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| **Minor Award Name** | Computer System Hardware |
| **Minor Award Code** | 5N0548 |
| **Level** | 5 |

**Note:** Some of the resources below require access to *Books 24x7.* Membership is available through the SOLAS eCollege platform which is open to all further education teachers employed by the ETB.

**Suggested resources to support delivery:**

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| **Theme/Topic** | **Type** | **Relevance** | **Author/Source** | **Web Link** |
| **Computer Hardware & Systems Software** | E-book | *The Architecture of Computer Hardware, Systems Software, & Networking*. This text provides a comprehensive analysis of the fundamentals of computer architecture. Topics include Input & Output, Hardware, Computer Buses, and Data Processing. | Irv Englander (available at *Books 24x7*) | <http://skillport.books24x7.com/toc.aspx?bookid=62710> |
| **Repair & Maintenance** | E-book | *A+ Guide to Hardware: Managing, Maintaining and Troubleshooting.* Chapter 2 focuses on PC Repair Fundamentals. The learning aims here are based on both troubleshooting problems and working inside a computer. | Jean Andrews (available at *Books 24x7*) | <http://skillport.books24x7.com/toc.aspx?bookid=26261> |
| **Computer Peripherals** | Website Article | A brief article about I/O devices. Both input and output devices are discussed and examples are included. The article also introduces the different standards for connecting peripherals to a computer. | Encyclopaedia Britannica | <http://www.britannica.com/technology/input-output-device> |
| **Computer Systems** | Website Article | A very basic introduction to different types of computer systems. | How Stuff Works (Source: [*http://computer.howstuffworks.com*](http://computer.howstuffworks.com/)) | <http://computer.howstuffworks.com/10-types-of-computers.htm#page=0> |
| **Computer Hardware** | Website Article | A systems designer discusses the primary differences between a gaming computer and a standard desktop. The article focuses on the GPU but also introduces clock speeds, cable management, cooling systems and customising the tower. | Jae Alexis Lee (available at forbes.com) | <http://www.forbes.com/sites/quora/2015/07/29/this-is-the-1-difference-between-a-gaming-pc-and-a-consumer-pc/> |
| **Computer Hardware** | Website | A beginners introduction to the hardware components found inside a computer. The article breaks down each component down and explains their purpose in plain english (ie. without computer tech terms). Their is a video attached to the page which can be used for the visual learner. | Lori Jacobson (available at study.com) | <http://study.com/academy/lesson/computer-system-components-computer-parts-functions.html> (requires an account at study.com to view the full article) |
| **Computer Hardware** | Website | A brief introduction to the internal hardware of a computer along with common removable media devices. | [Open Book Project](http://openbookproject.net/) | <http://openbookproject.net/courses/intro2ict/hardware/internal.html> |
| **Data Processing** | Website | This page examines the CPU and main processing units of a computer. The control unit, the ALU and the fetch-execute cycle are all explained. | Vic Fay-Wolfe ([Rhode Island University](http://www.cs.uri.edu/academics/course-index.php)). | <http://homepage.cs.uri.edu/faculty/wolfe/book/Readings/Reading04.htm> |
| **Computer Maintenance** | Website Article | A Lifehacker article addressing diagnosing and improving the performance of a PC. The article suggests software which can be used to diagnose various performance issues. | Melanie Pinola (available at lifehacker.com) | <http://lifehacker.com/5825953/how-can-i-diagnose-and-fix-my-slow-computer> |
| **Computer Maintenance** | E-book | *A+ Certification, Chapter 19, Lesson 2*. This lesson is titled “Planning and Performing Regular Maintenance”. The lesson focuses on the importance of maintaining a plan for performing routine preventative maintenance on a computer and also addresses the importance of keeping a computer physically clean. | Microsoft | <http://www.ibiblio.org/gdunc/cet/MSeBook_html/html/ch19c.htm> |
| **Component Upgrades** | Website Article | A short Lifehacker article which discusses the question of upgrading or replacing your computer. The article focuses on upgrading components and poses questions to the user to assist them in understanding the benefit from upgrading certain computer components. | Alan Henry (available at lifehacker.com) | <http://lifehacker.com/how-do-i-know-when-to-upgrade-my-pc-or-just-build-a-new-1571878154> |
| **Computer Safety** | Website | A document explaining safety precautions needed when working inside a computer, presented in bullet-point form. | CERN Computer Department | <https://computinghardware.web.cern.ch/ComputingHardware/doc/NEC/M360-UserGuide/um/01-05-2-05_installing_general_safety_precautions.htm> |
| **Computer Safety** | PDF | An article explaining Electrostatic Discharge and its implications. This detailed article explains ESD and static electricity, preventing ESD, and tools/materials required when working with electronics. | Mini-Circuits | <http://194.75.38.69/app/AN40-005.pdf> |
| **Computer Safety** | Website | An article discussing the dangers of ESD, working with electricity and how to protect yourself. | [Tim Seifert](http://www.cameratim.com/personal/biography) | <http://www.cameratim.com/computing/electrical-safety> |
| **Computer Safety** | PDF | A document discussing ergonomics along with health & safety issues with working with computers. | PDST (Professional Development Services for Teachers) | <http://www.pdsttechnologyineducation.ie/en/Technology/Advice-Sheets/Ergonomics-Health-and-Safety1.pdf> |
| **Computer Safety** | Website | An article which addresses frequently asked questions related to health and safety when working with computers. The questions address the suitable workstation, the Display Screen Equipment Regulation and eye strain. | HSA (Health and Safety Authority) | <http://www.hsa.ie/eng/Workplace_Health/Display_Screen_Equipment/Display_Screen_Equipment.html> |
| **Computer Assembly** | Website | A comprehensive guide to building your own PC from scratch. This guide is broken into five lessons detailing the hardware basics, choosing the right hardware for the build, and installing an operating system. | Whitson Gordon (available at Lifehacker) | <http://lifehacker.com/5828747/how-to-build-a-computer-from-scratch-the-complete-guide> |
| **Computer Assembly** | Video | A 30 minute video of a computer engineer talking the viewer through the entire build process of a computer built for gaming. The video discusses anti-static protection and explains the necessary components required to complete a build before undertaking the assembly of the complete project. | [EasyPCbuilder](https://www.youtube.com/channel/UCVhsPN8FKHvWVCcQ172U0_w) (available on YouTube) | <https://www.youtube.com/watch?v=0bUghCx9iso> |
| **Troubleshooting** | E-book | *PC Troubleshooting Pocket Guide.* This text troubleshoots common computer problems. The focus is on computer hardware (POST errors, motherboard, video, printer, etc.) but there is also a section dealing with Windows OS issues (slightly dated since this text was released in 2008). There is a section dedicated to the CMOS and another listing DOS commands. | Jean Andrews (available at *Books 24x7*) | <http://skillport.books24x7.com/assetviewer.aspx?bookid=26244&chunkid=260811381&noteMenuToggle=0&leftMenuState=1> |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| Quality and Qualifications Ireland (QQI) | <http://www.qqi.ie/> |
| Further Education Support Service (FESS) | <http://www.fess.ie/> |
| Professional Development Service for Teachers (PDST) | <http://www.pdsttechnologyineducation.ie/en/> |
| Tom's Hardware (Forum & Computer Guides) | <http://www.tomshardware.co.uk/forum/> |
| AnandTech (Hardware reviews & Benchmarking) | <http://www.anandtech.com/> |
| LinusTechTips (Hardware reviews & how-to videos) | <https://www.youtube.com/user/linustechtips> |
| LinuxQuestions (Popular forum for Linux issues) | <http://www.linuxquestions.org/> |
| Slashdot (Technology related news) | <http://slashdot.org/> |

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| **MOOCs (Massive Online Open Courses)** | |
| Free access to online courses  Search regularly for new courses and new start dates | https://www.mooc-list.com/ |
| **SOLAS eCollege –** Courses created for multiple level 5 IT courses offered at PLC level. Includes resources which match our learning outcomes. Content is continuously being developed and added. Registration provided for all ETB employees and various training courses are also available free of charge to ETB staff. Membership includes *Books 24x7* access. | https://www.ecollege.ie/ |

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| **Theme/Topic** | **Type** | **Relevance** | **Author/Source** | **Web Link** |
| **website for classifying computer hardware** | website | Essential reading - important for classifying computer component architecture good resource for material on computer hardware. | Explainingcomputers.com | http://explainingcomputers.com/hardware.html |
| **Understanding computer hardware terminology** | website | Explains key terminology and why understanding specifications are important for key computing components offers further links so this learning might be nurtured. | Quinstreet Enterprise | http://www.webopedia.com/quick\_ref/computer-architecture-study-guide.html#1-getting-started |
| **Understanding computer hardware components** | Website | Essential reading - latest industry news and product specifications that are important for key computing concepts. Updated regularly. | Tomshardware | <http://www.tomshardware.com/t/cpus/> |
| **Explaining computer bus architecture** | Website | Explains key bus concepts, terminology and functionality associated with computer hardware . | Computer Industry site /CCM.net | <http://ccm.net/contents/375-computer-bus-what-is-it> |
| **Principles of computing; system components** | website | Explains the essential components and how it relates to design issues, offers discussion on components and suggestions to selection of hardware. | Yale University | <http://pclt.cis.yale.edu/pclt/PCHW/PLATYPUS.HTM> |
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| **Hardware concepts; CPU structure** | website | Explains a range of key computer systems concepts, for example: the fetch/execute cycle, the boot sequence | Teach ICT | <http://www.teach-ict.com/gcse_computing/ocr/212_computing_hardware/cpu/miniweb/pg3.htm> |
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| **The fetch execute cycle in a CPU** | website | Video Explains fetch/execute cycle | John Phillips Jones | <https://www.youtube.com/watch?v=XM4lGflQFvA> |
| **Hardware components; key concepts binary numbers** | website | Essential reading - skills, knowledge, and understanding) that are important for key computing concepts and offers ideas and suggestions as to how this learning might be enhanced. | BBC education site | <http://www.bbc.co.uk/education/guides/zwsbwmn/revision> |
| **Hardware principles; binary numbers** | website | Provides guidelines on underlying technology principles and explains binary numbers for hardware interactions and design issues. | SStutor | <http://www.sstutor.com/cpp/binnum.htm> |
| **The hardware bootup process** | website | Provides guidelines on underlying technology principles and explains the boot process. | webopedia | <http://www.webopedia.com/DidYouKnow/Hardware_Software/BootProcess.asp> |
| **Health and safety issues** | website | Provides guidelines on health and safety considerations in a computing environment. | Atom content reference site | <http://www.itdonut.co.uk/it/staff-and-it-training/computer-health-and-safety> |
| **Hardware components problem resolution** | website | Discusses common causes of error or failure including component testing and the identification of issues that may have arisen during the construction of a computer system | Mysuperpc.com | <http://www.mysuperpc.com/build/pc_first_boot_common_problems.shtml> |
| **Common causes of failures** | website | Common causes of error and steps to identify issues that may cause concern. | Professor messor  (Comptia Instructor) | <https://www.youtube.com/watch?v=DSf1a6Jxzo4> |
| **Reference Book** | book | Recommended reading - important for classifying computer theory and covering Comptia certification as this may be explored as a career option. (new edition) This book is divided into 28 chapters: Broken down into simple chunks that each explain a short topic, in the computer field. Only some sections of the book are relevant to this programme, however the book has relevance across other QQI programme modules. | Wiley  Quentin Docter et al (Author) | [**http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1119137934.html**](http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1119137934.html) |
| **Reference Book** | book | Recommended reading - important for classifying computer theory and covering Comptia certification as this may be explored as a career option. | Quentin Docter et al (Author) | <http://www.amazon.com/CompTIA-Complete-Study-Guide-220-801/dp/1118324056> |
| **Reference Book** | book | Recommended reading - important for classifying computer theory and covering Comptia certification as this may be explored as a career option. | Mike Meyers | <http://www.mhprofessional.com/product.php?cat=112&isbn=007179512X> |
| **Principles of preventative maintenance** | PDF workbook | Recommended reading - skills, knowledge and suggestions for an assessment exercise. | Techrepublic | [www.nirealtor.com/images/pm**checklist**.pdf](http://www.nirealtor.com/images/pmchecklist.pdf) |
| **Principles of computing maintenance** | PDF workbook | Essential reading - important for classifying computer component maintenance procedures offers ideas and suggestions as to how this might be used in industry . | SMETOOLKIT | <http://www.smetoolkit.org/smetoolkit/en/content/en/586/Sample-Preventive-Maintenance-Task-Sheet-for-PCs> |

**Useful Organisations:**

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| **Name** | **Contact Information** |
| Quality and Qualifications Ireland (QQI) | <http://www.qqi.ie/> |
| Further Education Support Service (FESS) | [www.fess.ie](http://www.fess.ie) |
| Comptia | [www.comptia.com](http://www.comptia.com) |
| Cisco academy | [www.netacad.com](http://www.netacad.com) |
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| **MOOCs (Massive Online Open Courses)** | |
| Free access to online courses  Search regularly for new courses and new start dates | https://www.mooc-list.com/ |
| Selection of content available | What is a MOOC?  <https://www.youtube.com/watch?v=eW3gMGqcZQc>  Providers of MOOCs  e.g.  <https://www.edx.org/how-it-works>  <https://www.mooc-list.com/>  <https://www.coursera.org/>  <https://www.udemy.com/>  <http://www.extension.harvard.edu/open-learning-initiative>  <https://www.uclaextension.edu/pages/search.aspx?c=free+courses>  <http://oyc.yale.edu/> |
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