



Oide

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Supporting the Professional
Learning of School Leaders
and Teachers

Empowering Teaching, Learning and Assessment Through Scientific Investigations

Professional Learning Experience – Day 3



Shared Expectations



Oide

Be present



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

Engage



Your experiences and insights enrich discussions.

Collaborate respectfully



Listen, share and support each other as professionals.

Minimise Distractions



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

Take Care



Use breaks to check in with school matters if needed.

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The Chemistry Team



Helen
Van Eesbeck
Senior Leader

Declan
Cronin

Seán
Kelleher

Robert
Masterson

James
Stephens

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SCIENCE
TEAM LEADER

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Range of Supports Provided by Oide



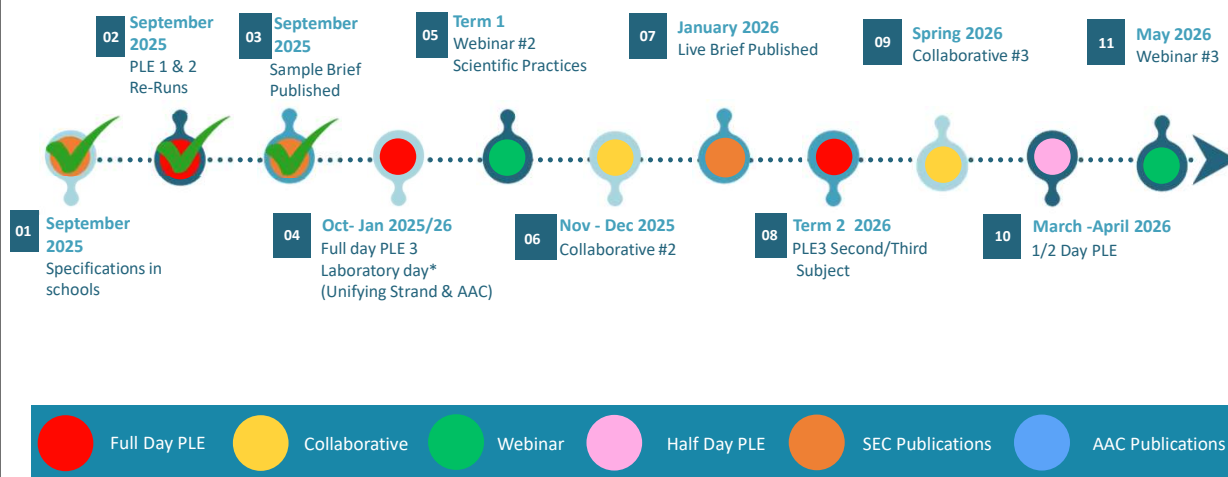
Senior Cycle Redevelopment - Science Timeline

Year 1 - 2024/2025



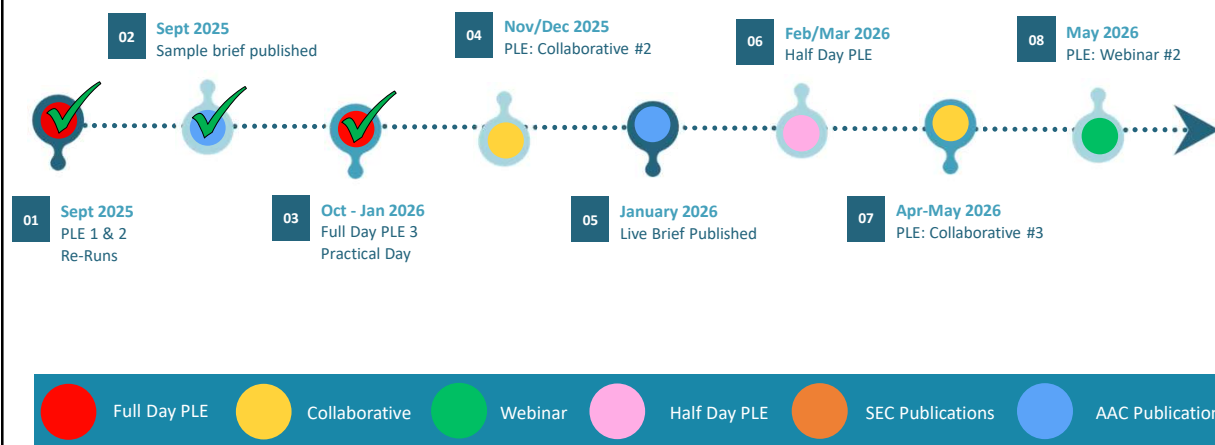
Senior Cycle Redevelopment - Science PLE Timeline

Year 2 - 2025/2026



Senior Cycle Redevelopment - Science Timeline

Year 2 - 2025/2026



Schedule



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Session 1 9:15 – 10:10	Empowering Chemistry Teaching Through Inquiry and Investigation: Exploring the Chemistry in Practice Guidelines
Session 2 10:10 – 11:00	Empowering Teachers with Strategies to Support the Incremental Development of Students' Scientific Practices Along the Continuum of Inquiry (1 Station)
11:00 – 11:10	Tea/Coffee
Session 2 11:10 – 13:00	Empowering Teachers with Strategies to Support the Incremental Development of Students' Scientific Practices Along the Continuum of Inquiry (4 Stations)
13:00 – 14:00	Lunch
Session 2 14:05 – 14:25	Empowering Teachers to Support Their Students' Development Along the Continuum of Inquiry in the Classroom (Interleaving Investigations)
Session 3 14:25 – 15:45	Building Scientific Practice Through Investigative Logs and the Sample Brief



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Key Messages

Students build scientific skills and practices by engaging in investigations across the inquiry continuum, which empowers teachers to meet the needs of their students within their own school context.

By implementing strategies that encourage students to develop their knowledge, skills, values and dispositions, they will be empowered to apply familiar concepts to unfamiliar contexts.



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Key Messages

Consistent integration of teacher and student reflection for planning will help support and empower students to engage with scientific investigation in a more independent and authentic manner.

Working collaboratively with professional colleagues and adopting a flexible and adaptable approach to planning will help support the implementation of the new specification.



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Session 1

Empowering Chemistry Teaching Through Inquiry and Investigation: Exploring the Chemistry in Practice Guidelines



Participant Learning Intentions for Session 1



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By the end of this session participants will have:

- explored the role of investigations in incrementally developing the students' scientific skills and their application to the different stages of the Chemistry in Practice Investigation.
- engaged in parallel reflection, discussion, and planning throughout the activities, guided by prompt questions provided in the teacher booklet for each activity.

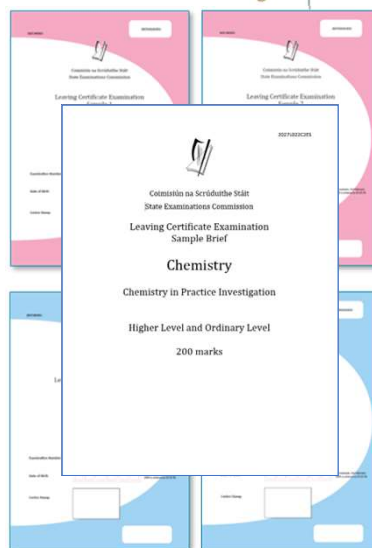
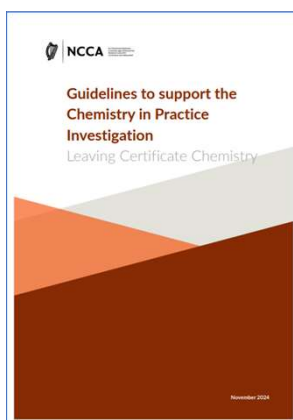
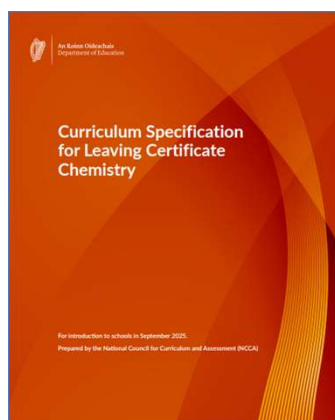
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Key Supporting Documents



Key Supporting Documents



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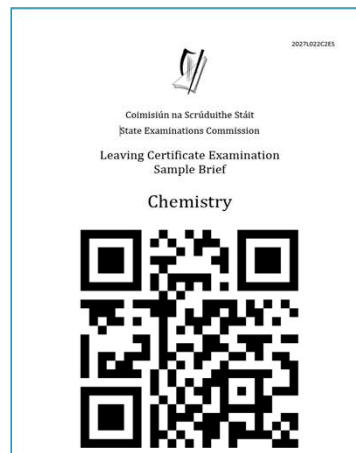
Key Supporting Documents



bit.ly/chemistryspecs



bit.ly/chemistryCIP



bit.ly/chemistrysample

Chemistry in Practice Investigation

"The Chemistry in Practice Investigation provides opportunities for students to pursue their interests in chemistry, to make their own investigative decisions, acquire a depth of conceptual understanding and self-regulate their own learning."



(NCCA, 2024, p.2)

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Chemistry in Practice Investigation

"An Investigation Brief will be published annually by the SEC in term 2 of Year 1 of the course. Upon completion, students submit a report of their investigation in Year 2 in a format prescribed by the SEC."



(NCCA, 2024, p.2)

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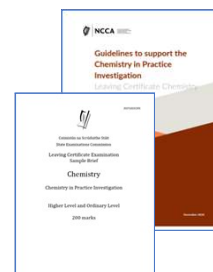


(NCCA, 2024, p.2)

Chemistry in Practice Investigation



"There is no expectation that students complete all of the stages of the Chemistry in Practice Investigation in one continuous block, different stages of the investigation may occur at different moments over the course of the year. Nor is it intended that the stages are a rigid or linear process."



(NCCA, 2024, p.2)

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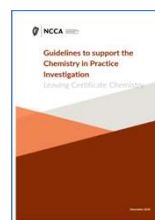
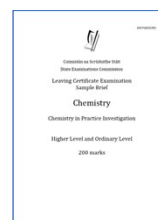
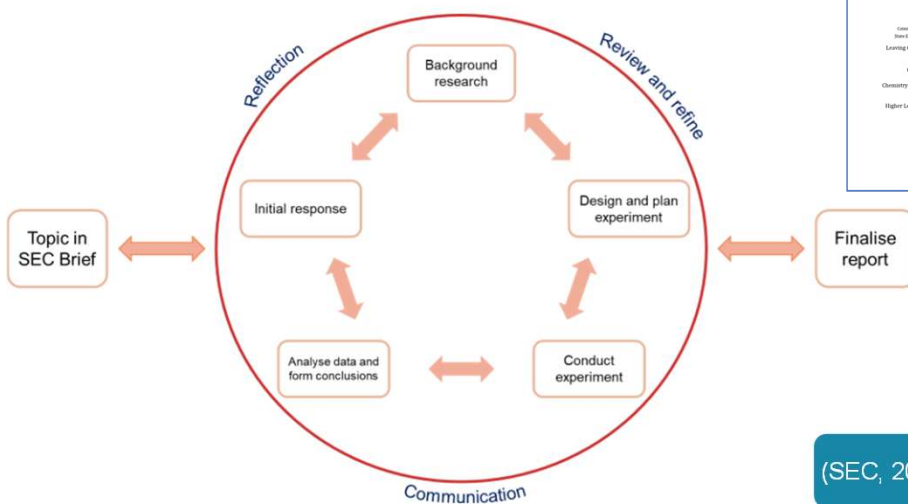
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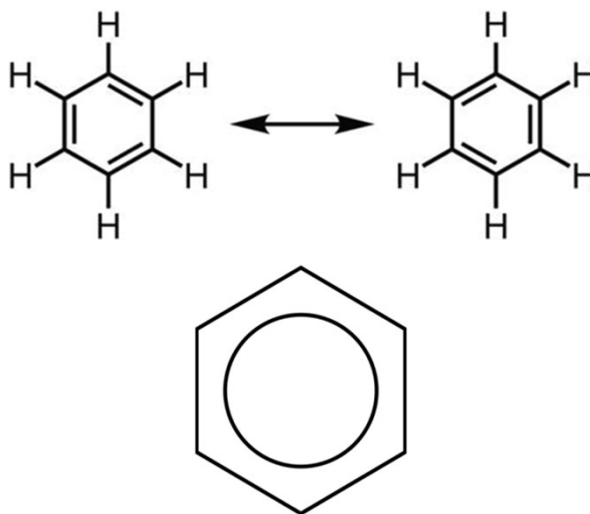
(NCCA, 2024, p.2)

Process for the Completion of the Chemistry in Practice Investigation



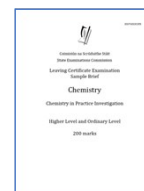
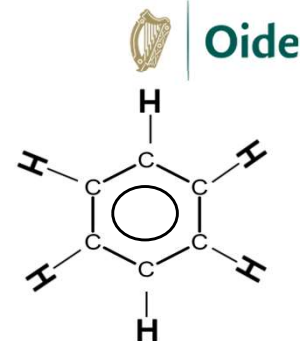
(SEC, 2025, p.5 NCCA, 2024, p.3)

Kathleen Lonsdale



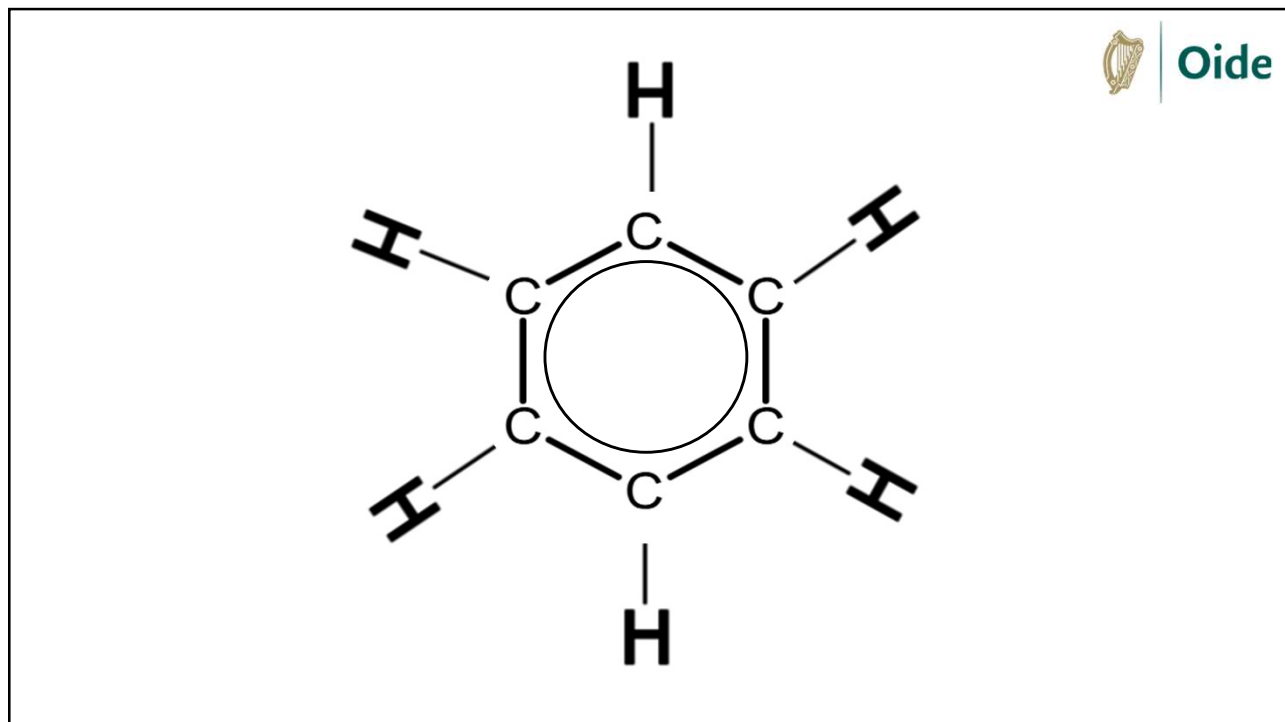
Process for the Completion of the Chemistry in Practice Investigation

- Stage 1: Initial Response to the Investigation Brief
- Stage 2: Background Research
- Stage 3: Designing and Planning the Experiment
- Stage 4: Conducting the Experiment
- Stage 5: Data Analysis and Conclusions
- Stage 6: Finalising the Chemistry in Practice Investigation Report

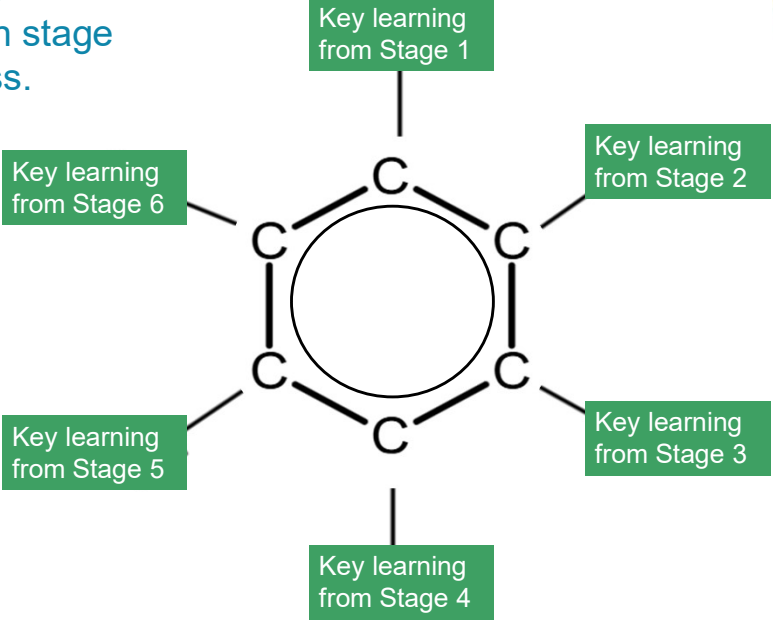


(NCCA, 2025, p. 5)

bit.ly/chemistryCIP



1. Identify the key learning from each stage of the AAC process.



The diagram shows the chemical structure of benzene, with six green boxes connected to the carbon atoms, each containing text indicating key learning from a specific stage of the AAC process:

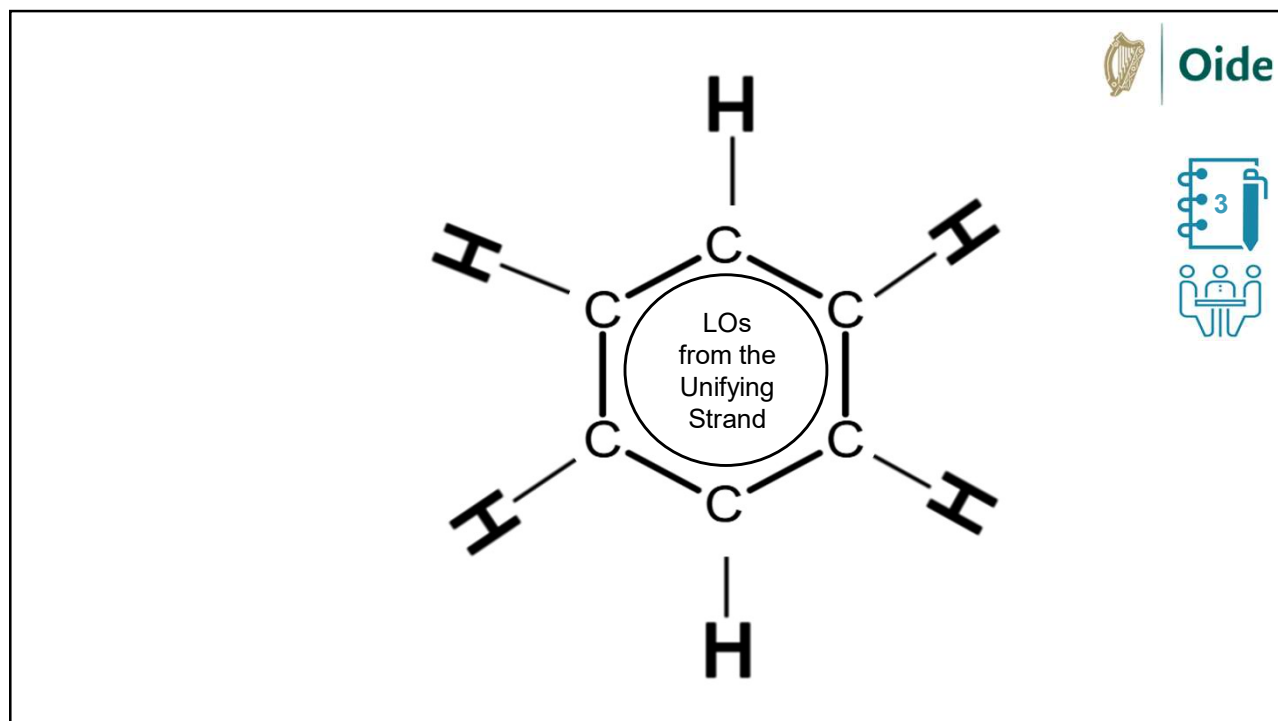
- Key learning from Stage 1 (top)
- Key learning from Stage 2 (top-right)
- Key learning from Stage 3 (bottom-right)
- Key learning from Stage 4 (bottom)
- Key learning from Stage 5 (bottom-left)
- Key learning from Stage 6 (top-left)

 Oide

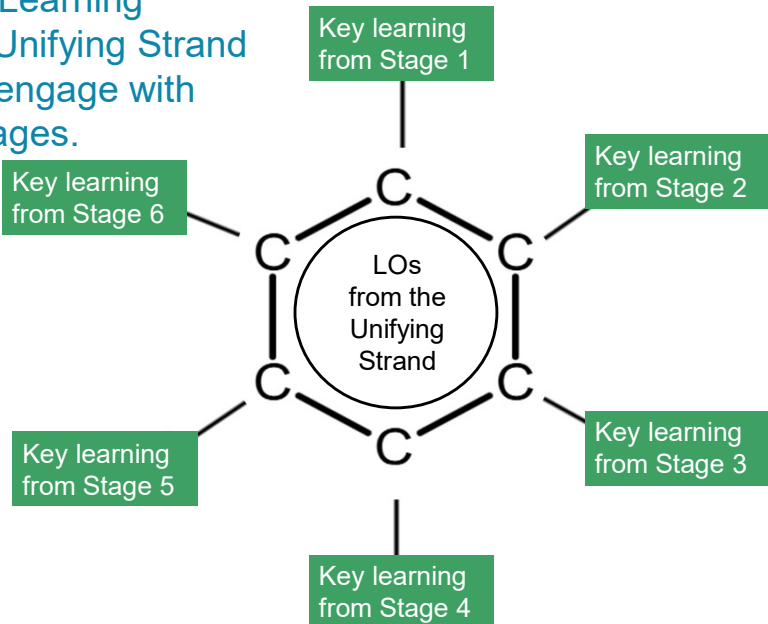




10 minutes



2. Reflect on the Learning Outcomes of the Unifying Strand that students will engage with throughout the stages.

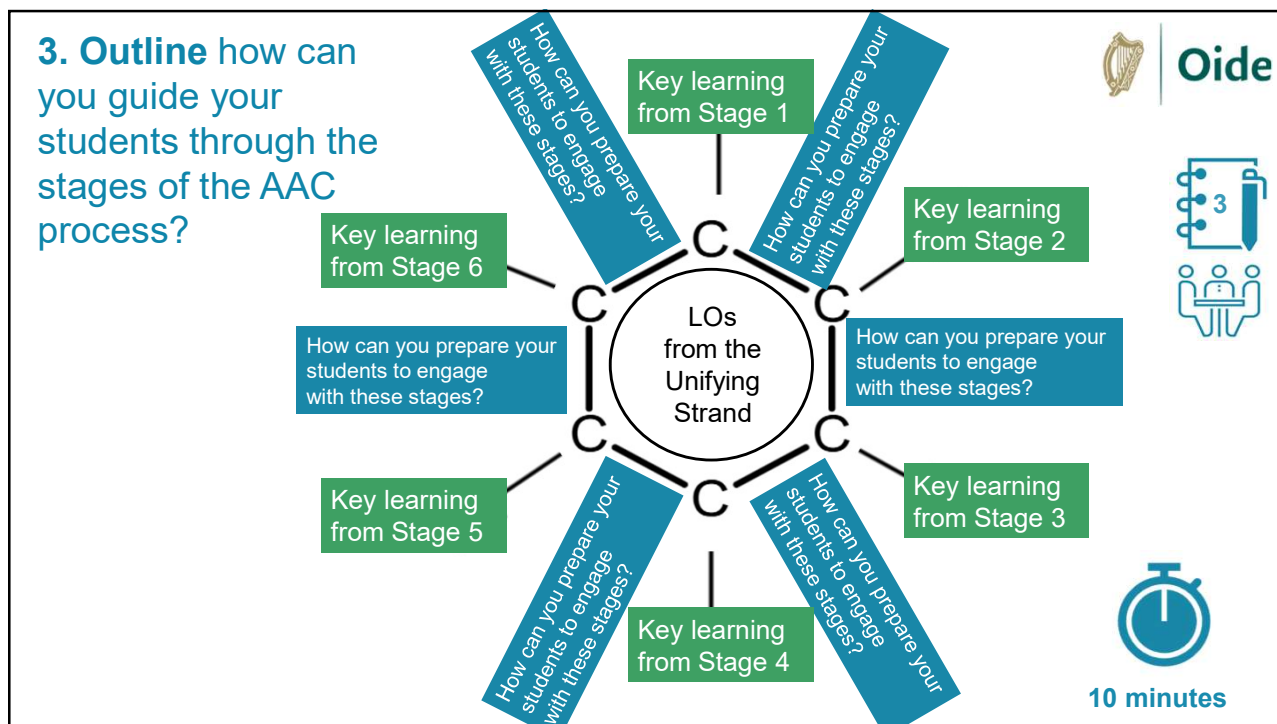


 **Oide**





5 minutes



Participant Learning Intentions for Session 1

Participants now have:

- explored the role of investigations in incrementally developing the students' scientific skills and their application to the different stages of the Chemistry in Practice Investigation.
- engaged in parallel reflection, discussion, and planning throughout the activities, guided by prompt questions provided in the teacher booklet for each activity.



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Session 2

Empowering Teachers with Strategies to Support the Incremental Development of Students' Scientific Practices Along the Continuum of Inquiry



Participant Learning Intentions for Session 2



Oide

By the end of this session participants will have:

- explored the use of primary and secondary data with stimulus materials to support suggested strategies for developing students' scientific practices.
- explored how they may guide and support their students along the continuum of inquiry as they develop their investigative and inquiry skills.

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Making Connections across the Specification



(Chemistry Specifications, 2024, p.8)

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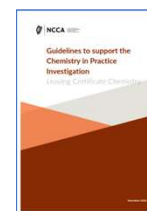
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Stage 2 of the Investigative Process



"Good research practice involves reviewing, summarising and evaluating evidence from different viewpoints. This allows an informed and justified opinion to be made in response to the research question."

(Guidelines to support Chemistry in Practice , 2024, p. 7)



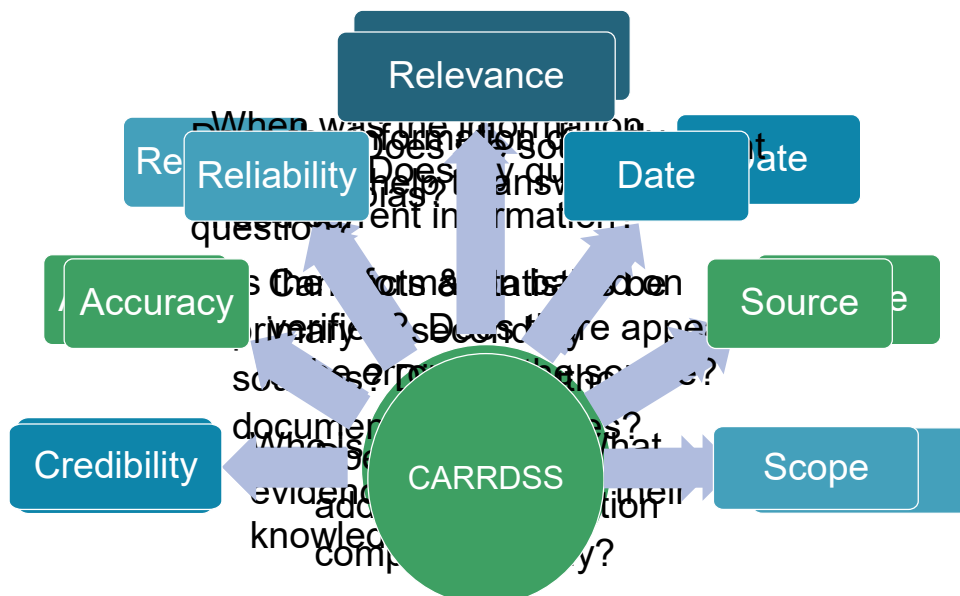
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Using CARRDSS



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20
Ca
40.08
33
As
74.92
44
Ru
101.1
45
Rh
102.9
105
Db
262.1
14
Si
28.09
16
S
32.07

Stage 3 of the Investigative Process



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"During this stage ... students design and plan an experiment to be completed in the laboratory, that will generate appropriate primary data ... This may involve students designing an original experiment, or extending/adapting an experiment they have already encountered, to explore the issue they are investigating."

(Guidelines to support Chemistry in Practice , 2024, p. 7)



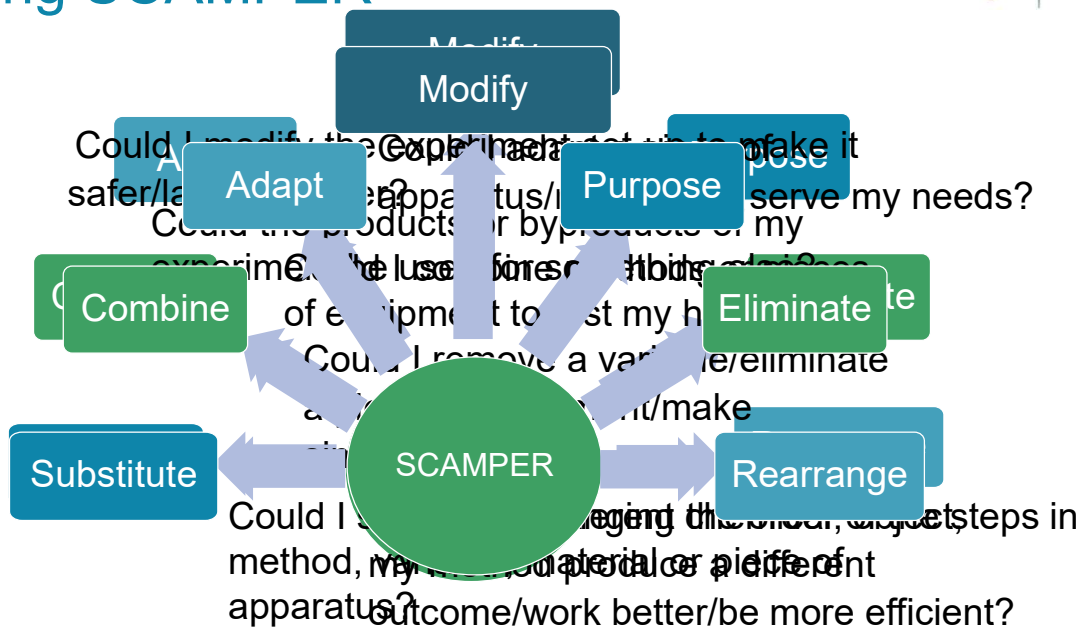
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Using SCAMPER



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21	Sc	44.96
6	C	12.01
13	Al	26.98
12	Mg	24.31
15	P	30.98
99	Es	252.1
88	Ra	226.0

Investigating in Senior Cycle Chemistry



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"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"

(Chemistry Specifications, 2024, p. 7)



Strengths and Limitations of an Investigation



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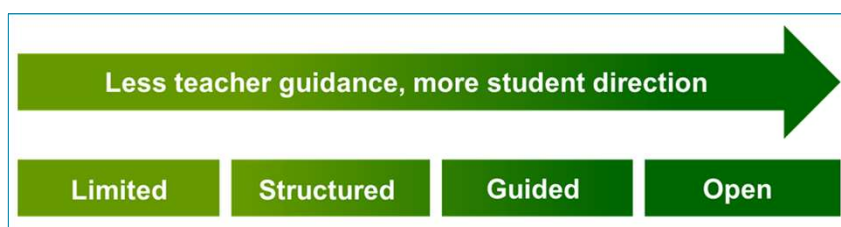
- Discuss the possible strengths of investigations at station 3.
- Outline limitations and possible solutions to address any limitations identified in investigations at station 4.



Continuum of Inquiry



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Junior Cycle Science Specification, 2015, p. 14

"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"

(Chemistry Specifications, 2024, p.35)

Investigative Carousel

Focus Questions

1. What are the benefits of using strategies that allow students to develop their scientific practices?
2. What role do primary and secondary data play in these investigations?



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21 Sc 44.96	20 Ca 40.08
6 C 12.01	33 As 74.92
13 Al 26.98	44 Ru 101.1
12 Mg 24.31	45 Rh 102.9
15 P 30.97	105 Db 262.1
99 Es 252.1	14 Si 28.09
88 Ra 226.0	16 S 32.07

Station 1

Learning Outcome 3.2.3 (p.25)

SCAMPER



Oide

Students learn about

Students should be able to

- measuring initial, average **and instantaneous** rates of reaction
- examples of reactions that can be used to collect primary data include, but are not limited to:
 - calcium carbonate and hydrochloric acid
 - sodium thiosulfate and hydrochloric acid
 - decomposition of hydrogen peroxide

3. **investigate** using primary data, the factors that affect rates of a reaction and interpret rate of reaction graphs, using primary and secondary data^{EI}

Investigate observe, study, or make a detailed and systematic examination, in order to establish facts and reach



A

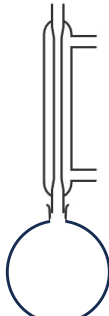


B



C



Station 2	Learning Outcome 4.2.14 (p.33)	CARRDSS	 Oide
Students learn about		Students should be able to	
a simple activity, using household reactants, to manufacture soap on a small scale and the consequences of having limiting or excess NaOH for the manufacture of soap (reflux method not required)		14 conduct an activity to prepare soap, with NaOH either limiting or in excess	
Conduct to perform an activity			
 A	 B	 C	

Station 2	Learning Outcome 4.2.14 (p.33)	CARRDSS	 Oide
Students learn about		Students should be able to	
a simple activity, using household reactants, to manufacture soap on a small scale and the consequences of having limiting or excess NaOH for the manufacture of soap (reflux method not required)		14 conduct an activity to prepare soap, with NaOH either limiting or in excess	
Conduct to perform an activity			
? 1) Which oil extraction method (cold vs. hot pressing) is more sustainable from an energy use and waste production perspective? 2) How does the percentage oil content of different plant sources affect the amount of soap produced during saponification?			

Station 3

Learning Outcome 3.1.8 (p.25)

Strengths



Oide

Students learn about

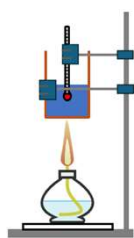
- the heat of combustion of a series of alcohols, which can be estimated experimentally using spirit burners

Students should be able to

- investigate, using primary data, the energy change of combustion and compare experimental values to standard values, accounting for differences^{E1}

**Investigate**

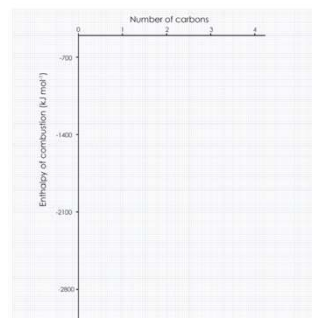
observe, study, or make a detailed and systematic examination, in order to establish facts and reach



A



B



C

Station 4

Learning Outcome 4.2.8 (p.32)

Limitations & Possible Solutions



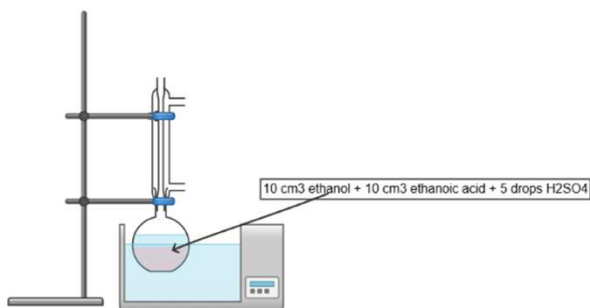
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Students learn about

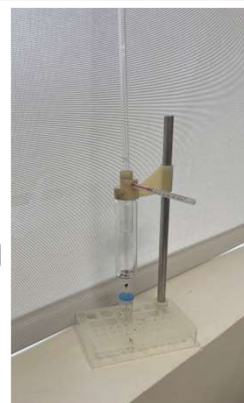
- the preparation of an ester using a reflux method

Students should be able to

- conduct an experiment to prepare an ester

Conduct to perform an activity

A



B

C

Station 5

Learning Outcome 3.5.6 (p.28)

Continuum of Inquiry



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Students learn about

- an electrolytic cell: how an external electrical source can be used to drive redox reactions in electrolytic cells exemplified by the electrolysis of acidified water and salt solutions including copper(II) chloride and potassium iodide using inert electrodes (**reactions at electrodes required**)

Students should be able to

- create** a simple electrolytic cell, explain its operation and split water using electrolysis

**Create**

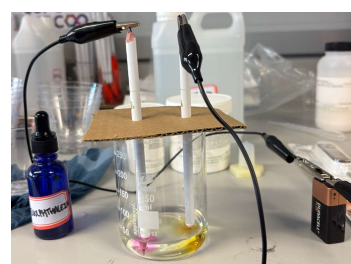
to bring something into existence; to cause something to happen as a result of one's actions



A



B



C

Station Summary



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Station Number	Methodology	Page Number in Workbook	Focus
Station 1	SCAMPER	Page 6	Student Viewpoint
Station 2	CARRDSS	Page 7	Student Viewpoint
Station 3	Strengths	Page 8	Student Viewpoint
Station 4	Limitations & Possible Solutions	Page 9	Student Viewpoint
Station 5	Continuum of Inquiry	Page 10	Teacher Viewpoint

Lunch



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Learning Outcome 1.1.4 & 1.1.5 (p.25) – Conservation of mass



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Students learn about

Students should be able to

Conservation of mass

- chemical and physical properties; chemical and physical change
- the laws of conservation of mass and of energy that underpin all physical and chemical changes

- distinguish between physical change and chemical change of matter
- verify, using primary data, the law of conservation of mass and explain through the use of models^{EI}



Distinguish	make the differences between two or more concepts or items clear
Verify	give evidence to support the truth of a statement



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Interleaved Learning Outcomes

Learning Outcome 3.1.8 (p.25) – Heat of combustion

Learning Outcome 1.1.4 & 1.1.5

Students learn about

Students should be able to

- the heat of combustion of a series of alcohols, which can be estimated experimentally using spirit burners

8. **investigate**, using primary data, the energy change of combustion and compare experimental values to standard values, accounting for differences^{EI}

Investigate

observe, study, or make a detailed and systematic examination, in order to establish facts and reach



Evaluate the conservation of mass in a reaction, and what impact does an open or closed system have on the results?



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Interleaved Learning Outcomes

Learning Outcome 4.2.8 (p.32) – Ester preparation

Learning Outcome 1.1.4 & 1.1.5

Students learn about

Students should be able to

Reaction mechanisms

- the preparation of an ester using a reflux method

8. **conduct** an experiment to prepare an ester

Conduct

to perform an activity



Design an investigation to determine whether the total mass of the reactants equals the mass of the products in an esterification reaction, and what conclusions can be drawn about mass conservation?



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The Conservation of Mass

Focus
Question

From the investigations you have engaged with today, which learning outcomes from the contextual and unifying strands could your students engage with while investigating the conservation of mass?

Learning Outcome 1.1.4 & 1.1.5 (p.25) – Conservation of mass



Oide



Students learn about

Students should be able to

Conservation of mass

- chemical and physical properties; chemical and physical change
- the laws of conservation of mass and of energy that underpin all physical and chemical changes

- distinguish between physical change and chemical change of matter
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Distinguish make the differences between two or more concepts or items clear

Verify give evidence to support the truth of a statement

Participant Learning Intentions for Session 2



Participants now have:

- explored the use of primary and secondary data with stimulus materials to support suggested strategies for developing students' scientific practices.
- explored how they may guide and support their students along the continuum of inquiry as they develop their investigative and inquiry skills.

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Session 3

**Building Scientific Practice Through Investigative
Logs and the Sample Brief**



Participant Learning Intentions for Session 3



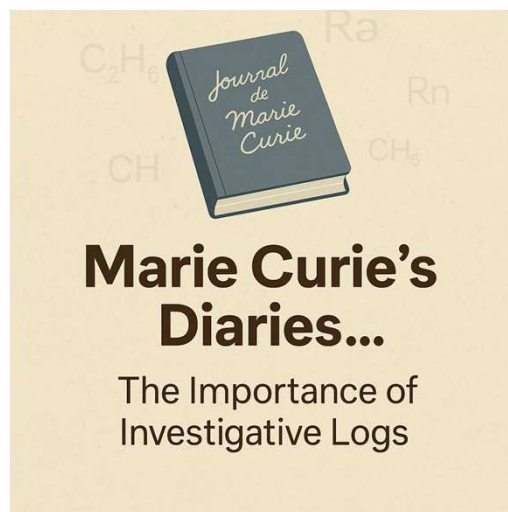
By the end of this session participants will have:

- developed strategies to support students through the Chemistry in Practice Investigation, focusing on designing, conducting, and evaluating their work while incrementally developing their key competencies through the Sample Brief.
- evaluated the importance of the different methods of recording in an investigative log

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Marie Curie's Diaries



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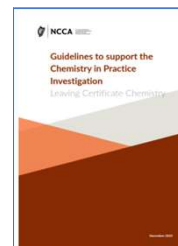
The Chemistry in Practice Investigation



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"Mistakes, errors and improvements are expected components of the investigative process and students should be prepared to iterate, that is move backwards and forwards between the stages and revisit investigative activities at different times, reflecting on and refining their work as they complete the investigation."

(Guidelines to support Chemistry in Practice, 2024, p. 5)



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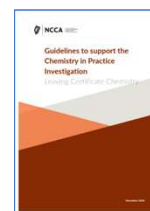
The Investigative Log



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"Students are strongly encouraged to compile an investigative log, which they can use to keep a record of their approach to the investigation and gather resources that they may use in the completion of their investigation."

(Guidelines to support Chemistry in Practice, 2024, p. 6)



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Features of an Effective Investigative Log



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What, in your opinion, are the features of an effective investigative log?



bit.ly/4nWKqDv

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Supporting Student Engagement During Assessment



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The Role of the Teacher in supporting Student Work



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

(NCCA, 2024, p10)



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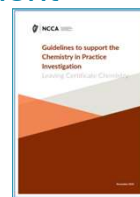
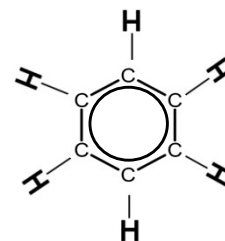
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Process for the Completion of the Chemistry in Practice Investigation

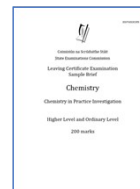


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- Stage 1: Initial Response to the Investigation Brief
- Stage 2: Background Research
- Stage 3: Designing and Planning the Experiment
- Stage 4: Conducting the Experiment
- Stage 5: Data Analysis and Conclusions
- Stage 6: Finalising the Chemistry in Practice Investigation Report



(NCCA, 2024, p. 5-9)



(NCCA, 2025, p. 5)

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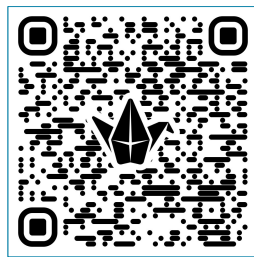


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Engaging with the Sample Brief

Using the sample brief identify the following:

1. The main area of focus.
2. The context.
3. Topics/learning outcomes related to the brief.



Sample Brief: Group 1	
Area of Focus:	Context:
Topics/Learning Outcomes:	

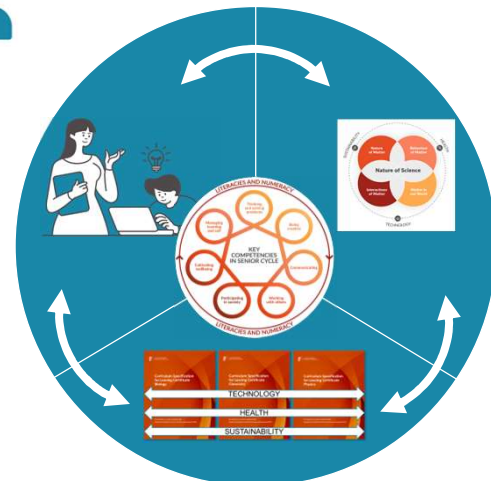
Reflection



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Which 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?



Participant Learning Intentions for Session 3



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Participants now have:

- developed strategies to support students through the Chemistry in Practice Investigation, focusing on designing, conducting, and evaluating their work while incrementally developing their key competencies through the Sample Brief.
- evaluated the importance of the different methods of recording in an investigative log

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Key Messages



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Students build scientific skills and practices by engaging in investigations across the inquiry continuum, which empowers teachers to meet the needs of their students within their own school context.

By implementing strategies that encourage students to develop their knowledge, skills, values and dispositions, they will be empowered to apply familiar concepts to unfamiliar contexts.



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Key Messages

Consistent integration of teacher reflection for planning will help support and empower students to engage with scientific investigation in a more independent and authentic manner.

Working collaboratively with professional colleagues and adopting a flexible and adaptable approach to planning will help support the implementation of the new specification.

Senior Cycle Redevelopment - Science Timeline



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Year 2 - 2025/2026

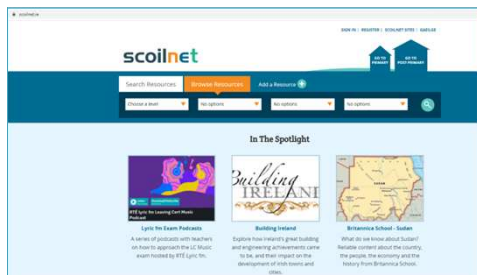




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