

Pearson BTEC Higher National qualifications in Computing

**Pearson-set Theme Release
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Unit 13: Computing Research Project

First Teaching from September 2018

First Certification from September 2019

For use with the following qualifications:

Pearson BTEC Level 5

Higher National Diploma in Computing

Edexcel, BTEC and LCCI qualifications

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1 Introduction to theme

The Pearson-set theme for use with Unit 13: Computing Research Project is:

The environmental impact of digital transformation

The amount of data created and stored globally is expected to reach 175 Zettabytes by 2025, a six-fold increase from 2018. This will demand additional hardware and power consumption, which; in turn, will increase the environmental impact of the digital sector and there is already increasing attention on the environmental footprint of ICT equipment and services as they become more widespread in all aspects of human life.

It is the responsibility of everyone to take action in addressing the challenges of climate change, as professionals we must also seek ways that the digital sector can play its part. While digital technologies are one of the sectors that has achieved greater efficiency; achieving about 100 times more computation power from the same amount of energy per decade, it remains unsustainable. The sector must continue to seek ways in which it can continue to support and drive innovation, while addressing the global climate emergency for a greener and fairer future.

2 Choosing a research objective/question

Students are to choose their own research topic for this unit. Strong research projects are those with clear, well focused and defined objectives. A central skill in selecting a research objective is the ability to select a suitable and focused research objective. One of the best ways to do this is to put it in the form of a question. Students should be encouraged by tutors to discuss a variety of topics related to the theme to generate ideas for a good research objective.

The range of topics discussed could cover the following:

- The use of modern methods to reduce carbon emissions in IT network systems.
- The impact of cloud data centres on the environment.
- The environmental implications of e-waste and ways to reduce it.

The research objective should allow students to broaden their understanding and widen their perspective of being able to explore, argue, prove, and/or disprove a particular objective. The research objective should be feasible, novel, ethical, relevant and ultimately of interest to the student. Guidance for tutors is available in the

Pearson-set Assignment Guidance document for Unit 13: Computing Research Project and templates are provided for both the research proposal and ethics form.

For those centres who have multiple start dates throughout the academic year, for example students beginning their studies on the Higher National Diploma between January and July, the same theme for both Level 4 and Level 5 Pearson-set units may apply (depending on delivery schedules and when students commence the Pearson-set units). If students are in a position of completing the same theme for both Level 4 and 5, centres must ensure that the theme for the Level 5 is addressed in a different context from the topic selected and applied at Level 4.

Please note that if reasonable adjustments are necessary to meet a specific individual student need you are able to adjust internal assessments to take this into account. Any adjustments must be considered in relation to the centre's policies on equality & diversity and student support.

Further details on how to make adjustments for students with protected characteristics are given in the document '*Pearson Supplementary Guidance for Reasonable Adjustment and Special Consideration in Vocational Internally Assessed Units*' available on our website (<http://qualifications.pearson.com>).

3 Project evidence / outcomes

It is important to recognise that project work is reliant on gathering information/data that can be analysed. The scale of the project means that there must be time for both primary and secondary research. An advised model would be to use secondary research to provide a context for the students to conduct and interpret primary data collection. The project could then yield data that could be compared with the findings of secondary research information.

In assessing the project, the assessor should be able to see a rationale for the project title, an identification of controversial aspects of the title and of the relevant literature/data sources. This will be based primarily on the student's research proposal. Student research should outline the literature/theories that supports the identified research objective/s and include critical evaluation of central arguments paying attention to whether or not the arguments are logically valid. Throughout their research students should be aware of the importance of clear and consistent use of language and the use of a consistent reference system. Engagement in reflective study of the research process should be evident, with students explaining how their ideas have developed, the significance of results and what they have learnt about the methodology of research. Well edited, focused writing and presentation, where the key decisions, developments, lines of argument and salient research are explained succinctly, is preferable to unstructured writing and presentation where little attempt to select or edit material has been made.

It is important to recognise that there are many different formats that a student could use to present their work and it is important that students think carefully about the suitability of the format in relation to the target audience. Both verbal and written forms of communication should be appropriate to the audience, both in terms of the nature and level of material they use and in terms of length. Students should be guided to produce research that gives a succinct account of the main arguments or developments from their project. If a verbal presentation is the chosen format, the question and answer session should address issues raised by the presentation, but also give students an opportunity to review their work.

Students are to submit as evidence for the unit in addition to their project findings, the **research proposal and ethics form**. The research proposal sets out the plan for how the students will achieve the intended research objective and shows whether the objective will be feasible, ethical and achievable in the time scale. It sets out how secondary research supports the research objective, how the research will be conducted, how the research will be evaluated. Students will need to gain ethical approval before commencing their research, this will be discussed with the tutor during the research proposal.

4 Employer engagement

It is advisable that centres look at the Pearson-set Assignment as an appropriate unit to embed employer engagement, although this is not a mandatory requirement. Developing and establishing links with employers enhances the teaching and learning experience and improves students' employability. Where possible, identifying links with employers as part of the delivery of the Pearson-set Assignment could lead to enhancing and supporting student learning. Real-life projects provide students with the opportunity to develop and acquire appropriate skills, knowledge and expertise required by employers.

5 Sharing of good practice

An appointed External Examiner (EE) for the centre will ask to sample the Pearson-set assignment briefs for review as part of the remote sampling request. Although this is not a mandatory requirement for centres we strongly advise that centres seek guidance and support from their EE on the Pearson-set assignment. The EE may also include the Pearson-set units in the centre visit sample of student work.

The EE will review and identify exemplars in all aspects of good practice. Good practice will focus on current themes that align to QAA Higher Education Reviews:

- Innovation
- Digital literacy

- Student employability and entrepreneurial skills
- Employer engagement
- Quality of assessment feedback.

6 Assignment guidance / Useful links

Suggested resources and links that centres may find useful are shown below. Centres should choose those resources that are relevant for localised use and complement these with additional resources to support independent research into the chosen topic.

Useful resources for underlying principles, examples of articles and webinars on the theme:

Type of Resource	Resource Titles	Links
Article	A quick guide to your digital carbon footprint	https://www.ericsson.com/en/reports-and-papers/industry/industrylab/reports/a-quick-guide-to-your-digital-carbon-footprint
Article	The future of sustainable digital infrastructure	https://lfca.earth/the-future-of-sustainable-digital-infrastructure/
Article	Uncovering the Environmental Impact of Cloud Computing	https://earth.org/environmental-impact-of-cloud-computing/
Article	Reducing e-waste: Could refurbished IT equipment be better than new?	https://www.wholegraindigital.com/blog/refurbished-it/
Magazine	Big Tech's carbon problem	https://www.newstatesman.com/spotlight/2020/11/big-techs-carbon-problem
Report	A Guide to Green ICT	https://www.greenict.org.uk/sites/default/files/Green%20ICT%20Handbook.pdf
Report	The climate impact of ICT: A review of estimates, trends and regulations	https://eprints.lancs.ac.uk/id/eprint/150985/

Video	How Data Centres impact the environment	https://www.youtube.com/watch?v=Y9IXWCAN0wE
Video	Energy and climate impacts of digital technologies George Kamiya TEDxClimateChangeAI	https://www.ted.com/talks/george_kamiya_energy_and_climate_impacts_of_digital_technologies
Video	The hidden pollution of the internet	https://www.youtube.com/watch?v=GX8sOrz_-Fg
Book	Jaco H. Appelman (Editor), Anwar Osseyran (Editor), Martijn Warnier (Editor), (2013) Green ICT & Energy: From Smart to Wise Strategies: 5 (Sustainable Energy Developments), CRC Press	
Book	Tom Worthington, (2017), ICT Sustainability: Assessment and Strategies for a Low Carbon Future, Lulu.com	

Additional materials	
Pearson-set Report 2018–2019: https://hnglobal.highernationals.com/sites/default/files/Pearson-set-Report-2018-2019-final.pdf	
Training Video for the RQF BTEC Higher Nationals Pearson-set Assignments: https://youtu.be/FkQi_l78_tw	

The Pearson-set Assignment Guidance for Unit 13: Computing Research Project should be read in conjunction with the theme release. It provides advice and guidance for both tutors and students.

For any further additional support or queries regarding this document, please email btecdelivery@pearson.com

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