Unit 9: Undertake an Extended Investigative Project in the Environmental Sustainability Sector

Unit code: F/602/6496

QCF Level 3: BTEC National

Credit value: 20

Guided learning hours: 120

Aim and purpose

This unit enables learners to gain an understanding of the skills required to propose and manage an extended investigative project in the environmental sustainability sector. Learners will need to formulate a strategy to conduct a literature review, to identify, plan, undertake and present the findings of their project.

Unit introduction

Learners could carry out this investigation in the workplace as an employee, a volunteer, on an extended work placement during vacation periods or at weekends, or within a centre setting. The investigation could be in conjunction with a local authority, a charity, a local community group or within an industry organisation. The investigation could be, for example, to improve the sustainability of the product, service or process or to improve its efficiency and effectiveness in reducing any harmful effects on the environment. With formal supervision the investigation could be carried out in a local, regional, national or international geographic area.

The ability to undertake an investigative project requires learners to develop important skills, such as the ability to perform a literature review that will influence the scope of the project and how successful it is. This unit gives learners the opportunity to develop project management and communication skills by investigating a chosen topic through a project of their choice. The knowledge and skills developed in this unit will also link to, and enhance, most of the other units learners take as part of their programme of study.

Learners will explore three topic areas that interest them and are relevant to their career aspirations. They will reduce these to one topic area that will form the basis of their investigative project. Learners will plan for their investigative project study by researching a chosen study area and produce a breakdown of resources and a project action plan. Health and safety will be considered throughout and learners will carry out a risk assessment before starting their project.

Learners will develop the ability to take responsibility for their own learning by independently identifying a research problem to be solved. Determining the solution to their research problem could have a number of benefits such as helping to improve educational practice or helping learners develop useful skills. Whatever the rationale and justification for developing their research proposal, it is important that the research topic is of personal interest to the learner. The research problem may arise from a real-world setting or be generated from theoretical concepts. Whichever route learners choose to take, it is paramount that in order to propose a valid research problem they have, or acquire, an in-depth knowledge about their topic of personal interest.

Learners will then implement, carry out and complete their investigative project. They will work towards deadlines and monitor the project performance. Learners will prepare an evaluative report that will look at the project outcomes, whether the schedule plan met the project aims and objectives, and how improvements could be made in the future.

Learning outcomes

On completion of this unit a learner should:

1 Be able to carry out a literature search in the environmental sustainability sector

2 Be able to produce a proposal for a suitable environmental sustainability investigative project

3 Be able to plan an investigative project in the environmental sustainability sector

4 Be able to carry out an investigative project in the environmental sustainability sector

5 Be able to report on an investigative project in the environmental sustainability sector.

Unit content

1 Be able to carry out a literature search in the environmental sustainability sector

Literature search: relevant areas of study; local, regional, national or international; centre-based, government, non-government or commercial organisation; information gathering eg websites, library, museums, visits and communications with organisations, discussion, media; health and safety considerations; other considerations eg control of variables

2 Be able to produce a proposal for a suitable environmental sustainability investigative project

Literature review: review of associated literature; proposed area selection

Investigative project proposal: area of study (rationale for selection); background to the problem; aims; objectives; suitability (career aspirations); potential difficulties; legitimacy; research design and methods; scope and limitations; implications eg resources, travel; health and safety; risk assessment

Research design: statement of the problem, intended research topic/area; published research, the research paradigm; research hypotheses; variables; methodology; data analysis techniques; benefits of intended investigation; summary; references

3 Be able to plan an investigative project in the environmental sustainability sector

Work breakdown: resources eg people, time, buildings, equipment, materials, media (internet, trade magazine), IT applications, budget

Schedule plan: aims; objectives; start date; completion date; operations (tasks); timings (resource availability); contingency planning; disrupting factors eg resource limitation, external influences; remedial actions eg extra resources, schedule revision

4 Be able to carry out an investigative project in the environmental sustainability sector

Project: implementation (according to research design and method); tasks, duties; data collection eg qualitative, quantitative, systematic recording; monitoring of performance against schedule plan eg daily progress, weekly progress, monthly progress, budget; deadlines; completion; health and safety; communication

5 Be able to report on an investigative project in the environmental sustainability sector

Data results: presentation of data eg use of tables, use of graphs; data interpretation eg selection of appropriate methods of analysis, use of appropriate statistical test(s), level of significance

Report: aims; objectives; schedule plan; summary of work; unforeseen circumstances; results; evaluation (strengths, areas for improvement); recommendations for further research; bibliography; referencing

Presentation of report: use of applicable software; title page; contents page; introduction; review of literature; project aim and objectives; hypothesis; method; results; discussion; conclusion; relevant references (Harvard Referencing System); appendices

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P1 carry out a literature search into three relevant environmental sustainability areas of study [IE1, 2]	**M1** explain reasons for choosing a selected investigative project in the environmental sustainability sector	**D1** justify the selected research design for an investigative project in the environmental sustainability sector
P2 carry out a review of the information gathered from the literature search to propose an investigative project in the environmental sustainability sector		
P3 describe relevant resources required, including support procedures [IE1, 2; CT1, 2, 3]		
P4 describe the research design for an investigative project in the environmental sustainability sector, to include a risk assessment [SM1, 2, 3, 4]		
P5 produce a relevant schedule plan to carry out a selected investigative project in the environmental sustainability sector [SM1, 2, 3, 4]	**M2** explain why identified resources are appropriate to a specified schedule of operations	
P6 carry out a selected investigative project in the environmental sustainability sector, using safe working practices [CT2, 4, 5, 6]		

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**	**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**
P7 document work undertaken in a systematic manner, amending the schedule plan as appropriate [CT2, 4, 5, 6; SM2, 3]	**M3** explain the importance of regularly monitoring performance against a specified schedule of operations	
P8 monitor own progress using appropriate methods, including ability to work to deadlines [SM2, 3, 4, 5]		
P9 interpret collected data to describe the results of the investigative environmental sustainability project	**M4** evaluate achievements and areas for improvement of a selected investigative project.	**D2** analyse research results from the investigative project, justifying areas for further research.
P10 report and draw conclusions from a selected investigative project in the environmental sustainability sector using relevant terminology [IE4, 6; RL5, 6]		
P11 present the investigative project following accepted scientific format. [IE6; RL5, 6]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery of this unit will involve extensive research and practical work and could take place in a local, regional, national or international location. The investigative project could be carried out by an employee in the workplace with a work-based supervisor. It could also be completed by a learner on an extended work placement or at the weekends by working under supervision with a local community or a charity.

The learning outcomes cover the selection, planning, carrying out and evaluation of what will usually be one investigative project for the purposes of delivery and assessment. The project should be linked to learners' areas of personal interest and/or career aspirations in the environmental sustainability sector.

For learning outcome 1, learners need to complete a literature search and review covering three relevant areas of study using a range of literature sources, and identify the investigative project they wish to pursue. Delivery will include formal input from tutors, including research methods and techniques.

For learning outcome 2, learners need to select and study one area for an investigative project. Delivery will include formal input on research methods and sources of information. Learners need to undertake independent research into three relevant areas of study and, in consultation with the tutor, select one study area for the project and produce their investigative proposal.

Learning outcome 3 covers the planning for the project. Learners need to identify the resources required to complete their project and create a plan of operations that identifies all the tasks and timings from the beginning of the project to the end. This could be delivered using lectures, planning seminars, practical sessions and/or independent research.

For learning outcome 4, learners will carry out their investigative project. Learners could keep a project diary that records the tasks necessary and when the actual tasks were completed. Monitoring worksheets could also be used to record the progress of the project against the plan of operations. Delivery is likely to include practical sessions, independent learner work and/or seminars.

Learning outcome 5 covers the reporting of the investigative project. Lectures and/or seminars are good ways to cover the requirements of report writing and evaluation. Independent learner work will be required for the actual write-up, together with opportunities for learners to discuss any issues they encounter.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and assessment
Introduction to the unit, structure and programme of assignments.
Formal input on valid literature sources of information in the environmental sustainability sector.
Assignment 1: Carrying out a Literature Search and Review (P1, P2) Tutor introduces the assignment brief.
Formal input and learner research to identify potential areas of study.
Learner literature search and review.
Tutorial review of assignment.
Assignment 2: Planning an Extended Investigative Project in the Environmental Sustainability Sector (P3, P4, P5, M1, M2, D1) Tutor introduces the assignment brief.
Formal input: sources of information and action planning.
Learner research: viability of potential projects.
Visits and visiting speakers (according to learner need).
Preparation of materials for assignment.
Tutorial review of assignment.
Assignment 3: Project Implementation (P6, P7, P8, M3) Tutor introduces the assignment brief.
Formal input and discussion.
Health and safety – learners carry out risk assessments.
Learners devise a work log/diary/monitoring system.
Learners carry out the research project.
Preparation of materials for assignment.
Tutorial review of assignment.
Assignment 4: Project Report and Evaluation (P9, P10, P11, M4, D2) Tutor introduces the assignment brief.
Formal input and discussion – report writing.
Formal input: analysis of data collected and use of statistical techniques.
Preparation of report.
Preparation of PowerPoint presentation.
Delivery of PowerPoint presentation.
Tutorial review of assignments and overall project outcomes.
Unit review and evaluation.

Assessment

For P1 and P2, learners need to select and carry out research into three different study areas that are suitable for a research project. Learners should undertake a search of the literature and then select one of the three areas as their focus for the research project. This should be in consultation with the tutor (or supervisor in conjunction with the centre-based tutor), to ensure that it is a viable and valid project. Tutors should complete observation records to confirm learners' achievement in practical tasks undertaken. For P2, learners need to carry out a review of the information gathered and propose an investigative project in the environmental sustainability sector.

P3, P4 and P5 could be assessed together. Learners need to describe their resources, and their chosen research design, and prepare a schedule plan of operations. Learners should detail how each resource is relevant to the schedule of operations.

For M1, learners need to explain why they have chosen their project and, for M2, explain why the identified resources are appropriate to their planned schedule of operations.

For D1, learners need to justify their selected research design, giving reasons and/or evidence to support their selection. These criteria are all clearly linked and evidence could be in the form of a presentation/seminar or a project report.

For P6, P7 and P8, learners need to carry out their research project in the environmental sustainability sector, document the work undertaken and monitor their progress. Assessment could include a diary and/or work log which records the work undertaken along with any achievements and/or outcomes. These criteria may also be assessed directly by the tutor during practical activities. If this format is used, then suitable evidence from guided activities would be observation records completed by the tutor, accompanied by appropriate work logs or other relevant learner notes. If assessed during a placement, witness statements should be provided by a suitable representative and verified by the tutor. Learners will be required to produce a risk assessment for the project and discuss the health and safety implications associated with carrying out an investigative project in the environmental sustainability sector.

For M3, learners need to explain the importance of regularly monitoring performance against the project's schedule of operations. Learners should include in their evidence problems that may occur with a project if regular monitoring of performance does not occur.

For P9, P10, P11, M4 and D2, learners need to prepare a report on their investigative project in the environmental sustainability sector. For P9, learners need to interpret data collected and describe their results. For P10, learners need to produce a report on the project and draw conclusions and, for P11, present the report following standard scientific format.

For M4, the report must detail the project in terms of planning, schedule of operations, monitoring and its completion, evaluating the achievements and areas for improvement.

For D2, learners need to analyse their research results, justifying areas for further research.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2	Carrying out a Literature Search and Review	You work for the research department of a large environmental and land-based organisation. Within the next few months you have the opportunity of promotion and as part of the selection process you have been asked to undertake a research project. Research the different information sources relevant to the environmental sustainability sector. Produce a list of potential sources of information. Research three potential topics and produce a summary of each one. Choose one topic and prepare a proposal for an investigation of your chosen topic. As part of your proposal, produce a plan of operations and a list of resources needed to carry out the project. Explain why each resource has been chosen and justify your research design.	Literature report on three study areas.
P3, P4, P5, M1, M2, D1	Planning an Extended Investigative Project in the Environmental Sustainability Sector		Research proposal. Presentation. Observation record.
P6, P7, P8, M3	Project Implementation	Produce a risk assessment for the project and summary of the health and safety implications of the project. Carry out the research project, keeping a record of your progress. This could be in the form of a work log or diary, which shows how you met deadlines. Produce a summary which explains the importance of regularly monitoring performance against the project's schedule of operations.	Research. Report. Work log/diary. Witness statements. Observation records.
P9, P10, P11, M4, D2	Project Report and Evaluation	Produce a report on the project using appropriate format. Include details of the planning, schedule of operations, monitoring and completion of the report. Analyse the research results and evaluate the achievements of the project and areas for improvement. Finally, present the report to your supervisor.	Report. Presentation. Observation records.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Environmental Sustainability sector suite. This unit has particular links with the following units in the BTEC Environmental Sustainability suite:

Level 3
Understand the Principles of Sustainable Development
Informatics for Environmental and Sustainability Industries
Understanding the Principles of Wildlife Populations, Ecology and Conservation
Work-related Experience in the Environmental Sustainability Sector
Using Statistics in Science
Waste Management
Pollution Control and Management
Sustainable Transport

Essential resources

Learners need access to suitable resources that they have identified for completion of their project. Resource requirements must be agreed with the tutor and/or supervisor before the project starts.

Employer engagement and vocational contexts

Visits to environmental sustainability establishments and visiting speakers from organisations would enhance unit delivery. Use of the Science, Technology, Engineering and Mathematics (STEM) Network to set up placements or visits from ambassadors may be useful.

Indicative reading for learners

Textbooks

Applegarth M and Posner K – *Project Management Pocketbook* (Management Pocketbooks, 2008) ISBN 9781903776872

Barker S and Cole R – *Brilliant Project Management: What the Best Project Managers Know, Do and Say* (Prentice Hall, 2009) ISBN 9780273722328

Fleming I – *Time Management Pocketbook* (Management Pocketbooks, 2003) ISBN 9781903776087

Lock D – *Project Management* (Gower Publishing, 2007) ISBN 9780566087721

Nokes S and Kelly S – *The Definitive Guide to Project Management: The Fast Track to Getting the Job Done on Time and on Budget* (Financial Times Series, 2007) ISBN 9780273710974

Portny S E – *Project Management for Dummies* (John Wiley & Sons, 2006) ISBN 9780470049235

Websites

Association for Project Management	www.apm.org.uk
Carbon Trust	www.carbontrust.co.uk
Project Management Institute	www.pmi.org.uk
Project Manager Today	www.pmtoday.co.uk

Journal

Project Manager Today

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	carrying out a literature search describing relevant resources required reporting and drawing conclusions from an investigative project presenting the investigative project following accepted scientific format
Creative thinkers	describing relevant resources required carrying out a selected investigative project documenting work undertaken in a systematic manner
Reflective learners	reporting and drawing conclusions from an investigative project presenting the investigative project following accepted scientific format
Self-managers	describing the research design for an investigative project producing a relevant schedule plan to carry out an investigative project documenting work undertaken in a systematic manner monitoring own progress using appropriate methods.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	carrying out research for the project
Creative thinkers	identifying topics for potential research projects explaining the reasons for topic selected
Reflective learners	evaluating the progress of the research project
Team workers	working with others on the research project
Self-managers	carrying out their research project working towards deadlines and monitoring their progress managing their own time and monitoring the progress of the project
Effective participators	taking part in class discussions to identify potential research projects.

Functional skills – Level 2

Skill	When learners are ...
ICT – using ICT	
Plan solutions to complex tasks by analysing the necessary stages	planning and implementing their extended investigative project
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	researching information for potential research projects
Manage information storage to enable efficient retrieval	saving information into files and folders
ICT – finding and selecting information	
Use appropriate search techniques to locate and select relevant information	planning which information to select and use for the literature review
Select information from a variety of sources to meet requirements of a complex task	carrying out the research project
ICT – developing, presenting and communicating information	
Enter, develop and refine information using appropriate software to meet requirements of a complex task	producing the research project following standard scientific format
Use appropriate software to meet the requirements of a complex data-handling task	analysing data collected during their project
Use communications software to meet requirements of a complex task	contacting others by email for information exchange
Combine and present information in ways that are fit for purpose and audience	writing up the research project producing a presentation
Mathematics – representing	
Understand routine and non-routine problems in familiar and unfamiliar contexts and situations	carrying out statistical analysis of data collected during the research project
Identify the situation or problems and identify the mathematical methods needed to solve them	identifying an appropriate statistical technique to analyse data collected during the research project
Choose from a range of mathematics to find solutions	carrying out statistical analysis of data collected during the research project
Mathematics – analysing	
Apply a range of mathematics to find solutions	carrying out statistical analysis of data collected during the research project
Use appropriate checking procedures and evaluate their effectiveness at each stage	carrying out statistical analysis of data collected during the research project
Mathematics – interpreting	
Draw conclusions and provide mathematical justifications	reporting on their research project results