



Professional Development Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúil do Mhúinteoirí

pdst.ie  



An Roinn Oideachais
Department of Education

Senior Cycle Agricultural Science

Information Processing
Workshop
March 2023

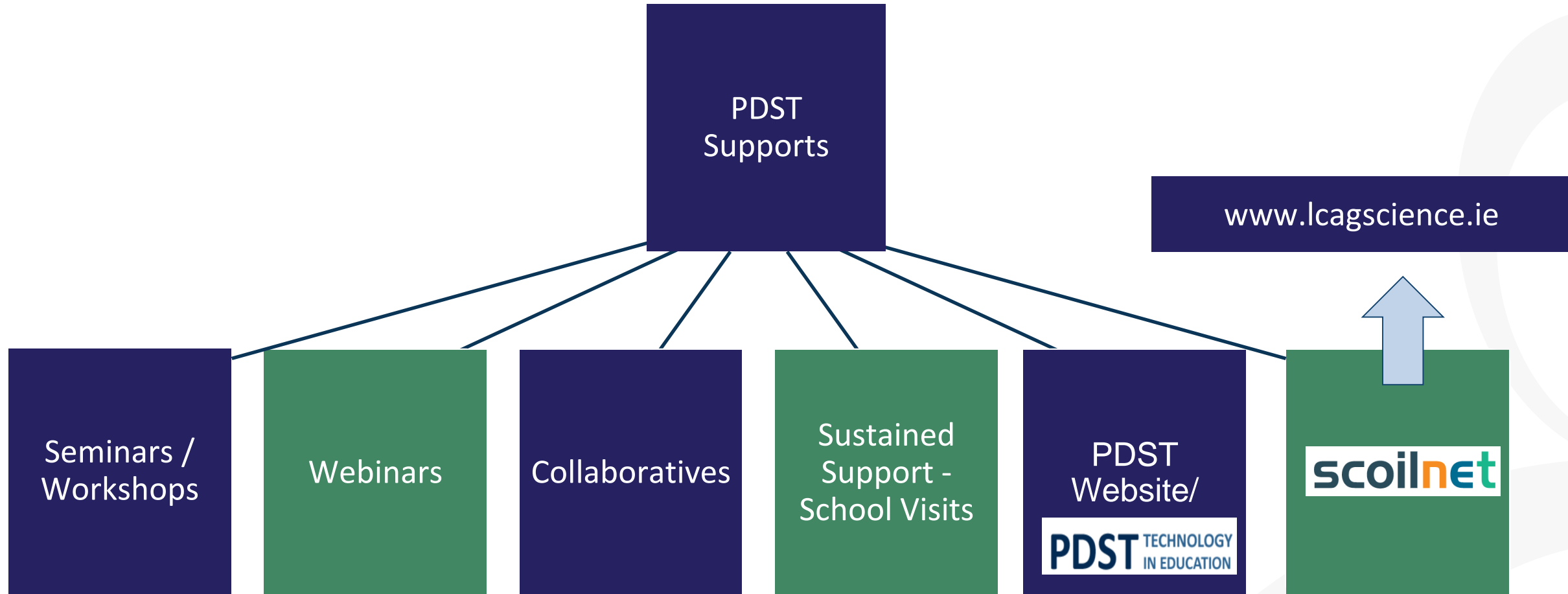
Expectations for Online CPD



The PDST does not give permission for this CPD event to be recorded. Screenshots cannot be taken.

- The meeting link should not be shared outside of agreed attendees.
- Timekeeping.
- Bring relevant resources.
- Respect all participant contributions.
- Engage in professional dialogue and interaction.
- Respect the confidentiality of all participants and issues raised.
- Mute your microphone when you are not talking.
- Raise the pen or hand to indicate to the facilitator that you wish to contribute.

PDST Supports



CPD Timeline 2022/2023



Sept '22

Collaborative

8 Oct

Webinar 7

Jan

Collaborative

9 Feb

Info Processing
Workshop March

Webinar 8

May

May '23

Practical Day
1

Practical Day 2
Feb/Mar

Phase 2 NW3 Sept

Phase 2 NW4 Jan



Timetable

Session 1 19:00 - 19:50	<ul style="list-style-type: none">• Welcome and introduction• Presentation of Data: choosing the most appropriate graph• Presentation of Data: features of quality
19:50 - 19:55	Tea/Coffee/Stretch Break
Session 2 19:55 - 20:30	<ul style="list-style-type: none">• Comprehension of scientific paper: summarising the key points• Referencing from a scientific paper: paraphrasing and using direct quotes
Session 3 20:30 - 21:00	<ul style="list-style-type: none">• Evaluating the reliability and validity of a scientific study• Closing summary and evaluation



Participant outcomes

By the end of this workshop participants will be able to:

- approach scientific practices in relation to the IIS with increased confidence
- evaluate effective representations of data and information
- summarise and reference scientific information related to agriculture
- evaluate the reliability and validity of a scientific study



Key Messages



Information is supplied in numerical, graphical and written forms. The role of a scientist is to interpret and analyse this, question its reliability and validity and see its relevance to their own study.



Engagement with analysis of data and information, will help students acquire skills and values equipping them to take informed positions on scientific information, irrespective of how the information is presented.



Examining the data and scientific claims of the work of other scientists, will build confidence in students helping them in the process of collating, analysing and critiquing their own primary data.



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Session 1

Graphical Representation of Data

Rationale for this topic: SEC Information Note on Agricultural Science Coursework

*“Candidates should consider **how best to represent their data**. They should choose the type of graph, table, or other presentational form which **best suits the data they wish to display**. Replication of similar information in many formats should be avoided. **One judiciously chosen representation** (or perhaps two – one being tabular and the other graphical) is much more effective.”*

*“Candidates should **include titles, labels, legends etc.** as appropriate in all tables and graphs used in the presentation of data and information.”*

<https://www.scoilnet.ie/uploads/resources/37517/37319.pdf>

(SEC, 2021 p5)



Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Coursework

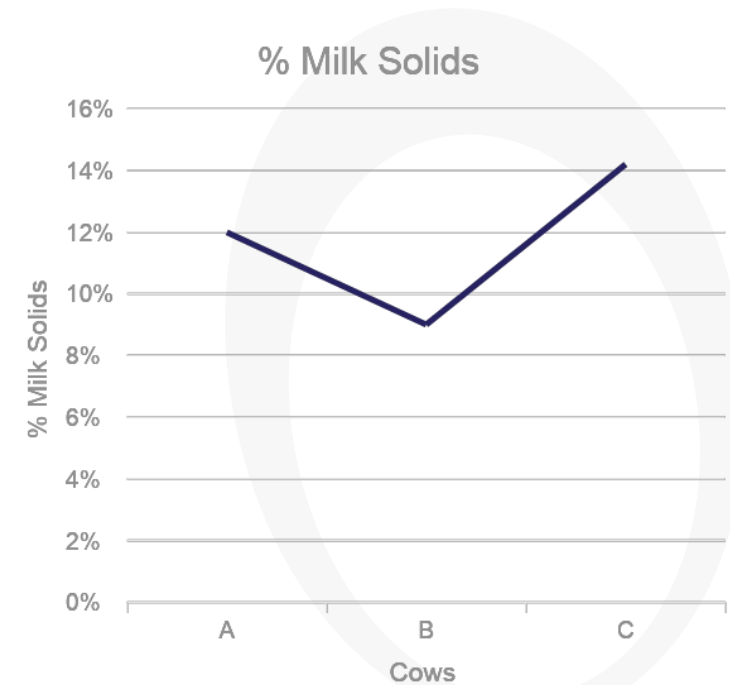
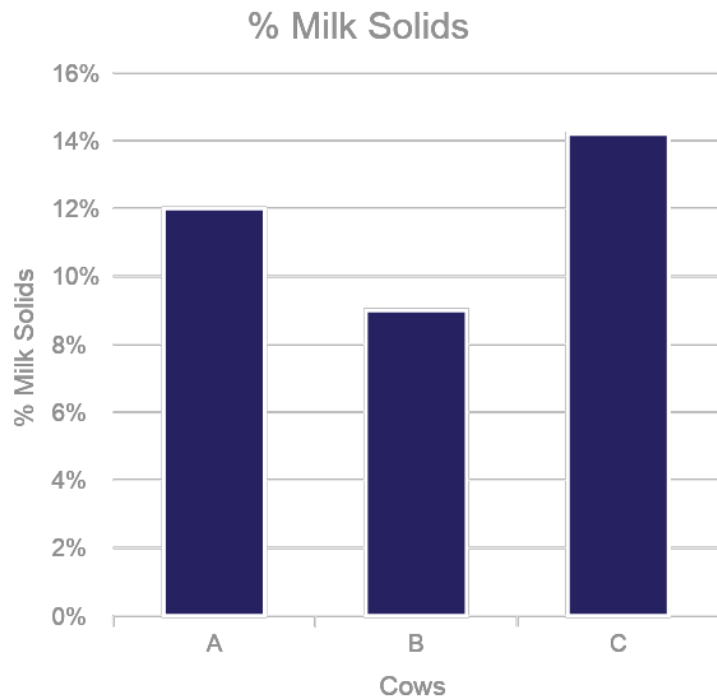
Information note for four Leaving Certificate subjects with new subject specifications

- Agricultural Science – Individual Investigative Study
- Computer Science – Coursework Project
- Economics – Student Research Project
- Physical Education – Physical Activity Project

Representing Data

Which graph below presents the data most appropriately?

Cow	A	B	C
% Solids	12	9	14.2



Activity 1: Assess the suitability of different graphical representations of data

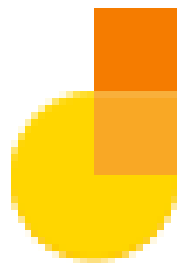
1. Part A: Discuss the suitability of the three graphs provided in representing the data for each of the three given data sets.

Justify your answer and suggest other alternative means of representation.

1. Part B: Develop learning intentions and success criteria for presenting data which allows for ease of interpretation.

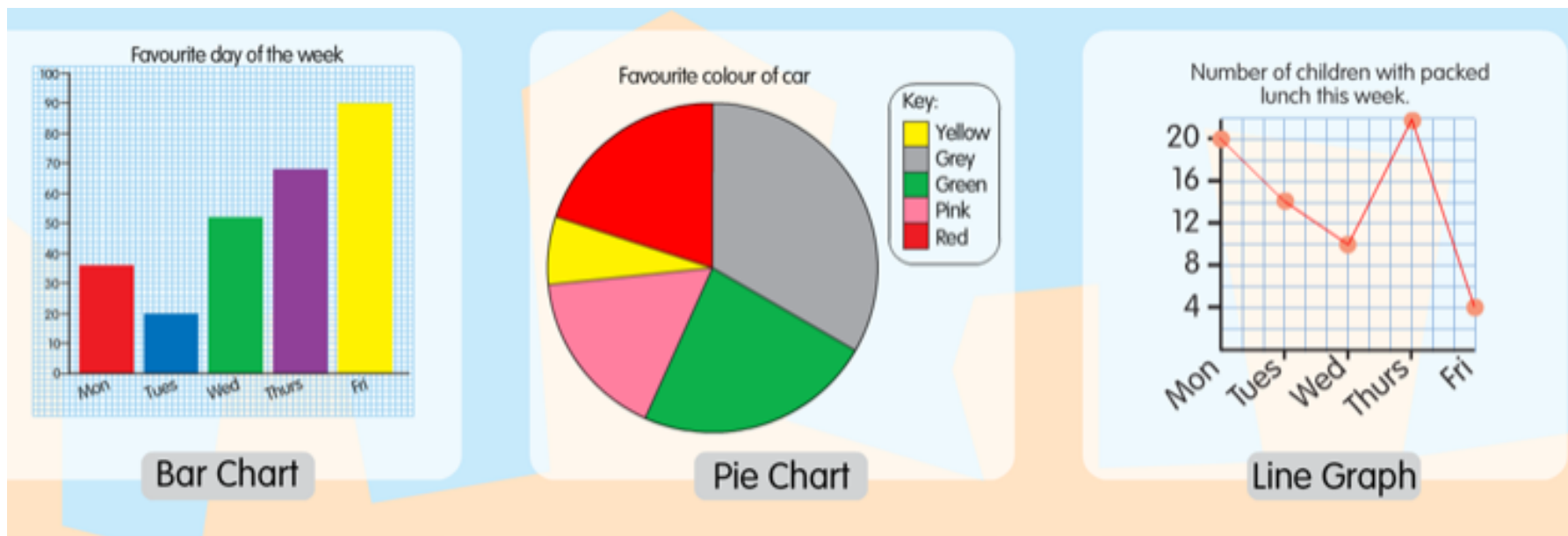


Pgs 5-8



Presenting Data

Graphs: diagrams used to show the data.



Is used to compare variables

Is used to compare parts of a unit/population

Is used to track changes in variables over time or determine the relationship between two variables

Success Criteria

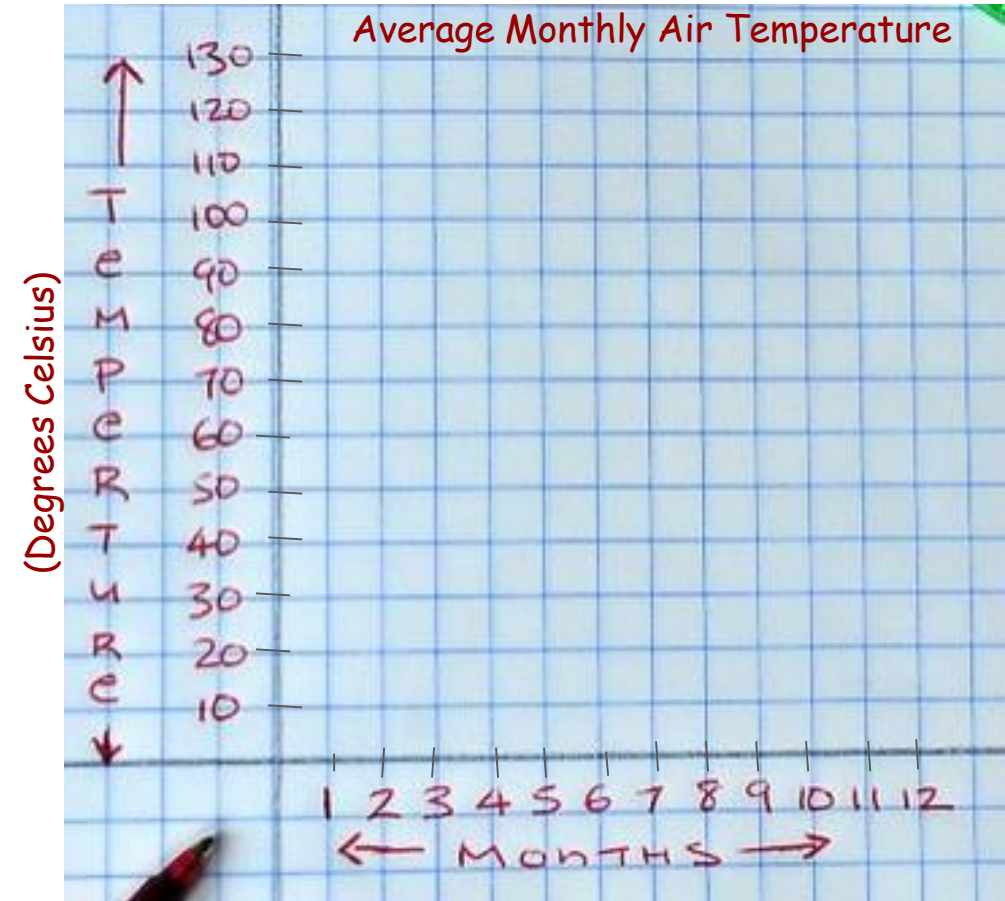
For most graphs consider the SALT acronym:

1. Decide on a **scale** (spaces you mark on the axis).

1. Draw the **x-axis** (horizontal) & **y-axis** (vertical).

1. **Label** each axis with its title & units. Put the independent variable on the x axis.

1. **Title** the graph. Plot the data on the graph.

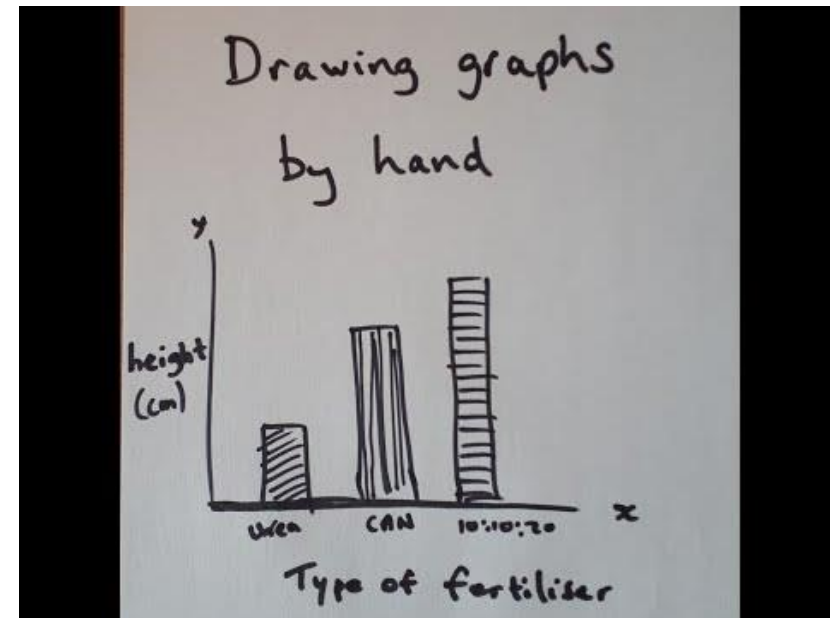


Supports to Help With Data Analysis

A “how-to” Guide for Excel for Teachers and Students of Agricultural Science



A “how-to” Guide for uploading images of hand-drawn graphs



All five videos are available [here](#). They progress in difficulty for the user as they go along.

Session 1 Feedback: How would you use these activities in your Agricultural Science Classroom?

Where in your schemes of work might you fit these activities?



Tea/Coffee Break

Back in 5 minutes. Enjoy!



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Session 2

Evaluating and referencing
scientific information in text form

SEC Information Note on Agricultural Science Coursework

*“Candidates need more experience with research methods and the compiling of research which will aid them in the completion of their coursework. They should **avoid just “copying and pasting”** external material into the sections of the IIS report. They should show – through their own text – an understanding of any quoted material and of its relevance.”*

*“Candidates need to **make a greater link(s)** between their particular investigation and their background research conducted. Any **external material** quoted or referenced **should be sufficiently integrated** with a definite link(s) to the candidates study and to the specified theme as given in the brief.”*

(SEC, 2021 p5)

What can we do to help? Comprehension Strategies

What strategies have you used to help with learners accessing texts?

How have you used them?

For more information please feel free to read [Guiding Comprehension: Teaching for Meaning](#)

Evaluative

Synthesising
Determining Importance
Summarising and Paraphrasing
Self Questioning

Inferential

Connecting
Comparing
Inferring
Predicting

Literal

Creating Images
Skimming
Scanning
Self Questioning

Referencing the Work of Others - Direct quotes v Paraphrasing

Direct Quotes:

“If excessive amount of fertilisers are used, they can be washed into streams causing rapid abundant growth of water plants. The increased growth rate can give rise to algae bloom” (Kennedy, Lawlor and Finn, 2016).

Paraphrase:

As stated by Kennedy, Lawlor and Finn when too much fertiliser is used, this can cause run-off into waterways which can cause algae bloom (2016).

or:

Run-off of nutrients into water ways can occur if excess fertiliser is spread, this can cause algae bloom (Kennedy, Lawlor and Finn, 2016).

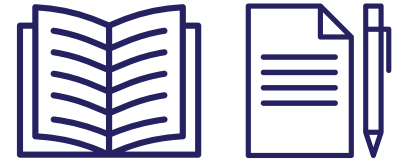
Useful Links:

[How to Read a Scientific Paper](#) (KU Libraries, 2021)

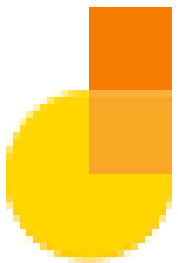
[How to do Harvard Referencing using Word](#) (P. Ryan, Kilkenny College)

Activity 2: Summarising, Paraphrasing and Referencing

1. Read the scientific article provided and process the information to identify eight key statements that link to your specific research question.
2. Using reductive research skill, prioritise the eight statements down to four essential statements.
3. Develop learning intentions and success criteria for referencing the work of others.



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Session 2 Feedback: How would you use these activities in your Agricultural Science Classroom?

What modifications could you make to support all learners?





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Session 3

Evaluate the reliability and validity of a scientific study

Scientific Practices Terminology

- Examining and applying key terms from Learning Outcomes in Strand 1: Scientific Practices
- LO 1.3 (c) make judgements and draw informed conclusions arising from the result of the investigation—their own and those of others—and consider the reliability and validity of data



Learning Outcome 1.3 c :

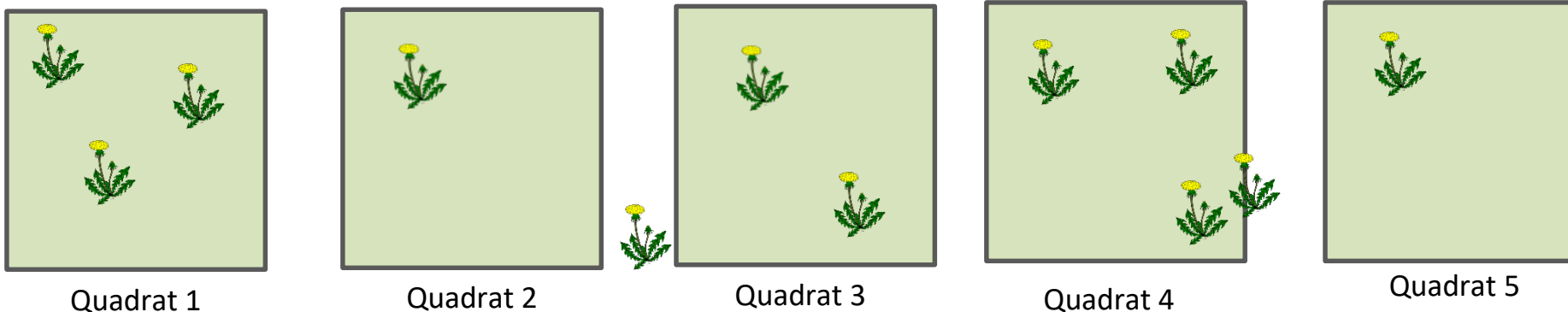
“Make judgements and draw informed conclusions from the result of investigation...”
(Ag Science Spec, 2019, p 17)



When considering this learning outcome consider the following questions:
What is an investigation?
What is data?

Learning Outcome 1.3(c) :

Using the investigation below, collect your own **primary data** to determine the average population of dandelions in a 1m² of pasture.

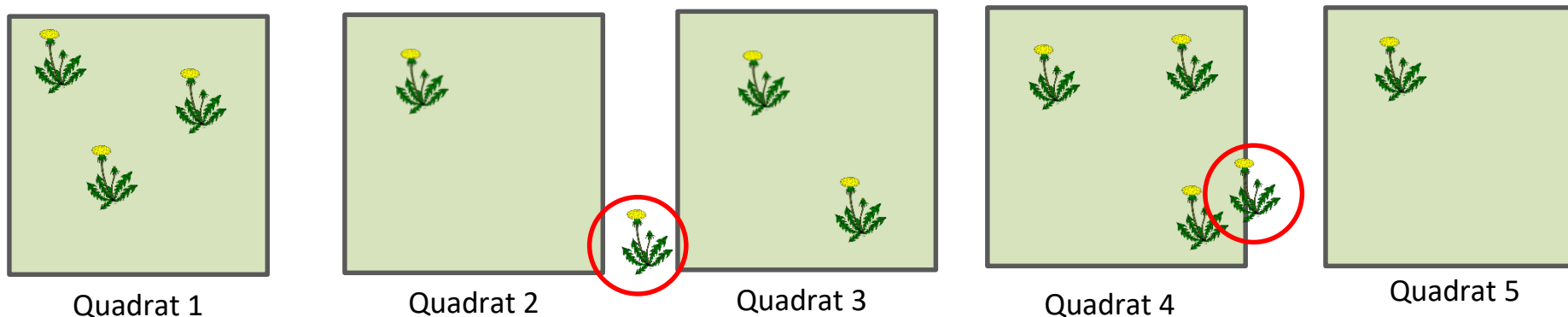


Quadrat	1	2	3	4	5	Average:
Number of dandelions:						

What is primary data?

Learning Outcome 1.3 c :

Using the investigation below, collect your own **primary data** to determine the average population of dandelions in a 1m² of pasture.



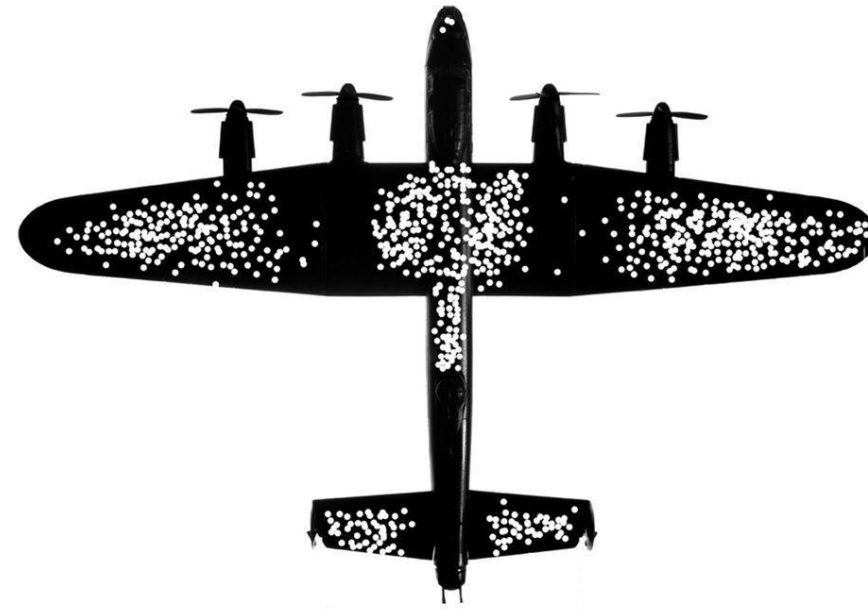
Quadrat	1	2	3	4	5	Average:
Number of dandelions:	3	1	2	3	1	$10/5 = 2$

What is a conclusion? And what conclusion can you make?
What is a judgement? And what judgement do you make?

Learning Outcome 1.3 c :

**LO 1.3 c: Make judgements and draw informed conclusions from the result of investigation...
...and consider the reliability & validity of data**

(Ag Science Spec, 2019, p 17)



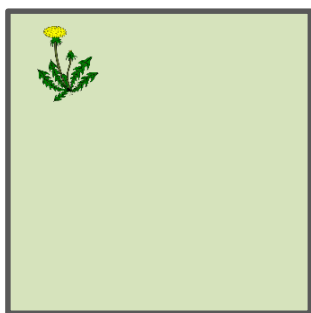
When considering this learning outcome consider the following questions:

What is reliability?

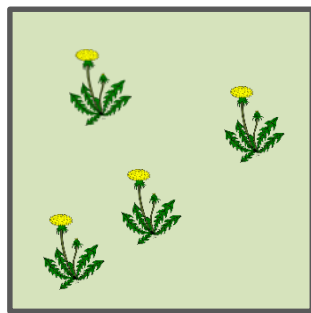
What is validity?

Learning Outcome 1.3 c :

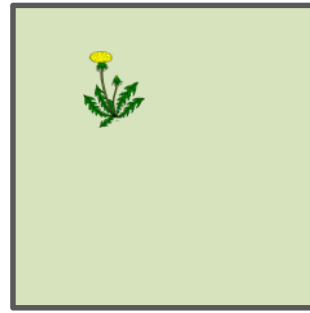
Using the investigation below, collect your own **primary data** to determine the average population of dandelions in a 1m² of pasture.



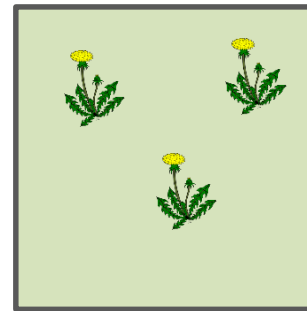
Quadrat 1



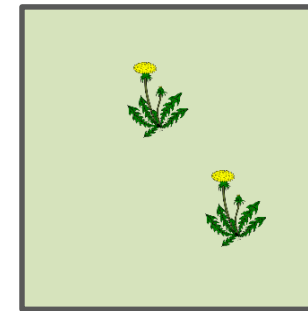
Quadrat 2



Quadrat 3



Quadrat 4



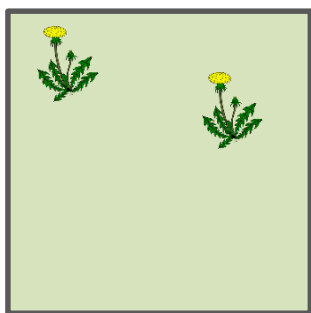
Quadrat 5

Quadrat	1	2	3	4	5	Average:
Number of dandelions:	1	4	1	3	2	$10/5 = 2$

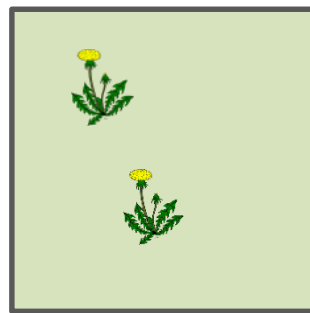
Is this reliable?

Learning Outcome 1.3 c :

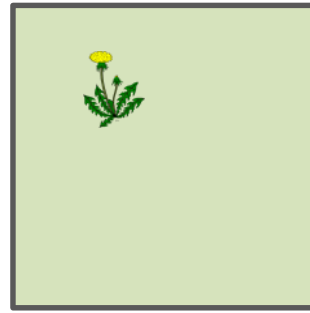
Using the investigation below, collect your own **primary data** to determine the average population of dandelions in a 1m² of pasture.



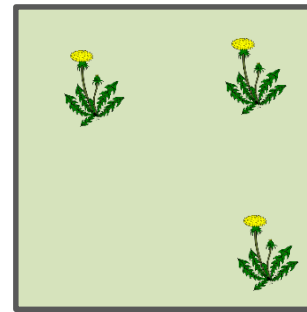
Quadrat 1



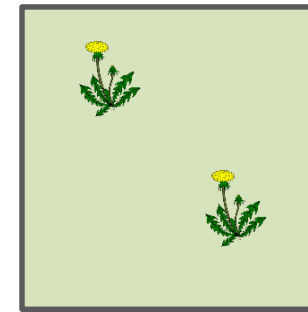
Quadrat 2



Quadrat 3



Quadrat 4



Quadrat 5

Quadrat	1	2	3	4	5	Average:
Number of dandelions:	2	2	1	3	2	$10/5 = 2$

Is this valid?

Activity 3 - Question

A milk processor carried out an investigation to “determine the average milk volume of purebred Holstein dairy cows over the course of a week”. The data they collect is presented below.

	Age (years)	Breed	Day 1 (litres)	Day 2 (litres)	Day 3 (litres)	Day 4 (litres)	Day 5 (litres)	Average milk volume (litres)
Cow 1	7	Holstein	2	2.2	2.2	2	2	2
Cow 2	7	Holstein	2.4	2.4	2.4	2.4	2.4	2.4
Cow 3	7	Holstein x Jersey	2	2	2	2	2	2
Cow 4	9	Holstein	2	2	2.4	1.8	1.8	1.8
Cow 5	5	Holstein x Jersey	2	1.6	2.2	2.6	2	2.2

The data collected from the investigation was used by the milk processor to draw the conclusion that: “Purebred Holstein dairy cows on average produce 2L of milk over the course of a week”.

Assess the **reliability** and the **validity** of this investigation.

Activity 3: Summarising, Paraphrasing and Referencing

Evaluate the scientific study provided.

Assess whether the study is

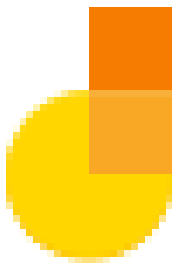
(a) Reliable

(b) Valid

Justify your answers.



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Activity 3 - Solution Part A

	Age (years)	Breed:	Day 1 (litres)	Day 2 (litres)	Day 3 (litres)	Day 4 (litres)	Day 5 (litres)	Average milk volume (litres)
Cow 1	7	Holstein	2	2.2	2.2	2	2	2
Cow 2	7	Holstein	2.4	2.4	2.4	2.4	2.4	2.4
Cow 3	7	Holstein x Jersey	2	2	2	2	2	2
Cow 4	9	Holstein	2	2	2.4	1.8	1.8	1.8
Cow 5	5	Holstein x jersey	2	1.6	2.2	2.6	2	2.2

The data collected from the investigation was used by the milk processor to draw the conclusion that: *“Purebred Holstein dairy cows on average produce 2L of milk over the course of a week”*.

While the investigation is **repeatable** somewhat, it does lack many details e.g. diet, milking interval, housing, stage of lactation of the cows. Also it does not produce **similar results**, as Holsteins are more likely to produce circa 25-30 litres per day, therefore it is **unreliable**.

Activity 3 - Solution Part B

A milk process carried out an investigation to “determine the average milk volume of purebred holstein cattle over the course of a week”. The data they collect is presented below.

	Age (years)	Breed:	Day 1 (litres)	Day 2 (litres)	Day 3 (litres)	Day 4 (litres)	Day 5 (litres)	Average milk volume (litres)
Cow 1	7	Holstein	2	2.2	2.2	2	2	2
Cow 2	7	Holstein	2.4	2.4	2.4	2.4	2.4	2.4
Cow 3	7	Holstein x Jersey	2	2	2	2	2	2
Cow 4	9	Holstein	2	2	2.4	1.8	1.8	1.8
Cow 5	5	Holstein x jersey	2	1.6	2.2	2.6	2	2.2

The data collected from the investigation was used by the milk processor to draw the conclusion that: “Purebred Holstein dairy cows on average produce 2L of milk over the course of a week”.

Not valid, investigation is NOT measuring what it is supposed to be measuring.

Session 3 feedback: What are you going to take back to your Agricultural Science Classroom?



What activities do you already use in your classroom to develop information processing skills?

Plenary: How would you use these activities in your Agricultural Science Classroom?

What modifications do you need to make to support all learners?

Where in your work plan might you fit these activities?

What activities do you already use in your classroom to develop information processing skills?



Participant outcomes

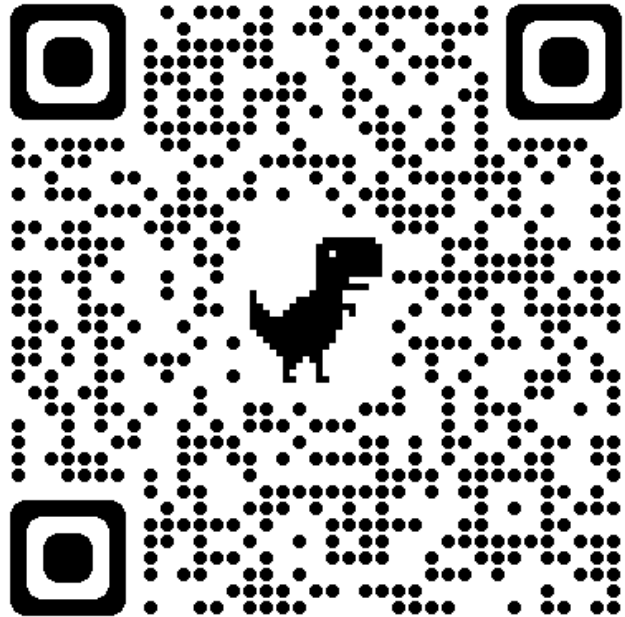
By the end of this workshop participants will be able to:

- approach scientific practices in relation to the IIS with increased confidence
- evaluate effective representations of data and information
- summarise and reference scientific information related to Agriculture
- evaluate the reliability and validity of a scientific study

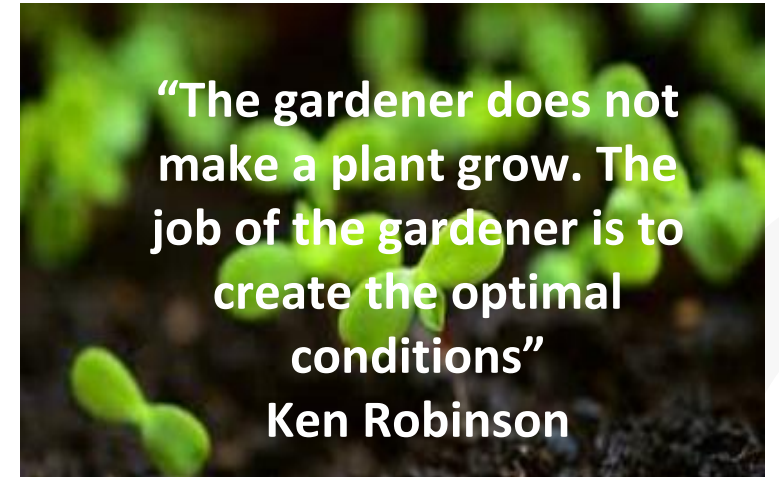


Evaluation

Please scan the QR code to log on:



<https://forms.gle/yKH7VaTrqRW7FUPf8>



References

Images used were source from:

Slide 14 - Graph: [How to Make a Line Graph: 8 Steps \(with Pictures\) - wikiHow](#)

Slide 26 - Optical Illusion: [Study Claims Age Affects Perception of Classic Optical Illusion \(insider.com\)](#)

Slide 26 - Blindfolded Cartoon: [Boy blindfolded standing alone on a ladder rung Vector Image \(vectorstock.com\)](#)

Slide 29 - Plane: <https://www.trevorbragdon.com/when-data-gives-the-wrong-solution/>

Slide 29 - Egg: [Corona lays a rare triple yolk at her Bournemouth home | Bournemouth Echo](#)