

AS/A Level Applied Information and Communication Technology 9713

Unit 5: How Organisations use ICT- Part 2

Recommended Prior Knowledge

Students will require a basic knowledge of ICT systems, and they should have covered the content of Unit 2 'How organisations use ICT – Part 1'.

Context

This unit can be studied on its own or in conjunction with other theory units. It is recommended that students understand the importance of a range of the uses of ICT by organisations in a wide context to enable them to appreciate the way ICT is used outside the classroom. These notes are to show the range of situations on which questions could be based; it is not an exclusive list.

Outline

This unit covers the following areas:

- Expert systems
- Monitoring and measurement
- Project management
- Modelling
- Market research
- Research applications
- Online applications
- Stock control

Candidates will be expected to learn about the hardware and software requirements of each area.

AO	Learning outcomes	Suggested Teaching activities	Learning resources
5a	Expert Systems	Review IGCSE topic of Expert systems. Groups of students can then produce a presentation for one of the following examples in class discussion or in a presentation. The following web sites are offered, for example, by group presentation ideas or teacher set tasks for a written report or quiz activity. Knowledge base and inference engine should be	SP3 q 1c) All the following resources are online: This site has a useful but simple diagram and links to other sources: http://computing-dictionary.thefreedictionary.com/Expert+systems This next site is at a much higher level and may be useful with some

AO Learning outcomes

Suggested Teaching activities

explained in an introduction to the topic.

Learning resources

students as it gives a more detailed explanation:

http://www.wtec.org/loyola/kb/c1_s1.htm

This next site is a simple inference engine that could be used in a lesson to show the application of rules and the production of a finding:

<http://homepage.ntlworld.com/peterhi/sie.html>

The code on this next site could be written by students to enhance their understanding of Ai systems:

http://www.csupomona.edu/~jrfisher/www/prolog_tutorial/2_17.html

Mineral prospecting

This next site provides an overview of geological surveying using an expert system:

<http://www.computing.surrey.ac.uk/AI/PROFILE/prospector.html>

Investment analysis

Financial planning

Insurance planning

This is a good example in the insurance industry.

<http://www.csc.com/industries/insurance/mds/mds221/408.shtml>

Car engine fault diagnosis

A different approach to car fault diagnosis:

<http://www.kurzweilai.net/articles/art0310.html?printable=1>

Medical diagnosis

This site is beyond A level but offers information about a medical expert system:

<http://www.openclinical.org/dss.html>

Route scheduling for delivery vehicles

A delivery route planning site:

<http://www.transendworldwide.com/Cultures/en-NZ/MailDelivery/MailDelyPlanningSys/>

Plant identification Animal identification

These situations work through diagnosis:

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		<p>Students must be able to comprehend a given expert system scenario and answer the questions to an A2 standard. A range of activities would offer more opportunities for the students to discuss and improve their knowledge and understanding.</p> <p>The above applications should be explored by students, possibly in groups with each one presenting a report back to the class.</p> <p>Each student in the group could act out a different role. One could act as the rules base, one the inference engine; another could be the knowledge base (using an encyclopaedia or the Internet). Other students could act out the role of the doctor / prospector / mechanic</p> <p>For each application students will need to identify which hardware is used to input data, store data and output data.</p> <p>This could be done by hot-seating. i.e. a volunteer goes in the hot seat and is asked by their peers to name the items of hardware used to input data for each application. Another volunteer could be asked about the form of output. Students can only ask a question that they know the answer to themselves. This could be repeated for software.</p>	
5b	Monitoring and measurement	<p>Students need to be able to explain a range of sensors. They could be set a competition/ task to find a number of everyday examples. The teacher could make presentations on each of these but students could be given one topic to research and report back to the group. A quiz could be set with questions about the application of different sensors and how they are used in measurement. Students</p>	<p>This is one site that describes the use of IT to monitor: http://www.jacksonbottom.org/wetlandsmonitoring.htm</p> <p>This is a PDF document that could be given to students to discuss the use of sensors in a medical situation: http://www.draeger-medical.com/MT/internet/pdf/CareAreas/ORAnesthesia/or_monisys_br_en.pdf</p>

AO Learning outcomes

Suggested Teaching activities

do not need to know the physical device that is detecting the variable. They do need to know which sensors would be appropriate in a given context to measure physical variables such as:

temperature
pressure
humidity/moisture
light
sound
blood pressure
pH

Students need to be aware of the reasons for using sensors and a data logging system. They need to be able to describe the use of sensors in the following contexts:

Medical applications
Weather monitoring
Climate monitoring
Monitoring the environment
Scientific experiments

Students could be asked to investigate (for homework) how these variables are measured without using computers or microprocessors. Their results could be used to emphasise the nature of analogue data.

Students could be given cards with the name of sensors on them. The teacher could name an application and the students have to hold up their card if they have the name of a sensor which can be used in this application.

Students have to learn about the types of software used to record the data from the monitoring exercises.

Learning resources

This next site provides one example of a weather monitoring station:

<http://www.allweatherinc.com/industrial/synoptic/qnet.html>

The Environmental Protection Agency offers this site:

<http://www.epa.gov/oar/data/>

AO	Learning outcomes	Suggested Teaching activities	Learning resources
5c	Project management	<p>Students need to be aware of large projects where a number of teams work together to a planned schedule.</p> <p>Students could be shown, by demonstration, the task of planning a large scale task, such as building a bridge. The work must progress in a logical order or the bridge will fail. A spreadsheet could be used to create a GANT chart.</p> <p>The stages could be:</p> <ul style="list-style-type: none"> • Design • test (see simulation section 5d) • hire personnel for ground works • prepare ground works and access • foundations built • hire construction workers • start construction of main towers • sections of bridge delivered just in time for fitting • live testing • ceremony for official opening <p>Other examples that need to be taught include the following areas. Groups of students could create a presentation on each of these topics:</p> <p>Software development Building construction Business efficiency</p> <p>Students could be asked to manage something themselves like planning the cooking of a feast for several family members. They could list the ingredients and use a Gantt chart to put down times at which the various ingredients would be prepared and cooked. With different parts of the meal taking different lengths of time to cook, they would need to carefully plan the times at starting these so that they</p>	<p>This site uses a basic task of planning a party, there are also other examples:</p> <p>http://www.conceptdraw.com/en/products/project/ap-gant-chart.php</p>

AO	Learning outcomes	Suggested Teaching activities	Learning resources
5d	Modelling	<p>are all ready at the same time.</p> <p>Students are hot seated to give a description of the software used in project management.</p> <p>Students need to be taught to differentiate between 3-D modelling to produce a graphical image, and the processing of input data to produce numeric output or physical output with a simulator. One example could be used by the teacher as an introduction; then groups can be set tasks to research and report back on the following areas, using the suggested sites or alternative ones:</p> <p>Economic</p> <p>Prototype</p> <p>Climate</p> <p>Simulations</p>	<p>This question shows the level of knowledge and understanding students require: SP3 q 2a) and q 2b)</p> <p>The next site describes the computer model used for the UK economy: http://www.bized.ac.uk/virtual/economy/model/info.htm</p> <p>This next site provides some information about the modelling of cars being crashed: http://www4.eurekalert.org/features/doi/2001-12/dnrl-ccs061202.php http://www.arasvo.com/tr_crash_1car.htm</p> <p>This site offers weather forecasting and can be used to find the local weather and record how accurate the forecasts have been over time: http://www.wunderground.com/global/Region/A2/Temperature.html</p> <p>El Nino is a cause for concern world wide and this site shows computer modelling being used for predicting its future:: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/lanina/ens_oforecast.shtml</p> <p>Climate prediction: http://www.worldchanging.com/archives/004107.html</p> <p>This site has some slides that are at A level of simulation in fires. http://www.slac.stanford.edu/cgi-wrap/getdoc/slac-wp-049-ch17-Corsanego.pdf</p>

AO	Learning outcomes	Suggested Teaching activities	Learning resources
		<p>Profit forecasts</p> <p>Architecture</p> <p>Weather forecasting</p> <p>Air pilot training</p> <p>Car driver training</p> <p>Nuclear research</p> <p>Geology/predicting deposits</p>	<p>This photo shows the rams that are output devices to move the vehicle in a flight simulator: http://www.nads-sc.uiowa.edu/</p> <p>There are a number of games that simulate driving or flying; students are probably quite familiar with these. http://www.microsoft.com/games/flightsimulator/</p> <p>An Australian site about mineral deposits: http://www.csiro.au/csiro/content/standard/ps14t,.html</p>
		<p>Students should be asked to find out the variables in each model, the changes that would be made and the results of the changes.</p> <p>A loop game could be used where each student has a card with a question on it and another card with an answer on it. The teacher chooses somebody to start and they ask the question from their question card. The student who has the card with the correct answer on it then asks their question. This is repeated until all the cards are used up.</p>	
5e	Market research	<p>Business and Governments are using market research to determine policy and planning change. Students need to explore using examples. These could be presented by the teacher or peers, such as</p>	<p>SP3 q7</p> <p>Some interesting marketing research sites online: http://www.jupiterresearch.com/bin/item.pl/home</p>

AO	Learning outcomes	Suggested Teaching activities	Learning resources
		<p>a new consumer product or a change in the tax system.</p> <p>Students could work on different approaches such as producing questionnaires for their peers to answer in researching a new facility that could be built locally- say a multi-screen cinema. They could perhaps interview each other and devise an online questionnaire. They could then evaluate each method.</p> <p>Research in: Advertising Media Public opinion</p> <p>Techniques: Personal interviewing Phone interviews being used more due to lower costs of foreign call centres On-line data capture; use of pop up questionnaires, web forms with prize as bribe to spend time filling in details</p>	<p>http://www.warc.com/Default.asp?ID=1</p> <p>http://publications.mediapost.com/index.cfm?fuseaction=Articles.showArticleHomePage&art_aid=41420</p> <p>http://www.mediapost.com/</p> <p>A failure of marketing? : http://www.gartner.com/DisplayDocument?doc_cd=136331</p>
5f	Research applications	<p>Students need to be taught situations where a desk top computer does not have sufficient computing power.</p> <p>The following situations use Supercomputers to handle the large number of calculations required.</p> <p>There will be local examples of a programme that uses ICT in each of these areas.</p> <p>Teachers or students could present details of how ICT is being used in each case:</p> <p>Medicine: Developing new drugs</p>	<p>This site is about climate research and mentions the supercomputers it uses.</p> <p>http://www.metoffice.com/research/hadleycentre/</p>

AO	Learning outcomes	Suggested Teaching activities	Learning resources
5g	Online applications	<p>Genetic Analysis Space research Universities</p> <p>Education: ICT in education Teacher education</p> <p>This is a topic that students should be familiar with from everyday experience. They must give detailed answers to any A2 questions set and a detailed class discussion of appropriate level of detail might be one way to deliver this section.</p> <p>The emphasis in this section is on the software and hardware that an organisation would require to operate such a service. The knowledge is how organisations use ICT for these processes, not the impact on Society; that is the next unit.</p> <p>The range of online applications can be explored if a centre has Internet provision or saved for off-line use. Groups could be set the task of finding the best deal for a given holiday or product.</p> <p>They need to be able to describe the security measures necessary for these sites to be operated effectively. This could be done by discussion with the class. It might be possible to devise a quiz with students answering questions relevant to this topic.</p> <p>They could be set the task of organising a holiday at a particular holiday resort. Using the Internet they would be expected to use software to compute the total travelling time (including journey time for each stage) and total cost (costs for each stage).</p> <p>Shopping:</p>	<p>SP3 q 1b)</p> <p>A range of local web sites could be explored:</p> <ul style="list-style-type: none"> <li>• The local airline site. <li>• The train time table. <li>• A bus company. <li>• A local shopping company <p>It is a useful exercise to use the WWW to compare prices locally for, say a PC or camera, with USA or Far East prices.</p> <p>It is not possible to use a bank online system due to security but 'phishing' sites could be found, such as</p> <p>http://www.wilderssecurity.com/showthread.php?t=123741</p> <p>http://www.malwarehelp.org/screenshots-of-phishing-email-messages.html</p> <p>Expedia provides a good example of using an online booking system.</p>

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5h	Stock control	<p>Purchasing goods</p> <p>Banking: Maintaining accounts</p> <p>Booking: Holidays Train tickets Plane tickets Cinema tickets Theatre tickets</p> <p>This topic provides a means of testing students' knowledge and understanding of an important application of ICT in the real world. They need to discuss in detail these following areas:</p> <p>Point of sale: Retail industry/ supermarkets</p> <p>Manual systems:</p> <p>Manufacturing industry Wholesale/suppliers Just in time</p>	<p>An online source with brief descriptions:</p> <p>http://ilt.co-op.ac.uk/Word%20Expert/practice%20files/retail.doc</p> <p>SP3 q 3a) and b) show the level of knowledge and understanding required on these topics.</p> <p>This link also has a computer based stock control.</p> <p>http://www.businesslink.gov.uk/bdotg/action/detail?type=RESOURCES&itemId=1073792661</p> <p>http://people.brunel.ac.uk/~mastjib/jeb/or/jit.html</p>