A PROJECT APPROACH TO DELIVERY
THE DIGITAL RESOURCE CENTRE
Version 1
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INTRODUCTION

The purpose of this guide is to give you an overview of how you could holistically deliver a range of units from Cambridge Technicals in IT Level 3 (IT Infrastructure Technician Pathway) through the delivery of a project.


For the purpose of this guide, the intention is for learners to investigate and analyse an IT infrastructure requirement and formulate a proposal for the replacement of an organisation’s existing IT system which is to become a new digital resource centre. Learners will be expected to tender a proposal that will recommend the acquisition of hardware and software, plan the infrastructure construction, implement the system build, configure the infrastructure components and provide test and maintenance plans. Learners will also propose an IT support facility.

The project consists of five modules, each of which has a number of activities that learners can carry out individually or in learner groups. Many of the activities will require individuals or learner groups to share their results with the group as a whole. Many of the activities require writing of procedures or scripts. It is not intended that these procedures and scripts be in accurate detail and so, these procedures and scripts are referred to as ‘in outline’. Learners will provide any necessary detail in their own individual evidence during final assessment.

When delivering any qualification it is always useful to be able to look at the full range of units selected and consider how they are or could be linked together – a holistic approach.

A holistic approach will provide you with a structured plan to teach the learners how a range of topics work together across a number of units, providing them with some understanding of how skills and knowledge link together in a working environment.

Please note that this Project Approach MUST NOT be used directly for assessment purposes. It is intended to support the teaching and learning of the units specified.
### THIS PROJECT APPROACH ENABLES THE DELIVERY AND FACILITATION OF LEARNING OF THE FOLLOWING UNITS:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Unit title</th>
<th>LO No</th>
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<td>Unit 4</td>
<td>Computer networks</td>
<td>LO1</td>
<td>Understand the concept of networks</td>
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<td>LO2</td>
<td>Be able to plan computer networks to meet client requirements</td>
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<td>LO3</td>
<td>Be able to present network solutions to clients</td>
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<td>LO4</td>
<td>Be able to plan maintenance activities for computer networks</td>
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<td>Unit 18</td>
<td>Computer systems – hardware</td>
<td>LO1</td>
<td>Understand the components of a computer system</td>
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<td></td>
<td></td>
<td>LO2</td>
<td>Be able to propose a computer system for identified business requirements</td>
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<td></td>
<td>LO3</td>
<td>Be able to build or upgrade computers</td>
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<td></td>
<td></td>
<td>LO4</td>
<td>Be able to test and evaluate the functionality of computer systems</td>
</tr>
<tr>
<td>Unit 19</td>
<td>Computer systems – software</td>
<td>LO1</td>
<td>Understand different software installations and their purpose</td>
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<td></td>
<td></td>
<td>LO2</td>
<td>Be able to implement software installations and upgrades to meet specified user requirements</td>
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<td></td>
<td></td>
<td>LO3</td>
<td>Be able to conduct system maintenance using utility software</td>
</tr>
<tr>
<td>Unit 20</td>
<td>IT technical support</td>
<td>LO1</td>
<td>Understand the role of technical support</td>
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<td></td>
<td></td>
<td>LO2</td>
<td>Be able to diagnose faults and solutions for computer systems</td>
</tr>
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<td></td>
<td></td>
<td>LO3</td>
<td>Be able to provide advice and guidance to specific customers</td>
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</table>
The intention is that the learners will be taught a range of knowledge and skills within each of the units and then carry out relevant review activities at various stages. Each of the review activities (once successfully completed by the learner) will provide all the required underpinning knowledge for their final assessment.

The practice review activities within the modules must not be used for final assessment purposes of Cambridge Technicals in IT Level 3.

Model assignments for each of the mandatory centre-assessed units (Units 4, 5, 6, 7 and 8) for Cambridge Technicals in IT Level 3 units or can be found at [http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-it-level-3-certificate-extended-certificate-introductory-diploma-foundation-diploma-diploma-05838-05842-2016-suite/](http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-it-level-3-certificate-extended-certificate-introductory-diploma-foundation-diploma-diploma-05838-05842-2016-suite/)

It is assumed that the learners will be given the opportunity to carry out activities that will enable them to practice the skills they have learned within each module prior to being given final assessment activities.

When considering a holistic approach to delivery and learning it is important to consider the overall objectives. In this guide the objectives are to:

- Deliver four units of Cambridge Technicals in IT Level 3.
- Structure a programme of learning and reviews which is exciting and engaging for learners.
- Provide learners with an overview of how the knowledge and skills gained in one unit, support the knowledge and skills used within other units.
- Provide the learners with an opportunity to consider how they would use their social and communication skills holistically within the working environment.
ABOUT THE MODULES AND ACTIVITIES

The guide is divided into five modules which may be sub-divided or combined according to the teaching time available.

The tables below show where each of the modules in this project provides delivery approaches and learning opportunities to ensure a thorough review of skills and understanding, prior to final assessment and evidencing by the learner.

Please note that should assessment be presented in a similar holistic way, learners must be able to present clearly mapped evidence for each of the centre-assessed units (Unit 4, 18, 19 and 20).

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<th>LO2</th>
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ASSESSMENT OF UNITS

This project provides opportunities to produce additional and separate evidence to meet the assessment requirements of Units 4, 18, 19 and 20.

This is summarised in the table below which indicates how each Module and Activity provides an opportunity for additional and separate evidence for each unit. Completion of the modules does not guarantee all criteria have been met; this is entirely dependent on the quality of the evidence produced.

This Project Approach should be read in conjunction with the published grading criteria in the unit documents.

**METHODS OF ASSESSMENT**

<table>
<thead>
<tr>
<th>Unit No</th>
<th>Unit title</th>
<th>How are they assessed?</th>
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<tbody>
<tr>
<td>Unit 4</td>
<td>Computer networks</td>
<td>Internal = Centre assessed and moderated by OCR</td>
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<tr>
<td>Unit 18</td>
<td>Computer systems – hardware</td>
<td>Internal = Centre assessed and moderated by OCR</td>
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<tr>
<td>Unit 19</td>
<td>Computer systems – software</td>
<td>Internal = Centre assessed and moderated by OCR</td>
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<tr>
<td>Unit 20</td>
<td>IT technical support</td>
<td>Internal = Centre assessed and moderated by OCR</td>
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The Academy is a local school for 11-19 year learners. The current IT infrastructure of the school has been acquired as a 5-year lease from an external provider and expires in 12 months. During the 4 years, there have been many developments in technology to include the emergence of streaming technology and other Internet applications. These developments would really help the staff and learners at The Academy, but the aging hardware and software are not capable of hosting these new technologies. The school have, therefore, just completed a 4 month consultation with all stakeholders as to what provision is necessary for a new IT infrastructure.

There are approximately 1200 learners and 200 staff in The Academy all of whom require user access to the school network. The current system allows each user an allocation of 100 MB of storage for their own data and it has been proposed that this is increased to 1GB in the new system. User data must be available to staff and learners throughout their entire time at the school.

Users may also need to have access to shared storage areas on the network through membership of various groups in order to facilitate assessment by tutors on a subject basis. For example, membership of the Year12 Maths Group would enable the member to securely download assessment material and upload work to the shared storage for this group.

Although users have unlimited access to the network whilst on the school premises, there is now a need to move to access from outside the school on a 24/7 basis to facilitate a new e-learning initiative.

Users must be able to remotely or locally:
- access their storage for upload and download
- get help with the aid of an on-line forum
- use the school virtual learning environment
- access the school library of streamed video and audio files.

The school also want to pilot the use of tablet computers for internal and external access to the network for sixth form learners.

The school administration, including finance, is also hosted on the same network and must be kept secure from access by learners and under controlled access by staff.

Experience with the existing network has been disappointing; users find it often takes a long time to log in to the system, access to files is very slow, some user accounts have been hacked resulting in loss of data and virus infections are causing a lot of down time for the network.

It is important that there is good overall security, high network speeds and good response on all devices used to access the network. Security will be especially important because it is intended to allow remote access to the network from outside the school premises.

It is essential that all aspects of the new infrastructure have a responsive IT support team including an IT Help Desk to ensure that the users’ experience of the network is within limits specified in a Service Level Agreement.

The school currently experiences various problems with the maintenance and support of the existing network. This is mainly due to the fact that different companies are responsible for maintenance and support and it can often be difficult to get an agreement on who is responsible for a particular issue. A further complication is that neither of these companies was involved in the build of the existing system and this has led, in some cases, to very lengthy periods in resolving problems. For example, users are currently unable to use social networking with the school Virtual Learning Environment. The company responsible for the VLE have reported that the problem lies with the school web-server. The company responsible for the web-server support have carried out tests but report that no problems exist.

The Academy wants to have a single provider to:
- propose a network infrastructure that will replace the existing system
- produce a user acceptance test plan for approval by The Academy
- select all hardware and software components of the infrastructure
- implement the building of server and workstation computers
- implement the building and configuration of the network infrastructure
- plan and execute testing
- maintain the network infrastructure
- provide full IT support for all users and staff.

You, as an IT services provider have been asked to meet with senior management of The Academy to discuss requirements for the new IT infrastructure.

You will be expected to analyse a given set of user requirements, plan an IT infrastructure replacement to meet those requirements and decide how the IT replacement plan will be implemented. You will then produce a maintenance plan for the new infrastructure and detail how users will be supported by the new IT Support Help Desk.
ANALYSING USER REQUIREMENTS FOR THE INFRASTRUCTURE


The delivery begins with Unit 4 Computer networks.

The first steps in designing a network for a client are to conduct a thorough analysis of the user's network infrastructure needs. What must be the user experience of the network infrastructure? The analysis will result in a list of user requirements which must be agreed with the client. This should include how it will be used and accessed etc.

After the user requirements have been formulated and agreed with the client, the proposed physical layout of the network can then be drawn up. The layout diagram will illustrate all the hardware of the system and all the connections between hardware components. Where will the servers and routers be located within the building? How will these components be physically connected to the network and where will the components receive mains power? These are some of the considerations that will need to be taken into account when drawing up this diagram. This is a vital communication document between the proposer and the client. The diagram can be used as a tool to reach agreement on the proposed infrastructure.

With the physical structure agreed with the client, the next step will be to populate the diagram with the details of all the hardware, software, and protocol information. The design process will require an understanding of all the elements of an infrastructure diagram. The expanded detail of the network diagram can now be used in making a selection of individual components. What motherboard and CPU for a server? Are the CPU and motherboard compatible? What disk drive to select for the desktop PC?

The motherboard of a computer will be chosen on the functionality it makes available to the network infrastructure. There is a very wide range to choose from in selecting for a particular set of user requirements. The motherboard itself is populated with a wide range of electronic devices; the chipset, perhaps a graphics interface, a network interface, an audio interface, or even all of these. Devices on the motherboard will often require ‘drivers’ to be able to communicate with the operating system through the BIOS when it has been installed.

A CPU and cooler must be chosen that will support user requirements and be compatible with the chosen motherboard.

Next there will have to be choice of memory of suitable speed, capacity and also compatibility with the motherboard.
A power supply is also required and this must have a sufficient capacity to cope with the highest demand, perhaps on a 24/7 basis.

Storage is also an essential element of the computer system and this must be chosen appropriately. The operating system may have to have its own dedicated disk and be chosen for the features that suit that particular operating system. Data storage may have to be separate from the operating system storage and chosen where high capacity may be more important than speed of access.

The motherboard will now need to be fitted into a suitable case for the environment in which it will operate. Connections will need to be made to the case from the motherboard, for example by front panel USB sockets.

A suitable operating system will need to be chosen. Considerations of 32bit or 64bit versions must be made and the version must also be compatible with the chosen CPU.

The activities that follow are intended to guide the learner through the four units of this project.

Contains within the following assessment criteria/units/LOs:

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<thead>
<tr>
<th>Unit number</th>
<th>LO number</th>
<th>Learning Outcome</th>
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<td>Unit 4</td>
<td>LO1</td>
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<td>LO2</td>
<td>Be able to plan computer networks to meet client requirements</td>
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<td>Be able to present network solutions to clients</td>
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<td>LO4</td>
<td>Be able to plan maintenance activities for computer networks</td>
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<td>Unit 18</td>
<td>LO1</td>
<td>Understand the components of a computer system</td>
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<td>LO2</td>
<td>Be able to propose a computer system for identified business requirements</td>
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<td>Unit 19</td>
<td>LO1</td>
<td>Understand different software installations and their purpose</td>
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During the delivery of the units, the learners should carry out a range of activities to demonstrate and check their knowledge and understanding. They should also undertake review activities as they work through the programme of learning.
ACTIVITY 1 – ANALYSING USER REQUIREMENTS

The tutor could introduce this topic by demonstrating the components of a network infrastructure and how these might be chosen by analysing a particular set of user requirements.

Learners must understand that a successful network infrastructure can only be achieved by thoroughly analysing what the users require from that network infrastructure. It is important that the provider and the client are in full agreement before any further work can proceed on the proposal. The resulting network diagram is a vital communication document as well as the basis for the subsequent planning.

Learners could then analyse a reduced set of user needs themselves to determine the components of an Internet connected network infrastructure. They could create a list of components that will satisfy requirements. The set of requirements should be wide enough to ensure that there is a representative range of components chosen for the list. This activity could be carried out in groups but it is important that learners seek agreement from the tutor.

The list of components derived by learners can be used as a basis for carrying out the remaining activities. However, the tutor could provide a realistic set of user requirements that will enable learners to complete the remaining activities.

A set of user requirements is available at:

ACTIVITY 2 – CHOOSING A MOTHERBOARD

This topic could be introduced by the tutor using a real hardware motherboard. A demonstration could be carried out with the motherboard on its own and then inside a computer where the connections to external devices can be observed by the learners. The components of the hardware could all be identified and their functionality explained. The tutor could discuss the need for a chipset and how external components can be connected to the motherboard. Procedures for connecting the motherboard can be shown and health and safety precautions emphasised.

Learners must understand that the selection of the motherboard will have an impact on the choice of other components within the computer. The memory type and address range, the CPU type, the disk drive type and capacity, graphics and network capability are all influenced by the choice of motherboard. It may be required to choose extra hardware to fit on the motherboard where existing integrated functionality does not exist or does not meet user requirements. For example, some motherboards do not host an integrated graphics processor and so will need an external graphics processor fitted whilst other motherboards may integrate the graphics processor on the motherboard but its features may not be good enough for a gaming application.

The learners could be split into two groups.

One group of learners could then investigate the choice of hardware components required to build a server computer to fulfil a user requirement. This could be carried out by having a detailed examination of a physical motherboard that would be suitable to support a server and ideally a server that is functioning within their own organisation.

Each area on the motherboard is of interest in the planning process. For example, the motherboard will determine the range of memory that can be accommodated and it also restricts the type of CPU that will be compatible with it.

The learners could then document their findings which would include:

- Memory
- Storage
- BIOS
- Network
- Graphics
- USB.

Information on the details of motherboards can be found at:
http://www.buildcomputers.net/motherboard-components.html

Another group of learners could investigate the role that device drivers play on the motherboard and the IT support requirements for these drivers. For one device on the motherboard, learners could compose an email to a technical client type user to explain:

- How to find a device driver for a new motherboard.
- The function of the driver.
- How to install the driver.

Although the device driver is most often used by the operating system of a computer, they can be installed, updated and removed without an operating system being present. This usually occurs with a new motherboard installation prior to installing an operating system.

Groups could then report their results back to the whole group.

Some information on device drivers can be found at:
http://pcsupport.about.com/od/termsag/g/term_driver.htm
ACTIVITY 3 – CHOOSING A CPU

Learners must understand the role that the CPU plays as a component on the motherboard of a computer. The tutor could introduce this topic by describing how the CPU executes the instructions it retrieves from memory on its data bus, from a memory location specified by the combination of digital values placed on its address bus.

It is important that learners understand that the CPU is designed to work with a specific type of motherboard. The tutor could demonstrate how a suitable match can be chosen between the choice of CPU and a motherboard by accessing an online supplier such as ‘ebuyer.com’ and using the published specifications to identify the important features. Learners could then observe the procedure for fitting a CPU to the socket on the chosen motherboard and noting especially the care required to ensure that the positioning on the socket is correct and the safety precautions to be taken against electrical or mechanical damage.

Learners should know that the inside of a CPU contains millions of transistors and these generate a burning level of heat when the processor is running. Insufficient removal of this heat can result in intermittent system behaviour or even complete failure. The tutor could demonstrate the fitting of a suitable cooling system and the need to use thermally conductive material to ensure good heat transfer between the cooler and CPU.

The underside of the CPU has a large number of electrical pins for connecting to a motherboard socket. The pins are very delicate and incorrect insertion can result in irreparable damage. These factors have implications for IT support staff.

The learners could be split into two groups, with one group being given the identity of a specific motherboard. They would research the following:

• A suitable CPU for the selected motherboard.
• List features that make the CPU suitable for a server.

Some helpful information can be found at:
https://www.youtube.com/watch?v=82bEmgvZuXk

Another group of learners could investigate the IT support implications of installing and maintaining the CPU of a server computer and write outline IT support scripts for the following:

• Installing a new CPU.
• Installing a CPU heatsink.
• Dealing symptoms of CPU overheating.
• Remedies of CPU overheating.

Some useful information can be found in the following clip:
https://www.youtube.com/watch?v=H3yTF6wqTbg

The groups could then report their findings back to the whole group.
ACTIVITY 4 – CHOOSING STORAGE

Learners must understand that all computers require storage for applications and data. The type of storage and the required storage capacity will depend on the function to be carried out by the computer; a file server, mail server, video streaming server (perhaps all three), for example. A server might use a fast Solid State Disk (SSD) to hold the operating system. SSDs allow very fast access to the stored data but these types of disks are unlikely to be able to hold the large amounts of data typically held on a file or video-streaming server.

The tutor could introduce this topic by demonstrating a range of computer types such as desktops, file servers, database servers and web servers by discussing the storage arrangements for each type.

Learners should understand that the choice of drive is important to the planning of hardware; some disks have very limited capacity but fast access times, others have much larger capacity but perhaps much slower access times. Data can now be stored in the cloud and this storage method carries its own implications for use and IT support.

Learners could investigate the storage requirements for a streaming video server. The server requires storage for the operating system and also the school library of video files which are currently 6 TB in size. There is choice between Direct Access Storage and Network Attached Storage, each choice has its advantages and disadvantages.

The learners could be divided up into two or more groups. Each group could investigate the choice of suitable storage for the:

- operating system
- video data.

Give reasons for choosing a particular type of drive.

The following document may be helpful:

https://vanillavideo.com/blog/2014/started-storage-understanding-san-nas-das

The groups could then report their findings back to the whole group.

ACTIVITY 5 – CHOOSING AN OPERATING SYSTEM

Learners must understand that it is the operating system of a computer that enables any applications to use the hardware in a standard way. Developers can create applications without having to program the hardware directly. Programming applications for a wide range of CPUs and motherboards would be all but impossible if the developer had to access the hardware directly. The range of features required by the computer will influence the choice of operating system.

The tutor could demonstrate the role played by the operating system in making the hardware easy to use and the importance of the BIOS in providing a standard hardware interface to hosted applications. Operating systems currently come in 32-bit and 64-bit versions and the choice of a particular bus-width will have IT support implications for future upgrades because a 32-bit version cannot usually be upgraded to a 64-bit version and vice versa.

Learners could then analyse a given set of user requirements to choose the operating system for a video streaming server computer. It is important to consider the operating system during the planning phase because applications will depend on it and, once installed, the operating system will usually stay on the computer for its lifetime or until it is upgraded.

The learners could be split into two or more groups. The groups could then investigate the choice of an operating system and give reasons for their choice.

The following document may be helpful to learners:

https://blogs.msdn.microsoft.com/e7/2009/05/12/media-streaming-with-windows-7/

The groups could then report their findings back to the whole group.
ACTIVITY 6 – WRITING A COMPUTER USE POLICY

Learners must understand that once the new computer system comes into operation it may be the target of viruses, hacking, copyright and data protection violations and even vandalism.

Tutors could introduce this topic by discussing the wide range of attacks that a computer can come under as a result of negligence or deliberate misuse by users. For example, use of simple passwords or leaving passwords written on post-it notes next to the computer is simply inviting a hacking experience.

The learners could be divided into two or more groups. Each group of learners could investigate the ways in which the opportunity for attacks on a computer can be reduced.

The owners of the IT infrastructure will require the publication of a set of do’s and don’ts with regard to the use of computers in infrastructure. This publication is called a policy.

Each group could then create an outline computer use policy for the desktop computers connected to the infrastructure. These computers can be used by all staff and learners in the school. IT Support require this policy to govern what users can and cannot do when they use the computer.

You may find the following document helpful:

https://security.berkeley.edu/computer-use-policy

Groups could then report their findings back to the other groups.
PLANNING THE NETWORK INFRASTRUCTURE


The delivery continues with Unit 4 Computer networks.

Having developed an understanding of the components required to create a network infrastructure that complies with a given set of user requirements, it is now time to start the planning phase of the project.

First will be the creation of a diagram. This diagram will show how the network will be laid out in the school building. The network diagram will also be a key document in communicating the infrastructure proposal to the ‘The Academy’ and it will become populated with more detail as the plan evolves. Each device on the diagram will be expanded to detail all its hardware and software requirements. The diagram will also include network protocol details such as IP addresses, subnet masks and default gateways.

The diagram will be used to create a User Acceptance Test Plan. UATs are designed by the client, or at least they are agreed by the client before the project can begin. The UATs represent what the client will expect to get from the network if the project is to be deemed a success. Failure to achieve success in the UATs may mean failure of the provider to be paid for work carried out on the infrastructure work. The UATs will help to keep the project team focussed on what is required in order to achieve successful project completion.

The development of the IT support system will begin during this planning phase. Component details will be documented as well as the configuration of network protocols and security settings etc. The documentation will be used, for example, to organise the first, second and third line IT support requirements, staff training and the creation of IT support policies.

MODULE 2

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ACTIVITY 1 – CREATING A SOLUTION PROPOSAL

The tutor could introduce this topic by demonstrating the information conveyed by a network diagram. The tutor could then show how a network diagram can be constructed from a set of user requirements using industry standard recognised symbols. Microsoft Visio might be used to construct a diagram or there are free versions of CADE DIA and Diagram Designer for download. It is not necessary to use software to create such diagrams but constant changes to hand drawn diagrams can become very tedious and messy for learners.

The tutor could discuss the advantages of a well detailed infrastructure diagram in providing a means of communication between those involved in the planning. The diagram can give early warning of problems that may arise during network implementation.

The learners could then be split into two groups of learners. One group could use the list of network components obtained in Module 1 analysis to create an appropriately labelled diagram to illustrate the layout of the infrastructure and network topology.

Some helpful network topology diagrams can be found at:

http://www.conceptdraw.com/samples/network-diagram

The other group could then identify one IT Support role that could be required for this infrastructure and list some support tasks that could be carried out for the identified role.

An infrastructure support document is available at:

http://www.portical.org/Presentations/Barnett/infra/notes.pdf

The groups could now report their findings back to the whole group and put plan together.
ACTIVITY 2 – PLANNING THE VIDEO STREAMING SERVER SPACE

The tutor could introduce this topic by discussing work that will be undertaken by the video streaming server space. Servers will usually be running 24/7 so the components chosen will have to be of sufficient quality to withstand the duration of running as well as the loading that will be placed on them. The hardware and software of the server will be processing work for many users at the same time, unlike the typical use of a desktop where most of the work is carried out for a single user.

Learners must understand that the server requirements will influence the motherboard that will be chosen and that the motherboard will limit the range of CPUs than can be used with that motherboard. Learners must also understand that the user requirements will also influence the type and capacity of memory, disk storage, network adapter and even the power supply that will be chosen.

The tutor could arrange a visit to the server room of the centre’s existing network. A tour could be conducted by an IT technician if possible. It is important that learners can visualise real servers in a professional IT environment.

The learners could be split into two or more groups. Each group of learners could then use the result of user requirements analysis in Module 1 to select actual software and hardware components that would be suitable for the server.

Helpful information on choice of computer components can be found at:

http://www.wikihow.com/Choose-Components-for-Building-a-Computer

Groups could the report their findings back to the whole group and identify the best solution.
ACTIVITY 3 – CHOOSING AN OPERATING SYSTEM

The tutor could introduce this topic by discussing the importance of the operating system running on a computer. A desktop computer could be used for the majority of the discussion. Operating systems look much the same on the surface whether they are on a desktop or on a server. The learners could be shown some of the major differences between the two types of operating systems.

Learners must understand that hardware alone will not make a server. The features required to provide the services offered by a server can only be provided by software of the operating system. The tutor could show how the operating system provides an interface to the capabilities of the installed hardware.

Learners should also understand that some services, such as streaming video, may not be supported by some operating systems and also that even with the same operating system there may be different efficiencies and features to be had from 32-bit versions and 64-bit versions.

Another factor is that some applications and devices may not be compatible with an operating system that may otherwise seem like a good choice. Hardware drivers can be particularly problematic where even simple operating system updates can render the drivers useless.

The learners could be split into two groups. One learner group could then use the analysis carried out in Module 1 to select a suitable operating system for the streaming video server. Another group could use the Module 1 analysis to choose an operating system for the desktop.

Helpful information in choosing an operating system can be found at:
http://networking.xtreemhost.com/wp/?cat=88&ckattempt=1

Each group could now report their findings back to group in the form of a table containing the important features.

ACTIVITY 4 – PLANNING BACKUP STORAGE

The tutor could introduce this topic by considering the need to protect operating systems and data against loss or corruption. Learners should understand the implications of loss of operating system or system/user data due to hardware failure. The installation of an operating system, configuration of its services, creation of computer accounts, allocation of storage space and many other tasks on a running server would take a very long time to restore, after loss or corruption, by doing a manual re-installation. IT support can use a range of techniques to restore a system that has failed and many of these rely on up-to-date backups being available.

The tutor could then demonstrate the backup features of an actual operating system and show that successful backup will require hardware of enough capacity to store the backed up data. Most computers will have backup facilities built in to the operating system.

Learners must understand that the backup solution will require enough capacity to store all the planned storage.

The learners can be split into two groups. Each group of learners could then investigate the selection of a backup storage device for the network infrastructure. The analysis of Module 1 can be used in selecting a real backup solution.

The learner groups could then create a table of important properties of the hardware and software of the backup solution they have chosen and report this back to the group.

Some helpful information regarding choice of backup storage can be found at:
http://www.backupschedule.net/choose-backup-storage.html
http://typesofbackup.com/types-of-storage/
ACTIVITY 5 – SELECTING A WIRELESS ACCESS POINT

The tutor could introduce this topic by discussing how devices with only WiFi network capability can connect to the network infrastructure; tablets and many laptops can only connect to networks using wireless technology.

Learners should understand that although devices like tablet computers come already WiFi enabled, network infrastructure components do not normally have a mechanism for connecting wirelessly, they usually depend on a wired connection to a network adapter.

The tutor could then demonstrate a wireless access point and show that it can be configured on the wireless side to communicate with wireless computers such as tablets or laptops, and on the other side can be wired to the hardware of the network infrastructure. Wireless access points host features that enable them to be controlled and secured by software on the operating systems of the network to which they are connected.

The group could be split into two or more learner groups. From the analysis of user requirement from Module 1 each group could then investigate the selection of a suitable wireless access point to enable tablet access to the infrastructure. The learner groups could then report their findings back to the whole group and using the network configuration diagram to show where the access point would be located and also provide a table of important hardware and software properties of the chosen access point and discuss solutions.

Some useful information regarding choice of access points can be found at:


ACTIVITY 6 – PLANNING USER ACCEPTANCE TESTS

The tutor could introduce this topic by discussing the need for a set of tests that will confirm that the completed network infrastructure provides the client with everything that is specified in the user requirements.

Learners should understand that these tests are not the normal functional testing that would be carried out by the project team during the infrastructure build. User acceptance tests are designed by the client for the clients benefit to ensure that the client is getting what they are going to pay for. UATs are created at the planning stage when the planned network infrastructure is known.

The tutor could explain that although, in this case, the learners are being asked to create the UATs it is usual that a third party would provide these to the team as part of the overall infrastructure proposal package.

The learners could be split into two groups. Each learners group could then use the analysis of user requirements carried out in Module 1 to help to plan some tests that will be carried out when the design is complete.

The learners could then report their tests back to the whole group and seek agreement with the tests from the tutor.

Helpful information User Acceptance Testing is can be found at:

http://www.softwaretestinghelp.com/what-is-user-acceptance-testing-uat/

https://techwalla.com/content/plan-user-acceptance-test
IMPLEMENTING AND TESTING THE NETWORK INFRASTRUCTURE

The delivery now moves onto Unit 18 Computer systems – hardware.

This phase of the project is where all the planned components are brought together to implement the network infrastructure. Some pieces of the hardware of the infrastructure may be purchased ‘off the shelf’ such as an Internet router or a tablet computer. Other components such as servers or desktop computers are going to be built from scratch using appropriately chosen hardware. All the hardware is then cabled together to provide the planned connectivity.

The operating system and services will then be installed and configured, network connectivity will be configured and connected to the Internet. Applications will be installed and configured, user accounts will be created and user storage allocated.

During this phase, the implementation information will be documented for future use by IT support and maintenance staff.

The component build must consider health and safety requirements. The build must also then have a suitable operating systems, drivers and required applications installed and these will also have inventory, maintenance and IT support implications for the infrastructure.

It is also important that the client and other stakeholders, especially the finance and IT support staff, are involved in the building of the system. Approval will need to be sought from the accounting team for any items that need to be purchased to ensure that the completed project meets its budget. Similarly the IT support staff will need to approve of items that will require maintenance after completion as well as agreeing to the configuration documentation of the build. IT support staff will need to be aware of any support that will be provided by vendors of purchased items such as routers and network switches so that these can be factored into their support plans.

MODULE 3

Contained within the following assessment criteria/LO(s)/units:

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ACTIVITY 1 – BUILDING A SERVER OR DESKTOP

The tutor could introduce this topic by discussing the process of building a server or desktop computer. It is important that health and safety precautions are taken to ensure personal safety and the protection of sensitive electronic hardware.

Learners must understand that building a computer is a reasonably straightforward process. But a really successful build will require careful observation of safety rules and the use of appropriate tools. Electronic components are susceptible to electrostatic charge, wrong connections, bent pins and so on. Motherboard manuals provide a wealth of information to guide the progress of a build. Incorrect configuration at this stage can be very problematic because there are few troubleshooting hints available.

The tutor could then demonstrate how the motherboard BIOS can be used to configure the hardware of the computer during the build and prior to the installation of the operating system. It is important that learners understand that some features of the motherboard can only be made available to the operating system through BIOS configuration.

The learners could be split into two groups. One learner group could then investigate the building of a server computer in accordance with user requirements. The other group could investigate the building of a desktop computer in accordance with user requirements.

Each group could then report back to the whole group with an outline IT support procedure for the build and test of their computer.

The following resource will provide information on building a computer:

http://www.wikihow.com/Build-a-Computer
ACTIVITY 2 – INSTALLING AN OPERATING SYSTEM

The tutor could introduce this topic by discussing the process of installing an operating system on a computer. Installation of a new operating system will be required on a machine that does not have an operating system on it. This means that the hardware of the computer must meet the specification of the operating system being installed.

Learners must understand that operating systems are usually distributed on DVD. This means that the bare hardware must have the capability of reading this media. The initial configuration is carried out on the hardware by pressing a special key or key sequence on the keyboard during start-up. The special key is commonly the DEL key. This process runs a procedure from the BIOS that enables the configuration of the drive that the computer will boot from during start up. Failure to configure this correctly can lead to the computer not accessing the DVD at start up.

The tutor could demonstrate the installation requirements of a particular operating system and discuss the licensing requirements of installing this type of software. The demonstration should use a real computer and be a real installation process.

The learners could then investigate the installation of the chosen operating system on chosen new hardware. IT staff will require a procedure to follow in order to successfully install the new operating system and records will need to be kept of all installation details that could be used by IT support staff when the system becomes live. Records could include computer name, location, licencing and hardware details.

The learners could be split into two groups. Each learner group could then write an outline procedure that could be used by IT support staff to install an operating system.

The learners could then report back to the whole group and include a table of some items that could be recorded for future IT support use.

Helpful information regarding a clean install of Windows 10 can be found at:

http://www.howtogeek.com/224342/how-to-clean-install-windows-10/
ACTIVITY 3 – ADDING EXTERNAL STORAGE

The tutor could introduce this topic by discussing why external storage might be added to a computer. With appropriate device drivers installed on a computer the external storage will appear just like internal storage on the computer.

Learners must understand that there are occasions when external storage is essential, for example, when very large capacities are needed or when the external drive must be shared with other computers.

The learners could be split into two groups. One learner group could investigate the introduction of Network Attached Storage (NAS) devices and the other group could investigate the introduction of Storage Area Network (SAN) devices to the infrastructure for Video Streaming Storage. Each group could examine the details of how this type of storage would be connected to a network infrastructure and any precautions that can be used to avoid a single point of failure if there are problems with this storage component.

Learner groups could then report back to the whole group with outline procedures to:

1. Install a NAS or SAN device.
2. Avoid single point of failure of the SAN or NAS.

Information on NAS installation can be found at:

ACTIVITY 4 – INSTALLING A NETWORK SWITCH

The tutor could introduce this topic by discussing how the Ethernet protocol uses the available bandwidth of the connecting cable. Ethernet ‘listens’ to the line to determine a quiet time when a signal can be sent on the cable. If more than one computer tries this operation at exactly the same time then the transmitted signals will ‘collide’ and both signals will be corrupted.

Learners must understand that this is expected behaviour, usually called a ‘collision’, and the Ethernet protocol is smart enough to force both senders to re-transmit again at different times. Unfortunately, if the network is very busy then it is likely that the retransmission will result in a collision with another device that is trying to send for the first time. The end effect is that under heavy load the traffic on an Ethernet network quickly comes to a standstill.

The tutor could then demonstrate how a network switch identifies the source and destination address of the signal passing through the switch and opens a private path between the sockets connecting source and destination computers. This will result in zero collisions and maximum use of the bandwidth between sender and receiver.

The learners could be split into two groups. Each group could then investigate an outline IT Support document that illustrates how a network switch can be connected to the network infrastructure to connect the desktops and servers together. The document will be used for maintenance by IT support staff after the network infrastructure goes live. The illustration could include IP details.

The groups could report their results back to whole group.

Network switch information can be found at:
https://en.wikipedia.org/wiki/Network_switch
**ACTIVITY 5 – CONFIGURING TCP/IP**

The tutor could discuss the process of configuring TCP/IP on the network adapter of a server. The learners should already be familiar with the operation of TCP/IP protocol. IP information from the network diagram could be used to determine all the essential IP parameters for the server network adapter. The tutor could then show how the IP parameters can be set and modified and how the IP configuration may be tested by using tools built into the operating system.

The learners could be split into two groups. One learner group could investigate the procedure to be used to configure and test TCP/IP on the server. The other group could investigate the procedure to configure and test TCP/IP on a tablet computer. IT support staff require an outline procedure for protocol configuration and connectivity testing on network components. Tablet computers rely on the network providing DHCP.

The groups could then report their findings back to the whole group.

Learners may find the following configuration information helpful:


Diagnostic information for TCP/IP can be found at:


**ACTIVITY 6 – CHOOSING A FIREWALL**

The tutor could introduce this topic by discussing the nature of network services that run on most computers. These services perform tasks like receiving and sending email, hosting web pages, communicating instant messages, receiving GPS to display information on SATNAV etc. Learners could be asked to cite specific services they think may be on their own phones as part of their installed apps.

Learners must understand that in order to connect to a TCP/IP service it is necessary to not only identify the IP address of the device running that service but also the port number on which the service is listening. If the service running on a computer’s IP address and port number can be identified then it is easy to communicate with that service remotely. Rogue services can be installed on computers easily through users clicking on dubious links on email messages such as those claiming to be from a bank or government department such as HMRC. Once installed, these rogue services can do anything on a computer that the rogue service is programmed to do, limited only by security permissions on that computer.

The tutor could demonstrate the listening ports and the services running on those ports of a Windows computer by using the command prompt tools on that computer:

- `netstat -a -n -o`
- `netstat -ab | more` (requires the command prompt to be in Admin mode)

The tutor could then demonstrate how to open the Windows Firewall on a computer and view the settings.

The learners could be split into two groups. Each learner group could investigate the Windows Firewall tool on a computer. The learner groups could then provide outline IT support documentation for:

- Opening a port on the computer firewall.
- Closing a port on the computer firewall.

The groups could then report their procedures back to the whole group.

Learners may find the following configuration information helpful:

A brief overview of TCP/IP communications:

http://www.taltech.com/datacollection/articles/a_brief_overview_of_tcp_ip_communications

Use Netstat to See Listening Ports:


How to Configure Windows Firewall:

http://www.techtalkz.com/windows-7/515977-how-configure-windows-firewall-windows-7-a.html

This is for Windows 7 but configuration is the same on other versions of Windows.
MAINTAINING THE NETWORK INFRASTRUCTURE

The delivery continues with Unit 18 Computer systems – hardware.

Now that the system infrastructure is in place and user acceptance tests are successfully signed off by the end user, the network will now enter operation by its users. Users will report problems, devices will fail, disk drives will fill up, files will be accidentally deleted, viruses will be introduced and configurations will change, environmental conditions will change, disasters will occur, to name but a few of the many problems that will now face IT support staff. The network infrastructure will need to be maintained to ensure that the system always provides the best performance with regard to the initial requirements.

Baselines provide IT support staff with information relating to the current performance of the network. Comparing future performance data with the baseline will inform maintenance staff of any system deterioration and the ability to take pre-emptive action to avoid problems. Performance information is divided into four main areas: CPU, Memory, Disk and Network. Monitoring utilities and diagnostic tools tend to also fall into these groups. Some tools are built into the operating systems and some come from third-party providers.

During the delivery of the units, the learners should carry out a range of activities to demonstrate and check their knowledge and understanding. They should also undertake review activities as they work through the programme of learning.
ACTIVITY 1 – BACKING UP FILES

The tutor could introduce the many ways that users can have problems with the data they are storing on network storage. Sometimes a user will inadvertently delete a file or save a file with a name that accidentally overwrites another important file. Sometimes these ‘accidents’ do not reveal themselves until the deleted or corrupted file is next required.

Learners must understand that an operational network must have procedures available to enable lost or corrupted files to be restored to the user. Sometimes the operating system will provide assistance in the form of access to ‘previous versions’ sometimes the file will need to be restored from a previous backup.

The tutor could then demonstrate the operation of the backup software of a server or desktop and show how a backup might be scheduled automatically.

The learners could be split into two groups. Each learner group could investigate how data for the users may be recovered when files have been accidentally deleted or become corrupted. Learners could experiment with the backup utility of a server or desktop computer. Backup software is usually bundled with all operating systems and third party companies provide additional sophisticated backup solutions.

Groups could then report back to the group with an outline procedure and schedule for carrying out the following backup types:

1. Full.
2. Differential.
3. Incremental.

Helpful information on backups can be found at:

http://typesofbackup.com/
ACTIVITY 2 – DISASTER RECOVERY

Having the odd file accidentally lost by a user or corrupted is one thing. But what if the drive containing ALL of the user data became corrupted and unusable? What if the server itself was damaged by fire, flood or even stolen? What if the drive holding the operating system crashed? The tutor could introduce this topic by discussing consequences of different disasters and the strategies and procedures that are available to deal with them.

Learners must understand that not being prepared for disaster events isn’t an option for any organisation. The better prepared the IT staff are by having a procedures and resources for every possible disaster event means that the requirements for the Service Level Agreement should always be met.

Learners could investigate disaster recovery planning for the network. The Service Level Agreement will specify how quickly the system must be restored in the event of any disaster. Learners could research the disaster planning of a particular type of disaster such as a server disk failure. IT support staff will require recovery procedures to cover every disaster eventuality.

The learners could be split into two groups. Each group could then write an outline disaster recovery procedure for a real computer that could be followed by IT support in the event of a hard disk failure on the video streaming server.

Some helpful information on disaster recover can be found at:

ACTIVITY 3 – MONITORING PERFORMANCE

The baseline of the server will have already been taken and this should represent the performance of the measured components during a normal loading of the network by users. The tutor could demonstrate the performance of an actual computer system or server during a normal loading of the network to provide them an insight into how monitoring is performed and the results that can be obtained. In Windows, for example, perfmon is a tool available to record many of the measurable parameters and even display them graphically.

Learners should understand that CPU, memory, disk and network adapters can each be a source of bottlenecks in performance. If the network adapter is operating at full load then the CPU might not have enough work to do and much of the available memory and disk capability will not be needed. Replacing the network adapter with a higher performance model or even a second adapter will allow an increase in network traffic through the computer. But now the CPU may be the bottleneck because it can't keep up with the extra work, and so on. Monitoring performance will provide the ability to ensure the highest performance at all times.

Learners could then investigate built-in tools the operating system provides for monitoring the performance of the server or desktop computer. An important feature is the ability to establish an initial baseline for all the relevant properties of the computer so that system degradation can be detected and corrected. For example, over time the hard drive may suffer difficulties in reading information from the disk surface and this will result in slower file access and eventually complete failure. Some monitoring systems allow IT support staff to be automatically alerted when failures are detected.

Learners could be split into two groups. Each learner group could then experiment with the monitor utility on a server or desktop. They could then report back to the group with a graph showing the performance of one key property from each of Memory, CPU, Disk and Network categories.

Some useful information on baselines can be found at:
https://community.spiceworks.com/how_to/104-creating-a-windows-server-performance-baseline
ACTIVITY 4 – DISK DRIVE DIAGNOSTICS

The tutor could introduce this topic by discussing the range of ways in which a disk drive can fail. The mechanism inside a magnetic drive case is really quite delicate. For magnetic drives the surface of the disk can deteriorate so that areas of the magnetic material become unusable for storage, sometimes called ‘bad sectors’. The way in which the sectors of a disk are linked together to store files can lead to a single file being spread across non-contiguous areas of the whole disk. This is called fragmentation and leads to delays in reading and writing files.

Learners must understand that there are tools available to deal with problems in all types of disk, some are built-in, and some are downloadable from the disk manufacturer such as Seagate. These tools can recover disks that appear beyond any recovery.

Learners could then investigate the ways in which disk drives fail in a system. Failing drives will often give strange results. For example you might see a file in a folder in Windows Explorer but are unable to open it because it really isn’t there, simply being displayed there because of some form of corruption on the drive. Such corruptions can cause great inconvenience to users and result in the system slowing down and giving poor response to its users.

The learners could be split into two groups. Each learner group could investigate writing an outline IT support procedure to carry out checking and repair of a hard drive using one of the available disk tools.

The groups could then report their procedures back to the group.

The following document contains useful information built-in disk diagnostics:
https://support.microsoft.com/en-us/kb/2641432

ACTIVITY 5 – MEMORY DIAGNOSTICS

The tutor could introduce this topic by discussing symptoms of memory failure and any tools that can be used to reveal memory problems. The tutor could demonstrate a memory diagnostic tool in operation.

Learners must understand that sometimes parts of the RAM will fail to store information. Sometimes it may be just a single bit within the 4GB range of the memory card. Nevertheless, a single bit being incorrect could mean a character of text may be corrupted, but it could also mean that a computer instruction is executed incorrectly and lead to a CPU crashing the computer.

Learners must understand that applications and data are placed into potentially different areas of memory every time they are loaded. If memory is lightly loaded it is possible that the code or data do not get placed into a faulty area of memory and no problems will arise. Under other conditions, the code or data may be placed into a faulty area and then a corruption or crash may occur. This, ‘almost random’ behaviour can sometimes be confused with the symptoms of a CPU overheating.

Learners could then investigate the symptoms of server and desktop memory failure. RAM failure can give rise to strange random actions on a computer and may even causes crashes and restarts that can be difficult to explain.

The learners could be split into two or more groups. Each learner group could then write an outline script that could be used by first line IT support staff when a user calls in with suspected memory issues.

Learner groups report back their procedures to the whole group.

Some information on memory failures symptoms can be found at:

An example of a built-in memory diagnostic tool can be seen at:
**ACTIVITY 6 – PLANNING THE INFRASTRUCTURE MAINTENANCE**

The tutor could introduce this topic by discussing the importance of maintaining the hardware and software of the IT infrastructure after the system comes into operation. The designed use of the network will see hard drives being filled and fragmented, operating systems, applications and drivers being updated. New applications will require installing and licensing records will need to be updated.

Learners must understand that maintaining the hardware and software is essential to ensure that the infrastructure is kept secure and that Service Level Agreements are met. The wide scope of maintenance activities means that such activities will require careful planning to ensure complete coverage.

Learners could then investigate what software and hardware activities should be part of an infrastructure maintenance plan.

The learners could be split into two groups. Each learner group could then provide a simple outline plan containing a hardware and software activity that would be carried out:

- Weekly
- Monthly
- Yearly

The learner groups could report back their plans to the whole group.

Some helpful information regarding maintenance plans can be found at:

http://it.ouhsc.edu/policies/MonthlyMaintPlan.asp
SUPPORTING THE INFRASTRUCTURE USERS


The delivery now moves onto Unit 20 IT Technical support.

Once in operation there will be many problems arising from the use of the network infrastructure by those it was designed to serve. Users come with a wide variety of IT experience. Novice users will give rise to the most help desk support calls and these will usually be easily tackled by IT support staff using an effective set of scripts that cater for every support event. Helping novice users will require IT support staff to be appropriately trained in guiding users who may have very little understanding of computer systems and have little awareness of the technical terminology commonly used by IT technical staff.

More experienced users will give rise, quite often, to more challenging support issues. Such staff will usually be able to sort out first line support issues themselves. Second line support will usually be required for these experienced users, these are support staff with a much deeper understanding of the network technology.

Support staff will have a full inventory of the system hardware, software and licensing information as well as a wide range of procedures for troubleshooting for users. Help desk software will help support staff to manage IT support function.

A Service Level Agreement will be signed between the provider and the school to confirm the service that the users should expect from using the network infrastructure together with any penalties for failures to keep to the agreement.

During the delivery of the units, the learners should carry out a range of activities to demonstrate and check their knowledge and understanding. They should also undertake review activities as they work through the programme of learning.
ACTIVITY 1 – ORGANISING IT SUPPORT

The tutor could introduce this topic by discussing the need to make efficient use of IT support staff and resources. Many of the problems that face users on a daily basis are issues that arise repeatedly and the solution is simple enough to be resolved by telephone support. So a first tier of support can be provided by staff that can follow a set of scripts that have been written by system experts for this purpose. A second tier of more technical staff can then provide support for those issues where a script is inappropriate or where the first tier script could not resolve a user problem and the fault has been escalated for second tier attention. A third tier may also exist to deal with even more complex issues.

Learners must understand that supporting users in an effective way will require good organisation and the availability of resources to help staff deliver the necessary assistance. Help desk software is widely available for organising, scheduling, recording and updating issues.

Learners could then investigate how the IT support function is split into the number of levels to facilitate efficient use of available IT support staff and resources for this set of user requirements. As part of the overall IT infrastructure proposal the school require information on the support levels that will be offered to the network users and the type of support that will be provided at each level.

Learners could be divided into two or more groups. Each learner group could then provide an outline document, perhaps in the form of a table, to demonstrate the support levels that will be provided with an example of support offered at each level.

The groups could then report back their outline document to the whole group.

Helpful information on support levels can be found at:
http://joehertvik.com/help-desk-definitions-level-1-level-2-level-3-support/
ACTIVITY 2 – SERVICE LEVEL AGREEMENTS

The tutor could introduce this topic by discussing the need to provide users with some form of agreement on the service they will be entitled to expect when using the network infrastructure. For example, say a user fails to be able to connect to the infrastructure at home. What is the maximum time the user can expect to wait before the issue is resolved after first reporting the problem?

Learners must understand that providers of network services are bound by the Service Level contract that would be agreed between parties prior to commencement of the service. Penalties for failure to meet the agreement will also be included in that agreement.

Learners could then investigate the use of an IT Support Service Level Agreement. As part of the whole infrastructure proposal to the ‘The Academy’ a Service Level Agreement is required to be included in that proposal.

The learners could be split into two groups. Each learner group could create a simple SLA that defines details of the planned downtime of the video streaming server and a penalty for exceeding the agreed downtime.

Each group could then report their SLA back to the whole group.

For helpful information on structure and content of a Service Level Agreement, look at: http://www.itdonut.co.uk/it/it-support/it-support-contracts/sample-service-level-agreement

ACTIVITY 3 – DIAGNOSTIC TECHNIQUES

The tutor could introduce this topic by discussing some of the methods available to diagnose problems flagged up by users. A wide range of tools are built-in to the operating systems of computers to diagnose network and computer problems and many more are available on a third-party basis. Support staff will need to be conversant with the use of these tools to carry out diagnostics and, in many cases, be able to guide users in the use of these tools over the telephone.

Learners must understand that supporting users by email or telephone can often be a difficult and fraught affair that requires good expertise in use of tools as well as patience with users. Many systems come with a built-in capability of being controlled remotely so that staff can carry out the diagnostic tests themselves. Third party software is also available, some even free.

The tutor could then demonstrate the support that can be provided by a help desk. Enlisting one or more of the learners as ‘users’ having a specific network issue could help learners understanding.

Learners could investigate the diagnostic techniques that should be available to IT support staff. Help desk staff may have to talk users through a troubleshooting scenario in order to solve an issue for the user or be able to escalate the problem to another support level. The approach used will be to gather information from the user and then use this information to get the user to apply appropriate tools to help solve the problem. All of this process will require the type of issue to be well documented in a script that staff can use each time they receive a support call.

The learners could be split into two groups. Each learner group could then write an outline script for a particular scenario. For example; a user calls to say that they logged on to their desktop but they are unable to connect to a shared folder on the network file server. The user suspects that IP connectivity is the issue because ‘they pinged another computer and got no reply’.

Learner groups could then report their scripts back to the whole group.

Information on Help Desk Support can be found at: http://ptgmedia.pearsoncmg.com/imprint_downloads/cisco/irc/prepubchaps/2109_ch02.pdf
ACTIVITY 4 – WORKING WITH TECHNICAL AND NON-TECHNICAL USERS

The tutor could introduce this topic by discussing how the IT support advice given differs between technical users with a good knowledge of computer/network technology and the many users who will not be in this category.

Learners must understand that dealing with non-technical users can require a great deal of empathy and patience. Many such users will not understand the technical terms that IT staff may use as a matter of course. Many will need to be guided through issues in terms they will understand and scripts must be written accordingly to reflect this.

Learners could investigate how the help desk support advice differs between technical users and non-technical users. Consider a user who calls to say they had accidentally deleted a file contained in a server folder the previous afternoon.

The learner could then formulate a response to both types of user. Although there will be attempts at simple restoring, in reality the file has really disappeared out of the folder. The communication technique may be different in each case but the result should be the recovery of the lost file.

The learners could be divided into two groups. One learner group could then create an outline script for IT support to respond to this problem to advise technical users. The other group could create an outline script for non-technical users.

Learner groups could then report their scripts back to the group as a whole.

Information on dealing with non-technical users can be found at:
http://www.techrepublic.com/article/seven-tips-for-talking-with-nontechnical-people/

Information on file recovery can be found at:
https://support.microsoft.com/en-qb/kb/316951

ACTIVITY 5 – SUSPECTED DHCP PROBLEM

The tutor could introduce this topic by discussing the roles of first line and second line IT support teams.

Learners must understand that the vast majority of faults reported to IT support are relatively minor and very easily fixed by the first line support team. Issues such as those with the network DHCP service will definitely fall into the remit of second line support. Second-line support deal with fault-diagnosis and troubleshooting of problems that have been escalated from first-line support.

Consider a fault that has been escalated from the help-desk to the second-line support team. Sixth formers are able to access the school VLE and can stream videos on their tablet computers when they are at home. However, when they are in the grouproom the tablet computer pops up a message saying that an IP address cannot be obtained.

The group could be split into two or more learner groups. Each learner group has been asked to investigate this issue and provide an outline approach to the solution of the problem.

Each learner group will report back to the whole group how they:

- problem was approached
- issue might be resolved
- solution might be tested

Helpful information on troubleshooting the DHCP service can be found at:
OTHER RESOURCES

Below is a list of resources available from the OCR website which can support the delivery of this project.

http://www.ocr.org.uk/qualifications/vocational-education-and-skills/cambridge-technicals-it-level-3-certificate-extended-certificate-introductory-diploma-foundation-diploma-diploma-diploma-
05838-05842-2016-suite/

Delivery Guides

Delivery Guides contains suggestions for activities for lessons. There is a Delivery Guide for each unit, structured by learning outcome so that you can see how each activity helps learners cover the unit. We've also included links to other resources you might find useful.

Lesson Elements

There are a number of Lesson Elements for some of the units. Each Lesson Element contains fully worked-up activities with tutor instructions and answers along with learner task sheets.

Resources Links

There are a number of Resources Links for some of the units. Resources Links provide a range of other resources you might find useful – videos, data sets and other online content.

Skills Guides

We have produced a range of skills guides covering a variety of topics, including research, communication skills, managing projects, problem solving.
We’d like to know your view on the resources we produce. By clicking on the ‘Like’ or ‘Dislike’ button you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click ‘Send’. Thank you.

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