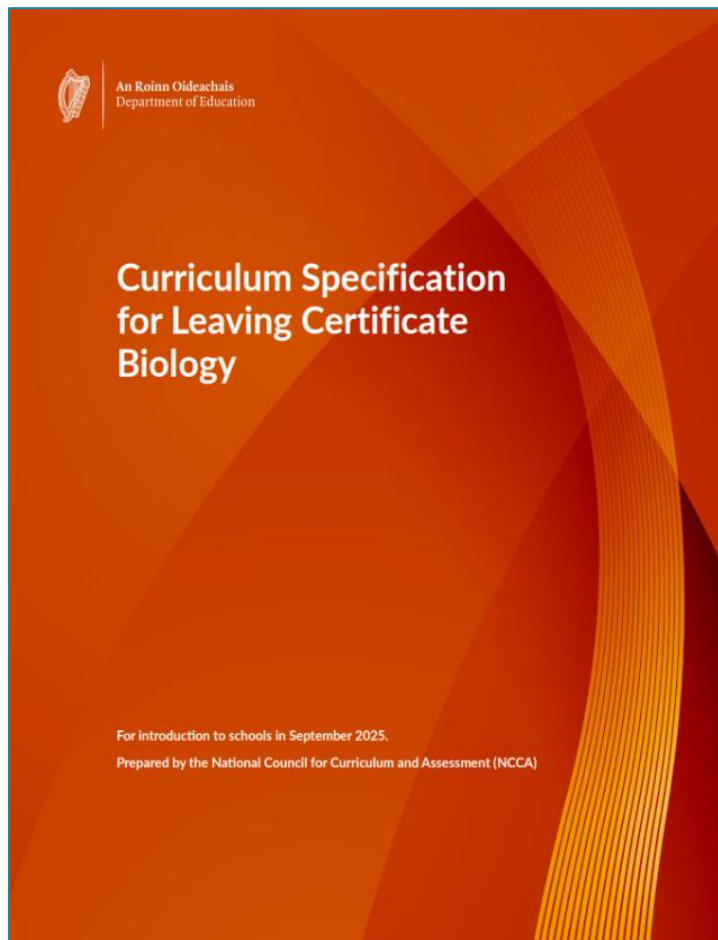
Participant Learning Intentions for Session 2

By the end of this session participants will have:

- engaged with multiple inquiry-based investigations.
- reflected on how such activities can be used for teaching, learning and assessment of various learning outcomes.



Engaging with Action Verbs



Action verb	Students should be able to
Investigate	observe, study, or make a detailed and systematic examination, in order to establish facts and reach new conclusions

**Action Verbs.
Specification p. 47/48**



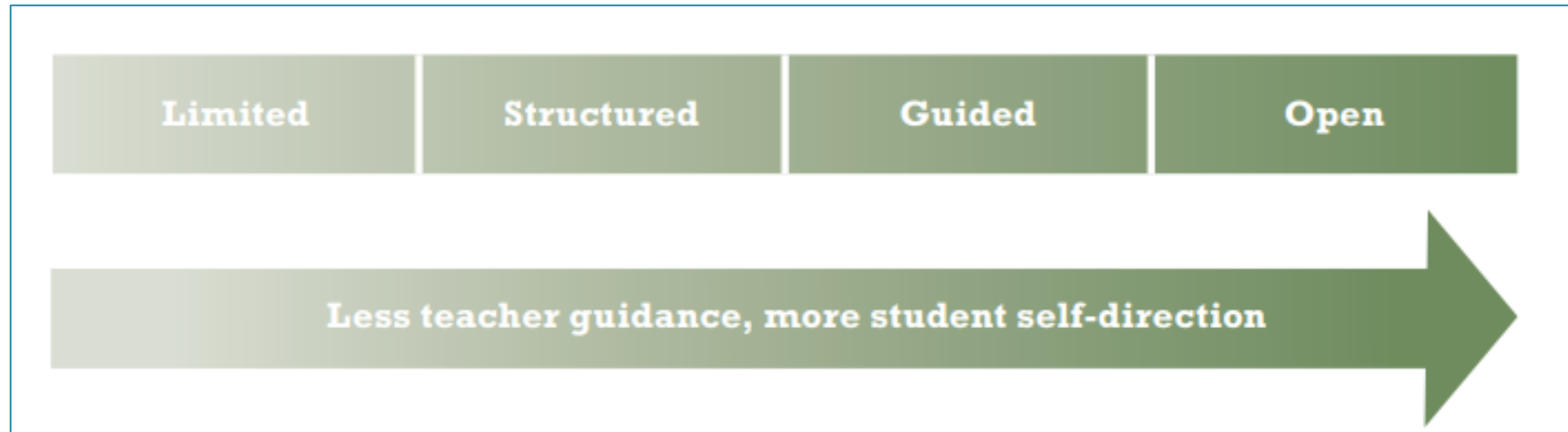
Working like a Scientist in Senior Cycle

“As they learn to work like scientists, they develop a habit of mind that sees them rely on a set of established procedures and practices associated with scientific inquiry to gather evidence, generate models and test their ideas on how the natural world works”.

(NCCA, 2024, p. 13)



Continuum of Inquiry



(NCCA, 2015, p.14)

“Providing opportunities for students to develop a range of inquiry skills will be necessary to progress along the continuum of inquiry”

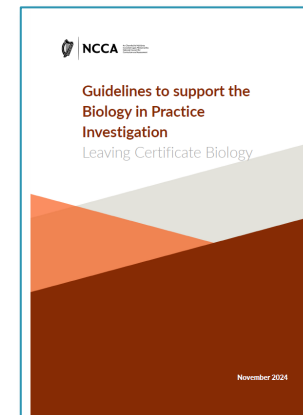
“Teachers are best positioned to make professional judgements on how to develop these skills with their students through an appropriate balance of explicit instruction and inquiry-based approaches”

(NCCA, 2024, p.40)



Investigation in Leaving Certificate Biology

"Scientific investigation is not a linear process and sometimes unexpected results and errors may occur. As students work through challenges, they build their individual and group resilience as investigators, assessing and responding to risks and errors in healthy ways"

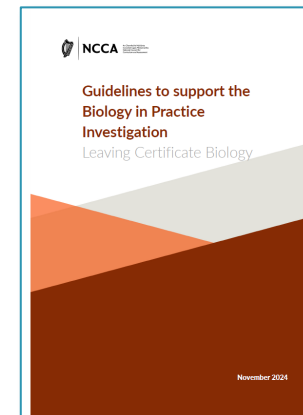


(NCCA,
2024, p.10)



Investigation in Leaving Certificate Biology

“As students become curious about the natural world, they learn to express their curiosities in the form of scientific questions. They seek answers to these questions through the practices of investigation, trying out new approaches in response to situations and being creative in their investigate methods”



(NCCA,
2024, p.10)



Investigation in Leaving Certificate Biology

Students learn about

- rate of enzyme activity (conversion of substrate into product per unit time) influenced by
 - substrate concentration
 - enzyme concentration
 - environmental pH
 - temperature
 - subject to denaturation

Students should be able to

3. investigate factors affecting the rate of enzyme-catalysed reactions, use primary and secondary data to support conclusions

Action Verbs
Specification p. 47/48

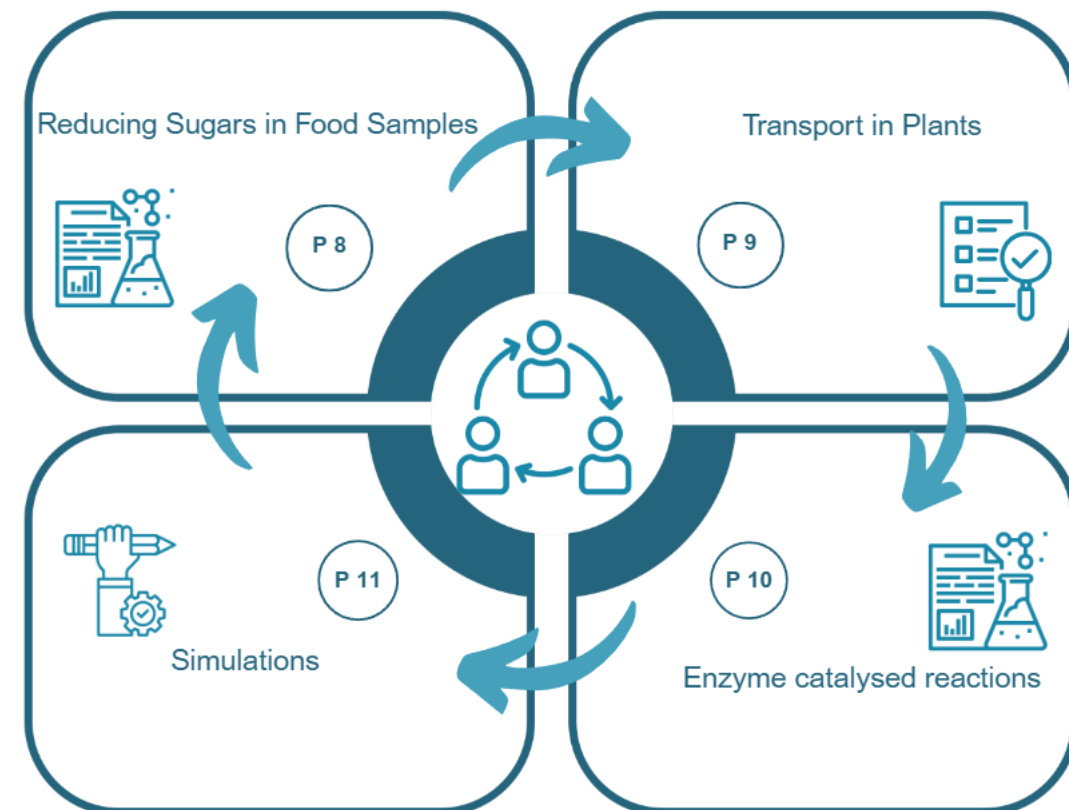
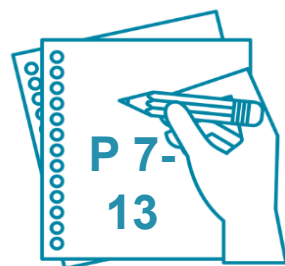
L.O. 2.1.3

Investigate	observe, study, or make a detailed and systematic examination, to establish facts and reach new conclusions
Use	apply knowledge or rules to put theory into practice



Inquiry-based Learning in the Biology Classroom

- Inquiry-based learning approach
- Rotate through 3 stations
 - Additional simulation-based station
- SCAMPER each activity to reflect on your own school context



15 minutes
per station





Adapt

Adjust how the volume of foam is measured, e.g. how long it takes to produce a certain volume

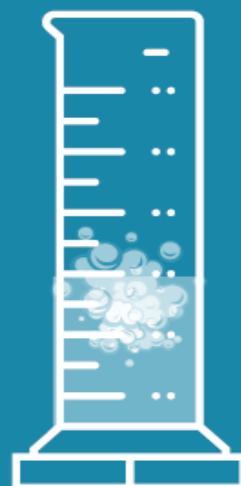
Modify

How does changing the surface area of the food affect the rate of enzyme activity?

Purpose

How might this investigation be related to real world examples, e.g. pH and temperature in food preservation?

SCAMPER



Combine

Could I combine different temperature and pH levels and study their interaction?

Eliminate

Remove the dishwashing soap and measure oxygen production using a gas collection kit.

Substitute

What happens if I change the concentration of hydrogen peroxide? Or use a different source of catalase e.g. potato

Rearrange

Change the order in which the reagents are added - does this affect the reaction?

Substitute (Swap)

- Can I swap for a different chemical, object, method, variable, material or piece of apparatus
- Could I replace any parts or features in the original to improve or change the design to make it my own?

Combine (Bring together)

- Could I combine methods or pieces of apparatus to test my hypothesis?
- If I repeat the test many times and combined the results to get an average, would it improve my investigation?

Adapt (Change)

- Could I adapt a piece of apparatus to serve my need?
- Could I adapt a method to work for my experiment?
- Could a solution to one issue be adapted to help solve a different issue?

Modify (Magnify/Minify)

- Could I modify the time taken for my experiment? Could I modify an experimental set up to make it safer?
- What could I make bigger or smaller to improve the efficiency of my design?

Purpose (Possible other use)

- Could the products or by-products of my experiment be put to use in the real world?
- Could my apparatus, method or device be used for something else? Could I use my apparatus in other investigations?

Eliminate (Remove)

- Could I remove a variable affecting my results?
- Could I eliminate a piece of apparatus?
- What can be removed or simplified?

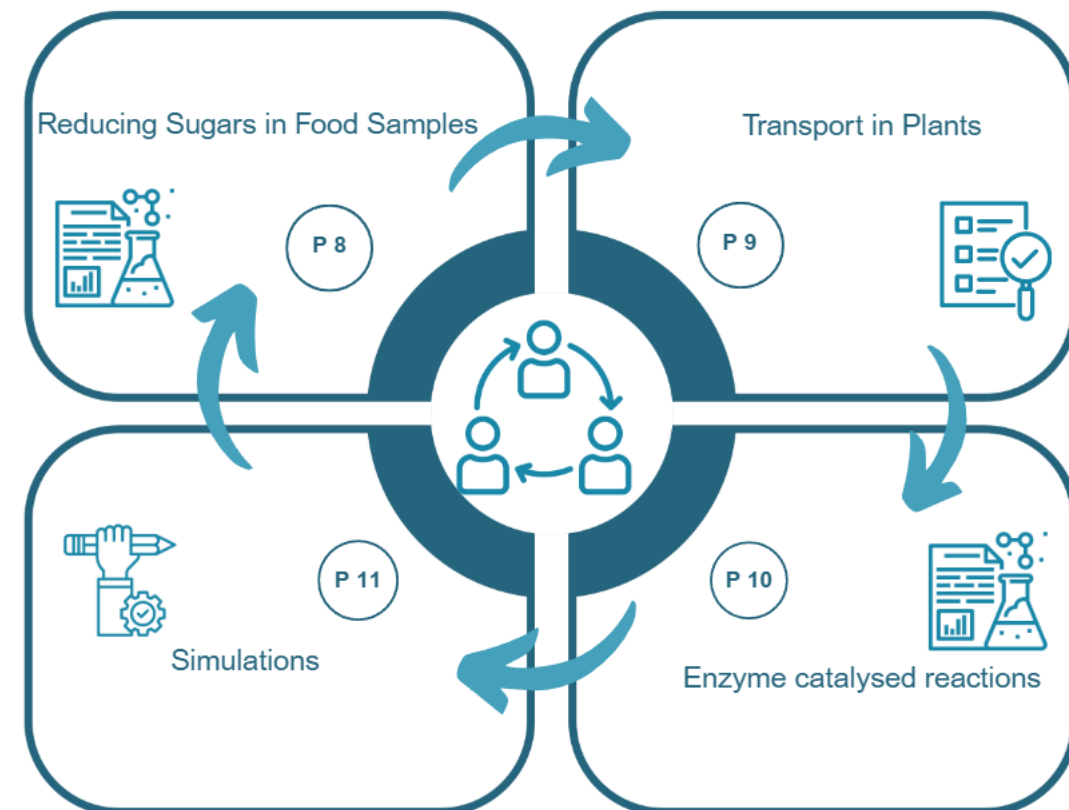
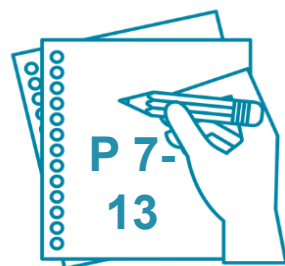
Rearrange (Reverse)

- Would rearranging the order of steps in my method produce a different outcome?
- What if I reversed the way my device works
- What other arrangement might work better or more efficiently?



Inquiry-based Learning in the Biology Classroom

- Inquiry-based learning approach
- Rotate through 3 stations
 - Additional simulation-based station
- SCAMPER each activity to reflect on your own school context



15 minutes
per station





Inquiry in the Biology Classroom



Dr. Natalie O'Neill

Assistant Professor, School of Policy and Practice, DCU
Programme Chair -Science and Maths Education Programme.



Reflection

1. How can I scaffold my students' learning to ensure they build confidence and competence in planning and carrying out scientific investigations?
2. What will inquiry look like in my classroom?
3. How can I support my students in developing the necessary skills for inquiry-based learning?





Working towards Competent Learners





Participant Learning Intentions for Session 2

By the end of this session participants will have:

- engaged with multiple inquiry-based investigations and reflected on how such activities can be used for teaching, learning and assessment of various learning outcomes.



Lunch





Engaging with Action Verbs

Students learn about

- the value of technology in analysing large quantities of genetic information to identify patterns and search for anomalies

Students should be able to

5. use a genome database to search for alleles that are known to cause (or be responsible for) specific genetic diseases

L.O. 3.3.5

Action Verbs
Specification p. 47/48

Use

apply knowledge or rules to put theory into practice



Engaging with Learning Outcomes



<https://tinyurl.com/ywjean28>

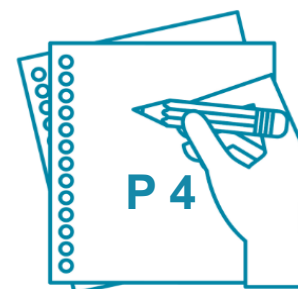
01:52 **DNA DILEMMA: NAVIGATING THE GENETICS OF LIFE**

STUDENT SHOULD BE ABLE TO:
3.3.5: USE A GENOME DATABASE TO SEARCH FOR ALLELES THAT ARE KNOWN TO CAUSE (OR BE RESPONSIBLE FOR) SPECIFIC GENETIC DISEASES

Learning Intentions: Dominant vs Recessive Glossary of Genetic Terms

START >

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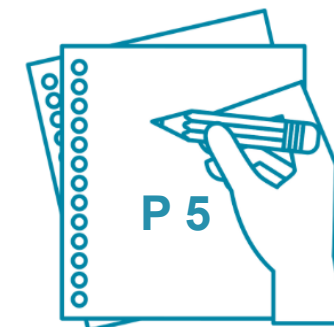


30 min



Reflection

1. What other contextual strand learning outcomes can engagement with this activity support?
2. What unifying strand learning outcomes can students engage with during this activity?
3. How could I adapt this activity to cater for the needs of my students (UDL and inclusion)?





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Supporting the Professional
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Session 3

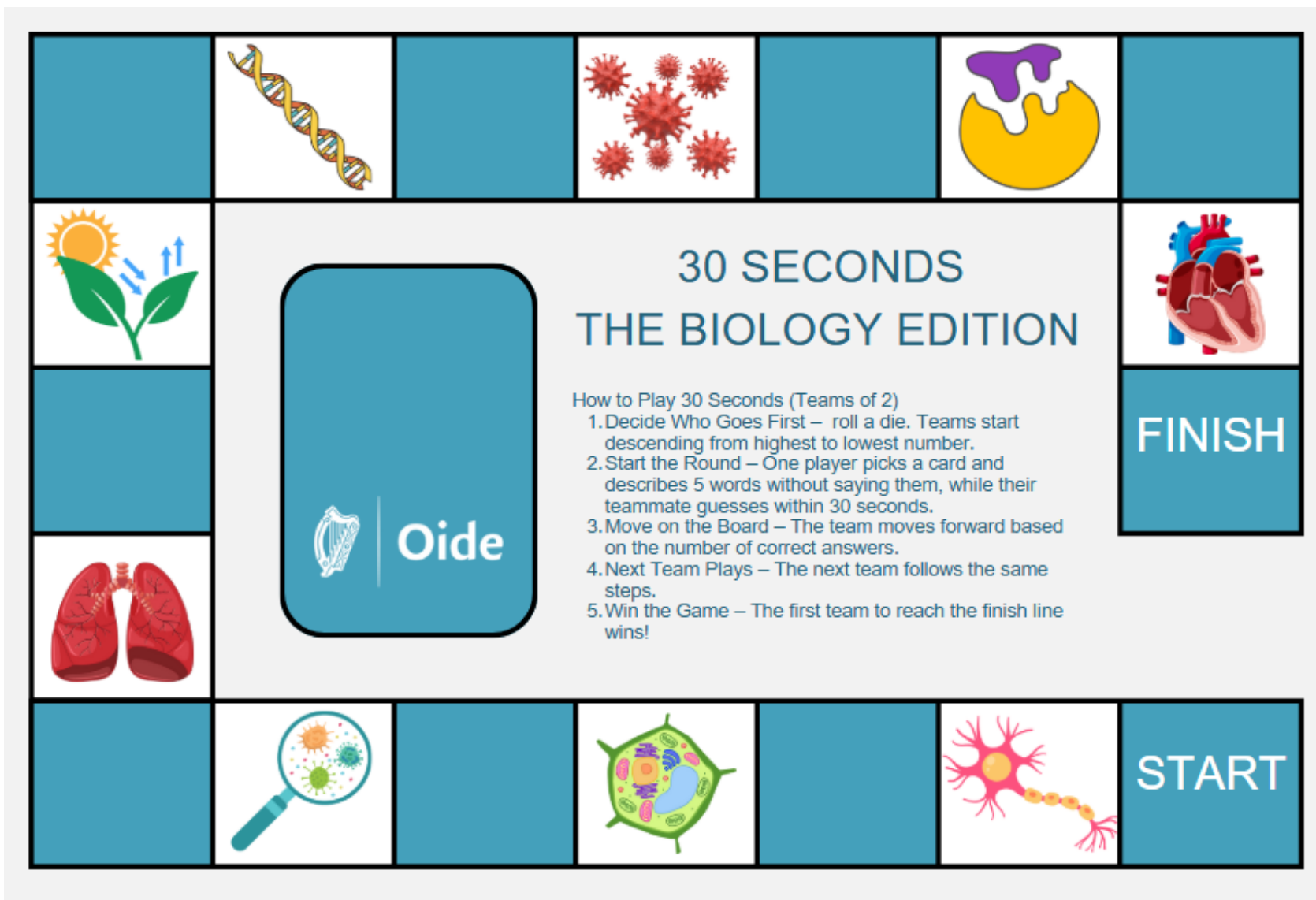
Preparing for the Biology in Practice Investigation



Participant Learning Intentions for Session 3

By the end of this session participants will have:

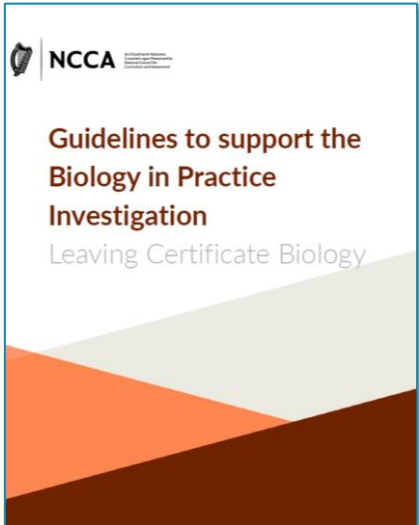
- reflected on their approach to investigations in the senior cycle, linking insights to the planning segments from PLE Day 1 and 2.
- explored how to use physical and digital learning methods to support student progress, with a particular focus on the AAC.



Biology in Practice Investigation Considerations



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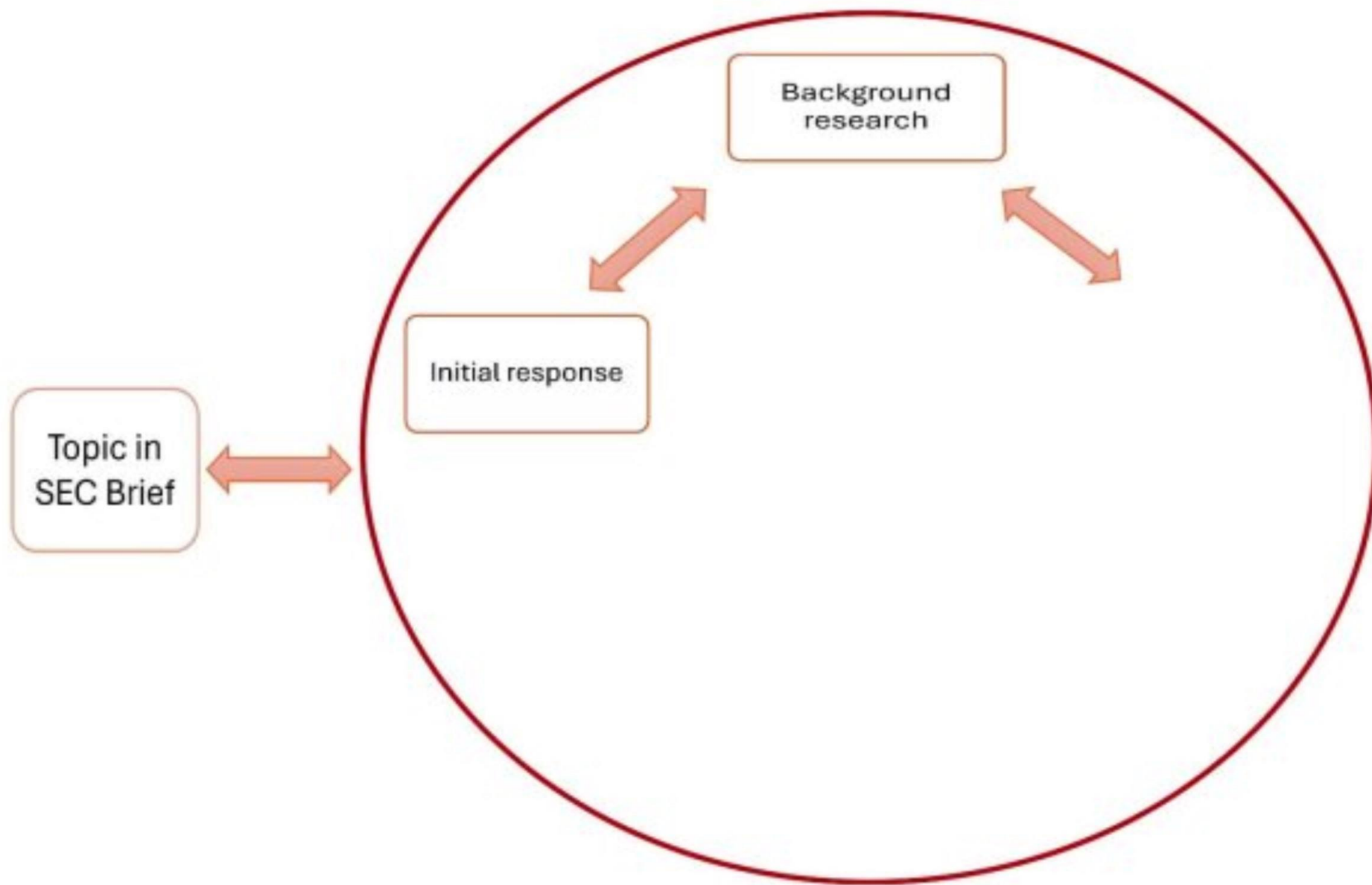
“The Biology in Practice Investigation is intended to be integrated into the regular teaching and learning of the biology classroom. As such, students will be planning for its completion from the very beginning of the course, developing the skills required to complete the investigation as they engage with the learning set out in the specification.”

(NCCA, 2024, p.5)

“Teaching and learning related to the additional assessment component should be integrated into ongoing classroom practice to maximise opportunities for students to achieve the learning outcomes of the specification.”

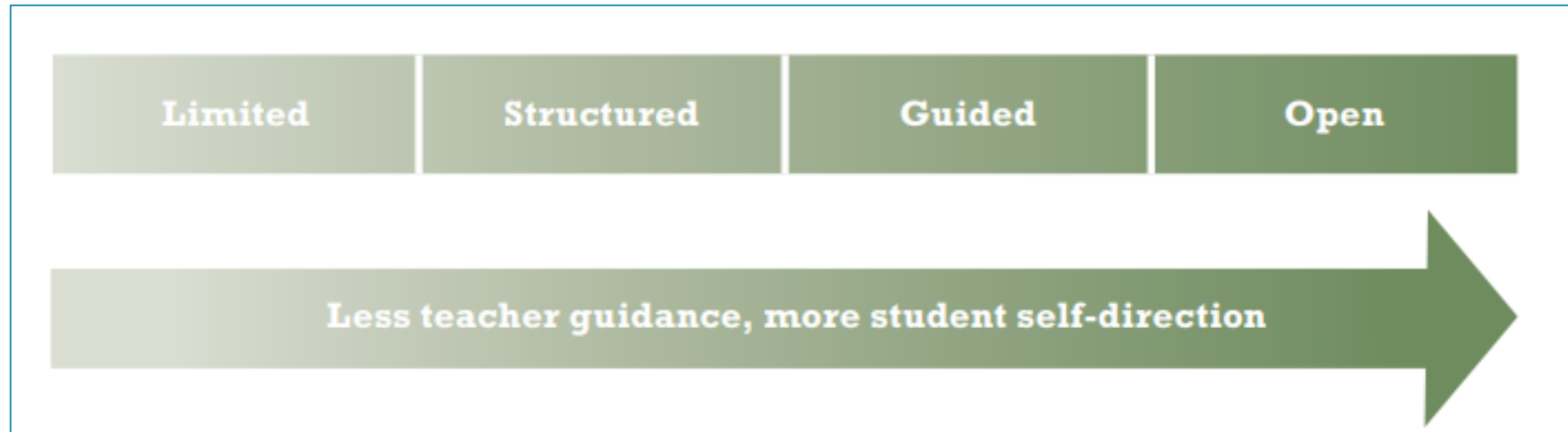
(NCCA, 2024, p.12)







Continuum of Inquiry



(NCCA, 2015, p.14)

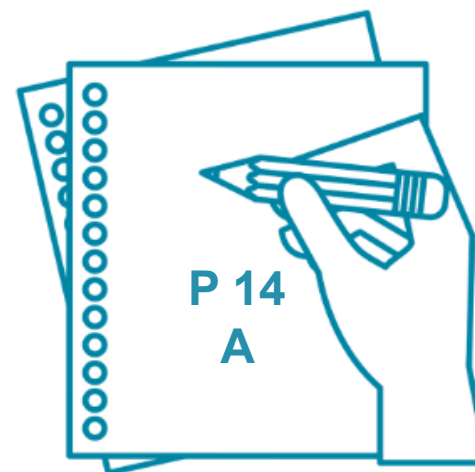
“Providing opportunities for students to develop a range of inquiry skills will be necessary to progress along the continuum of inquiry”

“Teachers are best positioned to make professional judgements on how to develop these skills with their students through an appropriate balance of explicit instruction and inquiry-based approaches”

(NCCA, 2024, p.40)



Planning for the Biology in Practice Investigation in the Leaving Certificate Biology Classroom

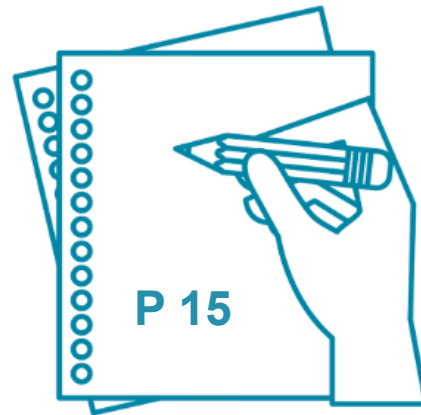
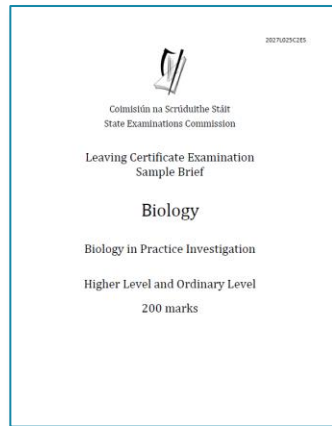




Engaging with the Sample Brief

Using the sample brief identify the following-

1. The main topic.
2. What aspects could be investigated
3. Learning outcomes related to the brief.

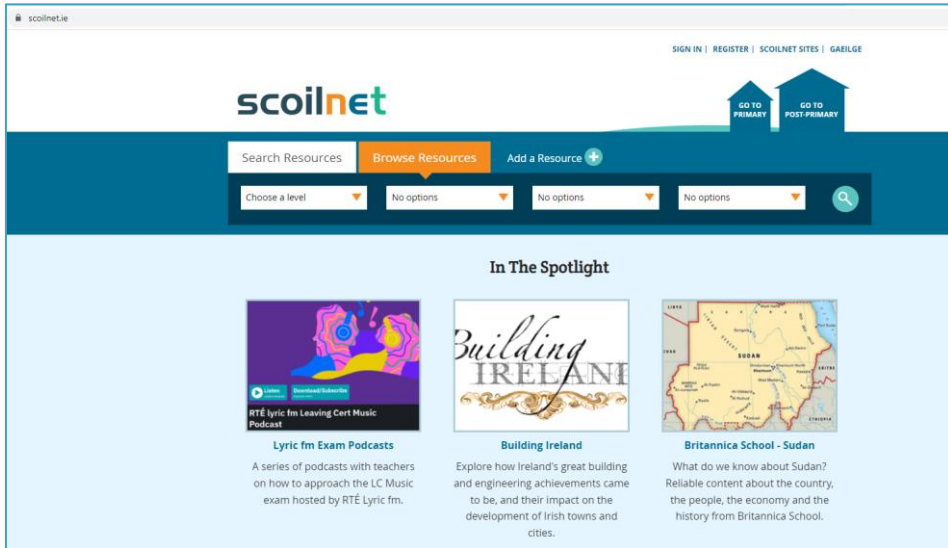


Resources



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www.scoilnet.ie



info@oide.ie



[@Oide_Science](https://twitter.com/Oide_Science)



<https://tinyurl.com/Bio-PLÉ3-thinglink>



Biology in Practice Investigative Log



“It is recommended that students keep an investigative log of learning activities that relate to and support the development of inquiry and practical skills that they can draw upon as they complete their investigation.”

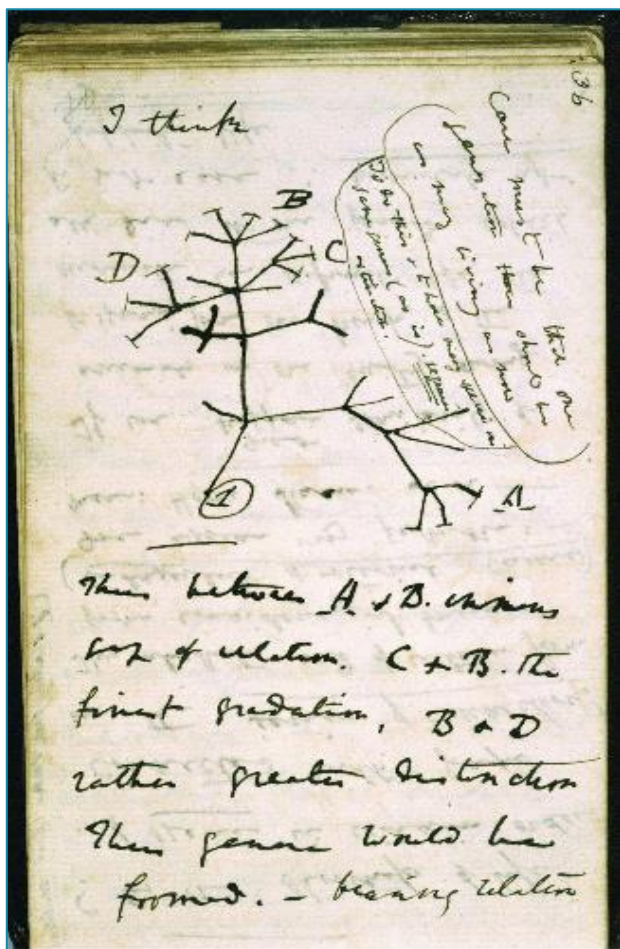
(NCCA, 2024, p.4)

“An investigative log is the student’s working document where they record and reflect on the process of their investigation. As this personal document is not submitted to the SEC for examination, its format, which may be digital or hard copy, is decided by the student.”

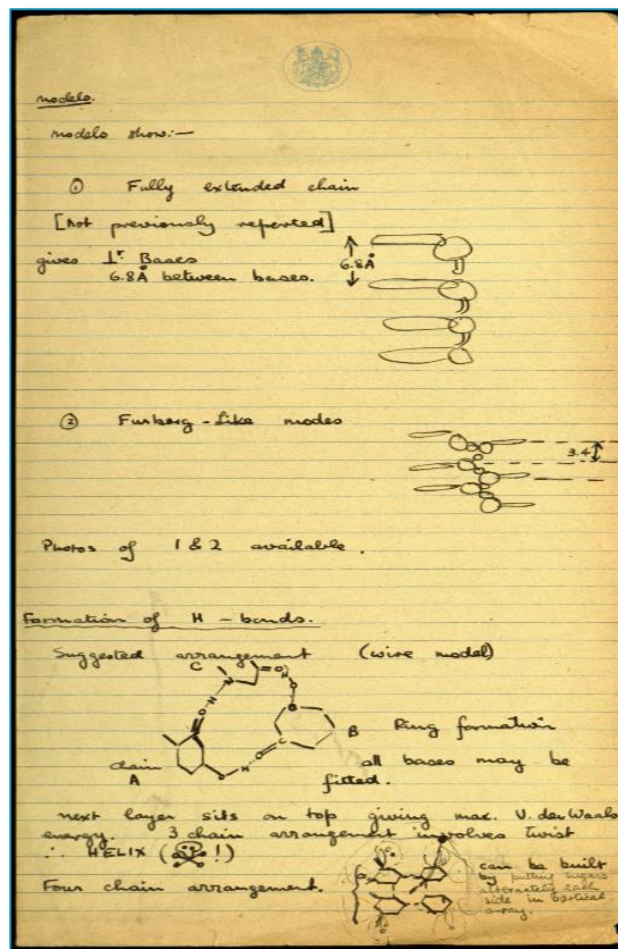


Features of an Effective Investigative Log

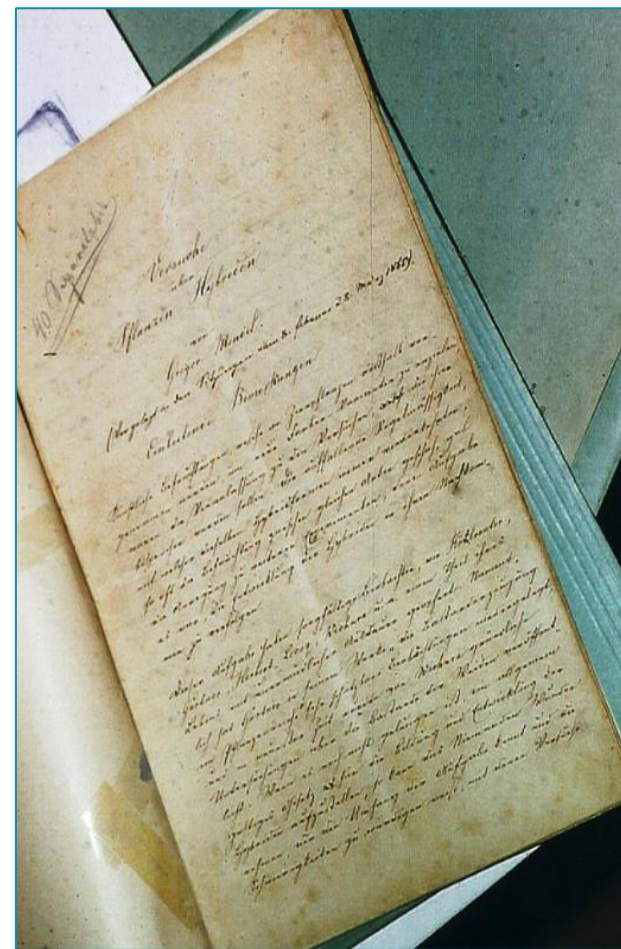
Darwin



Franklin

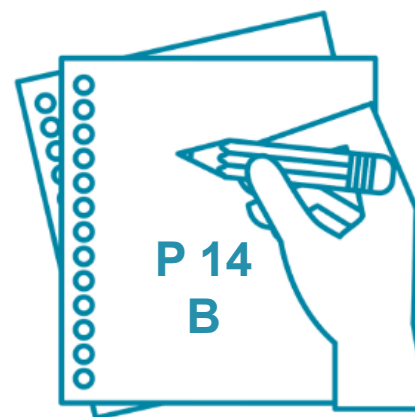


Mendel





Features of an Effective Investigative Log





Investigative Logs

Teacher testimony on the various tools available to support students progress and authenticate student work during the AAC



Digital / Written logs

What are the benefits and challenges of using a digital or written log?



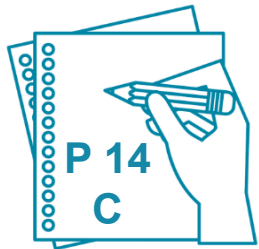
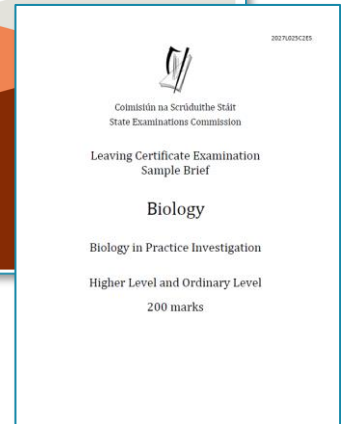
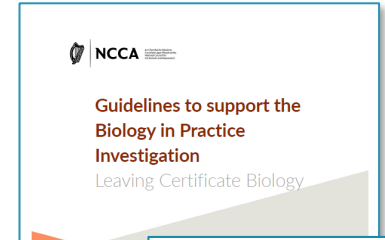
The Role of the Teacher in supporting Student Work



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‘Regular, comprehensive engagement with each student’s work on their Biology in Practice Investigation will enable teachers to confidently and legitimately authenticate any work being submitted for assessment’

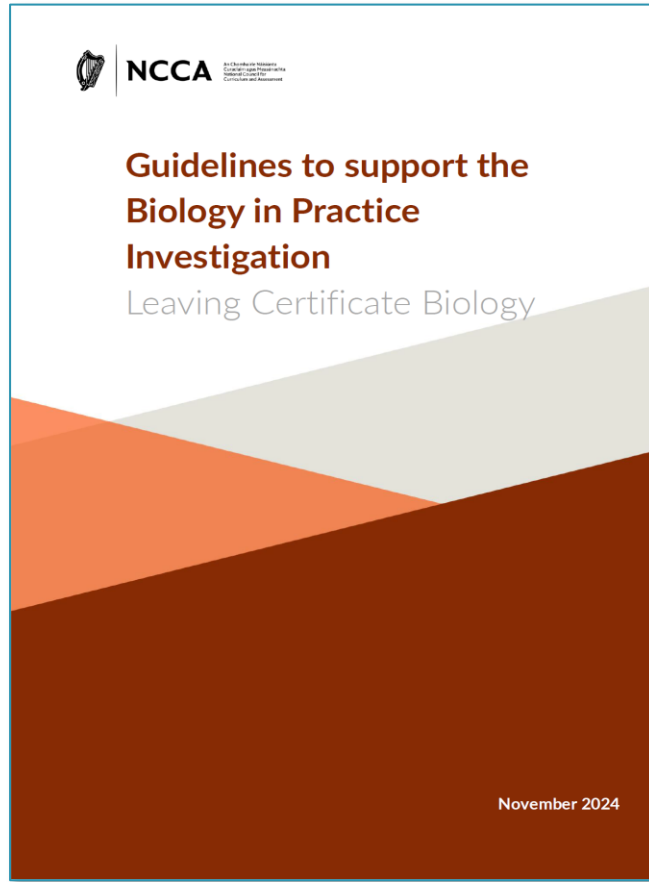
(NCCA, 2024, p.10)





Role of the Teacher - Building Scientific Integrity

Page 12-13 of Guidelines





Reflection



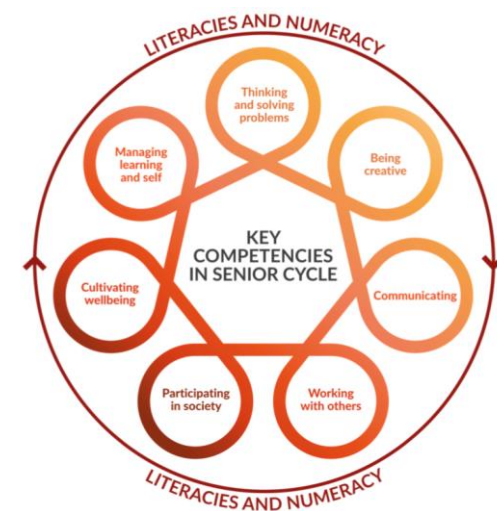


Reflection

- What learning outcomes from the Unifying and Contextual Strands are being explored through the AAC process?
- How does engaging students in the stages of the AAC help them develop the key competencies?



Figure 1: The components of key competencies and their desired impact





Key Messages

Through engagement with the learning outcomes set out in the Unifying strand of Biology, key competencies are developed which are required to engage with the Biology in Practice Investigation.

An approach to teaching, learning and assessment to highlight the importance of investigations in the Senior Cycle Biology classroom and explore opportunities within the specification to develop scientific skills and progress along the continuum of inquiry.

The use of written and digital learning platforms to enhance teaching, learning and assessment in the senior cycle Biology classroom.

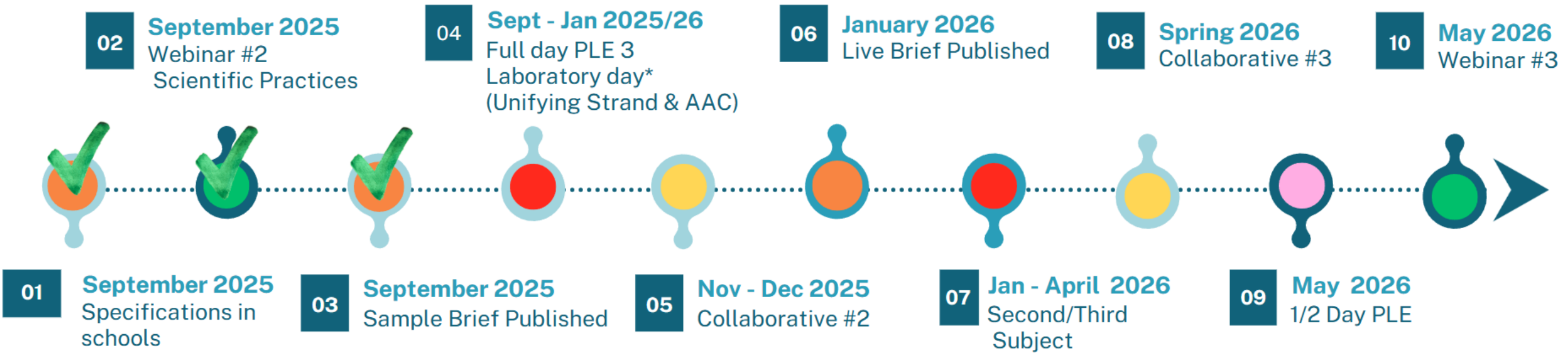
Senior Cycle Redevelopment - Science PLE Timeline



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Next
Steps

Year 2 - 2025/2026



- Full Day PLE
- Collaborative
- Webinar
- Half Day PLE
- SEC Publications
- AAC Publications



How to Keep in Touch



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