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

LEAVING CERTIFICATE
AGRICULTURAL SCIENCE

National Seminar Day 2

Workbook

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Agricultural Science National Seminar
Session 1: 9.30 - 11.00 am

Key Messages

1. Working collaboratively with professional colleagues, engaging with a non-linear approach to planning which will help support implementation of the new specification.

2. An approach to teaching and learning which is student – centred, promotes inquiry based learning, cultivates students' critical thinking, literacy and numeracy skills in agricultural science by encouraging them to ask questions relating to the world around them and apply their learning in differentiated, collaborative, creative and innovative ways.

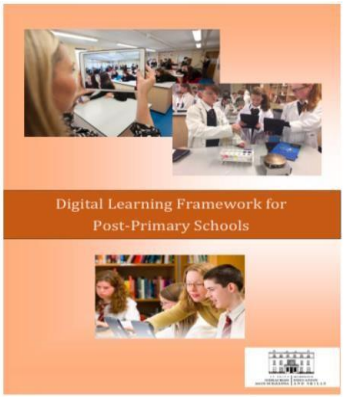
3. The use of effective questioning in the agricultural science classroom will enhance teaching, learning and assessment.

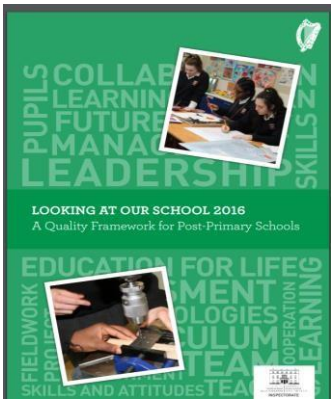
What is the Need for Change?

1. **Leaving Certificate Agricultural Science: Draft Specification (2014):** The documents on the following NCCA link provide an insight into the need for changing the agricultural science syllabus and the process behind the change to the new specification. **https://www.ncca.ie/en/senior-cycle/curriculum-developments/agricultural-science**

2. **Digital Learning Framework (DLF) 2015:** The Digital Learning Framework represents one of the key supports envisaged under the Digital Strategy for Schools 2015-2020. In implementing the Digital Learning Framework, schools and teachers are given a structure which allows them to identify where they are on the journey towards embedding digital technologies in teaching, learning and assessment, and enable them to progress in that journey.

3. **Looking at Our School (LAOS) 2016**: A Quality framework for Post-Primary Schools is designed to give a clear picture of what good or very good practices in a school look like. It will allow schools to look at their own practices and to identify what they are doing well, and what aspects of the school's work could be further developed to improve students' learning experiences and outcomes.





The New Specification Aims

Leaving Certificate Agricultural Science aims to enable students to:

- Appreciate the natural environment and human interactions with it and the sustainable use of its resources, recognising the need for a rationale and balanced approach to the exploitation of these resources in a local and global context
- Recognise the need for, and global importance of, relevant strategies and policies to promote the agri-food industry while insulating it from future challenges (e.g. climate change, novel crop and animal diseases) and identify opportunities for innovation and entrepreneurship in the context of local, regional and world markets
- Develop their scientific knowledge and skills, in the context of agricultural practices, and increase their awareness of health and safety issues associated with these practices.

(Aims, Agricultural Science Specification 2018, Page 7)

Objectives

Students should:

- Develop an ecological awareness in the context of the provision of food and non-food materials
- Recognise the impact of various agricultural practices on the environment and appreciate how the application of science and technology affects the individual, the community and the environment
- Become aware of the contribution of agriculture to the economy of the locality and the nation and its importance in EU and world contexts
- Make informed evaluations of contemporary agricultural science issues locally and globally
- Understand that the study and practice of science are primarily co-operative activities which are subject to social, economic, technological, ethical and cultural influences, and legislative and economic considerations
- Develop independent thinking, problem-solving and self-directed learning skills through active engagement in their own learning and through project work
- Understand the need for safety in conducting laboratory and field investigations.

(Objectives, Agricultural Science Specification 2018, Page 8)

Overview of the specification

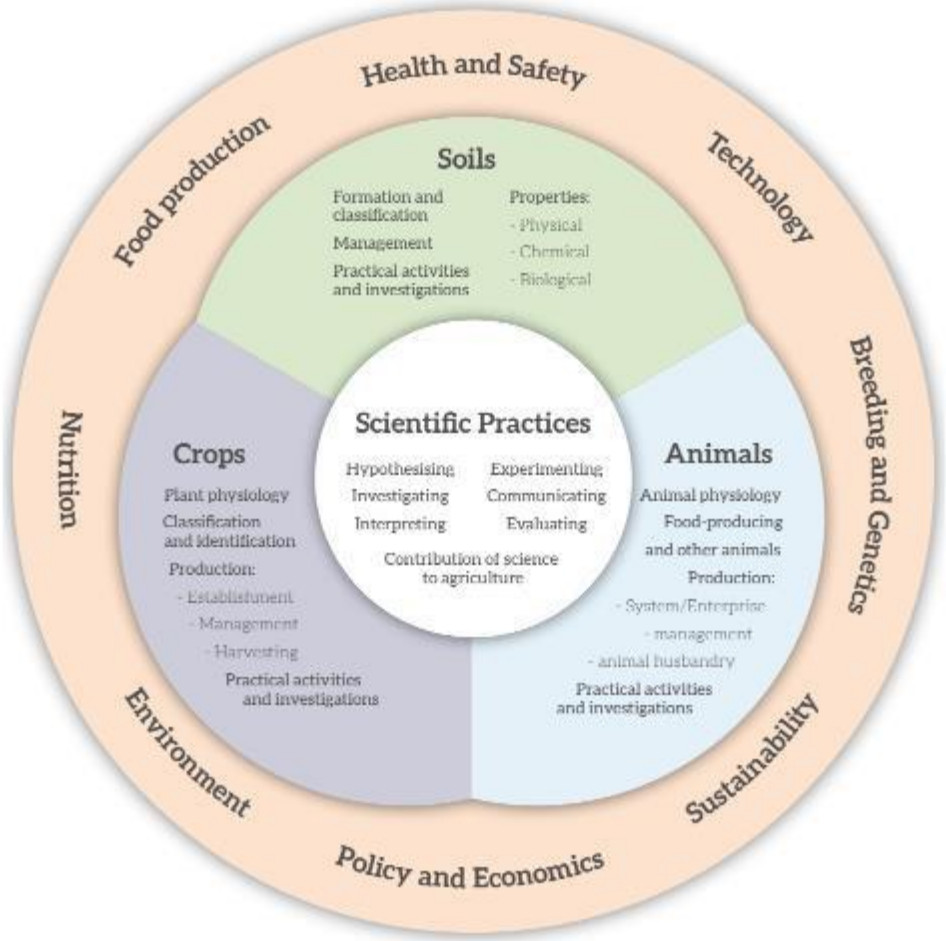


Figure 4: Structure of the specification

Session 1 Activity

Using a stimulus to promote questioning:

"One of the major problems with organ transplants is rejection. The immune system of the patient destroys the transplanted organs unless there is a very close match. Pigs have been genetically engineered in a number of ways to find out if they could be a source of organs for human transplantation".

Using the specification, what questions may arise from the above statement?

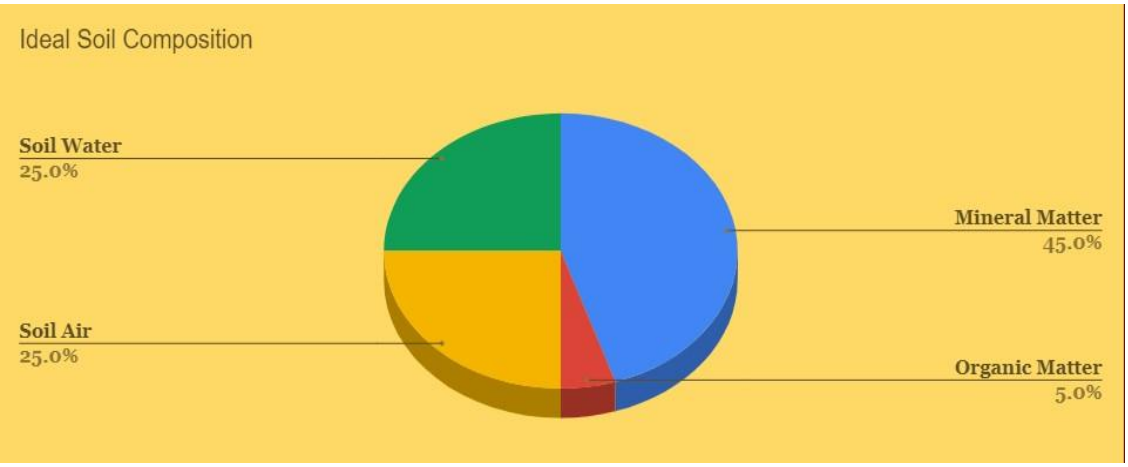
Session 1 Reflections: Think- Pair-Share

COMBINED IDEAS			
MY PARTNERS THOUGHTS/IDEAS			
MY THOUGHTS/IDEAS			
QUESTION			

Using formative assessment in my teaching & learning, what techniques would I now use?

Identifying learning outcomes:
Providing feedback that moves learning forward:
Using students as learning resources for one another:
Empowering students to take ownership of their own learning:
Other ideas you have discussed in your groups:

Activity 3 - Workshop



Calculating the organic matter in your sample:

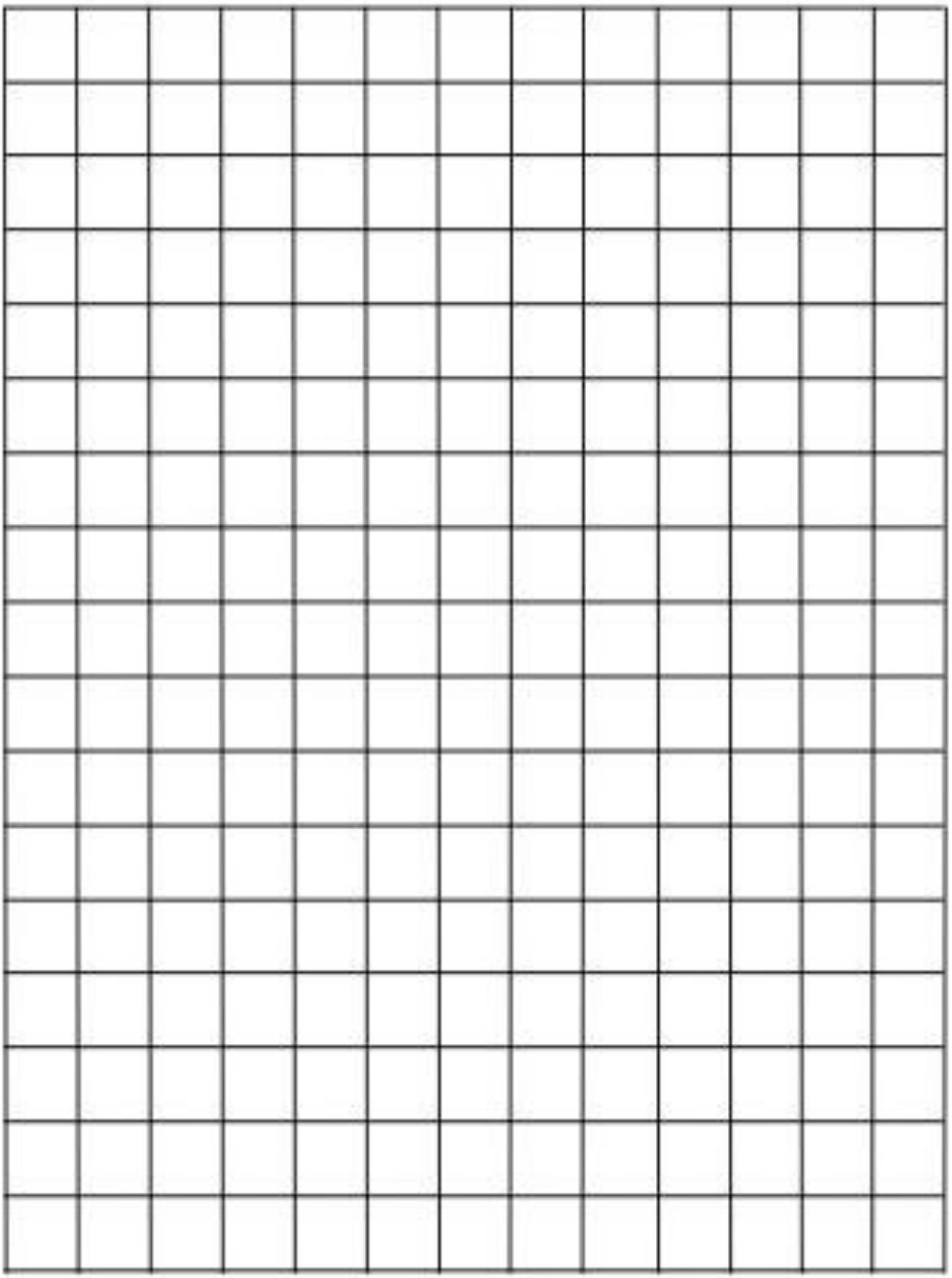
Mass of dried soil (g)	
Mass of burned soil (g)	
Calculate % OM	

Graphing Exercise – School Soil Analysis Results

Soil A		
Sample	**% Organic Matter**	**% Carbon**
Paddock 1	12.1	7.0
Paddock 2	16	9.3
Paddock 5	12.5	7.3
Paddock 7	6	5.2
Paddock 8	10.5	6.1
Paddock 10	14.5	8.4

Soil B		
Sample	**% Organic Matter**	**% Carbon**
Dominics Hill Upper	4	2.4
Dominics Hill Lower	16.5	10.1
Packers upper	10	6.5
Packers lower	8.5	5.2
Cannons upper	9.5	5.8
Cannons lower	12.5	7.6

Soil C		
Sample	**% Organic Matter**	**% Carbon**
MC 1	85	42.5
MC2	36	18
Tarpey's 1	20.5	10.3
Tarpey's 2	52	26
Tarpey's 3	64	32
Tarpey's 4	55	27.5

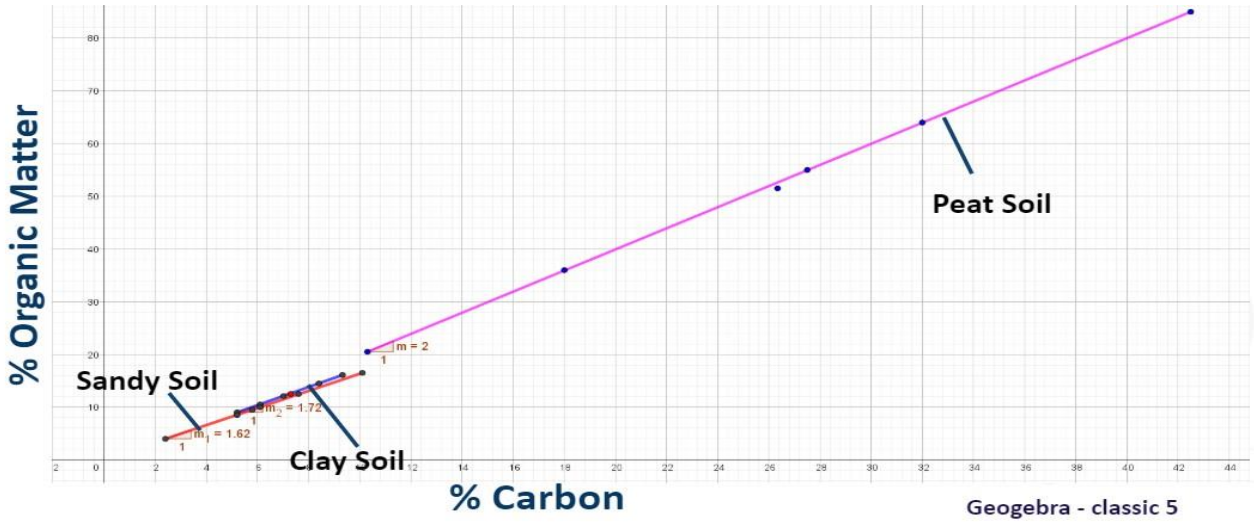


Calculations / Discussion:

Workshop Reflections:

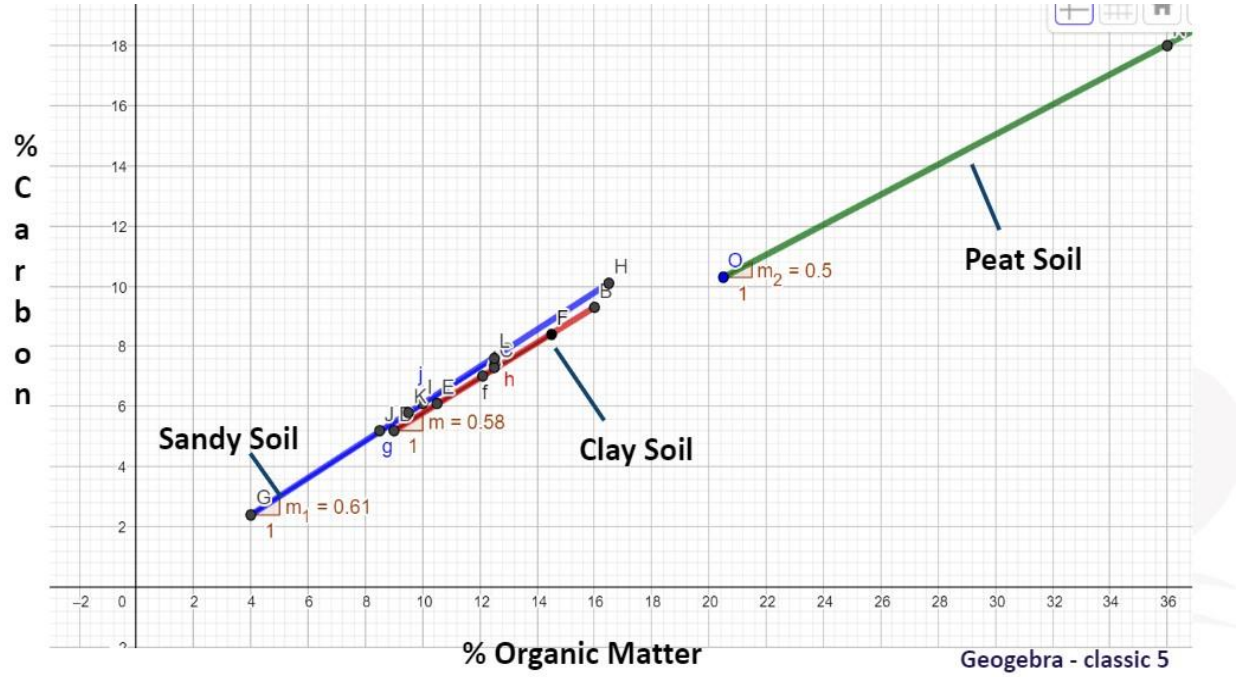
Relationship between % Carbon & % Organic Matter

% OM = 1.72 X % C



Relationship between % Organic Matter & % Carbon

% C = 0.58 X % C



Reasons for the variation in the soil organic matter conversion factor

Dr. Emil von Wolff

The Universal conversion factor of 1.72 was published after studies by a leading agricultural chemistry pioneer Dr. Emil von Wolff. Following extensive research he published this conversion factor which has been universally accepted and used.

Dr. DW Pribyl

In his review of this factor, Pribyl 2010, stated that a factor of 2.0 is more suited based on the assumption that most SOM's are closer to 50% rather than 58%.

Baize et al, 1988

In France for instance, analytical laboratories use the factor of 1.72 or 2.0. The former (i.e. 1.72) is better suited for cultivated horizons while the latter (i.e. 2.0) is more appropriate for forest top soils (Baize, 1988).

Andreas Moeller, 2010 - The Federal Institute for Geosciences and Natural Resources, Hanover.

In mineral soils the factor 0.58 (1.72) is the commonly used one. For organic rich soil (e.g. peat soil >30% organic matter) we use the factor 0.5. (2.0) Plant C is usually below 0.5. Thus, it increases with decomposition of the organic matter. Water saturation reduces decomposition.

So we have to consider the fact that SOM will vary depending on the soil type and a number various factors, therefore, a consideration of the possible variation in SOM composition predicts a range of factor values between 1.4-2.0.

DISCUSSION TASK:

1. In your groups, can you discuss which soil factors may affect the numerical factor used (1.72).

2. How could you link in the **"overarching strand" of scientific practices** into the above discussion to form meaningful lessons on topics such as evaluating evidence, hypothesising and experimenting?

Key Reflections for Session 2:

Additional Information:

Notes:

PDST

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An Roinn Oideachais agus Scileanna
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Dublin West Education Centre

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