ACE
Adult Continuing Education at UCC

ACCESS, SUCCESS AND INCLUSIVITY WITHIN THE UNIVERSITY:
THE WEST CORK DAIRY FARMERS' RPL PROJECT

Staunton, C., Gascoigne, B., Ó Tuama, S., O'Neill, S. and Buckley, E.

2017/2018

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh

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Contents

01 Foreword
02 Executive Summary
04 Introduction, Background and Objectives
13 Methodology
22 Conclusion
25 Summary
26 References
27 Appendices

Foreword

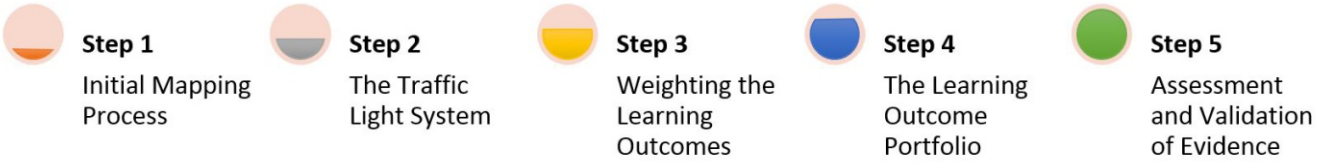
Creating an inclusive learning environment for all is at the heart of the University's mission Statement (UCC Strategic Plan 2017-2022)

The present report outlines how 18 farmers from the West of Ireland gained access to and, at the time of writing, are well on their way to successfully completing UCC's Diploma in Environmental Science and Social Policy (NFQ Level 7) through a recognition of prior learning (RPL) process. What follows is a detailed report of how the RPL method was developed and how it evolved organically to allow these farmers access a third level qualification based on the skills, competencies and knowledge they had gained outside of a formal educational setting. This process involved a close working collaboration between the Centre for Adult Continuing Education (ACE) and the Carbery Multinational Group which is headquartered at Balineen, Co Cork.

Farmers participating in the Carbery Greener Dairy Farms Project (CGDF)

Executive Summary

This report outlines a pilot project in which a group of 18 West Cork farmers were successfully granted exemptions on a full 40 out of 60 credits on UCC's Diploma in Environmental Science and Social Policy (NFQ Level 7) through a recognition of prior learning (RPL) mechanism. These farmers had gained considerable experience on farming sustainability through the Carbery Greener Dairy Farms Project (CGDF), an initiative established by Teagasc in 2012. An RPL methodology was created whereby the learning and experience achieved by the farmers was compared to the specific learning outcomes of the Diploma programme. The methodology that was created and used for the RPL purpose is described in detail in this report but can be summarised in five main steps as follows.



Essentially, this RPL project involved the identification of learning by the farmers and the recording of this learning in a form suitable for assessment. A Learning Portfolio was created which was assessed by a number of suitably qualified individuals. As a result of the method presented, the farmers were granted exemptions on 40 credits (5 modules) of the Diploma by the ACE Academic Standards Board in December 2017. This is the first time that UCC has approved a group RPL portfolio and as the 40 credits constitutes 60% of the programme it is beyond the current UCC policy recommendation of a 50% limit. At the time of writing, the farmers are completing the remaining twenty credits (three modules) of the programme in a blended learning fashion and one that adopts both an adult education ethos and teaching for understanding approach. This project has had a very powerful and positive outcome for the farmers who will graduate in Winter 2018 alongside the current UCC cohort of Diploma students. According to the Carbery Group Management, the project has added value in terms of profitability to the farmers, while at the same time minding and improving the environment. These farmers have already spread the meaning of sustainability which is now easily understood by all suppliers/farmers in West Cork. The purpose of this report is to disseminate learning from this pilot project to the wider university community and to inform development of UCC policy on RPL.

Introduction

Introduction

RPL is defined as "the process by which prior learning is given a value. It is a means by which prior learning is formally identified, assessed and acknowledged". (NQAI, 2005, p. 2)

This RPL pilot project was established by Adult Continuing Education (ACE) in December 2016 in order to provide access to a Higher Education Programme for a group of 18 West Cork Farmers who have been participating in the Carbery Greener Dairy Farms Project since 2012. The aim of this pilot project was to establish a mechanism of awarding exemptions to the farmers as a group on the basis of demonstrated learning that had occurred through their experience of participating in the Greener Dairy Farms Project prior to admission to UCC's Diploma in Environmental Science and Social Policy. This Diploma is an NFQ Level 7 two-year part-time course offered through ACE at UCC.

Recognition of Prior Learning (RPL) in Ireland

There is no separate or dedicated infrastructure for RPL in Ireland. Instead, it is practiced and largely understood in the context of education and training. Awarding bodies and institutions use RPL in relation to accessing programmes and qualifications. They evaluate prior certificated as well as prior experiential learning. In the principles and operational guidelines for the recognition of prior learning in further and higher education in Ireland (NQAI, 2005). RPL is defined as "the process by which prior learning is given a value. It is a means by which prior learning is formally identified, assessed and acknowledged" (NQAI, 2005, p.2).

The key terms associated with RPL are a) 'prior', i.e., learning already achieved; and b) 'process' i.e., the distinct stages of identification, assessment and certification. RPL encompasses all forms of prior learning, including learning acquired by following a course of study (i.e., formal learning), learning acquired outside of the formal education system which may not lead to certification (i.e., non-formal learning) and learning acquired through experience (experiential learning). The current UCC RPL policy is contained in Appendix 1. According to this policy, the process of RPL can be used to gain:

- admission to courses where a person may not have obtained the standard entry requirements;
- exemptions from course components which duplicate the learning an individual has already acquired;
- credit towards a qualification; and
- a qualification solely on the basis of prior learning.

There are different means of assessment in place for RPL depending on the type of RPL an individual wishes to gain, i.e., it can be dealt with by an admission officer who reviews previous certification and experience, or (in the case of experiential learning) **it can involve an assessment of the individual against the learning outcomes associated with the relevant unit, module, programme or qualification** (FIN Report, 2011).

The establishment of the RPL Practitioner Network Ireland in 2015 has provided an opportunity for the ongoing sharing of national practices, however no standardised national policies have been agreed. **Therefore, in the absence of set policies to capture previous formal and non-formal learning, this RPL pilot project had a dual purpose in that it set out to create a mechanism or pathway that would allow the 18 farmers to be considered as a group in order to facilitate access to the Diploma in Environmental Science and Social Policy and award exemptions to them based on the non-certified learning they acquired on the Greener Dairy Farms Project.** Recent research by Goggin, O'Leary, and Sheridan (2017) of RPL across the Irish FET sector alludes to "a sense that RPL processes would be more amenable to a cohort approach as it can be very time consuming to process claims from individuals" (p. 27).

Recognition of prior learning (RPL) in the context of the current project describes a process used to evaluate the skills and knowledge acquired by the farmers outside of the classroom (i.e. on the Greener Dairy Farms Project) for the purpose of recognising competence against a given set of standards, in this case the learning outcomes of the Diploma. In this way, RPL was recognised as a means by which the prior experience and earning of the farmers could be reasonably identified, assessed and acknowledged. It is a means by which gaps in their learning could be identified and addressed thereby creating a pathway for the farmers to complete the Diploma in a way that best matched their needs and interests.

Background of the Carbery Greener Dairy Farms Project (CGDF)

The Carbery group is a major international manufacturer of quality nutritional ingredients, flavours and natural cheeses, headquartered in Cork, Ireland. With milk suppliers at the heart of Carbery's business, the Greener Dairy Farms Project was developed by Carbery as Ireland's first model for best practice in sustainable dairy farming. CGDF is an innovative, dairy efficiency programme designed in collaboration with Teagasc to measure, monitor and optimise resource allocation and best sustainable practice on farms. The overall aim of the project was to identify as many practical means by which West Cork farmers, who supply dairy ingredients to Carbery, could improve their sustainability in the hope that it would lead to long term reductions in green-house gas emissions as well as improve the financial gains of the farmers in a measurable way. Therefore, the primary objectives were to introduce efficiencies and improve environmental sustainability on all Carbery milk supplier farms. Eighteen farmers from across four co-operatives in Bandon, Lisavaird, Drinagh and Barryroe have been taking part in the programme since its inception in 2012.

Initial Objectives of the Project

- ·Measure the carbon footprint of milk on the dairy farms and identify potential for improvement;
- Measure soil fertility on the farms and identify potential for improvement;
- Measure energy (electricity, fossil fuels) and water use on farms and identify potential for improvement;
- Measure biocide use on farms and identify potential for reduced use;
- Assess the economic sustainability of the farms and the economic implications of the various aspects of implementing improvement plans on farms;
- Implement an economic beneficial improvement plan on each farm in collaboration with Carbery milk quality and Teagasc advisor;
- Disseminate these results in the wider Carbery area;
- Investigate the possibility of developing a protocol for measuring biodiversity on farms with international collaborators.

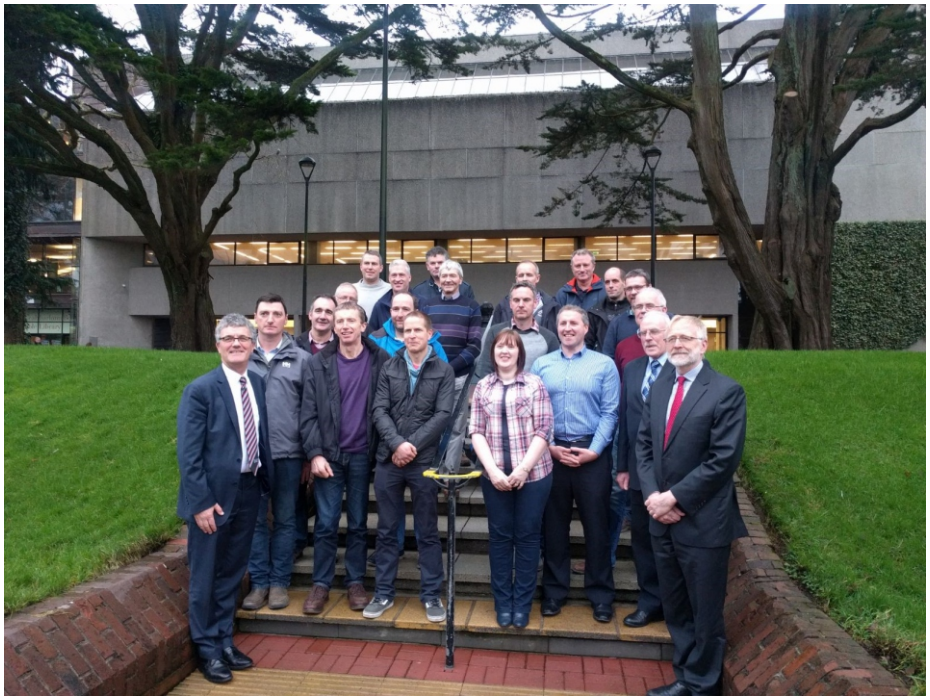
In 2012, only measurements were taken so that a 'base line' or a 'control' for comparison purposes would be set. Soil fertility was established, nutrient management plans drawn up, and profit monitors were completed. The carbon foot-print was calculated for each participant using a Carbon Trust certified model.

Throughout 2013, specialist advice was given to all farmers through a combination of one-on-one and group meetings. Individual sustainability plans were developed which identified aspects, technologies and management changes that could be carried out and would reduce the participant's carbon emissions and improve their financial bottom line.

Being part of the project allowed the volunteer farmers access to feedback of information that facilitated the reduction in energy and water use on their respective farms.

All improvements identified were disseminated to the larger farming community though a variety of communication methods including newsletters, information meetings, seminars and farm walks, in association with Teagasc and the West Cork Co-ops (Drinagh, Lisavaird, Bandon and Barryroe).

The West Cork Farmers on UCC Campus with the VP for Teaching and Learning, Prof. John O'Halloran, Course co-ordinator Belinda Gascoigne and Director of ACE, Dr Séamus O'Tuama



Sustainable milk production and efficient milk production go hand in hand. The Carbery Greener Dairy Farms scheme has shown that resource efficient farmers, those that use less energy and water and create less waste in producing milk, tend to produce higher investment returns than their less resource-efficient counterparts. Resource efficiency, therefore, is not just some nice-to-have quality. It is a leading indicator of economic performance and one that every farmer should be tracking. At farm level, sustainability involves minimising the amount of resources (e.g. electricity, feed, water etc.) used to produce a kg of milk solids, however implementing measures that enhance the environmental performance of a farm will also typically deliver economic benefits through lower costs of production as illustrated in the Carbery Greener Dairy Farms scheme.

All farmers attended the following workshops arranged specifically for the CGDF project:

- ·Carbon emissions reduction programme training in July 2013 with emphasis on " Carbon Navigator", focussing on increased efficiency and greater production from grass;
- Biodiversity workshop – June 2014. Dr. John Finn provided this one day workshop on retaining and increasing the levels of bio diversity on farms;
- Effects of stocking rate on profitability workshop – Ballineen 14th December 2015;
- Breeding, EBI and next generation herd workshop – Moorepark April 12th 2016. Breeding programmes to increase the EBI of their herds which increases the efficiency of the herd, by improving the herd fertility, thus needing less replacement stock and by increasing the production efficiency of the cow from grazed grass;
- Grassland Management and clover cultivation workshop – Darrara June 21st 2016;
- Soil Fertility Workshop – Celtic Ross Hotel October 4th 2016;
- Soil nutrient management farm walk – Aidan McCarthy's farm May 2017.

What follows are examples of some of the results of the Greener Dairy Farms Project which have led to more efficient and sustainable farming practices.

Increased number of grazing days, increased nitrogen efficiency, EBI (profit index) and more targeted manure spreading and their related carbon footprint reduction and impacts on income

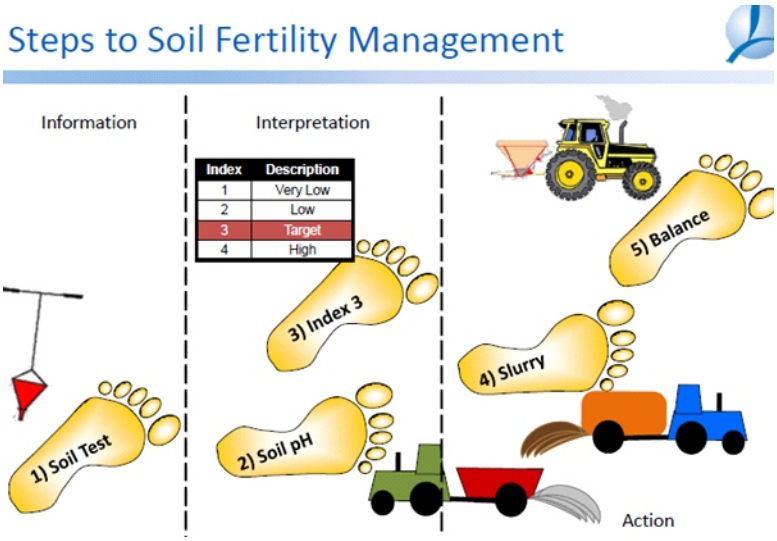
Measure	3-year targets	Footprint reduction	Income increase
Grazing season	+11 days	-1.9%	€4,445
N efficiency	+ 0.2%	-0.5%	€324
EBI	+ 14 units	-2.8%	€2,240
Manure spreading	+ 20% spring	-1.3%	€145
Total		-6.5%	€7,165

Soil Sampling and pH Levels

Soil pH levels were identified as being low across all the farms in 2012. Advice was given to the farmers in May 2013 to use lime to increase their pH levels. This resulted in the amount of lime purchased per year increasing from an average of 8 tonnes per farm in 2012 to 111 tonnes in 2013 then reducing to 57 tonnes per farm in 2014. The effect of this was an increase in the Carbon footprint of the farms from 1.16 kg CO2/kg energy corrected milk in 2012 to 1.32 kg CO2/kg energy corrected milk in 2013 reducing again from 2013 to 2014 to 1.25 kg CO2/kg energy corrected milk.

Index	Description	Morgan's P (mg/l)	Morgan's K (mg/l)
1	Very low	0-3	0-50
2	Low	3-5	51-100
3	**Target**	**5-8**	**101-150**
4	High	>8	>150

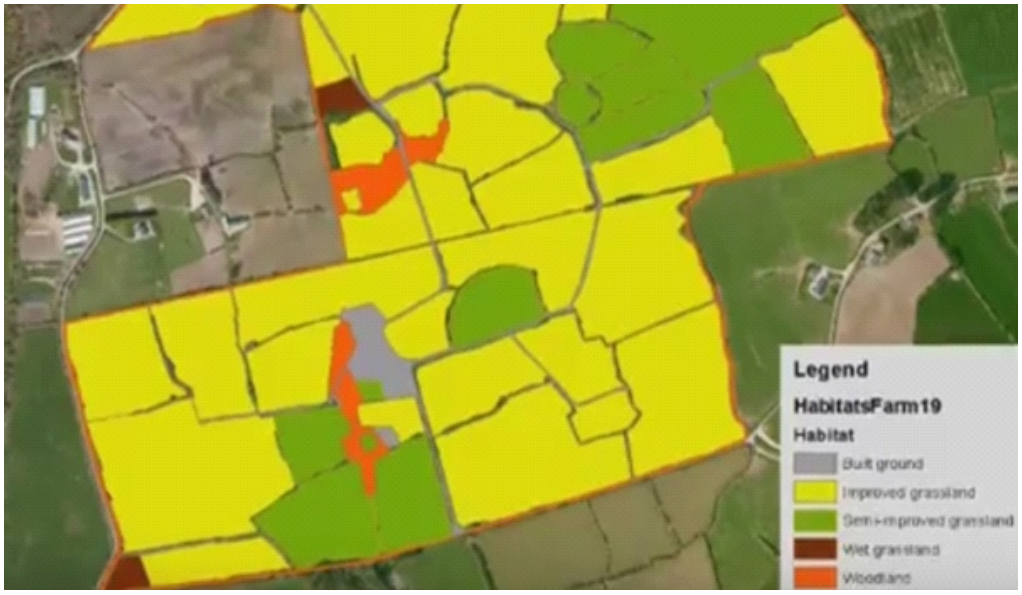
Soil Fertility



Liming the Soil

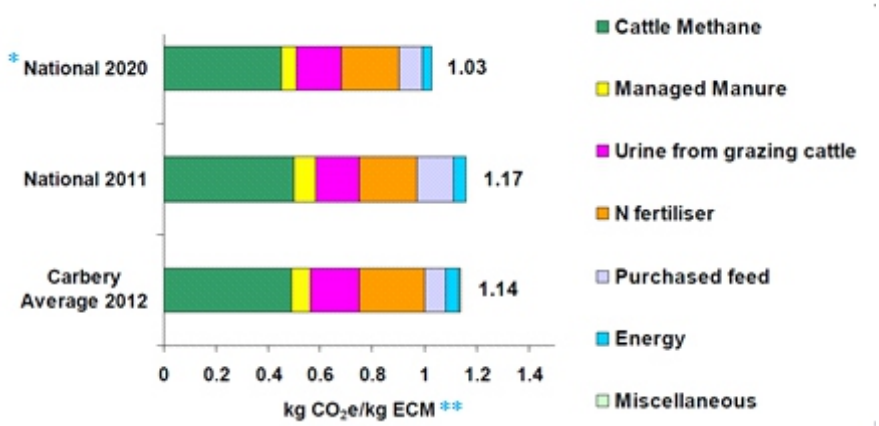
Liming based on soil testing results of Soil pH levels

Habitat Mapping



Use of Renewable Energy

Below is the summary results of the carbon navigator when applied to the group. Each farmer set targets to be reached by 2015 which he believed was achievable. The benefits were both environmentally and financially significant ranging in value from €1,276 to €10,430 and reducing green-house gas emissions from 4.4% to 16.4%.



* National 2020 carbon footprint estimate is a projected figure based on Teagasc Dairy Roadmap estimate for 2020

**Co2 e = Carbon dioxide Equivalent; ECM = Energy Corrected Milk

The influence of farm performance on the greenhouse gas emissions and carbon footprint of milk in kg of CO2-equivalent/kg of energy corrected milk (ECM)

Parameter	2012-14	2015
Carbon Footprint, kg CO_2e/kg milk	1.15	1.01
Nitrogen efficiency	21%	24%
Electricity, kWh/cow	199	187
Water heating, L water/L milk	0.16	0.13
Milk solids/ha	704	788

Some of the additional on farm benefits of efficiency and sustainability of the project can be summarised as follows:

- Every 1 day increase in grazing season length reduces carbon footprint by 0.17% per kg of milk and increases profitability by €2.70 per cow on a typical farm.
- Every 1 unit increase in EBI reduces the carbon footprint by 0.2% per kg of milk and increases profitability by €2/EBI unit increase on a typical farm.
- Every additional 100 litres of milk produced per cow through improved productivity or better use of grass is worth €35 based on a milk price of 35c/litre while also reducing methane emissions per kg of milk.
- Through the expertise of Teagasc, participants in the Carbery Greener Dairy Farms project were actively able to minimise the impact of farming on the environment and secure the long term viability of their business.

Details of additional workshops and seminars that the farmers engaged in as part the CGDF project are contained in Appendix 2.

Diploma in Environmental Science & Social Policy

The Diploma in Environmental Science and Social Policy (NFQ Level 7) offers an interdisciplinary approach to the environment and issues related, either directly or indirectly, to our use of it. The course is designed to give a broad knowledge and experience of the key concepts of environmental science, sustainable development, social policy and economics that shape the world we live in. The course consists of eight modules completed over two years as follows:

YEAR 1 MODULES

AD1871 - Environments for Living Organisms (5 credits)
AD1872 - The Physical Environment (10 credits)
AD1873 - Environmental Systems and Resources (10 credits)
AD1874 - Development and the Environment (5 credits)

YEAR 1 MODULES

AD2850 - Social Policy and the Environment (5 credits)
AD2851 - Analysing and Managing Environmental Change (10 credits)
AD2852 - Introduction to Environmental Policies (10 credits)
AD2853 - Health and Human Needs (5 credits)

After initial discussions with the sustainability consultant of Carbery Enda Buckley in December 2016, it was felt that this Diploma would be a good fit for the farmers. It was also agreed at the outset that the 18 farmers who have taken part in the Carbery Greener Dairy Farms Project would be considered as a group for the RPL process given that each member of the group had completed the same training provided by Carbery and Teagasc. They attended the same seminars, workshops and initiatives such as: Tree Planting; Water Testing; Habitat Surveying and Soil Testing.

The first step of the project was to establish a committee or RPL Team who would meet regularly in order to:

- Ensure best practice and use of RPL guidelines where available and tailor these to suit a group cohort;
- Ensure that the RPL process developed is comprehensive, transparent, consistent and fair, and conducted within a reasonable time frame;
- Ensure that sufficient quality assurance mechanisms were in place;
- Ensure that the academic standards for the outcome of the RPL process are maintained in such a way that the academic standards of awards of UCC are maintained;
- Regularly communicate updates to the Carbery Group and report to the ACE Academic Standards Board.

The RPL team comprised the following individuals:

Dr Séamus Ó Tuama, ACE Director
Dr Ciara Staunton, ACE Rep at the National RPL Network of Practitioners
Belinda Gascoigne, Course Co-Ordinator and Lecturer, Diploma in Environmental Science and Social Policy
Sinéad O'Neill, Adult & Community Education Officer, ACE
Enda Buckley, Sustainability Consultant Carbery Group
Dr Caitriona Carlin, NUIG and UL, previous external examiner of the Diploma in Environmental Science & Social Policy
Dr Laurence Shalloo, Teagasc
Keiron Phillips, Environmental Protection Agency (EPA)
Darragh Enright, Student Representative from a previous cohort of the UCC Diploma
Sinéad Treanor, Sustainability Manager, Carbery Group
Paddy Barrett, Quality Assurance Manager, Carbery Group

Methodology

Methodology

There are a number of common stages taken in any RPL Process which can be summarised as follows /

Identify/Document
Identify and record what someone knows and can do. This may be achieved with support.

Assess
Establish what someone knows or can do. This is a measurement stage.

Validate
Establish what someone knows or can do to satisfy certain requirements (points of reference, standards). A level of performance is set and requires the involvement of a third party.

Certify
Stating that what someone knows or can do satisfies certain requirements, and the award of a document to testify this. (Necessitates the involvement of an accredited authority to certify performance and level.)

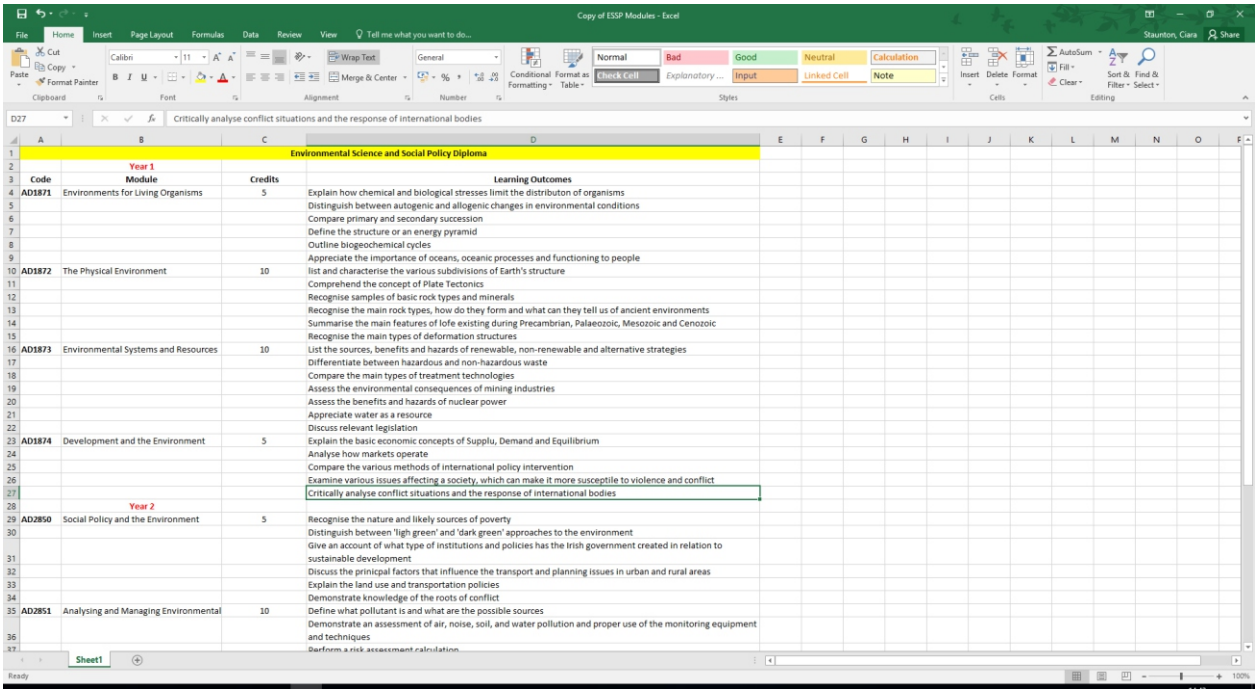
(Adapted from Expert Group on Future Skill Needs, 2011, p. 18; Werquin, 2010)

This section describes in detail the methodology that was developed and which evolved organically during the RPL process.

The common stages outlined earlier provide a good framework from which to develop an RPL process. As is normal for any RPL assessment applicants must demonstrate that they understand the theory as well as the practical learning elements of a module or modules of the programme to which they are seeking entry to or in this case to which they are seeking exemptions from. Prior learning must be evidenced in writing or through the medium appropriate to the particular learning outcomes of the module and accompanied by authentication as necessary. A number of steps were taken to achieve this as described below.

Step 1: Initial Mapping Process

The first step in this pilot project involved an "Initial Mapping Process" of the Learning Outcomes (LOs) for each module on the Diploma in Environmental Science and Social Policy against the learning achieved by the farmers on the Greener Dairy Farms Project. A simple excel file was created which listed each module of the Diploma and every associated learning outcome as follows:



	A	B	C	D
1		Environmental Science and Social Policy Diploma		
2		Year 1		
3	Code	Module	Credits	Learning Outcomes
4	AD1871	Environments for Living Organisms	5	Explain how chemical and biological stresses limit the distributon of organisms
5				Distinguish between autogenic and allogenic changes in environmental conditions
6				Compare primary and secondary succession
7				Define the structure or an energy pyramid
8				Outline biogeochemical cycles
9				Appreciate the importance of oceans, oceanic processes and functioning to people
10	AD1872	The Physical Environment	10	list and characterise the various subdivisions of Earth's structure
11				Comprehend the concept of Plate Tectonics
12				Recognise samples of basic rock types and minerals
13				Recognise the main rock types, how do they form and what can they tell us of ancient environments
14				Summarise the main features of lofe existing during Precambrian, Palaeozoic, Mesozoic and Cenozoic
15				Recognise the main types of deformation structures
16	AD1873	Environmental Systems and Resources	10	List the sources, benefits and hazards of renewable, non-renewable and alternative strategies
17				Differentiate between hazardous and non-hazardous waste
18				Compare the main types of treatment technologies
19				Assess the environmental consequences of mining industries
20				Assess the benefits and hazards of nuclear power
21				Appreciate water as a resource
22				Discuss relevant legislation
23	AD1874	Development and the Environment	5	Explain the basic economic concepts of Supplu, Demand and Equilibrium
24				Analyse how markets operate
25				Compare the various methods of international policy intervention
26				Examine various issues affecting a society, which can make it more susceptile to violence and conflict
27				Critically analyse conflict situations and the response of international bodies
28		Year 2		
29	AD2850	Social Policy and the Environment	5	Recognise the nature and likely sources of poverty
30				Distinguish between 'ligh green' and 'dark green' approaches to the environment
31				Give an account of what type of institutions and policies has the Irish government created in relation to sustainable development
32				Discuss the principal factors that influence the transport and planning issues in urban and rural areas
33				Explain the land use and transportation policies
34				Demonstrate knowledge of the roots of conflict
35	AD2851	Analysing and Managing Environmental	10	Define what pollutant is and what are the possible sources
36				Demonstrate an assessment of air, noise, soil, and water pollution and proper use of the monitoring equipment and techniques
37				Perform a risk assessment calculation

This file was sent to the Carbery Group management in order to help facilitate discussion around the work that the farmers had completed and an attempt to match that work against some or all of the learning outcomes of the Diploma modules. A visit to the Carbery Group in Ballineen by the course co-ordinator, Belinda Gascoigne helped the Carbery team to identify more clearly the extent of learning achieved for each of the Learning Outcomes. From this very early simple mapping process it was agreed that there potentially was sufficient learning by the farmers that could be suitably demonstrated against many learning outcomes on the Diploma programme. But it was also clear that a more in-depth analysis of the LOs was necessary to fully elicit the extent of demonstrable learning that had occurred by the farmers. This led to Step 2 of the process which involved a Traffic Light Colour Coded system.

Step 2: The Traffic Light System

Next a Traffic Light Colour Coded System of **Red, Orange** and **Green** was applied as a way of visually representing the work completed by the farmers against the learning outcomes of each module:

Red indicated that the learning outcome was not achieved by the farmers.

Orange indicated that the learning outcome was partly achieved.

Green indicated that the learning outcome was deemed to have been fully achieved by the farmers.

This assessment of the learning outcomes resulted in the spreadsheet as follows:.

Diploma in Environmental Science and Social Policy			
	Programme Learning Outcomes		
	Year 1		
Code	**Module**	**Credits**	**Learning Outcomes**
AD1871	Environments for Living Organisms	5	Explain how chemical and biological stresses limit the distributon of organisms
			Distinguish between autogenic and allogenic changes in environmental conditions
			Compare primary and secondary succession
			Define the structure or an energy pyramid
			Outline biogeochemical cycles
			Appreciate the importance of oceans, oceanic processes and functioning to people
AD1872	The Physical Environment	10	List and characterise the various subdivisions of Earth's structure
			Comprehend the concept of Plate Tectonics
			Recognise samples of basic rock types and minerals
			Recognise the main rock types how they form and what they can tell us of ancient environments
			Summarise the main features of life existing during Precambrian, Palaeozoic, Mesozoic and Cenozoic
			Recognise the main types of deformation structures
AD1873	Environmental Systems and Resource	10	List the sources, benefits and hazards of renewable, non-renewable and alternative strategies
			Differentiate between hazardous and non-haz waste
			Compare the main types of treatment technologies
			Assess the environmental consequences of mining industries
			Assess the benefits and hazards of nuclear power
			Appreciate water as a resource
			Discuss relevant legislation
AD1874	Development and the Environment	5	Explain the basic economic concepts of Supply, Demand and Equilibrium
			Analyse how markets operate
			Compare the various methods of international policy intervention
			Examine various issues affecting a society, which can make it more susceptile to violence and conflict
			Critically analyse conflict situations and the response of international bodies
	Year 2		
AD2850	Social Policy and the Environment	5	Recognise the nature and likely sources of poverty
			Distinguish between 'light green' and 'dark green' approaches to the environment
			Give an account of what type of institutions and policies has the Irish government created in relation to sustainable development
			Discuss the prinicpal factors that influence the transport and planning issues in urban and rural areas
			Explain the land use and transportation policies
			Demonstrate knowledge of the roots of conflict
AD2851	Analysing and Managing Environment	10	Define what pollutant is and what are the possible sources
			Demonstrate an assessment of air, noise, soil, and water pollution and proper use of the monitoring equipment and techniques
			Perform a risk assessment calculation
			Outline the optimum ways of rehabilitating contaminated sites
			Identify the stages of conducting an Environmental Impact Assessment
			Recognise the different types of environmental mitigation and the hierarchy of individual mitigation measures
AD2852	Introduction to Environemental Polici	10	Outline the government policy regarding the renewable sources of energy
			Interpret the statuory procedures applicable to renewable erergy and waste management projects
			Identify , using an example, the impact of local legislation/National legislation/European legislation
			Identify the principle steps associated with implementing ISO 14001:2004 and EMAS
			Demonstrate knowledge of the principles of sustainability
AD2853	Health and Human Needs	5	Recognise the benefits associated with an improved energy rating of buildings
			Examine the benefits and hazards of using genetically modified products, organic gardening
			Discuss relevant legislation
			Recognise the health effects of radon exposure, and how we can protect outselves from it
			Evaluate the main effects AIDS has on economic development

What was evident from this traffic light analysis was that there were plenty of learning outcomes deemed to be Green or Orange which indicated that there was quite a good match between the work the farmers had completed on the Greener Dairy Farms Project and the LO's of the Diploma in Environmental Science and Social Policy. As can also be seen from the spreadsheet very few learning outcomes were colour coded Red, indicating that the learning was not deemed to have been achieved by the farmers.

Upon further analysis of the Learning Outcomes that were awarded an Orange colour code and discussion with the Carbery team, it was felt that some of these LOs were closer to being fully achieved than others. Therefore a more refined analysis was necessary. This led to Step 3 in the process which involved a re-ordering of the learning outcomes and assigning a percentage weighting to them as described next.

Step 3: Weighting the Learning Outcomes

This step involved assigning a percentage weighting to the learning outcomes which took into consideration their relative importance to the overall module. For example, the learning outcomes for each module were re-ordered and each one assigned a percentage weighting by the course co-ordinator. As can be seen in the table overleaf, there were six learning outcomes for the module AD1871. These were re-ordered and then the first LO which was "Outline biochemical cycles" was assigned a weighting of 25% compared to the final LO "Define the structure or an energy pyramid" which was assigned a percentage weighting of just 10%. In this way, full completion of all of the LOs in any one module would equate to 100% complete. This procedure allowed for a more refined analysis of the LO's. The traffic light system was then re-applied to the LO's with the orange colour having three distinct bands associated with it as follows:

Red - 0% achieved
Orange - 25%, 50% or 75% achieved
Green - 100% achieved

This analysis produced the tables overleaf which indicated in percentage terms the proportion of the module which was deemed to have been successfully completed by the farmers. For example, as can be seen in the Year 1 Table, for the Module AD1871, it was found that 72.5% of the learning outcomes were successfully completed. This naturally led to a discussion on the threshold values needed in order to state that the farmers had fully satisfied the learning of the modules.

While the RPL team initially proceeded cautiously by agreeing a 70% threshold, this was subsequently revised to a much lower 40%. This was based on the reality that for traditional students who complete the Diploma programme within the University the Marks and Standards stipulate a 40% pass standard for each module. Therefore, why would we create a dual standard whereby the level of expectation for the farmers would far exceed that of the traditional student? It was agreed by the RPL team that the benchmark would be 40%. Interestingly, what can be seen clearly from the two tables below is that is a clear delineation between those modules which are achieved and those which are not. For example, in Year 1, there are three modules in which over 70% of the Learning Outcomes are deemed to have been achieved indicating that they are in fact well achieved by the farmers and only one module (AD1072) whereby only 10% of the Learning Outcomes were deemed to have been achieved suggesting that full completion of this module would be necessary by the farmers.

Weighted Learning Outcomes					
Module		**Learning Outcome**	**Weighting**	**Achieved**	**Complete**
AD 1871	1	Outline biogeochemical cycles	25	12.5	50%
	2	Explain how chemical and biological stresses limit the distribution of organisms	20	20	
	3	Distinguish between autogenic and allogenic changes in environmental conditions	20	20	
	4	Appreciate the importance of oceans, oceanic processes and functioning to people	15	0	
	5	Compare primary and secondary succession	10	10	
	6	Define the structure or an energy pyramid	10	10	
		Module Total	100	72.5	
AD 1872	1	List and characterise the various subdivisions of Earth's structure	25	0	
	2	Recognise samples of basic rock types and minerals	20	10	50%
	3	Comprehend the concept of Plate Tectonics	20	0	
	4	Recognise the main rock types how they form and what they can tell us of ancient environment	15	0	
	5	Recognise the main types of deformation structures	10	0	
	6	Summarise the main features of life existing during Precambrian, Palaeozoic, Mesozoic and Cer	10	0	
			100	10	
		Module Total			
AD1873	1	Appreciate water as a resource	20	20	
	2	Discuss relevant legislation	15	15	
	3	List the sources, benefits and hazards of renewable, non-renewable and alternative energies	15	15	
	4	Differentiate between hazardous and non-haz waste	15	15	
	5	Compare the main types of treatment technologies	15	7.5	50%
	6	Assess the environmental consequences of mining industries (slurry spill, gorse fires, etc)	10	0	
	7	Assess the benefits and hazards of nuclear power (wind, wave, solar)	10	0	
			100	72.5	
		Module Total			
AD 1874	1	Explain the basic economic concepts of Supply, Demand and Equilibrium	25	25	
	2	Analyse how markets operate	25	25	
	3	Compare the various methods of international policy intervention	25	25	
	4	Examine various issues affecting a society, which can make it more susceptible to violence and	15	0	
	5	Critically analyse conflict situations and the response of international bodies	10	0	
			100	75	
		Year 1 Total		**58%**	

Weighted Learning Outcomes					
Module		**Learning Outcome**	**Weightin**	**Achieved**	**Complete**
AD 2850	1	Give an account of what type of institutions and policies has the Irish government created in	25	18.75	75%
	2	Discuss the principal factors that influence the transport and planning issues in urban and ru	20	0	
	3	Explain the land use and transportation policies	15	0	
	4	Demonstrate knowledge of the roots of conflict	15	0	
	5	Recognise the nature and likely sources of poverty	15	0	
	6	Distinguish between 'light green' and 'dark green' approaches to the environment	10	5	50%
			100	23.75	
		Module Total			
AD 2851	1	Identify the stages of conducting an Environmental Impact Assessment	25	0	
	2	Define what pollutant is and what are the possible sources	25	25	
	3	Demonstrate an assessment of air, noise, soil, and water pollution and proper use of the mc	20	20	
	4	Perform a risk assessment calculation	15	15	
	5	Recognise the different types of environmental mitigation and the hierarchy of individual m	10	10	
	6	Outline the optimum ways of rehabilitating contaminated sites	5	0	
			100	70	
		Module Total			
AD 2852	1	Demonstrate knowledge of the principles of sustainability	30	30	
	2	Identify, using an example, the impact of local legislation/National legislation/European leg	20	20	
	3	Interpret the statutory procedures applicable to renewable energy and waste management	20	15	75%
	4	Outline the government policy regarding the renewable sources of energy	20	10	
	5	Identify the principle steps associated with implementing ISO 14001:2004 and EMAS	10	0	
		Module Total	100	75	
AD 2853	1	Examine the benefits and hazards of using genetically modified products, organic gardening	35	0	
	2	Discuss relevant legislation	25	12.5	50%
	3	Recognise the benefits associated with an improved energy rating of buildings	20	15	75%
	4	Recognise the health effects of radon exposure, and how we can protect ourselves from it	15	0	
	5	Evaluate the main effects AIDS has on economic development (Avian Flu etc)	5	0	
		Module Total	100	27.5	
		Year 2 Total		**49%**	

Overall, as a result of having mapped the learning outcomes in terms of weightings, key skills and required competencies across the programme, it was found that the farming cohort met 58% of the learning outcomes in Year 1 modules overall and 49% of learning outcomes in Year 2 modules overall. Or put another way, through their participation on the Greer Dairy Farms Project, the farmers appeared to have completed the equivalent of three of the Year 1 modules and two of the Year 2 modules. The next stage of the process involved capturing the evidence to support this analysis. For this purpose a Learning Outcome Portfolio was developed which is described in Step 4.

Step 4: The Learning Outcome Portfolio

A simple one-page template was devised in which the following information would be captured:

- The Module Code;
- Learning Outcome Number and Description;
- Description of how the Learning Outcome was achieved by the farmers; and
- Any supporting documentation, reports, certification etc that would provide additional evidence to support the learning achieved.

An example of a completed learning outcome is provided below. The full Learning Outcome Portfolio is provided in Appendix 3.

Module: AD1871 Environments for Living Organisms (5 Credits)

Learning Outcome 1 Outline Biogeochemical Cycles

Please describe how this learning outcome was achieved.

Through the Greener Dairy Farms Program, the farmers learnt the following:

- How the lack of nutrients in soil could inhibit the growth of organisms through a deeper study of the importance of fertiliser and slurry in helping the growth of crops, as well as soil preservation. They also learnt how to maximise the beneficial effects of fertiliser and slurry, for example, by studying the ideal times that slurry and fertiliser should be spread, and how to preserve soil quality, e.g. minimising of soil poaching;
- How unsuitable soil pH could limit the distribution of crops on their farms and also how to improve their soil pH through the use of lime;
- About the make-up of their farm's silage through participating in a silage analysis. Silage pH, Protein content, dry matter digestibility (DMD) and other soil properties which were all measured thus contributing to how these properties are relevant to the health of livestock e.g. if DMD of silage was below 60% the silage would struggle to sustain healthy livestock herds. Farmers received expert advice from Carbery on formulating diets for their livestock based on any silage deficiencies;
- About the importance of organisms on the atmosphere by studying Nitrogen Fixing Organisms in the ecosystem (Clover);
- Edaphic factors – the mapping of soil types along with mapping of biodiversity helped to highlight the influence of soil diversity on the distribution of organisms, and the influence of organisms on the types of soil. The importance and value of soil was studied and factors causing soil erosion were examined with its implications for plant life;
- How edaphic factors such as soil p.H., or soil Potassium or Phosphorus content, could affect soil fertility. Farmers learnt how to control such methods e.g. using lime to improve soil p.H. so as to help the spread of crops.

Step 5: Assessment and Validation of Evidence

This step involved assessing the evidence provided by the Carbery Management Team in the Learning Outcome Portfolio. A number of criteria must be met when assessing this evidence of learning (as per the UCC Policy, 2010, Appendix 2).

- **Validity/Relevance:** Does the prior learning presented clearly correlate with the learning outcomes required for the programme/module?
- **Level:** Is the learning at the academic level required for the award? Does it meet the appropriate level descriptors in the NFQ? Is it equivalent to the standard expected of other students?
- **Currency:** How long has it been since the learning was acquired? Is it up to date with current knowledge and practice? Have there been any significant developments since the learning was acquired that might undermine its adequacy?
- **Sufficiency:** Is there enough evidence to demonstrate that the learning outcomes have been achieved?
- **Authenticity:** Is it clear that the prior learning is that of the applicant? Can it be verified?

In order to achieve these requirements a systematic review of the learning outcome portfolio was conducted independently by a number of people. The portfolio was examined by Dr Caitriona Carlin, a previous external examiner of the Diploma in Environmental Science and Social Policy; Dr. Laurence Shalloo of Teagasc; Keiron Phillips of the Environmental Protection Agency; Belinda Gascoigne, Co-ordinator of the Diploma in Environmental Science and Social Policy and Darragh Enright, a student representative from a previous cohort of the UCC Diploma. Written feedback was provided by each of these individuals regarding their review of the Learning Outcome Portfolio which is contained in full in Appendix 4. All individuals were fully satisfied that the evidence presented sufficiently met all of the criteria outlined above. For example, according to Dr Caitriona Carlin: **"Overall the team have done a huge deal of work in putting together the LO documentation. There are some that have very good examples of evidence – i.e. the habitat mapping."**

Dr. Laurence Shalloo of Teagasc indicated that the farmer cohort satisfied the learning outcomes identified through the evidence templates especially in the following areas:

- Nutrient management driven by soil tests and planned nutrient advice to maximise nutrient efficiencies;
- Business planning and budgeting through a number of case studies;
- Benchmarking through in depth evaluation of the profit monitor over time and across farms;
- Evaluating carbon footprints of the farms and understanding the factors driving the footprints;
- Evaluating energy demand and benchmarking across farms and between years;
- Evaluating water footprints and benchmarking across farms and between years;
- Bull selection including the active bull list, cross breeding and the next generation herd;
- Biodiversity mapping and evaluating the options to increase the biodiversity status of the farms.

Keiron Philips of the Environmental Protection Agency (EPA) stated that he: **"...found the (LO) content to be extremely detailed covering a wide range of scientific, sociological and economic disciplines, with a combination of material that is directly familiar to students with an agriculture background."**

The student representative Daragh Enright stated that he **"...believed that the achieved learning outcomes for the module was a fair reflection of what was covered in the course."**

Summary of Learning Outcome Assessment

Module	Credits	No. LO's	LO's achieved	% Achieved
AD 1871	5	6	4.5	72.50%
AD 1872	10	6	0.5	10%
AD 1873	10	7	4.5	72.50%
AD 1874	5	5	3	75%
AD 2850	5	6	1.25	23.75%
AD 2851	10	6	4	70%
AD 2852	10	5	4	75%
AD 2853	5	5	1.25	27.50%

As can be seen from the table above, based on the initial mapping process, the traffic light system, the weighting analysis of Learning Outcomes and the assessment of the Learning Outcome Portfolio, it was agreed by the RPL team that there was sufficient evidence to suggest that the farmers had successfully completed five out of a total 8 modules, or 40 out of 60 credits of the Diploma programme.

As a result of the above RPL methodology, it was agreed that an exemption of 40 credits from the 60 Credit Diploma Programme would be requested for approval by the ACE Academic Standards Board at UCC. These modules were both Year 1 and Year 2 modules. The modules that were deemed to have been insufficiently completed included one Year 1 10 credit module and two Year 2 five credit modules.

The ACE Academic Standards Board approved this request in December 2017. This was the first time that UCC has approved a group RPL portfolio and as the 40 credits constitutes 60% of the programme it is beyond the current UCC policy recommendation of a 50% limit. However it was agreed at the Board meeting that the current UCC policy which stems from 2010 is in need to updating and that this pilot project provided a good opportunity to test the policy and perhaps inform future revisions to the policy.

A cost-based analysis of the RPL project was conducted by the ACE finance manager and a price agreed to charge the farmers for entry to and completion of the Diploma. This costing is provided in Appendix 4. Subsequently the farmers were all registered onto the Diploma.

programme and at the time of writing they are completing the remaining 20 credits of the course. Minor changes to the assessment of the modules were successfully awarded by ACE ASB which benefited both student cohorts, i.e. the farmers as well as the UCC students.

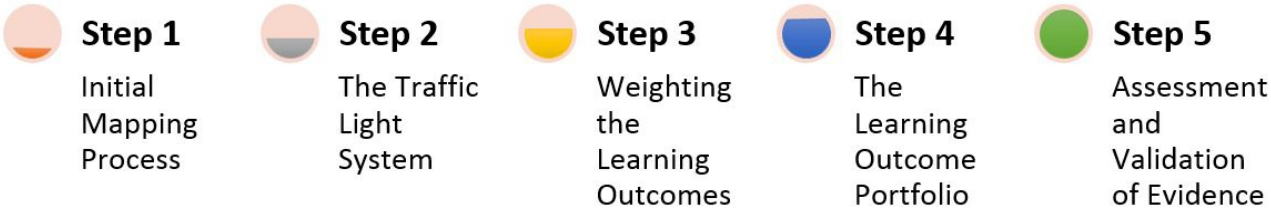
In order to achieve the remaining 20 credits of the programme 96 contact hours have been delivered to the farmers. This has involved the use of Panopto recorded lectures, several half day workshops in UCC and fieldtrips.

Conclusion

Conclusion

This Pilot Project is the first of its kind in UCC in which a group of 18 West Cork farmers have been successfully awarded exemptions for 40 credits of a 60 credit NFQ Level 7 Diploma Programme. Through their participation in the Carbery Greener Dairy Farms Project (CGDF), these farmers had achieved learning, competencies, experience and skills that were mapped through an RPL process against the Learning Outcomes of UCC's Diploma in Environmental Science and Social Policy.

The aim of this project was to create an RPL method that could be applied to the farmers as a group rather than each of them applying individually to the University which would be standard RPL practice. As such, this was a test case. This report has described the process and method that was established in full. Essentially there were five Steps which developed organically in the RPL Process.



RPL initially involves the identification of learning and the recording of this learning in a form suitable for assessment. This was achieved through Steps 1 – 3 of the current methodology. Initial results from the mapping process in Step 1 indicated that there was sufficient overlap between the initiatives that the farmers were engaged in on the CGDF project and the learning outcomes of the modules of the Diploma Programme. The traffic Light System outlined in Step 2 provided a visual representation of every learning outcome for each module and indicated whether the learning outcome was fully achieved, partially achieved or not at all achieved by the farmers. A more sophisticated analysis which involved a percentage weighting being applied to the learning outcomes was described in Step 3. As a result of this analysis, it could be seen that that the farmers had successfully achieved 58% of the learning outcomes in Year 1 modules and 49% of the learning outcomes in Year 2 modules overall.

The next stage in a standard RPL process is the assessment of the candidate's prior learning. A number of approaches can be used to achieve this including a review of documentary evidence, interview, or demonstration (Goggin, O'Leary, Sheridan, 2017). For the purposes of the present project which considered all 18 farmers collectively as a group, a Learning Outcome Portfolio was created as described in Step 4 of the methodology. This portfolio contained a detailed description of evidence as to how the farmers had achieved specific learning outcomes. As such it was an evidenced-based document.

Validation is the next stage of an RPL process and involves the use of particular references points or standards. This stage is captured in Step 5 of our methodology which involved the assessment of the evidence based portfolio by several individuals including the previous External Examiner of the Diploma programme and a student representative of the course. It was extremely useful to have the views of the student representative in order to ensure fairness and transparency across the process. The portfolio document was also reviewed by representatives of Teagasc, the Environmental Protection Agency and Management of the Carbery Group. All indicated their approval that the evidence supplied was sufficient to merit the learning outcomes being deemed as “completed”.

Finally, validation is followed by certification which is the award of a formal qualification following the identification/documentation and assessment of the learning. Certification normally involves a recognised awarding body (CEDEFOP, 2016). In this instance, exemptions were sought on behalf of the farmers for 40 out of the 60 credits of the Diploma in Environmental Science and Social Policy. This request was approved by the ACE Academic Standards Board in December 2017. As a result of this approval, the farmers were individually registered for the remaining 20 credits of the programme and began the course in January 2018. A total of 96 contact hours is being rolled out to the farmers. They have reported that they are enjoying the learning on the course immensely and especially enjoyed the half day seminars on the main UCC campus. Lectures are also delivered off-site at Dararra Agricultural College in Clonakilty through the use of Panopto. A number of fieldtrips have also taken place. In accordance with the Book of Modules they will complete the same assessments and exams as the UCC cohort of students.

The farmers attended lectures on the UCC main campus

On June 5th 2018, the group visited one of the Carbery farms near Dunmanway, Co. Cork where along with UCC Geologist, Dr. Ed Jarvis of BEES they undertook a fieldtrip investigating both the geology of the area and the impact that it has on soil nutrients, water flow and soil structure

Summary & References

Summary

In summary, this pilot project has incentivised farmers in West Cork to consolidate their learning from the Greener Dairy Farms initiative by completing the Diploma in Environmental Science and Social Policy.

Through the RPL process, UCC has been able to highlight and validate the tremendous work that the farmers have completed in making their farms both more sustainable and profitable. Key achievements in their farming careers are now certified in an NFQ Level 7 programme. By developing a transparent and strong RPL methodology, the academic standards and rigour of the Diploma course has been maintained. It was important to the RPL team from the outset that the farming cohort and the conventional student cohort in UCC both remained happy with the process and the outcome.

There are plans by Carbery to extend their Greener Dairy Farms programme to all farm suppliers in the future and to distribute best advice to suppliers based on their findings. This means that there are future cohorts of farmers who can now access UCC's Diploma in Environmental Science and Social Policy through the RPL Method established here. It has been a cost effective project in that regard as the investment in getting the methodology established and approved means it can be used for each subsequent cohort of farmers with little additional work. Overall, this project has achieved access, success and inclusion in the University sector for 18 West Cork Farmers.

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Appendices

Appendix 1

UCC's Recognition of Prior Learning (RPL) Policy 2010

Appendix 2

Details of the Carbery Greener Dairy Farms Project

Appendix 3

Learning Outcome Portfolio

Appendix 4

Assessors' Feedback provided on the Learning Outcome Portfolio

Appendix 5

Pricing on 60 Credit Diploma (including RPL component) for Carbery Group

Appendix 1

UCC's Recognition of Prior Learning (RPL) Policy 2010

A) INTRODUCTION

Government policy in Ireland has increasingly aspired to widening opportunity for lifelong learning with emphasis on social inclusion, equity of access to higher education, wider participation and partnerships with community, educational and business organizations. Consequently education providers, including higher education, must acknowledge the significance of learning obtained in a breadth of contexts prior to admission and formulate policies to enable formal recognition of such learning.

The aim of this policy document is to provide a coherent framework for the recognition of prior learning in University College Cork.

Recognition of Prior Learning (RPL) is a process that allows students to gain admission to a programme of study or to gain exemptions/credit from some parts of a programme, based on demonstrated learning achieved prior to admission. UCC recognises that knowledge and skills can be acquired from a range of learning experiences. The policy provides opportunities for access, transfer and progression to education and training at third level. While flexibility in structures and increased opportunities for entry to UCC programmes and transfer between programmes (intra and inter institutionally) are central to the principles of RPL, it is essential that academic standards for all programmes are maintained.

B) CONTEXT

This policy has been developed in the context of the National Skills Strategy and has been formulated in accordance with the following:

- HEA. National Plan for Equity of Access to Education 2008-2013. In its recently published 5 year plan the National Office for Equity of Access has the stated policy objective of progressing 'the lifelong learning agenda through the development of a broader range of entry routes' and explicitly commits to 'support the development and implementation of a national action plan for the recognition of prior learning.' (HEA, 2008, 13, 48.)
- NQAI Principles and Operational Guidelines for the implementation of a national approach to credit in Irish Education and training (NQAI, 2004, 23).
- OECD. Thematic review and collaborative policy analysis recognition of non-formal and informal learning: Ireland. Recommendations contained in the OECD report of the review visit to Ireland in February 2008: 'From a lifelong learning perspective, broad provision of RPL would be logical so that a wide array of citizens can use RPL as an instrument to access education [and] to measure their existing skills, knowledge and competences.' (OECD, 2008. 65).

Recognition of Prior Learning (RPL) is an important element of EU policy for widening access to qualifications and supporting lifelong learning. The Irish Government has made a commitment to support RPL .

C) DEFINITIONS

Prior learning is learning which has taken place prior to admission to a programme. Such learning can be certified or experiential.

Recognition of Prior Certified Learning (RPCL) is a process of formal acknowledgement of formal (certified) learning that has taken place and has been recognised prior to student enrolling on a programme. It may support the applicant's application for admission to a programme or allow for exemptions from some parts of a programme.

3. Assessment Principles

3.1 Specific RPL procedures shall be put in place by individual programmes and modules at the design stage and if implemented, post-programme approval shall be approved by College Council in accordance with College procedures.

3.2 As part of the assessment for RPL applicants must demonstrate that they understand the theory as well as the practical learning elements of the module.

3.3. In seeking recognition under RPL prior learning must be evidenced in writing or through the medium appropriate to the particular learning outcomes of the module and accompanied by authentication as necessary.

3.4. For RPL the learning outcomes refers to learner's knowledge, understanding, skills and/or competences, i.e. what the learner knows and can do to the required standard as a result of prior learning.

3.5 Recognition will normally be given:

- For complete modules only;
- Where all of the learning outcomes of a module have been achieved;
- It is at the discretion of each programme to determine the proportion of credit which may be awarded at each stage of study up to a maximum of 50% of the total credits available for the programme overall. There is no requirement that credit is granted at any stage of a programme and, in particular, programme co-ordinators shall be mindful of professional and statutory body requirements and the appropriateness of awarding RPL in the final year.

Candidates will normally be entitled to apply for exemption for entire modules only, not parts of them. Exceptionally, when the module is composed of clearly distinguishable and distinct parts, for example theory + practical components, exemptions from a component may be permitted with the approval of the College Council in accordance with agreed College procedures.

3.6 Credit gained by RPL cannot be double-counted for purposes of second qualification at the same level.

3.7 The applicant is responsible for submitting relevant evidence in accordance with appropriate programme-specific guidelines. An applicant who is admitted via RPL and is found to have submitted false or misleading evidence is in breach of the University regulations. False or misleading evidence is a disciplinary matter and in all cases will be referred to the Student Discipline Committee.

3.8 Upon a submission of RPL application and relevant evidence, the applicant will be given feedback on the judgement and may be permitted to re-submit on one subsequent occasion.

3.9 The student record entry in respect of RPL is undertaken within the Student Records and Examination Office upon notification by the Examination Board.

4. Assessment Criteria

The following key criteria will be used by staff to help them to determine if the evidence of learning presented is appropriate and sufficient.

4.1 Validity - Does the prior learning presented match the learning outcomes required by the relevant module? Is the prior learning being presented by the applicant at the academic level required.

4.2 Sufficiency - Is there sufficient evidence to demonstrate that the learning outcomes have been achieved?

3. Assessment Principles

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4.1 Validity - Does the prior learning presented match the learning outcomes required by the relevant module? Is the prior learning being presented by the applicant at the academic level required.

4.2 Sufficiency - Is there sufficient evidence to demonstrate that the learning outcomes have been achieved?

4.3 Authenticity - Can it be verified that the prior learning is that of the applicant?

4.4 Reliability Is the evidence of prior learning presented reliable?

4.5 Currency - Is the prior learning achieved and being assessed current? Is it up to date with current knowledge and practice?

D) RPL PROCESS

1. The applicant initiates the process by providing appropriate outline information in support of their application for RPCL and for RPEL.
2. Consultation shall be arranged in accordance with College procedures and applicants shall receive advice and guidance for preparation of evidence and verification of prior learning in the required format
3. Initial judgment is made by the programme co-ordinator or designated member of staff as to whether the application for RPL is appropriate and the process may continue. If decided that it should continue, the applicant must then submit evidence of learning by providing the required detailed information to support the application within the specified timeframe.

4. The learning evidence shall be submitted to the programme co-ordinator or designated member of staff who shall make the submission on behalf of the applicant to the relevant College authority.
5. The outcome of the assessment process once verified shall be notified to the Examination Board as part of the student profile for assessment and the outcome reported to Student Records and Examinations Office for entry onto the student record.
6. The recommendation on the outcome of the assessment process for RPL prior to verification by the Examination Board shall be notified to the applicant within a reasonable period of time.

E) IMPLEMENTATION

It is for Colleges to design and agree local arrangements for the implementation of this policy in keeping with the universities strategic activities (Leading Action point 3 and 4, page 11 and Key Projects numbers 2, 3 and 4, page 18) and in the context of subject and professional body requirements.

F) REVIEW

This policy will be reviewed, in the first instance within two years from the date of adoption by Academic Council and a full policy review will be undertaken after five years. The review will be led by the Vice President for Teaching and Learning.

Recognition of Prior Experiential Learning (RPEL) is a process of awarding credit for learning that has not previously been accredited, that is, experiential learning (both non-formal and informal). It may support the applicant's application for admission to a programme overall for exemptions from some parts of a programme.

Experiential learning is achieved parallel to mainstream systems of education and training and does not lead to an award. Experiential learning includes:
Non-formal learning, which can take the form of organised, structured or planned training that may be assessed but does not lead to formal certification.
Informal learning encompasses learning gained through life experience in work, community or other settings.

For the purpose of this policy document the generic term RPL will be used and will incorporate both terms, Recognition of Prior Certified Learning (RPCL) and Recognition of Prior Experiential Learning (RPEL). RPCL and RPEL will be used where precise clarification between the two terms is required.

UCC RECOGNITION OF PRIOR LEARNING POLICY

The following principles apply to the implementation of RPL within UCC.

1. General Policy
1.1 Recognition of prior learning is a part of UCC's procedure for the admission, exemption and the award of credit.

1.2 All Colleges are required to ensure that their policies and procedures for the recognition of prior learning are clearly stated and documented, and readily available to all applicants, academic and administrative staff as required.

1.3 The modules and programmes eligible for recognition of prior learning shall be identified and specific assessment criteria and procedures shall be defined, documented and made available as required under 1.2.

1.4 The focus of the RPL process shall be on the achievement of learning outcomes rather than the experience of learning.

1.5 The first point of contact is the College which is responsible for overseeing the RPL application process. The final decision regarding the granting of exemption for admission or transfer rests with the appropriate academic unit, in consultation with relevant officer(s) as appropriate and shall be reported to the relevant Examination Board.

2. Quality Principles
2.1 The policies and procedures for the recognition of prior learning are embedded within the quality assurance procedures of UCC. Therefore they shall be included in the academic regulations of each programme as appropriate.

2.2 The academic standards for the outcome of the RPL process must be maintained in such a way that the academic standards of awards of UCC are maintained.

2.3 In defining their arrangements, Colleges shall ensure that their process of application, assessment and recognition shall be comprehensive, transparent, consistent and fair, and conducted within a reasonable time frame.

Appendix 2

Details of the Carbery Greener Dairy Farms Project

All of the 18 farmers have completed the following as part of the Carbery Greener Dairy (CGD) Farms Project.

- All farmers obtained a green cert from Teagasc. The course covers subjects such as: farm business and IT; principles of agriculture; farm safety; farm assurance; farm enterprise production modules; safe use of pesticides; farm performance and management modules; grass production modules, and environmental modules.
- All farmers have completed at least 1 (Sustainability Dairy Assurance Scheme) SDAS audit.
- All farmers completed two phases of the Carbery tree planting program.
- Since 2013 many of the farmers have opened up their farms for public walks. These walks focus on sustainability, producing quality milk, technical efficiency, nutrient management, cow and resource management etc.
- All CGD farmers attend the Carbery Milk Quality farm walk each summer, which includes topics similar to above with specific emphasis on how to produce high quality milk with favourable environmental outcomes.

All farmers have attended the following:

- Cell Check Workshops, on Cow udder health, reducing infection and mastitis prevention, milking practises;
- AHI Calf rearing events (one each year) on Calf health.
- They are all in their own Discussion Groups, which meet 8-10 times per year to discuss and debate current farm management issues. These are all facilitated by an agricultural advisor who ensures the discussion stays scientific and factual based.
- Most of the CGD farmers are in derogation and therefore have a Nutrient Management Plan (NMP) for their farm and are maximising the recycling of nutrients on their farms.
- All CGD farmers attended at least one technical seminar per year held by either Teagasc or their local Co-op.
- Most would attend one of the following day long conferences each year: Positive Farmers Conference, Irish Grassland Dairy Conference, Irish Grassland Summer Farm Tour, Teagasc National Dairy conference.
- The majority of CGD farmers were on a study tour to Bavaria in October 2017, and to Northern Ireland 2014, investigating organic milk production, anaerobic digestion on farm, nutrient management, cultural and the various social aspects of farming in those areas.
- Some have been on previous study tours to Belgium and Holland.

Appendix 3

Learning Outcome Portfolio

Module: AD1871 Environments for Living Organisms (5 Credits)
Learning Outcome 1 Outline Biogeochemical Cycles

Please describe how this learning outcome was achieved.
Through the Greener Dairy Farms Program, the farmers learnt the following:

- How the lack of nutrients in soil could inhibit the growth of organisms through a deeper study of the importance of fertiliser and slurry in helping the growth of crops, as well as soil preservation. They also learnt how to maximise the beneficial effects of fertiliser and slurry, for example, by studying the ideal times that slurry and fertiliser should be spread, and how to preserve soil quality, e.g. minimising of soil poaching;
- How unsuitable soil pH could limit the distribution of crops on their farms and also how to improve their soil pH through the use of lime;
- About the make-up of their farm's silage through participating in a silage analysis. Silage pH, Protein content, dry matter digestibility (DMD) and other soil properties which were all measured thus contributing to how these properties are relevant to the health of livestock e.g. if DMD of silage was below 60% the silage would struggle to sustain healthy livestock herds. Farmers received expert advice from Carbery on formulating diets for their livestock based on any silage deficiencies;
- About the importance of organisms on the atmosphere by studying Nitrogen Fixing Organisms in the ecosystem (Clover);
- Edaphic factors – the mapping of soil types along with mapping of biodiversity helped to highlight the influence of soil diversity on the distribution of organisms, and the influence of organisms on the types of soil. The importance and value of soil was studied and factors causing soil erosion were examined with its implications for plant life;
- How edaphic factors such as soil p.H., or soil Potassium or Phosphorus content, could affect soil fertility. Farmers learnt how to control such methods e.g. using lime to improve soil p.H. so as to help the spread of crops.

- **Module: AD1871 Environments for Living Organisms (5 Credits)**
- Learning Outcome 2 Explain how chemical and biological stresses limit the distribution of organisms
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- Please describe how this learning outcome was achieved.
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- Farmers participating in the Carbery Greener Dairy Farm program learnt about different Biological and Chemical factors that could limit the distribution of organisms, with particular focus on the relevance of this for agriculture.
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- Farmers learnt about biological factors that could inhibit the spread of desirable organisms – e.g. competition from weeds, diseases, poaching of soil by livestock.
- Also studied was how chemical factors could influence the spread of organisms - such as climate, temperature, humidity, pH, and pollution, and learning how to control such factors when possible. Their learning was sufficiently in-depth to understand how to minimise or maximise the effects of these factors to prevent them harming the growth of desired organisms, or deliberately employing these factors to prevent/promote the growth of undesirable/desirable organisms.
- How the threat of biological factors are studied in relation to various diseases to their livestock – such as Johnes Disease, BVD, Mastitis, Ringworm, Salmonella, and others and learned how to test for these diseases, and how to limit the growth of disease causing organisms chemically e.g. Vaccinating diseases such as Salmonella.
- Farmers examined the poaching of livestock on soil which could affect soil quality and thus the growing of crops, as well as the impact of organisms and how the competition they provide for scarce resources can inhibit the growth of desirable organisms – e.g. weeds.
- Farmers learnt how the growth of unwanted organisms can be controlled through chemical factors e.g. weed sprayer used to kill weeds or prevent their growth, control of humidity and ventilation levels to prevent the growth of moulds and mycotoxins.
- Having a strong familiarity with the importance of climate and weather on the growth of different types of organisms, particularly crops used in agriculture. This understanding was deepened through a formal study of these factors and influence on the distribution of organisms.
- They developed skills in the practice of constant weather monitoring, relevant to examination of how weather patterns influenced the success of different crops , or when they could best be grown.
- Farmers learnt how the lack of nutrients in soil could inhibit the growth of organisms through a deeper study of the importance of fertiliser and slurry in helping the growth of crops, as well as soil preservation. Learning also how to maximise the beneficial effects of fertiliser and slurry, for example, by studying the ideal times that slurry and fertiliser should be spread, and how to preserve soil quality, e.g. minimising of soil poaching.
- How unsuitable soil p.H. could limit the distribution of crops on their farms and also how to improve their soil p.H. through the use of lime.
- Farmers learnt about the make-up of their farms' silage through participating in a silage analysis. Silage p.H., Protein content, dry matter digestibility (DMD) and other soil properties which were all measured and farmers learnt about how these properties were relevant to the health of livestock e.g. if DMD of silage was below 60% the silage would struggle to sustain healthy livestock herds. Farmers received expert advice from Carbery on formulating diets for their livestock based on any silage deficiencies.
- The importance of humidity and ventilation on the distribution of organism and maintaining correct humidity and ventilation levels for the wellbeing of livestock, such as in sheds, milk parlours etc. was also studied. How to control humidity and ventilation levels to prevent growth of moulds and mycotoxins was also examined.
- Farmers also learnt to appreciate the impact that pollution could have upon organisms and their wellbeing such as polluted water, slurry, silage effluent, dangers of oil or diesel spillage etc. To control these negative effects, farmers learnt how to ensure water was clean, to properly store slurry to prevent contamination, to deal with silage effluent, proper bunding techniques of oil and diesel etc.
- Farmers studied how the pH of water and soil types could influence the types of organisms that would depend on them, and how water/soil of the incorrect pH could prevent the growth of desired plants/crops
- Farmers studied Animal health – particularly with reference to milking of animals in a manner that did not provide risks to livestock health.

Module: AD1871 Environments for Living Organisms (5 Credits)
Learning Outcome 3 Distinguish between autogenic and allogenic changes in environmental conditions

Please describe how this learning outcome was achieved.

The farmers in the Carbery program through both the Carbery Greener Dairy Farmers program and the accompanying and prerequisite agricultural work learnt about a variety of autogenic and allogenic factors that produced changes in local environments.
Factors examined included biotic and abiotic factors, internal and external factors, with close attention paid to the effects of agricultural practices. The farmers studied these factors in sufficient depth so as to properly appreciate their impact on the environment and gain practical uses of this knowledge involving mitigating negative effects on the environment while protecting beneficial factors.

- Farmers learned about the impact of autogenic and biotic factors including growth of hedgerows, trees, animals (bees), nitrogen fixing organisms (Clover).
- They studied how growing hedgerows could affect the local environment and habitats.
- Farmers learnt how to control the growth of the hedgerows to mitigate any negative impact they might have on other ecosystems.
- Farmers learned of the impact the growth of trees could have on the local ecosystems and used this knowledge to practical effect by using the trees to promote biodiversity by providing a shelterbelt to protect the growth of other organisms.
- The importance of animals in influencing the environment was also studied with a focus on the importance of bees in the ecosystem and their role as pollinators and how to help protect bee populations and hedgerows on which they depended.
- Farmers learnt about the importance of organisms on the atmosphere by studying Nitrogen Fixing Organisms in the ecosystem (Clover).
- Farmers also learnt how allogenic and abiotic factors, or external factors such as agricultural practices, could affect the local environment, through the development of roads and the impact this can have on local habitats.
- Agricultural practices such as the use of slurry and how this can unintendedly affect other local ecosystems.
- Solutions to the effects of slurry were examined – types of slurry injections and the pumping of slurry directly to fields to avoid compaction and minimise damage to fields.
- The impact of terrain on ecosystems and specifically on agricultural practices - by a study of hilly terrain and the challenges this presents to agriculture.
- Agricultural practices such as crop rotation, reseeding, and practices such as the use of drainage, were examined along with the implications of such factors for the local environment.
- Edaphic factors were studied – the mapping of soil types along with mapping of biodiversity helped to highlight the influence of soil diversity on the distribution of organisms, and the influence of organisms on the types of soil. The importance and value of soil was studied and factors causing soil erosion were examined with its implications for plant life.
- Farmers particularly learnt how edaphic factors such as soil pH, soil Potassium or Phosphorus content, could affect soil fertility. Farmers learnt how to control such methods e.g. using lime to improve soil pH so as to help the spread of crops.

Module: AD1871 Environments for Living Organisms (5 Credits)
Learning Outcome 5 Compare primary and secondary succession

Please describe how this learning outcome was achieved.

Farmers participating in the Carbery program through both the program and the accompanying and prerequisite agricultural work have learnt about primary and secondary succession in sufficient depth so as to learn how these processes could be enhanced for agricultural use:

- Farmers learnt about the difficulty of performing agricultural work on previously un-vegetated surfaces and thus the importance of primary succession through pioneer species capable of growing on such surfaces;
- How the impact of pioneer species - such as mosses and lichen on previously un-vegetated surfaces (primary succession) altered the soil, through waste, decomposition etc. of pioneer organisms and enhanced the soil's fertility, producing soil nutrients and increasing soil depth;
- It was learnt how the changes in the soil due to primary succession e.g. availability of soil nutrients, increased soil depth, made the soil suitable for the growth of further organisms including agricultural crops;
- Farmers learnt how surfaces which have undergone primary succession could be de-vegetated through disturbances or through abandonment in the case of agricultural fields;
- Farmers particularly learnt how disturbances relevant to agriculture could de-vegetate a surface such as oil spills, fires, or how slurry spillage, poaching, over-grazing could be harmful to existing vegetation. For instance, farmers are aware of the rationale behind legislation attempting to minimise such risks and were all compliant with such legislation – e.g. legislation about farm fires, storage of slurry, cross compliance regulations of poaching;
- The challenges of reclaiming land for performing a secondary succession for agricultural use – the possibility of damage or erosion to the soil; particularly farmers learnt that past agricultural practice on land could deplete soil of much of its nutrients;
- Farmers specifically learnt how to overcome some of the challenges involved in reclaiming lands in secondary succession or to accelerate the process of primary succession. How the soil could be enhanced e.g. through the use of slurry, use of other fertilisers, how certain crops would especially benefit the soil, through the transferring of topsoil to un-vegetated surfaces;
- In particular in the Carbery Greener Dairy Farmers program Farmers all worked to improve soil fertility, for instance through measuring of soil fertility, introducing nutrient management plans for their soil and the use of lime to increase soil pH levels etc;
- Farmers learnt in depth about the importance of the success or primary or secondary succession to the growth of animal populations. In particular farmers learnt about the quantities and varieties of crops necessary to sustain a healthy livestock herds of particular size and this had practical relevance to the farmers crop and livestock planning.

Module: AD1871 Environments for Living Organisms (5 Credits)
Learning Outcome 6 Define the structure of an energy pyramid

Please describe how this learning outcome was achieved.

The farmers undertaking the programme with Carbery through both the program and the accompanying and prerequisite agricultural work gained a detailed understanding of an energy pyramid and how it worked.

- Farmers learnt about the energy requirements of organisms at every level of the energy pyramid. A proper appreciation for the composition of an energy pyramid and the necessary ratios between the levels of the energy pyramid was gained. This knowledge was detailed enough to be of practical relevance to help farmers in agricultural planning.
- Farmers learnt about the energy needs of producer organisms particularly agricultural crops. Farmers learnt in detail how the energy levels available e.g. the amount of sunlight, influenced the extent to which the growth of crops would be successful.
- Farmers also learnt to appreciate the factors that influence how efficiently this energy would be exploited through the quality of soil, availability of nutrients etc.
- Farmers learnt to take into account methods to improve crop production for practical use e.g. improving the quality or availability of nutrients in the soil to make sure crops, in particular grass, are able to make optimum use of the energy they have available. The efficacy of crop energy use depends on these factors and the farmers used such methods to ensure crops maximally utilised the available energy to increase production per hectare.
- The relationship between producers and primary consumers and the necessary ratio balances and how many producers were necessary to sustain a certain population of primary consumers were learnt. This helped to deepen farmers' understanding of the amount of crops or grass necessary to successfully sustain healthy livestock herds of a particular size and requirements e.g. for cows (and how this varies with requirements such as levels of milk being produced, whether cows are calving) which was of practical relevance for the farmers agricultural work.
- Farmers conducted silage sampling and received results of silage analysis. This measured the feed value of the silage by measuring properties including pH, protein content, dry matter digestibility (DMD) content, etc. and how these influenced the energy contained by the silage. They also looked at the recommended levels of grass silage energy for dairy cattle: for instance, it is recommended that the DMD content of silage be over 70% in order to supply sufficient energy to milking cattle.
- Farmers paid particular attention to the balance between primary and secondary consumers, for example farm livestock such as cows and human beings. Farmers gained a deeper appreciation of the quantity of livestock such as cows needed to sustain a human population of particular size through energy transferred from products such as milk, cheese, beef etc.
- In taking all of this knowledge into account farmers also learnt how less energy is available to be transferred upwards at every level of the food chain. This is because only some of the energy absorbed by organisms at each energy level remains within that organism when it is consumed by another. Farmers thus learned to understand why there are decreasing numbers of organism as one moves up the food chain.

Module: AD1872 The Physical Environment (10 Credits)
Learning Outcome 2 Recognise samples of basic rock types and minerals

Please describe how this learning outcome was achieved.

Farmers undertaking the program with Carbery through both the program and the accompanying and prerequisite agricultural work learnt to recognise some different types of rocks and minerals.

- All farmers in the Carbery program would have carried out extensive soil sampling which included analysis of the minerals contained in the soil and soil types.
- Farmers have learnt about the colour, streak and hardness of different types of minerals in the process of learning about doing drainage work on their farms, including the rock type and structure of limestone, sandstone.
- Farmers would have learnt about hard water and the minerals that can give rise to hard water in the process of water testing and learning how to protect water quality.

Module: AD1873 Environmental Systems and Resources (10 credits)
Learning Outcome 1 Appreciate water as a resource

Please describe how this learning outcome was achieved.

Farmers participating in the Carbery program through both the program and the accompanying and prerequisite agricultural work, learned in great detail about legislation concerning the preservation of environmental systems and resources.

- Farmers learned about the practical application and relevance of the current EU Nitrates directive and how it sought to protect water resources from agricultural pollution and specifically how it is implemented in Ireland through Ireland's Nitrates Action Program (NAP).
- Farmers have learnt about the rationale behind the directive by learning about how nitrogen and phosphorus pollution harms the environment. Farmers particularly have learned how nitrogen and phosphorus can be harmful pollutants to water e.g. causing eutrophication in water ways and in groundwater supplies.
- Farmers also learnt about the Water Framework directive and how it sought to protect water resources and ecosystems from different types of pollution. Farmers particularly studied how the directive tried to regulate potential sources of pollution that might be relevant to agriculture: slurry, oil spillage, animal manure, pesticides.
- Farmers specifically learnt about the properties of water that could be influenced by such pollution such as the composition; chemicals, minerals, pH, hardness and salinity of water and how these properties of water were affected by pollution.
- Farmers took annual water tests to assess water under the above criteria to ensure they were protecting water in accordance with legislation.
- Farmers were aware and compliant with the Department of Agriculture's Cross Compliance regulations concerning the safe production of food, welfare of animals, prevention of pollution, and conservation of natural resources such as water.
- Farmers examined the issue of water sustainability and its importance for the growing human population.
- Farmers learnt how water sustainability could be improved well enough to put the knowledge to practical effect: They reduced water usage on farms, while also conducting annual water tests to ensure water was unpolluted and of high quality.
- Farmers would have learnt about hard water and the minerals that can give rise to hard water in the process of water testing and learning how to protect water quality.

Module: AD1873 Environmental Systems and Resources (10 credits)
Learning Outcome 2 Discuss relevant legislation

Please describe how this learning outcome was achieved.

Farmers participating in the Carbery program through both the program and the accompanying and prerequisite agricultural work, learned in great detail about legislation concerning the preservation of environmental systems and resources.

- Farmers learnt in detail about the practical application and relevance of the current EU Nitrates directive and how it seeks to protect water resources from agricultural pollution and specifically how it is implemented in Ireland through Ireland's Nitrates Action Program (NAP).
- Farmers would have learnt about the rationale behind the directive by learning about how nitrogen and phosphorus pollution harms the environment. Farmers particularly have learned how nitrogen and phosphorus can be harmful pollutants to water e.g. causing eutrophication.
- Farmers learnt about how the directive varied from the EU level to the individual member states: while the EU set the overall policy specific details were left up to decisions of the member states, each of which would create a National Nitrates Action Programme (NAP). Farmers would pay specific attention to the details of the Irish NAP.
- Farmers studied how the directive mandated member states to implement limits on the amount of livestock manure that could be applied to the agricultural land each year and how this impacted their farming. Farmers specifically learnt the specific details of this aspect of the directive as implemented in Ireland.
- Farmers studied how the directive mandated member states to set periods in which land spreading was not allowed due to the increased risk of nitrates at these times. Farmers specifically learnt about how this aspect of the EU directive was implemented in Ireland.
- Farmers studied how the directive mandated member states to set capacity levels for the storage of animal manure and how this impacted their agricultural practice.
- Farmers also learnt about the Water Framework directive and how it sought to protect water resources and ecosystems from different types of pollution. Farmers particularly studied how the directive tried to regulate potential sources of pollution that might be relevant to agriculture: slurry, oil spillage, animal manure, pesticides.
- Farmers specifically learnt about the properties of water that could be influenced by such pollution such as the composition, chemicals, minerals, pH, hardness and salinity of water and how these properties of water were affected by pollution.
- Farmers took annual water tests to assess water under the above criteria to ensure they were protecting water in accordance with legislation.
- Farmers learnt about the Habitats Directive and Irish wildlife acts, designed to protect biodiversity. Farmers specifically learnt how this directive would affect their agricultural work. For example, farmers learnt how legislation prevented the cutting of hedgerows during certain periods of the year.
- Farmers in the Carbery program all participated in habitat mapping exercises on their farms and the surrounding areas, helping the farmers to obey legislation to protect such habitats.
- Farmers learned about the concepts underlying the Environmental Liability directive, specifically the Polluter Pays principle, how polluters were responsible for pollution they caused and effects it had on their communities and how they would be responsible for compensating fellow members of the community who were negatively impacted by pollution they caused.
- Farmers were aware and compliant with the Department of Agriculture's Cross Compliance regulations concerning the safe production of food, welfare of animals, prevention of pollution, and conservation of natural resources.
- Farmers learned improved management techniques for dealing with potential sources of pollution on the farm e.g. through training with the Bord Bia Sustainable Dairy Assurance Scheme (SDAS), to decrease the risk of pollution and thus help comply with pollution legislation.
- Farmers would also be aware of the GLAS (Green Low-Carbon Agri-Environment Scheme) scheme and the requirements of the program in incorporating environmental practices into their farms.

Module: AD1873 Environmental Systems and Resources (10 credits)
Learning Outcome 3 List the sources, benefits and hazards of renewable, non-renewable and alternative energies

Please describe how this learning outcome was achieved.

Farmers engaged in the Carbery program and the accompanying or perquisite agricultural work learnt about the variety of energy sources available both renewable and non-renewable and the benefits and hazards of different sources.

- Farmers attained significant knowledge about solar energy and the transmission of solar energy to Earth. A particular focus was on the importance of solar energy in the practice of agriculture. Farmers studied how solar energy influences the growth of organisms, particularly agricultural crops and in the process learnt about the transmission of solar energy and how this can vary.
- Farmers learnt to engage in a cost benefit analysis of different renewable energy sources for their particular farm and how it may benefit them and the environment.
- Farmers also learnt about the availability and cost effectiveness of solar energy and solar panels from Solar energy firms as a renewable source of energy.
- Farmers learnt more about the hazards as well as the benefits of non-renewable energy sources such as fuels like diesel or petrol, which are of great importance in the use of agricultural technology.
- They learnt about the hazards of some non-renewable energy sources that could arise if the energy sources were not treated properly by learning about the impact that oil spillages could have on ecosystems particularly upon agricultural organisms.
- Farmers learnt how to adjust to some of the potential hazards of energy sources such as oil products by learning about bunding of diesel and other oil products to help minimise hazardous risks.
- Farmers learnt about monitoring some of the hazardous effects of non-renewable energy sources for example in measuring the carbon footprint of farms.
- Farmers also examined how this was related to energy sources such as diesel and petrol and the hazardous consequences of CO2 emissions on the atmosphere.
- Farmers learnt methods to reduce the hazardous effects of CO2 emissions from Carbon sources by reducing the use of fossil fuels on their farms and measuring the improvements in the use of carbon.
- Farmers would also be familiar with the renewable energy source of wind energy given the prominence of wind energy in West Cork. Through community groups in the West Cork region farmers would be familiar with problems that arise from the Windmills – e.g. the effects of shadow flicker.

Module: AD1873 Environmental Systems and Resources (10 credits)
Learning Outcome 4 Differentiate between hazardous and non-hazardous waste

Please describe how this learning outcome was achieved.

Farmers involved in the Carbery program through the program and the accompanying or prerequisite agricultural work learnt in detail about hazardous and non-hazardous wastes, how to treat waste appropriately e.g. the waste hierarchy and the potential dangers from hazardous wastes, particularly those used in agriculture and how to contain these dangers, as well as their responsibility for waste control.

- Farmers learnt about the concept of the waste hierarchy – with prioritisation on reducing and avoiding waste that occurs in agriculture, followed by recycling of waste e.g. in particular learning about the recycling of silage plastic, or about how manure can be used to make fertiliser and when and how wastes such as animal manure should be treated.
- All Carbery Greener Dairy Farmers were also participants in Bord Bia Sustainable Dairy Assurance Scheme (SDAS) and were trained to recognise, use, store and dispose of hazardous substances relevant to agriculture in a safe manner.
- Farmers learnt of the different types of waste both hazardous and non-hazardous as well as how even waste classified as non-hazardous can have the potential to be hazardous if not managed properly.
- Farmers learnt about the potential hazards of silage effluent and how it should be stored properly and were compliant with Department of Agriculture's Cross Compliance regulations concerning this.
- Farmers also learnt of hazardous waste and how it could be dealt with through Carbery's promotion of hazardous waste collection days.
- Farmers learnt of the hazards involved in the use of slurry, how slurry spillages have the potential to be harmful to an ecosystem or agricultural organisms and learnt methods of securely storing slurry to prevent this from happening and would have been compliant with relevant legislation.
- Farmers would be familiar with dealing with the deaths of animals – any animal that dies has to be removed by a certified knackery.
- The polluters pays principle, by learning about how a polluter has responsibility to pay compensation when their pollution negatively impacts upon their neighbours, with a particular focus on how this might be relevant for agriculture e.g. livestock waste, slurry affecting neighbours, and the importance of ensuring that agricultural waste does not affect others in the vicinity of the farm.
- Farmers would participate in Ireland's Waste Electric and Electron (WEE) scheme in the recycling of certain electrical farm equipment.
- Farmers would have learnt how to deal with and handle potentially hazardous chemical wastes such as those left from sanitising or sterilising milk parlours and how to correctly dispose of such chemical waste in a thorough fashion to prevent them from entry into milk produced.

Module: AD1873 Environmental Systems and Resources (10 credits)
Learning Outcome 5 Compare the main types of treatment technologies

Please describe how this learning outcome was achieved.

Farmers undertaking the program with Carbery through both the program and the accompanying and prerequisite agricultural work would have become familiar with a variety of treatment technologies and learn about them sufficiently in depth so as to learn benefits and disadvantages of different types.

- Farmers were familiar with the use of incinerators or the burning of farm waste such as farm plastics and the negative aspects of these treatment techniques such as the emission of polluting gasses like Co2.
- Farmers learned about the hazards of burning waste on farms and the pollution that this created the legal action of backyard burning.
- Farmers are fully aware of how farm plastics could be recycled in the Irish Farm Film Producers Group (IFFPG) and the technologies involved in plastic recycling. All Carbery farmers participate in the IFFPG scheme and be familiar with how the scheme works.
- Farmers learnt about landfill sites and how they worked. Farmers would learn about the disadvantages of landfill sites - e.g. limited space, expense of disposal, impact of a landfill site upon neighbouring community.
- Farmers learnt about the waste framework directive with specific focus on the polluter pays principle. Farmers learnt how they were responsible for any pollution that negatively impacted fellow members of their community and their responsibility to compensate those negatively impacted by pollution.
- Farmers learnt about the Waste Frame Work directive with a specific focus on legislation regarding protecting the environment e.g. water, air, soil from the effects of waste.
- Farmers learnt about a variety of methods that could prevent wastes from polluting the environment – e.g. proper storage of slurry, silage effluent.

Module: AD1874 Development and the Environment (5 Credits)
Learning Outcome 1 Explain the basic economic concepts of Supply, Demand and Equilibrium

Please describe how this learning outcome was achieved.

Farmers in the Carbery program and the agricultural work accompanying the program learnt about the concepts of supply, demand and equilibrium with a specific focus on the agricultural market.

- As businessmen and members of a co-operative farmers learnt about the concept of demand, how demand for a product influences its price and this in turn can provide incentives/disincentives to suppliers, specifically focusing on agricultural products.
- Farmers would have learnt specifically how price and demand are inversely related – how all other things being equal demand changes in the opposite direction to the change in price with particular reference to fluctuations in prices in agricultural markets.
- Farmers learnt about the concept of supply, how supply influences the price of a product and this in turn can influence the demand for a product, specifically focusing on agricultural products. Farmers would have learnt how supply and price are directly related – all other things being equal supply changes in the same direction as the change in price.
- Farmers learnt about interaction of supply and demand and about how this interaction influences the price of goods. Farmers learnt about how market equilibrium, where demand and supply for a good are equal exists at a specific price called the equilibrium price.
- Farmers were particularly aware of how demand, supply, and price interact in the agricultural market for goods such as milk etc. and how a market equilibrium can be disturbed by factors such as the milk quotas and their removal in 2015 leading to a new supply-demand relationship.
- Farmers learnt about the importance of factors influencing supply other than price and demand – e.g. regulations, with a focus on milk quotas and how this impacted milk supply.
- Farmers learned how the abolition of milk quotas in 2015 led to a surge in supply and how this led to a decrease in price. They also learnt how to EU tried to restore prices by incentivising suppliers to produce less, showing the relationship between supply and price.

Module: AD1874 Development and the Environment (5 Credits)
Learning Outcome 2 Analyse how markets operate

Please describe how this learning outcome was achieved.

Farmers involved in the Carbery program through the program and the accompanying and prerequisite agricultural work learnt about how markets operated with specific focus on agricultural markets.

- Farmers learnt about factors influencing the demand for goods - the price of a good, the economic climate, the availability of alternative goods providing competition – specifically in the area of agriculture e.g. how competition from cheaper foreign agriculture can result in less demand for the produce of Irish farmers, how health scares or traceability scandals such as the horse meat crisis might influence demand.
- Farmers learnt about how prices are set – the influence of price from the costs of production, supply of a good, anticipated demand for a good etc. Farmers learnt in particular about the cost of production in agriculture and how lowering agricultural production costs can help to set more competitive prices for their products.
- Carbery gave advice to farmers to help bring down the costs of agricultural production through its encouragement of 'resilient farm systems' in areas such as maximising efficient use of grass, managing labour, compact calving, and through the Carbery Greener Dairy Farmers all farmers had audits of their farms taken and received specialist advice on how each could reduce their input costs.
- Farmers have learned about the price volatility in agricultural markets and receive advice from Carbery through its encouragement of 'Resilient Farm Systems' in dealing with the volatile prices of the agricultural market– fixing portions of the milk price, fixing interest rates, having a cash reserve, as well as ways to reduce input costs.
- The farmers also learnt specifically how prices were determined in a co-operative structure e.g. the decision making process in the Carbery co-operative which determines the selling prices for milk the Carbery farmers produce.
- Farmers became familiar with the concept of price elasticity which is of particular relevance for agriculture. Farmers learnt how the price elasticity of different goods differs, particularly for agricultural produce, much of which is relatively price inelastic and would learn to distinguish between relatively elastic and inelastic agricultural produce.
- Farmers examine the influence that changes in a goods price has upon demand and supply and how these factors in turn influence price. In particular farmers learn about the lifting of milk quotas in 2015 and the repercussions this decision had in terms of change in supply, price, and how the change in price combined with incentives schemes helped to bring the supply and demand back towards equilibrium.
- Farmers also gained knowledge of how price changes in particularly important or volatile agricultural inputs could affect agriculture e.g. oil, how changes in oil can be of enormous importance in influencing changes in the price of agricultural produce.

Module: AD2851 Analysing and Managing Environmental Change (10 Credits)
Learning Outcome 2 Define what a pollutant is and what are the possible sources

Please describe how this learning outcome was achieved.

Farmers engaged in the Carbery program and in the accompanying and prerequisite agricultural work learnt about the concept of a pollutant, the variety of pollutants, and different aspects of the environment that could be affected by pollutants.

- Farmers learnt about a variety of potential pollutants that were used in agricultural work such as slurry, diesel and other oil products, silage effluent, and the negative impacts spillage of these could have on the environment including livestock, ecosystems, soil and human health.
- Farmers learnt about these pollutants and how these potential pollutants should be controlled – through the appropriate storage of slurry, silage effluent, through the bunding of diesel and other oil products.
- The dangers of pollution for the atmosphere with a focus on greenhouses gases, specifically carbon dioxide and methane was addressed by calculating the carbon footprint of their farms measured. They also studied ways the carbon footprint of their farms could be reduced to help protect the environment.
- Farmers learnt about other atmospheric pollutants such as nitrogen and phosphorus. Farmers would all be compliant with legislation designed to regulate such pollution e.g. the Nitrates directive, and aware of the rationale behind such measures and thus be familiar with how phosphorus and nitrogen could impact the environment.
- Farmers learnt also about other forms of chemical pollutants such as the danger of biocides as a source of air pollution and the effect that this could have on the health of human beings. And so were compliant with laws obliging them to take courses about the safe use of pesticides to minimise the danger of this source of pollution to the environment and human health.
- A major focus was put on the problem of water pollution. Farmers were made familiar with the dangers of water pollution and its causes. Farmers learnt about the mineral content and composition of water, and what substances should not be found in drinkable water.
- All farmers involved in the Carbery program had water testing done once a year to ensure their water was clean, unpolluted, and of high quality.
- Farmers learnt how to dispose of chemicals used to sanitise or sterilise milking equipment in a thorough manner to prevent them polluting the environment or milk products
- Farmers learnt how to dispose of potential pollutants involved in healthcare of animals – e.g. obsolete medicines, needles – in a safe and environmentally friendly manner
- Farmers learnt of the hazards involved in the use of slurry, how slurry spillages have the potential to be harmful to an ecosystem or agricultural organisms and learnt methods of securely storing slurry to prevent this from happening.

Module: AD1874 Development and the Environment (5 Credits)
Learning Outcome 3 Compare the various methods of international policy intervention

Please describe how this learning outcome was achieved.

Farmers undertaking the Carbery program and the accompanying and prerequisite agricultural work learnt about international policies affecting economic development, with a predominant focus on policies affecting trade and agriculture.

- Farmers learnt about international trade policies and barriers to trade – in particular learning of trade barriers to exporting to non-EU countries barriers which are set or restrained in accordance with international policy intervention - such as the General Agreement on Trade and Tariffs and policies of the World Trade Organisation with a focus on some important non-EU markets for the Carbery farmers such as Turkey and Russia.
- Farmers learnt about policies of free trade such as those that exist within the European Union and the European single market with a particular focus on how this influences the trade of agricultural produce between EU countries as opposed to non-EU nations.
- Farmers learned about international or multinational policy intervention particularly within the European Union with a focus on the Common Agricultural Policy and the supports and funding that if offers to agriculture.
- Farmers learnt about the regulations associated with the Common Agricultural Policy such as milk quotas, quality regulations for agricultural produce, health and safety regulations concerning agricultural produce, working conditions or associated pollution e.g. the Nitrates directive etc.
- Farmers in Carbery have paid close attention to Brexit and the potential types of trade barriers or restrictions that could come into existence between Britain and Ireland once Britain is no longer part of the EU.

Module: AD2850 Social Policy and the Environment (5 Credits)
Learning Outcome 1 Give an account of what type of institutions and policies has the Irish government created in relation to sustainable development

Please describe how this learning outcome was achieved.

Farmers participating in the Carbery program through both the program and the accompanying and prerequisite agricultural work would have learnt in detail about Irish government policy concerning sustainable development, particularly as this relates to agriculture. The Irish government and the EU try to promote sustainable development through encouraging long term economic strategies, ensuring economic growth is of minimal detriment to the environment or human health and through encouraging most efficient use of valuable resources e.g. through minimising energy use.

- Farmers learnt about the Irish Government's Sustainable Energy Authority of Ireland (SEAI) and its grants program to promote sustainable energy use through the more efficient use of energy.
- In particular farmers learnt about the SEAI Better Energy Community (BEC) Grant program in which the Carbery co-operative is a participant and how the scheme helps farmers to achieve greater energy efficiency.
- Farmers actively participated in the BEC scheme to Carbery to help purchase lower energy appliances e.g. low energy lighting.
- Farmers further learnt about government policies to reduce the use of unsustainable resources and pollutants harmful to the environment – e.g. fossil fuels through government taxes on fuel, carbon tax etc. to disincentive their use.
- Farmers are familiar with government policy to promote knowledge of the waste hierarchy and the correct treatment of waste – promoting the use of recycling etc.
- Farmers learned about Irish government policy of encouraging the recycling of agricultural plastics through establishing the national farm plastics recycling scheme, the IFFPG (Irish Farm Film Producers Group).
- Farmers would learn about government building planning policies and the planning permission process particularly as this relates to agriculture and building on farmers and in building using sustainable materials.
- Farmers learnt about Irish government and EU policies to promote sustainable development by encouraging economic growth in manner that protects the environment and protects natural resources e.g. water, ecosystems. E.g. farmers would have learned a great deal concerning the Nitrates directive, designed to minimise the harm of agricultural work upon water resources – limiting the amount of livestock manure that can be applied to the land or stored, limiting times periods in which the land manure can be applied etc. to minimise damage to the environment and water resources.
- Farmers would be familiar with the Water Framework directive and government policies to promote water quality through preventing water pollution. Farmers would know how the Water Framework directive regulates potential agricultural sources of pollution such as slurry, oil spillage, animal manure, pesticides.
- Farmers would be aware of Bord Bia's quality assurance scheme and all farmers would have taken an audit of their water. Farmers would also be aware of government policy concerning the preventing of excess use of water resources – e.g. water charges.
- They would also be aware of the Government policy to protect biodiversity from economic development such as through the habitats directive and Irish wildlife laws e.g. prevent cutting of hedgerows at certain times of the year constraining agricultural development from excessive harm to local ecosystems.
- Farmers learnt about government policy towards pesticides – how all Farmers were legally obliged to be trained and registered in the use of pesticides so as to protect human health and the environment.
- Farmers would have learnt about Irish and EU policies towards sustainable milk production. Farmers would be familiar with how policies such as milk quotas were originally designed to promote sustainable milk production and how new strategies such as incentive schemes haven been used to prevent overproduction of milk.
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Module: AD2850 Social Policy and the Environment (5 Credits)
Learning Outcome 6 Distinguish between 'light green' and 'dark green' approaches to the environment

Please describe how this learning outcome was achieved.

Farmers engaged in the Carbery program through the program and the accompanying and prerequisite agricultural work became familiar with the concept of different approaches to the environment including those that stress individual responsibility, or light green approaches, as well as approaches that view environmental protection as a political responsibility and often see radical political measures as necessary to protect the environment e.g. dark green approaches.

- Farmers participating in the Carbery program were encouraged to see themselves as 'custodians of the environment' and to be aware of the personal responsibility they had to the environment.
- The Carbery program developed on this responsibility. Farmers learnt of the negative impacts their agricultural work could potentially have on the environment and how certain resources utilised in agriculture could further deplete the world's natural resources.
- Farmers learned to measure the Carbon footprint, and to measure use of fossils fuels, water, phosphorus, nitrogen, biocides, electricity and how to reduce usage of all these chemicals as part of their personal responsibility to the environment.
- Farmers also learnt about darker green approaches to the environment such as government and EU regulations and incentive schemes to protect the environment – Nitrates directive, Carbon taxes, taxes on oil/diesel, legislation about water quality- and that the dark green view that enforcing such measures is necessary for the good of the environment.

Module: AD2851 Analysing and Managing Environmental Change (10 Credits)
Learning Outcome 3 - Demonstrate an assessment of air, noise, soil, and water pollution and proper use of the monitoring equipment and techniques

Please describe how this learning outcome was achieved.

Farmers in the Carbery program and in the accompanying and prerequisite agricultural work learnt about the different types of pollution and how to assess them and their effects.

- Farmers learnt about the possible sources of water pollution especially those in agriculture – the release of nitrogen from use of fertiliser, animal manure, silage effluent, and the release of chemicals from pesticides.
- Farmers specifically learnt about the properties of water that could be influenced by pollution such as the composition, chemicals, minerals, pH, hardness and salinity of water and how these properties of water were affected by pollution.
- Farmers learnt techniques of measuring water pollution and its effects on water. Farmers took annual water tests and were educated about water testing techniques and methods. They learnt to assess the properties of water listed above along with the levels of water pollution. Farmers could thus specifically measure the impact of pollution upon these properties of water.
- Farmers learnt about the various sources of air pollution from agriculture – such as carbon, phosphorous, nitrogen emissions and the use of biocides.
- Farmers specifically learnt in detail about the harmful impact of CO2 emissions on the atmosphere and the potential for CO2 emissions to become a long term hazard to society and human health.
- Farmers learnt to measure the Carbon footprint and Nitrogen/ Phosphorus emissions of their farms using a methodology selected by Carbery, the Life Cycle Assessment methodology accredited by the Carbon Trust and Moorepark Dairy System.
- Farmers learnt about sources of pollution that could be potentially harmful to soil quality such as petroleum products, silage effluent, pesticides, slurry etc. by learning techniques of assessing soil and its properties. All farmers were been involved in the sampling of soil from their farms.
- Farmers learnt how this sampling could measure the effects of pollution on soil properties such as fertility, pH, salinity, mineral composition etc.
- Farmers learnt about sources of noise pollution – in particular noise pollution caused from agriculture such as milking equipment, older tractors, harvesters etc.
- Farmers learnt to be conscious of such sources of noise pollution and the potential health hazards for personnel working on the farm as well as how such pollution could disturb other members of the community and are aware of legislation regarding noise pollution.
- Farmers learnt about the importance of maintaining agricultural equipment in sufficient conditions to minimise noise pollution and how servicing of equipment could help prevent pollution from equipment from becoming excessive and drivers of the machinery wearing ear protectors.
- Farmers would have familiarised themselves with others methods of reducing noise pollution – e.g. use of sound insulating materials and wearing ear protectors.

Module: AD2851 Analysing and Managing Environmental Change (10 Credits)
Learning Outcome 4 Perform a risk assessment calculation

Please describe how this learning outcome was achieved.

Farmers engaged in the Carbery program learned to be highly attentive to health and safety in the work place and at assessing the various risks involved in agriculture as well as responding to those risks and controlling them as much as possible.

- All farmers had to carry out risk assessment calculations of theirs farms and implement any risk mitigating measures that might be required, as a condition of involvement in the Sustainability Dairy Assurance Scheme (SDAS) in which all Carbery Greener Dairy Farmers participated.
- In SDAS the farmers were trained to recognise, use, store and dispose of hazardous substances relevant to agriculture in a safe manner.
- Farmers identified the variety of diseases their livestock could become infected with, posing not only a risk to livestock but also to human beings and learnt how these diseases could be detected e.g. Johnes disease, Salmonella, B.V.D and how they could be treated and prevented e.g. through means such as vaccinations and appropriate risk mitigation strategies.
- Farmers learned about the potential for agricultural inputs such as slurry to be harmful to human health and learnt how to properly store and contain slurry to prevent such scenarios occurring.
- Farmers were all legally obliged under the Sustainable Use of Pesticides directive to take training courses in the use of pesticides to minimise any risks to the environment and to human health and also in cross compliance regulations to use only registered and approved pesticides, to store pesticides safely, and to display warning signs where pesticides are stored.
- Farmers learn how to prevent threats such as the growth of mould and mycotoxins through the control of humidity and ventilation conditions.
- An annual water test is done to ensure that water was clean and safe for human consumption.
- Farmers had to receive training for the spraying of pesticides which had the potential to be harmful to human health and carry out a risk assessment before spraying.
- Farmers conducted risk assessment of buildings and the farm in general – identifying potential hazards, areas that might be unsafe for children etc.
- Farmers learnt about the various classes of people at risk – themselves, agricultural workers, farm visitors, the special vulnerability of children, the potential for health hazards to affect a farmers neighbours if not managed properly.
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Module: AD2851 Analysing and Managing Environmental Change (10 Credits)
Learning Outcome 5 Recognise the different types of environmental mitigation and the hierarchy of individual mitigation

Please describe how this learning outcome was achieved.

Farmers engaged in the Carbery program and in the accompanying and prerequisite agricultural work learnt about the different methods of mitigating harm to the environment and the order of desirability of the different methods.

- Farmers learnt about the hierarchy of methods of mitigating harm to the environment for example the prioritisation of avoidance and reducing harm to the environment, followed by policies of restoring damage or harm done to the environment, or reuse or recycling of waste to reduce the levels of waste which can potentially harm the environment.
- Farmers learnt how to avoid potential damage to the environment through proper storage of slurry, soil effluent, the bunding of diesel and other oil products.
- In using biocides or other potential harmful chemicals on farms, farmers received training and learnt about to use such substances in a safe manner that minimised damage to the environment and the risk to other human beings.
- Farmers learnt how to reduce the damage they did to the environment by learning about how they could reduce their carbon footprint and specifically the use of fossil fuels, reducing their use of nitrogen, phosphorus, biocides, and other substances potentially harmful to the environment and also conduct audits of the use of the above chemicals conducted on their farms and received specialist advice on reducing their usage.
- Farmers measured the reductions they managed to make in the above areas, thus measuring the efficacy of different mitigation/ reduction approaches.
- Farmers learnt how re-using and recycling could help to protect the environment by the reducing the amount of waste that would have to be dealt with. They learned about the recycling of silage plastic, the reuse of manure to create slurry etc.
- Farmers learnt in particular about minimising dangers to the local environment e.g. soil, local ecosystems, and water sources. Farmers learnt how to minimise dangers such as poaching from livestock on the soil, how intervention e.g. the building of roads or planting of trees had the potential to harm the ecosystems in the location affected and learnt how this damage could be minimised.
- Farmers learnt how growing Carbery trees would help mitigate other results of human action on the environment – sequestering Carbon dioxide from the atmosphere, helping biodiversity by providing a shelterbelt that protects other organisms etc.
- Farmers also learnt how to minimise water pollution and held annual water tests to ensure that water was unpolluted and of high quality.
- All farmers had biodiversity mapping done on their farms to identify the different species present and allow for adoption of strategies to protect species that may be at risk.
- Farmers also learnt of the long term effects that would result from oil depletion. Farmers thus learned about the importance of reducing fossil fuel reliance and about alternative energy sources e.g. solar energy, wind energy.

Module: AD2852 Introduction to Environmental Policies (10 Credits)
Learning Outcome 1 Demonstrate knowledge of the principles of sustainability

Please describe how this learning outcome was achieved.

Farmers engaged in the Carbery program and in the accompanying and prerequisite agricultural work gained a detailed knowledge of the principles of sustainability in the social, economic and environment fields.

- The Carbery program had a strong focus on economic sustainability. All farmers conducted an economic sustainability assessment of their farms and examined the economic implications of unsustainable agriculture.
- Particular attention was paid to the economic significance of agriculture's reliance on unsustainable resources such as fossil fuels. Farmers learnt about how the volatility of the supply and price of fossil fuels particularly oil and how this could be potentially damaging to agriculture.
- Farmers also learnt of the long term effects that would result from oil depletion. Farmers thus learned about the importance of reducing fossil fuel reliance and about alternative energy sources e.g. solar energy, wind energy.
- Farmers learnt about keeping their farms economically sustainable in the long run by protecting the natural resources of their farms – protecting the soil quality, protecting water sources and water quality, ensuring the health of livestock and healthy livestock breeding.
- Farmers in particular focused on the importance of maintaining soil quality which is crucial if farms are to be economically sustainable in the long run and viable for the use of future generations. All farmers in the Carbery Greener Dairy Farmers program worked to improve soil fertility and thus the sustainability of their farms, for instance through measuring of soil fertility, introducing nutrient management plans for their soil and the use of lime to increase soil pH levels etc.
- Farmers in the program focused in great detail on environmental sustainability and particularly how agricultural practices could help further environmental sustainability and have contributed to video stories about sustainability on their farms.
- Farmers learnt of the impact of CO_2 emissions on the environment and how this potentially threatens the environment's sustainability with reference to the well-being of human beings.
- Farmers learnt how CO_2 emissions could be reduced in the Carbery program and actively monitored the reductions they successfully made.
- Farmers also learn of the negative impacts from phosphorus, nitrogen, and biocides could have on the environment and in the Carbery program reduced the use these chemicals.
- Farmers took training in the use of biocides to minimise the damage that this caused to the environment.
- Farmers examined the issue of water sustainability and its importance for the growing human population, as well as how water sustainability could be improved well enough to put the knowledge to practical effect. They reduced water usage on farms, while also conducting annual water tests to ensure water was unpolluted and of high quality.

Module: AD2852 Introduction to Environmental Policies (10 Credits)
Learning Outcome 2 Identify, using an example, the impact of local legislation, National legislation, European legislation

Please describe how this learning outcome was achieved.

Farmers in the Carbery program through both the program and the accompanying and prerequisite agricultural work learnt about the impact of much European and national legislation on agriculture. The EU Nitrates Directive and its transposition into Irish law is a specific example of what the Carbery farmers would have covered.

- Farmers learnt about the EU Nitrates directive and how this legislation sought to reduce nitrogen and phosphorus pollution from agriculture to protect water resources.
- Farmers would have learnt about the rationale behind the directive by learning about how nitrogen and phosphorus pollution harms the environment. Farmers particularly learnt how nitrogen can be a harmful pollutant to water e.g. causing eutrophication.
- Farmers learnt about how the directive varied from the EU level to the individual member states: while the EU set the overall policy specific details were left up to decisions of the member states, each of which would create a National Nitrates Action Programme (NAP). Farmers would pay specific attention to the details of the Irish NAP.
- Farmers studied how the directive mandated member states to implement limits on the amount of livestock manure that could be applied to the agricultural land each year. Farmers specifically learnt the details of this aspect of the directive was implemented in Ireland and how this impacted their farming.
- Farmers studied how the directive mandated member states to set periods in which land spreading was not allowed due to the increased risk of nitrates at these times. Farmers specifically learnt about how this aspect of the EU directive was implemented in Ireland and how this impacted their farming.
- Farmers studied how the directive mandated member states to set capacity levels for the storage of animal manure, how this was implemented in Ireland and how this impacted their farming.

Module: AD2852 Introduction to Environmental Policies (10 Credits)
Learning Outcome 3 Interpret the statutory procedures applicable to renewable energy and waste management production

Please describe how this learning outcome was achieved.

Farmers in the Carbery program through both the program and the accompanying and prerequisite agricultural work learnt about the statutory procedures relating to renewable energy and waste management production:

- Farmers also learnt of the long term effects that would result from oil depletion. Farmers thus learned about the importance of reducing fossil fuel reliance and about alternative energy sources e.g. solar energy.
- Farmers would have learnt to engage in a cost benefit analysis of different renewable energy sources for their particular farm and how it may benefit them and the environment.
- Farmers also learn about the availability and cost effectiveness of solar energy and solar panels from Solar energy firms as a renewable source of energy.
- Farmers also examined how this was related to energy sources such as diesel and petrol and the hazardous consequences of CO2 emissions on the atmosphere.
- Farmers learnt methods to reduce the hazardous effects of CO2 emissions from Carbon sources by reducing the use of fossil fuels on their farms and measuring the improvements in the use of carbon.
- In SDAS the farmers were trained to recognise, use, store and dispose of hazardous substances relevant to agriculture in a safe manner.
- Farmers learned about the potential for agricultural inputs such as slurry to be harmful to human health and learnt how to properly store and contain slurry to prevent such scenarios occurring.
- Farmers learnt about the hierarchy of methods of mitigating harm to the environment for example the prioritisation of avoidance and reducing harm to the environment, followed by policies of restoring damage or harm done to the environment, or reuse or recycling of waste to reduce the levels of waste which can potentially harm the environment.
- Farmers learnt how to avoid potential damage to the environment through proper storage of slurry, soil effluent, the bunding of diesel and other oil products.
- In using biocides or other potential harmful chemicals on farms, farmers received training and learnt about to use such substances in a safe manner that minimised damage to the environment and the risk to other human beings.
- Farmers learnt how re-using and recycling could help to protect the environment by the reducing the amount of waste that would have to be dealt with. They learned about the recycling of silage plastic, the reuse of manure to create slurry etc.
- Farmers learnt in particular about minimising dangers to the local environment e.g. soil, local ecosystems, and water sources. Farmers learnt how to minimise dangers such as poaching from livestock on the soil, how intervention e.g. the building of roads or planting of trees had the potential to harm the ecosystems in the location affected and learnt how this damage could be minimised
- All Carbery Greener Dairy Farmers were also participants in Bord Bia Sustainable Dairy Assurance Scheme (SDAS) and were trained to recognise, use, store and dispose of hazardous substances relevant to agriculture in a safe manner.
- Farmers learnt of the different types of waste both hazardous and non-hazardous as well as how even waste classified as non-hazardous can have the potential to be hazardous if not managed properly.
- Farmers learnt about the potential hazards of silage effluent and how it should be stored properly and were compliant with Department of Agriculture's Cross Compliance regulations concerning this.
- Farmers would be familiar with dealing with the deaths of animals – any animal that dies has to be removed by a certified knackery.
- The polluters pays principle, by learning about how a polluter has responsibility to pay compensation when their pollution negatively impacts upon their neighbours, with a particular focus on how this might be relevant for agriculture e.g. livestock waste, slurry affecting neighbours, and the importance of ensuring that agricultural waste does not affect others in the vicinity of the farm.
- Farmers would participate in Ireland's Waste Electric and Electron (WEE) scheme in the recycling of certain electrical farm equipment.
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Module: AD2852 Introduction to Environmental Policies (10 Credits)
Learning Outcome 4 Outline government policy regarding renewable sources of energy

Please describe how this learning outcome was achieved.

Farmers undertaking the Carbery program through both the program and the accompanying and prerequisite agricultural work learnt about policy and initiatives relating to renewable energy:

- Farmers have learnt about government policy towards improving building energy ratings by learning about the Sustainable Energy Authority of Ireland's (SEAI) grants scheme for improved energy efficiency in the home via the BER scheme and its recommendations.
- In particular farmers learnt about the SEAI scheme with regards to Better Energy Community (BEC) Grant awarded to Carbery.
- Through this farmers learnt about the availability of lower energy appliances - SEAI BEC grant to Carbery was used by the Carbery farmers to purchase upgrades of low energy appliances for their farms to reduce energy inputs e.g. low energy lighting.
- Farmers in the Carbery program would also have become familiar with the option of the use of solar energy for farms and the offers available from solar energy firms, use of solar to heat water for the milking parlour and in their homes.
- The farmers would also have been introduced to the possibility of being involved in the wind energy sector and its potential to produce renewable wind energy.

Module: AD2852 Introduction to Environmental Policies (10 Credits)
Learning Outcome 2 Discuss relevant legislation

Please describe how this learning outcome was achieved.

Farmers learned about legislation concerning animal feed, especially legislation for the feed of cattle. Farmers covered the existence of extensive legislation to protect animal health and ensure that all feed fed to animals is authorised and of a certain standard, to protect the health of both animals and humans. Farmers learned about their legal responsibility to protect animal health through providing only suitable feed e.g. such as in the Department of Agriculture's Cross Compliance regulations. Farmers had to pass official inspections carried out to ensure they were obeying laws concerning animal feed.

- Farmers all strove to ensure they complied with their legal responsibility to look after animal well-being by participating in silage analysis which measured the feed value of silage under p.H. , protein content, Dry Matter etc. to ensure it was sufficient for animal health and were able to receive expert advice from Carbery in formulating diets for their animals;
- Farmers would also learn about legislation concerning food designed to protect human health, specifically legislation relating to food and drink produced from animal sources. Farmers would be especially aware of legislation concerning the health and safety of dairy products – regulations regarding hygiene measures such as the Cross Compliance regulations, the legally compulsory health testing of milking livestock to ensure they are free of diseases potential harmful to human health etc.
- All farmers observed legislation regarding traceability – Farmers were aware that food or drink products sold must have marks allowing for the final product to be traced back to its origins and that livestock must be identifiable e.g. as in the Cross Compliance regulations
- Farmers would be aware of the importance of traceability for confidence in the agricultural market – farmers would have learnt of the impact of the 2013 horse meat scandal on the beef industry.
- Farmers would be familiar with legislation concerning labelling of food products regarding to need to declare nutritional information, allergens, the presence of dairy, and how this legislation could necessitate farmers to declare the presence of trace elements of potential allergens to food processors.
- Farmers would be aware of the existence of the European Food Safety Authority and its role and initiating proposals for regulations of the food industry
- Farmers were all legally obliged under the Sustainable Use of Pesticides directive to take training courses in the use of pesticides to minimise any risks to the environment and to human health.
- Farmers were compliant with the cross compliance regulations to use only registered and approved pesticides, to store pesticides safely, and to display warning signs where pesticides are stored.

Module: AD2853 Health and Human Needs (5 Credits)
Learning Outcome 3 Recognise the benefits associated with an improved energy rating of buildings

Please describe how this learning outcome was achieved.
Farmers undertaking the Carbery program through both the program and the accompanying and prerequisite agricultural work learnt about the benefits of improving the energy rating of buildings:

- All farmers engaged in the Carbery program had electricity monitoring smart meters installed on their farms to measure electricity usage and thus the expense of the farms electricity usage.
- The meters are used by the farmers to learn how to reduce unnecessary energy use so as to reduce costs e.g. by identifying appliances which used the most energy.
- Farmers have regular energy audits conducted on their farms with auditors holding one on one meetings with farmers helping to identify areas the farmers could reduce energy use and thus save costs as well as in their home using the BER to gain an insight into the energy efficiency of the farmers home and to where possible make improvements to reduce the BER grade, A rating being the most efficient home.
- Farmers learnt about lower energy alternatives – for instance farmers learnt about plate heat exchangers and their possible benefits in terms of energy usage for farmers over conventional plate heaters. As a result of this a number of the farmers in the Carbery program switched to plate heat exchangers.
- Farmers also learnt about government policy towards improving building energy ratings by learning about the Sustainable Energy Authority of Ireland's (SEAI) grants scheme.
- In particular farmers learnt about the SEAI scheme with regards to Better Energy Community (BEC) Grant awarded to Carbery, through this Farmers learnt about the availability of lower energy appliances - SEAI BEC grant to Carbery was used by the Carbery farmers to purchase upgrades of low energy appliances for their farms to reduce energy inputs e.g. low energy lighting, reduced CO2.
- Farmers in the Carbery program would also have become familiar with the option of the use of solar energy for farms and the offers available from solar energy firms.

Appendix 4

Assessors' Feedback Provided on the Learning Outcome Portfolio

Dr Caitriona Carlin, NUIG and UL, Previous External Examiner of the Diploma in Environmental Science and Social Policy

"Overall the Carbery team have done a huge deal of work in putting together the LO documentation. Some rephrasing is needed for clarity i.e. students would learn/would be familiar – just from a tense point of view these are not the easiest to accommodate in an assessment framework. There are some that have very good examples of evidence – i.e. the habitat mapping… in most cases they just need to rephrase the evidence section."

Keiron Phillips, Environmental Protection Agency

I found the course content to be extremely detailed covering a wide range of scientific, sociological and economic disciplines, with a combination of material ranging from that directly familiar to students with an agriculture background, to that requiring a significant use of tangential thought and research.

I have no doubt that the remaining modules will prove intellectually challenging but varied in content and theme that it will prove rewarding and interesting to students.

There are repeated themes throughout the modules which will assist in cementing and reinforcing learning outcomes. I feel the course might possibly benefit from some future-casting on both the short and medium to long term, i.e. how might Brexit influence the market, to how climate change could affect agriculture, and it's important to stress the potential benefits, not just potential drawbacks.

Farmers with self-sufficiency in power, fuel, feed etc. will future proof themselves against potential shocks be they climate, economic or socially driven. It's worth stressing this as well.

Laurence Shalloo, Teagasc

The farmer cohort satisfy the learning outcomes identified through the evidence given and examples such as follows:

- Nutrient management driven by soil tests and planned nutrient advice to maximise nutrient efficiencies;
- Business planning and budgeting through a number of case studies;
- Benchmarking through in depth evaluation of the profit monitor over time and across farms;
- Evaluating carbon footprints of the farms and understanding the factors driving the footprints;
- Evaluating energy demand and benchmarking across farms and between years;
- Evaluating water footprints and benchmarking across farms and between years;
- Bull selection including the active bull list, cross breeding and the next generation herd;
- Biodiversity mapping and evaluating the options to increase the biodiversity status of the farms;
- Clear overlap with work from Teagasc done with the Carbery Farmerr group that co-insides with the learning outcomes.

Daragh Enright, Student Representative

“I believe that the achieved learning outcomes for these module were a fair reflection of what was covered in the course.

Perhaps increase the achieved mark slightly as the Nitrogen cycle would have been the major element and is important in studying other items, water pollution etc. - felt that it was harsh and should have a higher weighting.

Many areas in these module are fairly assessed as they are very close to agricultural topics and clearly show there relevance in the agricultural arena.

The knowledge of legislation with regards to sustainability would be an important part of a modern farmers remit and the learning outcomes are in my opinion a fair reflection of this prior and taught knowledge as described in the learning outcome evidence.”

Carbery Management Team

This programme is a very important project for Carbery, as we recognise that if our farmers are not sustainable economically and environmentally then Carbery itself will not be sustainable.

We see the project as adding value (profitability) to the suppliers, while at the same time minding and improving the environment.

These suppliers have already spread the meaning of sustainability which is now easily understood by all suppliers in West Cork, and being embraced by them, whereas when we started off suppliers were afraid of the word as they didn't understand it. It is also very powerful and positive for our customers.

Appendix 5

Pricing on 60 Credit Diploma (Including RPL component) for Carbery Group

PRICING ON 60 CREDIT DIPLOMA (INCLUDING RPL COMPONENT) FOR CARBERY GROUP			
Number of credits achieved through RPL	40 out of a total 60		
Number of credits undertaken in classroom	20		
Cost of 20 credits			€700
Number of hours of ACE Staff working on RPL	**Hours**	**Cost per hour**	**Total Cost**
Belinda Gascoigne	180	30	€5,400
Ciara Staunton	60	30	€1,800
Seamus O'Tuama	10	70	€700
			€7,900
Discount for first time learning on RPL project (reduce by 20%)			€6,320
Per Student (20 students in total)			€316
Total Cost of 60 Credit Diploma			€1,016
Round the fee down to			***€1,000***
PRICING ON 5CREDIT MODULE			
30 Credit Certificate Price			€990
5-credit module			€165
Allowance for registration cost			€25
			€190