PDST
Professiona Deve opment Service for Teachers | An tSeirbhís um Fhorbairt Ghairmiúi do Mhúinteoirí

An Roinn Oideachais
Department of Education

Mathematical Applications Day 3

Overview of the Seminar

| Session 1	Introduction Vision & Values - your story so far Module 2: Mathematics & the World Around Me Transdisciplinary Links
Session 2	Planning a Unit of Learning for Statistics in Unit 1: Current Affairs Formative Assessment - self and peer assessment
Session 3	Planning for Unit 2: Travel and Recreation Seminar Reflection and Evaluation

Key Messages

Subjects in LCA are inherently transdisciplinary, authentic and relevant to the current and future needs of all students

The Mathematical Applications module descriptor supports the use of a wide range of inclusive, differentiated, experiential teaching and learning approaches
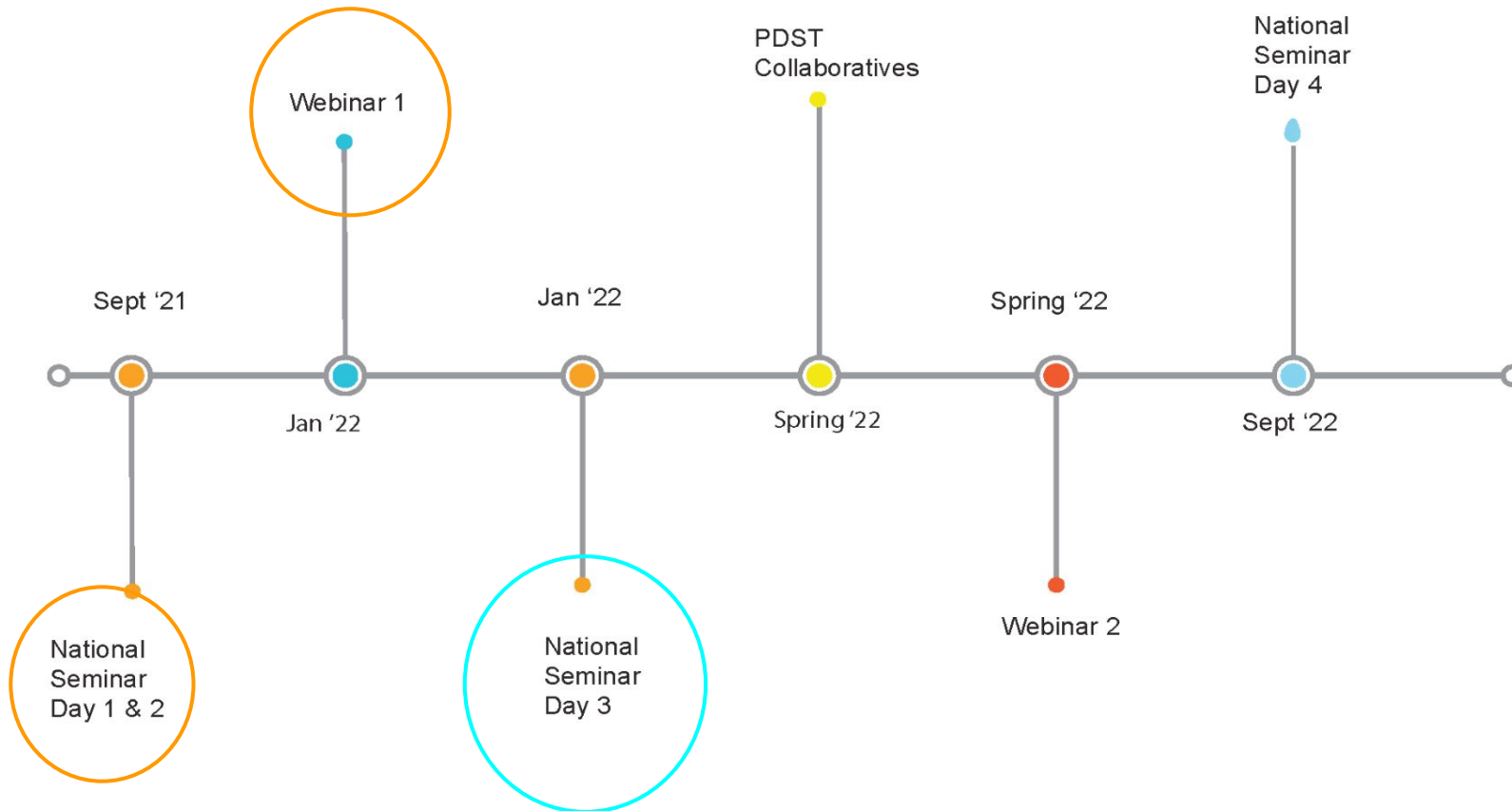
Student-centred activities should be used to develop the Mathematical Concepts and Skills while engaging with the learning outcomes

Self and peer assessment facilitated by the teacher are effective tools to improve the quality of student work while developing their key skills
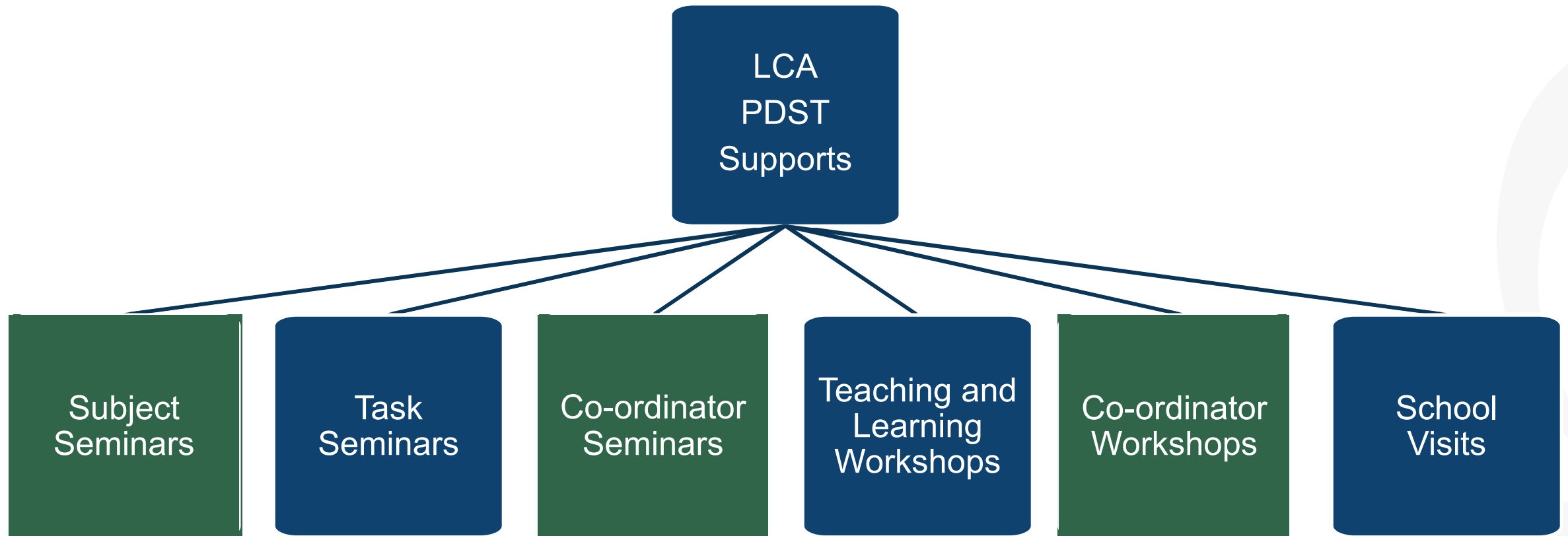
CPD for Revised Module Descriptors

Leaving Certificte Applied Subject Specification CPD

Session 1

By the end of this session participants will have:

Reflected on their experience so far with the new module descriptor and how that aligns with their values and vision expressed in seminar day 1

Explored Module 2 of the Mathematical Applications module descriptor and considered relevant prior knowledge

Considered selection criteria for suitable teaching and learning resources and investigated transdisciplinary links in their LCA centre

VALUES for High Quality T, L & A

kindness & respect

Engaging

Setting high expectations

Understanding

Safe learning space

Make the children want to attend

Clear expectations/ instructions/ descriptors for achievement

Everyday skills

Communication Skills

How maths can be used in everyday life

recalling prior learning

See Mathematics as useful in their daily lives

Positive Interactions with each other & class teacher

Students are clear about what they are learning, effective links are created between the maths they are learning in school and their lives outside school.

relevant class content that will interest the students to engage and keep them on task

Integration with mainstream

Appropriate effort and enthusiasm from students and teacher alike

See the relevance of Maths in their lives now and in the future

Engagement with all lessons
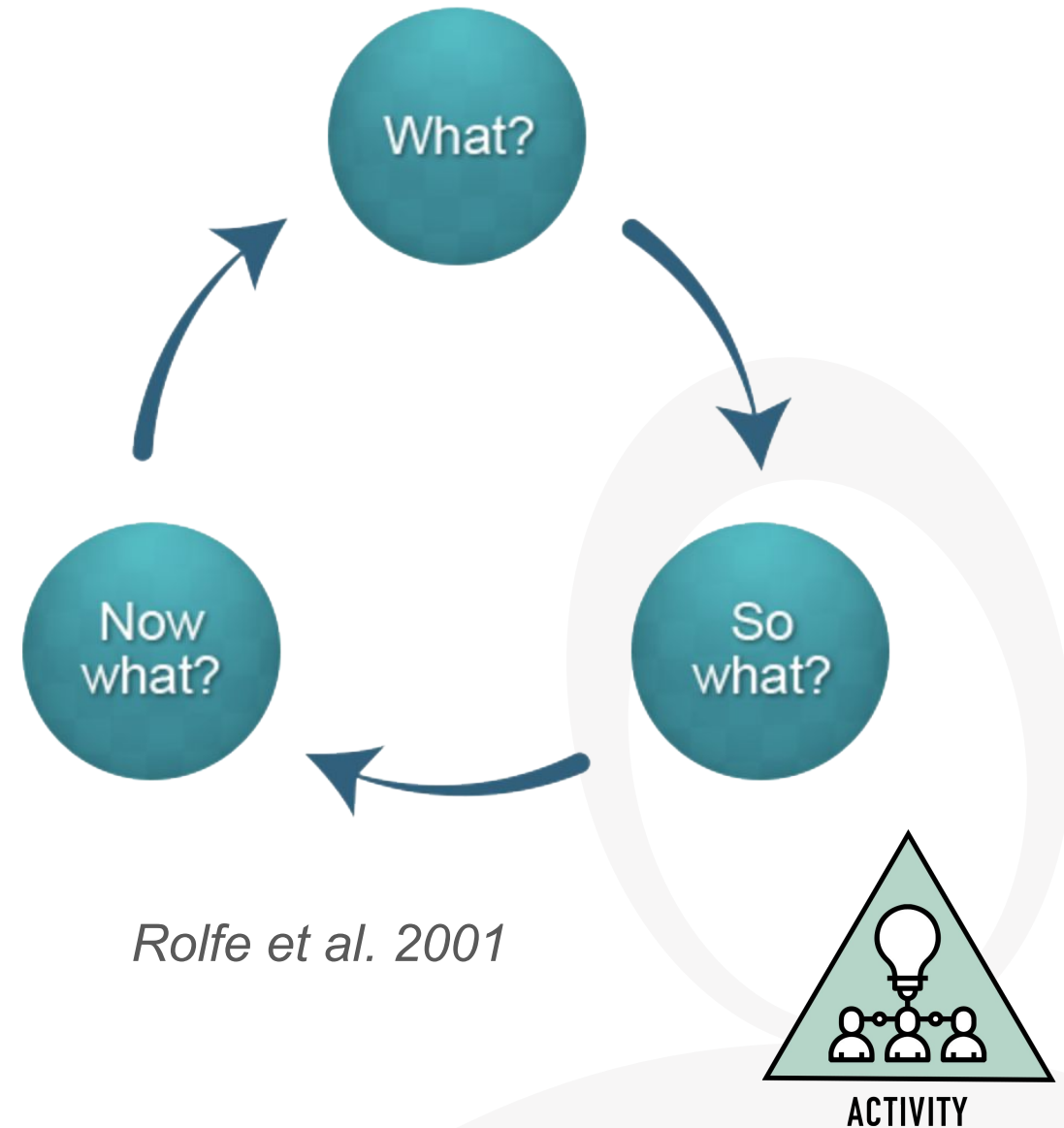
Work together

Differentiation and inclusion

Communication and differentiation

Everyone can achieve and learn new skills

The Journey So Far…...

How have you come closer to realising your shared vision for learning in the LCA classroom?

What unexpected learning has emerged for you?

What?

So what?

Now what?

*Rolfe et al. 2001*

ACTIVITY

LCA Session 2: Tasks

*"**Within each module, the order of units is discretionary to facilitate integration with other subjects, tasks and current events.**"*

Active learning methodologies, including practical work, group work and out of school activities are essential. Integration with other modules is part of the philosophy of the LCA programme. All tasks are cross-curricular in nature and afford opportunities for the integration of Mathematical Applications.

*"**Furthermore, in the case of the Vocational Education Tasks, Mathematical Applications is a specific requirement.**"*

(Mathematical Applications MD, page 12)

Module Progression
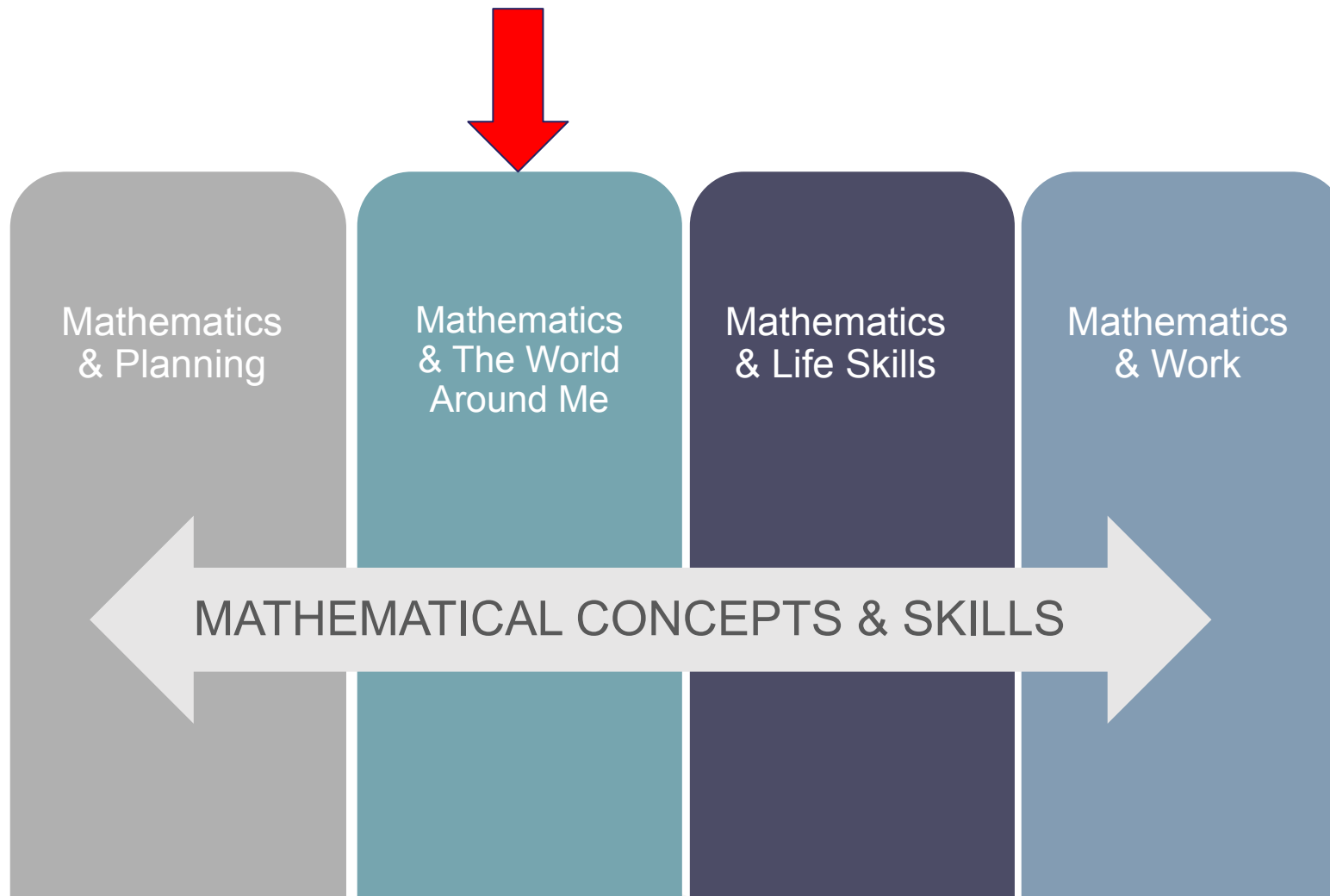
Module 2:
Mathematics and the World Around Me

AIMS

This module aims to provide students opportunity to:

• see the relevance of mathematics to issues encountered by them in their everyday lives

• consolidate and reinforce students' mathematical knowledge and skills

• make and justify decisions with mathematics

• develop confidence in using mathematics to solve problems.

UNIT 1: CURRENT AFFAIRS

Learning outcomes

The learning in this unit is underpinned by the mathematics specified in MCS1-5
The student will be able to:

1. Create and interpret opinion polls or surveys

2. Analyse and interpret relevant information including voting data communicated in words/tables/ charts or graphs.

3. Investigate an issue and use mathematics to communicate findings.

UNIT 2: TRAVEL AND RECREATION

Learning outcomes

The learning in this unit is underpinned by the mathematics specified in MCS1-5.
The student will be able to:

1. Research and plan an event to suit a particular budget.

2. Interpret relevant information communicated in words/tables/charts and graphs.

3. Prepare a written itinerary including costs and timings.

4. Communicate mathematics in words/equations/calculations /graphs or charts.

Mathematical Applications

Leaving Certificate Applied

NCCA

Teacher Guidelines
Page 28

Why is it important to consider prior knowledge?

Students should engage in the learning outcomes outlined in MCS 1-5 through the contextual experiences offered by Mathematics and the world around me (p. 20-21).

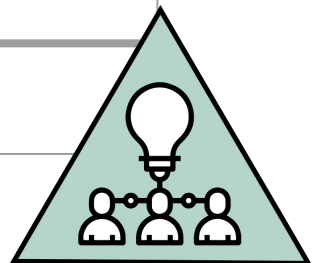**Concepts Through Modelling**　　　　　　**or**　　　　**Concepts, Then Modelling??**

- Although there's a chance to recap and reinforce, we need to progress the learning and don't want to just repeat what's been done before!

- Are there particular covid related considerations?

- Some prior knowledge for maths applications comes from other, less obvious school subjects and other sources.

- We want our students to build on their prior knowledge and apply it to interesting new areas.
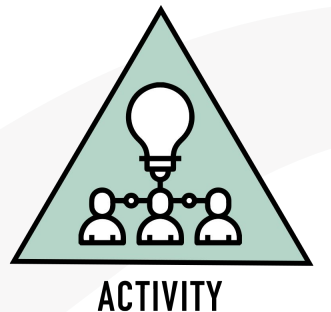
ACTIVITY

Prior Knowledge and Mathematical Concepts & Skills MCS

Activity in Workbook

	Unit 1: Current Affairs	Unit 2: Travel & Recreation
Primary School		
JC Maths		
Module 1 Maths Applications		
Other school work		
Other (around **me**)		
MCS (1-5)		

ACTIVITY

Using ICT to Assess Prior Knowledge

Maths and the World Around **Me**: Transdisciplinary Links

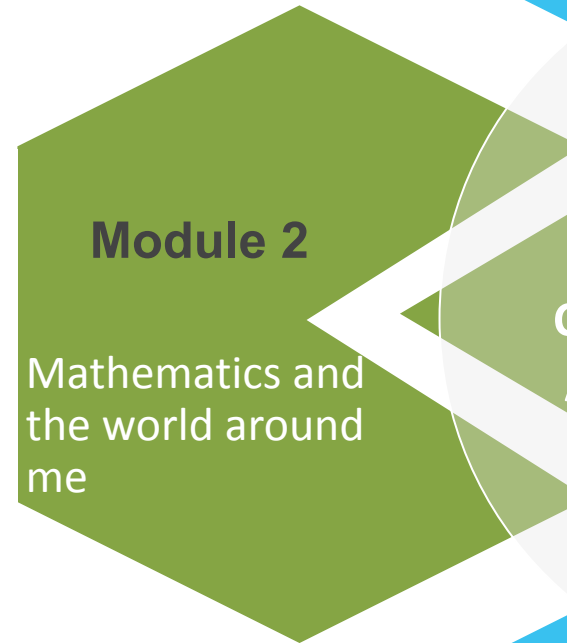|					
ALS Active Leisure Studies	**AH** Agriculture/ Horticulture	**CC** Childcare/Community Care	**CD** Craft and Design	**DA** Dance	**DR** Drama
EN Engineering	**EC** English and Communication	**GC** Gaeilge Chumarsáideach	**GCS** Graphics and Construction Studies	**HB** Hair and Beauty	**HCT** Hotel Catering and Tourism
ICT Information and Communications Technology (Voc. Specialism)	**ICT** Introduction to Information and Communications Technology	**LR** Leisure and Recreation	**MA** Mathematical Applications	**ML** Modern Languages	**MU** Music
OCC Office Administration and Customer Care	**RE** Religious Education	**SC** Science	**SL** Sign Language	**SE** Social Education	**TE** Technology
VA Visual Art	**VPG** Vocational Preparation and Guidance				

www.curriculumonline.ie/Senior-cycle/LCA/

- Which of these subjects are **your** students doing at the moment?

- Which subjects are particularly relevant to maths applications module 2?

LCA
Leaving Certificate Applied
Ardteistiméireacht Fheidhmeach

Transdisciplinary Nature of LCA
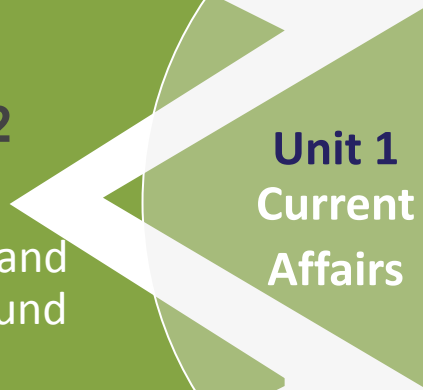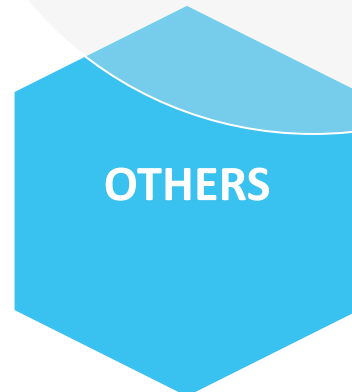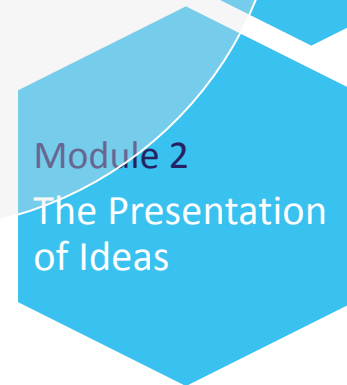
English and Communications

Visual Art

Module 2
Communication and the digital world

Module2
The Local environment

Social Education

MATHEMATICAL APPLICATIONS

Module 2

Mathematics and the world around me

Unit 1 Current Affairs

Module 2
My Community

Module 2
The Presentation of Ideas

ICT

OTHERS

LCA Programme Links: Unit 1

ICT
Introduction to Information and Communications Technology

UNIT 1: CURRENT AFFAIRS

Learning outcomes

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The student will be able to:

1. Create and interpret opinion polls or surveys.

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EC
English and Communication

SE
Social Education

ML
Modern Languages

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LCA Programme Links: Unit 2

ICT
Introduction to Information and Communications Technology

UNIT 2: TRAVEL AND RECREATION

Learning outcomes

The learning in this unit is underpinned by the mathematics specified in MCS1-5.
The student will be able to:

1. Research and plan an event to suit a particular budget.

2. Interpret relevant information communicated in words/tables/charts and graphs.

3. Prepare a written itinerary including costs and timings.

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HCT
Hotel Catering and Tourism

ALS
Active Leisure Studies
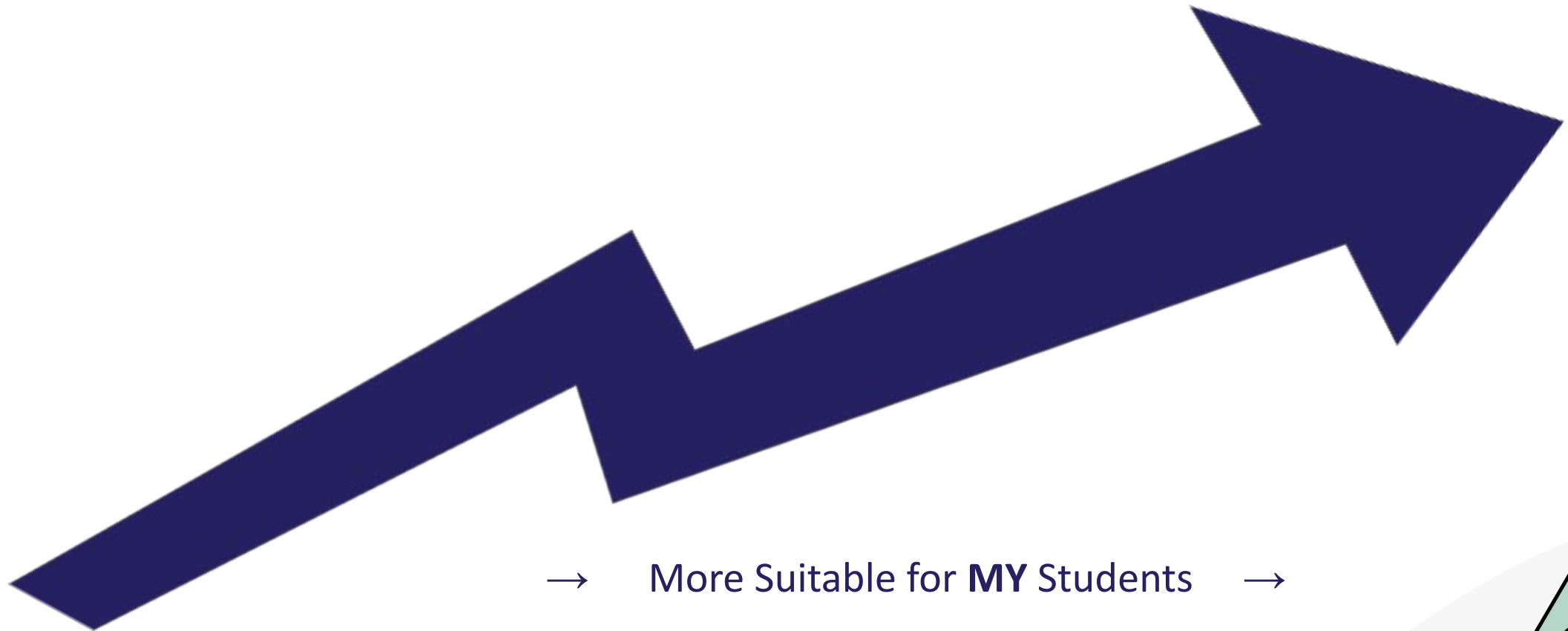
LR
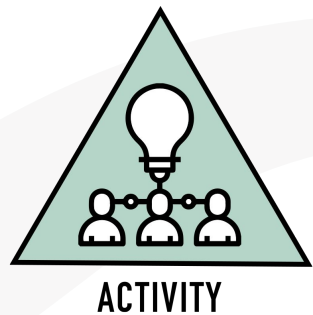Leisure and Recreation

ML
Modern Languages
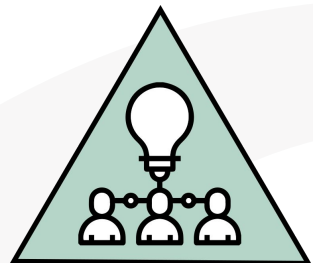
ACTIVITY

Ranking Activity:
What makes for a good student-centred learning experience?

→   More Suitable for **MY** Students   →

ACTIVITY

Points to Consider When Choosing Student-Centred Learning Experiences

We need to choose activities and topics that:

- Are "authentic", "relevant and recognisable" (module descriptor page 11)

- Are at a suitably challenging level for all of our students

- Are relevant to the aims and learning outcomes for the unit

- Allow students to "utilise a range of tools in a variety of contexts" (module descriptor page 11)

Session 1

By the end of this session participants will have:

Reflected on their experience so far with the new module descriptor and how that aligns with their values and vision expressed in seminar day 1

Explored Module 2 of the Mathematical Applications module descriptor and considered relevant prior knowledge

Considered selection criteria for suitable teaching and learning resources and investigated transdisciplinary links in their LCA centre

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**Day 3
Session 2**

Session 2

By the end of this session participants will have:

Explored the planning of a student-centred unit of learning on statistical investigations

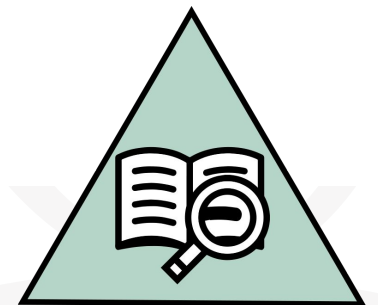Considered the role of peer and self assessment in the Mathematical Applications classroom
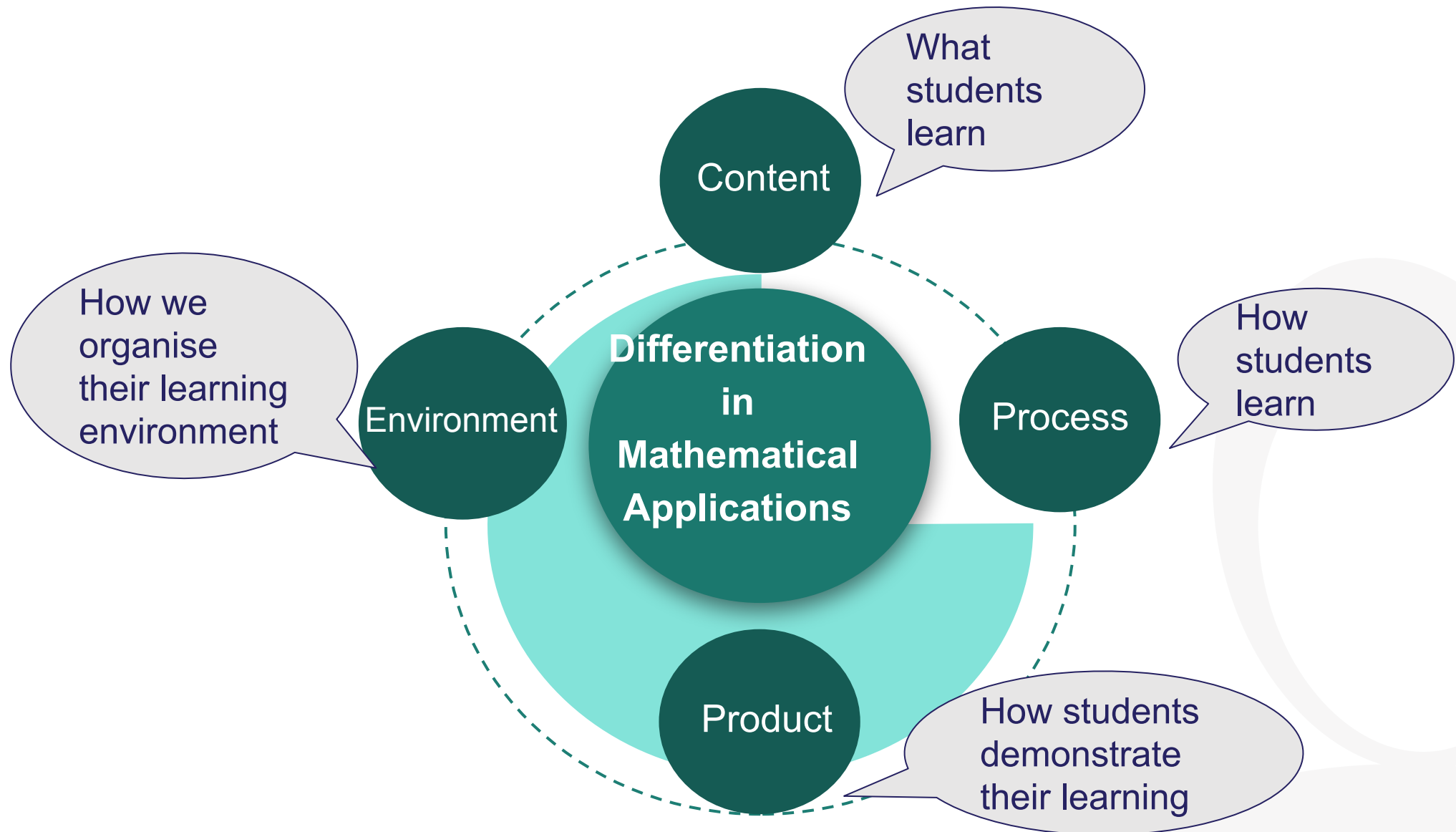
Planning for All: Elements of Good Planning

What are some of the elements of good planning?

Where should we start from?

Learning outcomes
Selected from the specification

Develop learning intentions
Developed by teacher shared with students.

Organise learning activities
Organise teaching, learning & assessment experiences to achieve the learning intention

Develop success criteria
Agreed by teacher and students

Feedback

(NCCA, 2019)

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RESEARCH

Planning For All: Seminar Day 2 Recap

Content — What students learn

Environment — How we organise their learning environment

Process — How students learn

Product — How students demonstrate their learning

Differentiation in Mathematical Applications

Planning for All: Universal Design for Learning (UDL)

UNIT 1: CURRENT AFFAIRS

- MCS.5. carry out a statistical investigation so that they can:

a. generate a statistical question

b. plan and implement a method to generate and/or source unbiased, representative data

c. select, draw, and interpret appropriate graphical displays of data, including bar charts, pie charts, trend graphs, and histograms (equal intervals)

d. select, calculate, and interpret appropriate summary statistics to describe aspects of univariate data, including measures of central tendency (mean, median, and mode) and of spread (range)

e. evaluate the effectiveness of different graphical displays in representing data

f. discuss misconceptions and misuses of statistics.

Formative Assessment Principles

- Learning Intentions & Success Criteria
- Effective use of Questioning
- Effective Formative Feedback
- Self-Assessment and Evaluation
- Peer Assessment and Evaluation
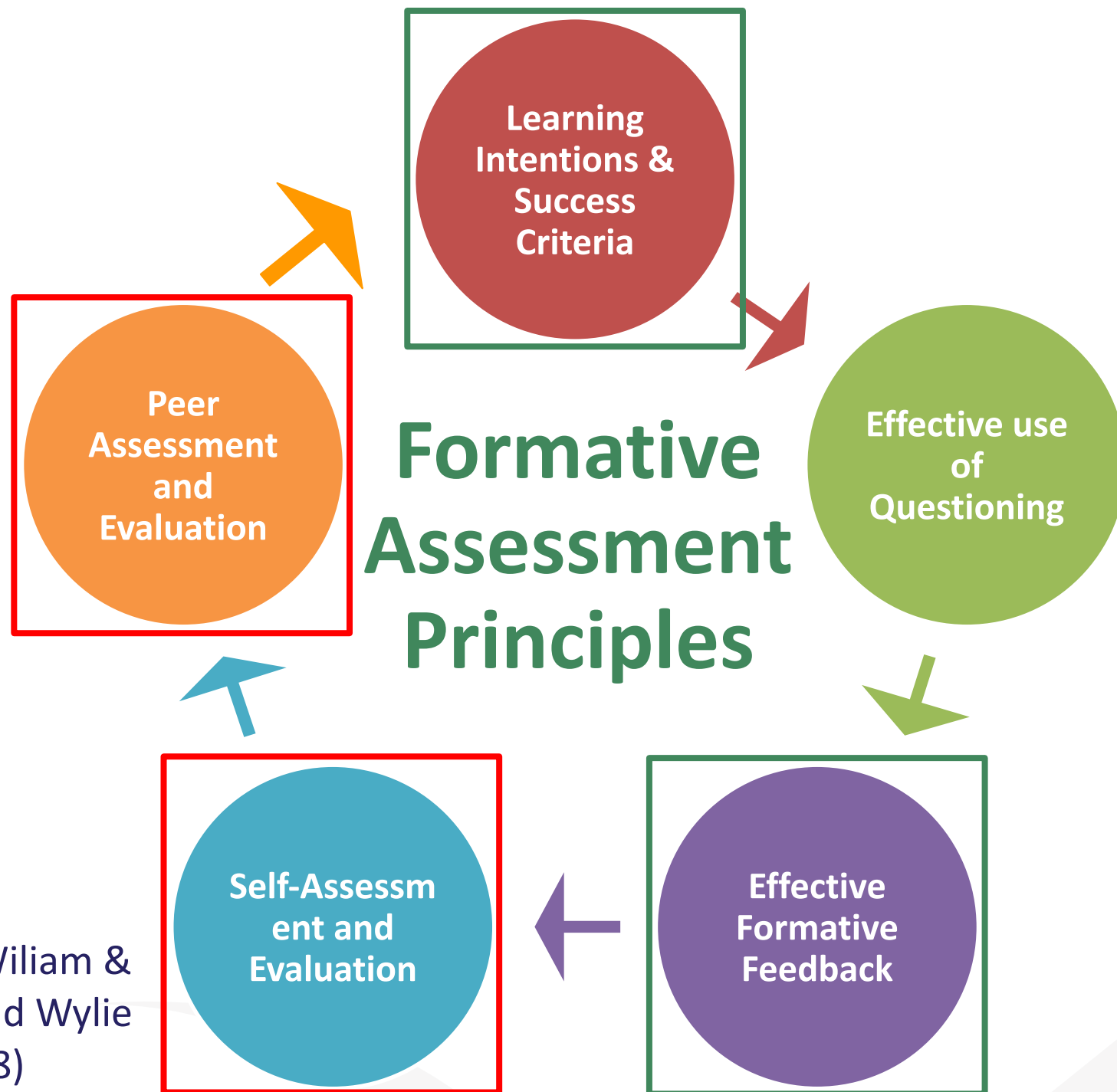
Adapted from Wiliam & Leahy, (2015) and Wylie et al (2008)

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RESEARCH

Self and Peer Assessment in Action: Create a Survey

Workbook Activity

1. How much money do your parents earn in a year? _____

2. We are doing a survey about people's internet use. We want to get high speed broadband in our area and check how many people are having trouble with their internet on the phone at home. We think it's harder to get good internet east of the town.
   Who is your internet provider? _____

3. Where are you from? _____

4. Tick the box for your Wifi speed at home:

   Slow ☐   Average ☐   Fast ☐

5. Do you agree that we need fast internet access in our homes? _____

15 sample responses for Q2

1. Don't know
2.
3. Eir
4. Vodafone
5. WhatsApp
6. Wifi
7.
8. Don't know
9. My phone
10. Sky
11. Don't have one
12. Vodafone
13.
14. Eircom
15. Satelite

ACTIVITY
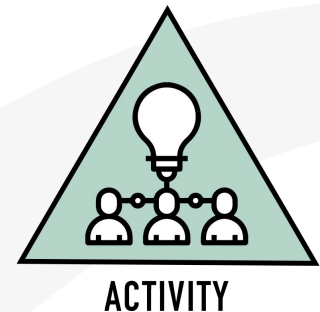
Planning for All: Success Criteria

From Seminar day 2: *"The success criteria should be shared with the students before they start work. Highly effective practice would see teacher and students co-create these success criteria."*

Success criteria achievable for all
E.g.

- Presentation must be relevant to the student group
- **At least** one mathematical formula must be used in a correct and relevant way
- **At least** two options must be analysed and a decision made
- **At least** two appropriate sources of information must be referenced

Presentation could be a physical poster, a software presentation or an oral presentation.

The presentation could contain quite simple BMI calculations or more sophisticated information e.g. looking at improving a students' weekly diet to prepare for an upcoming sporting event.

...sing the following criteria...

- Keep questions short, clear and unambiguous.
- Begin with simple questions.
- Avoid leading questions.
- Ensure questions are relevant to investigation.
- Avoid overlaps in answer options.
- Ensure answer options are specific.

esource/entity/show/Lre/24912/

Self and Peer (Formative) Assessment

Dylan Wiliam, Self and Peer Assessment

Planning for All

1. Consider your assigned learning outcome(s)

2. Devise an activity and associated success criteria to achieve learning outcome(s) and activate key skills

3. Identify the Mathematical Concepts and Skills underpinning the learning outcome(s) and the prior knowledge of students.

4. Identify links to other LCA subjects

5. Identify opportunities for peer and self assessment.

ACTIVITY

Planning for all: Census at School

"The best way of showing students what success criteria are is to show them what the end product looks like"
John Hattie, 2012

Planning for All: Graphical Representations

"The b
looks
John H

Figure 7 Average female heights by age, Ireland and Canada
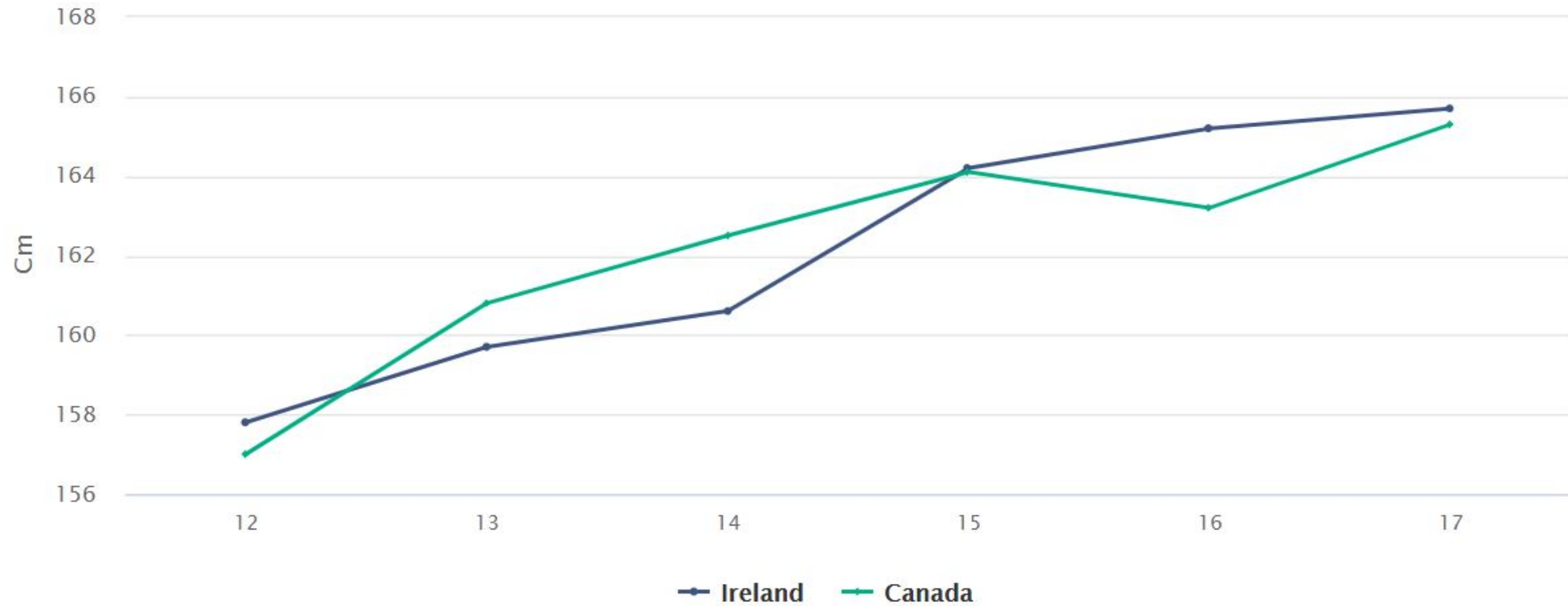
Planning for All: Diagnostic Questions

- MCS.2. reason mathematically about problems so that they can:

  a. perform calculations on positive and negative numbers involving addition, subtraction,multiplication, division, square roots (positive numbers only), and positive whole number

  b. use the order of arithmetic operations, including the use of brackets

  c. present answers to the degree of accuracy required, for example to the nearest whole number, to the nearest thousand, to two decimal places

  d. use appropriate units and convert between them, including, but not exclusively, mm, cm, m, km, seconds, minutes, hours, days, €k (i.e. thousands), €million, degrees, etc.

  e. flexibly convert between fractions, decimals, and percentages

  f. use and understand ratio and proportion.

I= Eedi

What is 4/5 as a percentage?

a) 20%   b) 45%

c) 80%   d) 40%

A	B	C	D
14%	19%	52%	14%

EXPLANATIONS

Planning for All: Using ICT to Gather Data

1. How many years have you been teaching at secondary level (rounded to the nearest whole number)? *

Your answer

2. What province do you live in? *

○ Connacht

○ Leinster

○ Munster

○ Ulster
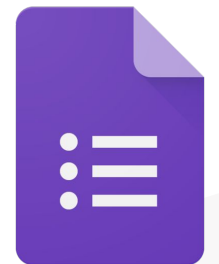
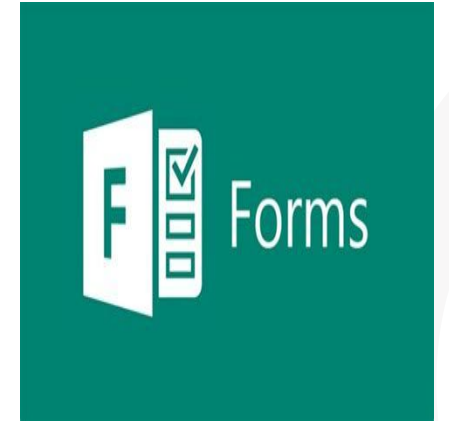3. How much (€) did you spend on your last haircut? *

Your answer

4. How much time (minutes) did you spend getting your last hair cut? *

Your answer

5. What's the most important factor for you when choosing where to get your hair cut *

Choose ▼

Planning for All: Engaging with Authentic Data

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Lear

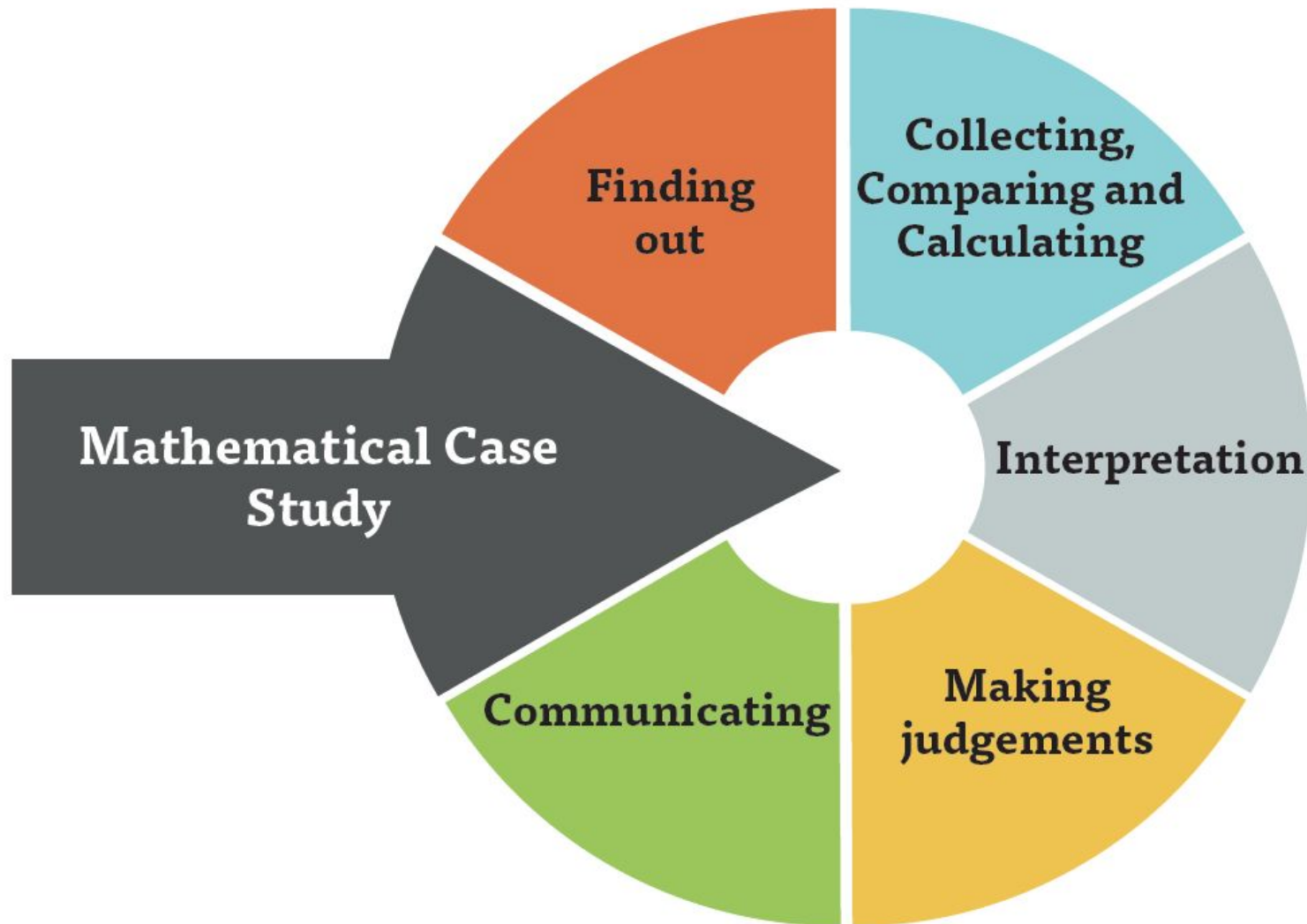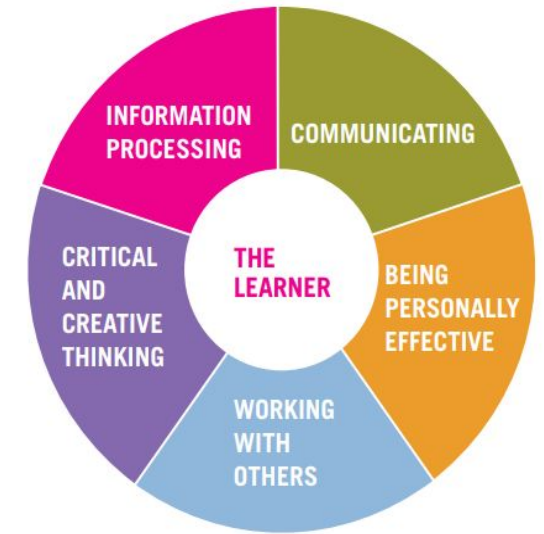The

The

1. (

2.

3. I

Mathematical Case Study

Finding out

Collecting, Comparing and Calculating

Interpretation

Making judgements

Communicating

1-5

municated in words/tables/

INFORMATION PROCESSING

COMMUNICATING

CRITICAL AND CREATIVE THINKING

THE LEARNER

BEING PERSONALLY EFFECTIVE

WORKING WITH OTHERS

By the end of this session participants will have:

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PDST

Professiona Deve opment | An tSeirbhís um Fhorbairt
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An Roinn Oideachais
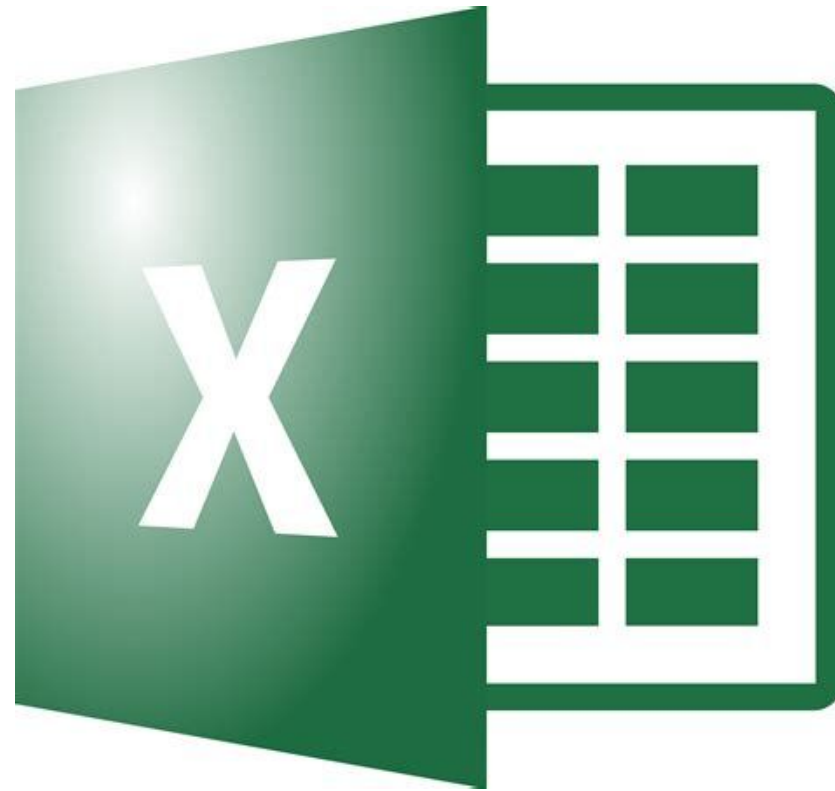Department of Education

Day 3
Session 3

Session 3

By the end of this session participants will have:

Planned a student-centred unit of learning for Travel and Recreation

Investigated the next steps in enacting your vision in your LCA Mathematical Applications class

Keeping Track of the MCS
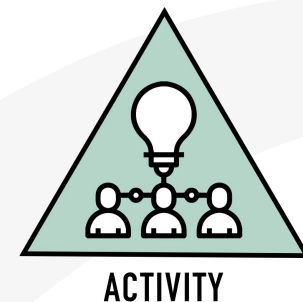
Planning For All: Travel and Recreation

UNIT 2: TRAVEL AND RECREATION

Learning outcomes

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ACTIVITY

Planning For All: Travel and Recreation

In your planning, consider the student centred approaches we worked on today:

Prior Knowledge
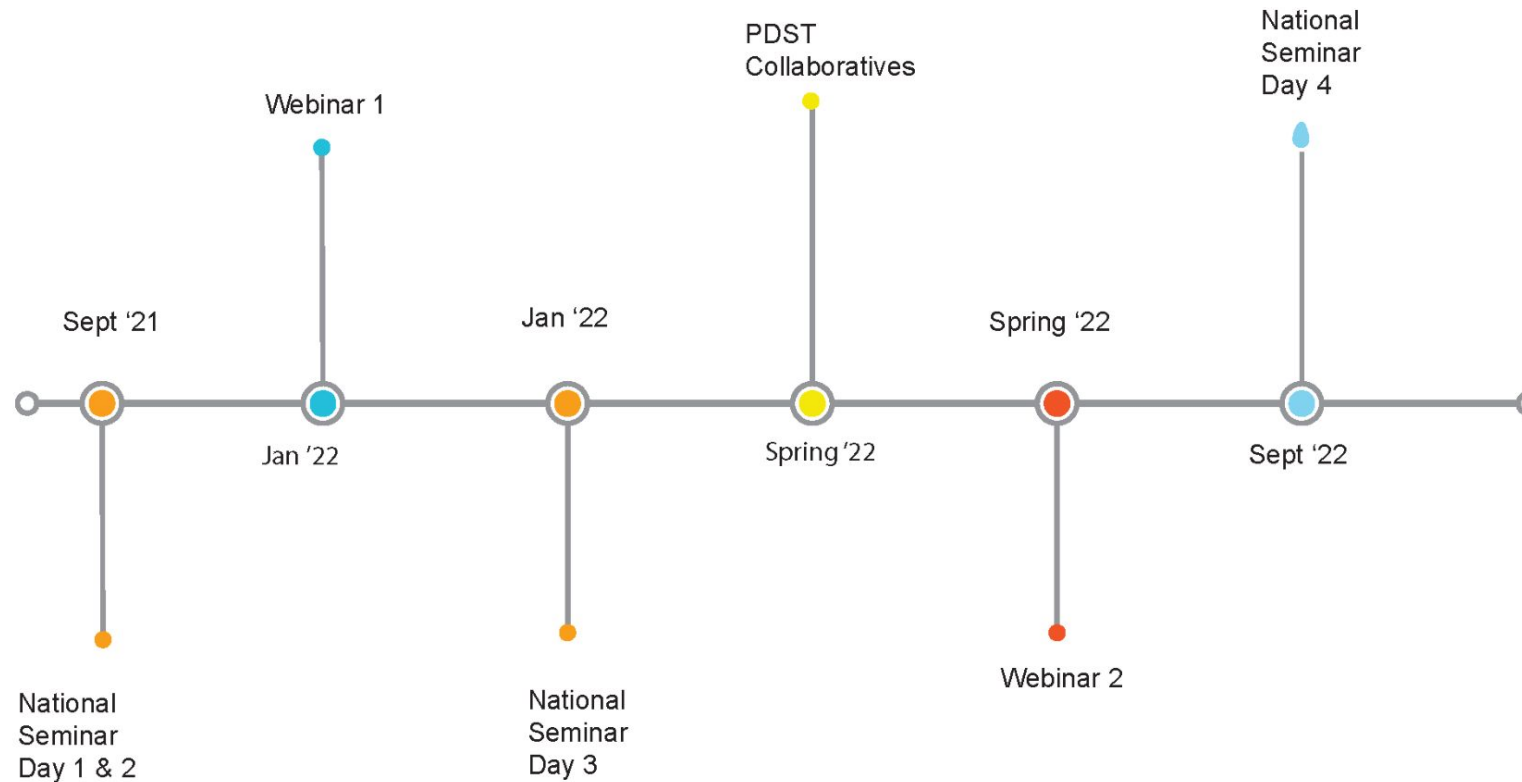
Transdisciplinary Links in the LCA Programme

Effective and engaging activities

Opportunities for Peer & Self Assessment

Success Criteria

ACTIVITY

CPD for Revised Module Descriptors

Webinar 1

PDST
Collaboratives

National
Seminar
Day 4

Sept '21

Jan '22

Spring '22

Jan '22

Spring '22

Sept '22

National
Seminar
Day 1 & 2

National
Seminar
Day 3

Webinar 2

Leaving Certificte Applied Subject Specification CPD

PDST Collaboratives

None of us is as smart as all of us

Japanese Proverb

In the past quarter century, teaching has made great strides in building professional collaboration. It is now time for this to progress into collaborative professionalism, rooted in inquiry, responsive to feedback and always up for a good argument.
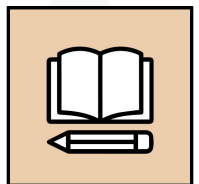
(Hargreaves & O'Connor, 2008, p. 9)

Learning is:
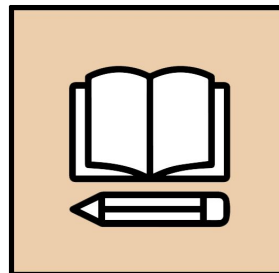
- Constructive
- Self regulated
- Situated
- Collaborative
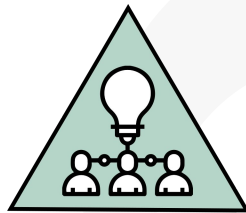
Realising our Vision for Student Learning in Mathematical Applications

Refer to your vision for student learning in Session 1.

1. What have you learned from this seminar that could support you in enacting your response to "Now what"?

2. What are the next steps required to enact your vision?

WORKBOOK

Session 3

By the end of this session participants will have:

Planned a student centred unit of learning for Travel and Recreation

Investigated the next steps in enacting your vision in your LCA Mathematical Applications class