

Pearson BTEC International Level 2 Information Technology

Specification

Pearson BTEC International Level 2 Certificate in Information Technology (19336)

Pearson BTEC International Level 2 Extended Certificate in Information Technology (19337)

Pearson BTEC International Level 2 Diploma in Information Technology (19338)

For first teaching in September 2014

Edexcel, BTEC and LCCI qualifications

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These qualifications have been approved by Pearson as meeting the criteria for Pearson's Self-regulated Framework.

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1 Purpose of this specification

Pearson BTEC International Level 2 Certificate, Extended Certificate and Diploma qualifications in Information Technology are designed for international schools and colleges. They are part of an international suite of BTEC Firsts qualifications offered by Pearson. These qualifications are not available to centres in the United Kingdom, the Channel Islands, the Isle of Man or British Armed Forces schools based overseas.

The purpose of this specification is to set out:

- the aim/objective of the qualifications
- the structure and rules of combination of these qualifications
- the resources required by the centre to offer these qualifications
- the knowledge, skills and understanding which will be assessed as part of these qualifications
- the method of assessment and any associated requirements relating to it
- the criteria against which learners' level of attainment will be measured (for example assessment criteria).

If you need guidance or support for Pearson BTEC International Level 2 qualifications please contact your Pearson representative.

Pearson BTEC International Level 2 qualification titles covered by this specification

The following qualifications have been approved by Pearson Education Limited as meeting the criteria for Pearson's Self-regulated Framework. These qualifications are not accredited or regulated by any UK regulatory body.

Pearson BTEC International Level 2 Certificate in Information Technology

Pearson BTEC International Level 2 Extended Certificate in Information Technology

Pearson BTEC International Level 2 Diploma in Information Technology

The qualification titles will appear on learners' certificates. Learners need to be made aware of this when they are recruited by the centre and registered with Pearson.

This specification must be used for delivery and teaching in your centres. For international centres this replaces the following QCF qualifications:

Pearson BTEC Level 2 Certificate in IT (QCF)	500/9551/1
Pearson BTEC Level 2 Extended Certificate in IT (QCF)	500/9550/X
Pearson BTEC Level 2 Diploma in IT (QCF)	500/9552/3

Pearson's international suite of BTEC First qualifications

Pearson BTEC International Level 2 qualifications make up our international suite of BTEC Firsts provision. These qualifications are designed in a range of sectors for learners who wish to explore a work-related vocational qualification or specific industry area. They offer learners the knowledge, understanding and skills that they need to prepare for employment.

On successful completion of a Pearson BTEC International Level 2 qualification, learners can progress to continued study in the same or related vocational area and/or within employment.

Pearson BTEC International Level 2 Certificate

The Pearson BTEC International Level 2 Certificate offers a work-related vocational qualification that focuses on particular aspects of employment in the appropriate vocational sector. The Pearson BTEC International Level 2 Certificate is a qualification that can be part of a learner's programme of study and provide a vocational learning experience. Potentially the qualification could prepare learners for progression to an appropriate Level 3 programme in the same or related vocational area.

Pearson BTEC International Level 2 Extended Certificate

The Pearson BTEC International Level 2 Extended Certificate extends the work-related focus from the Pearson BTEC International Level 2 Certificate and covers the key knowledge and practical skills that are required in the appropriate vocational sector. The Pearson BTEC International Level 2 Extended Certificate offers flexibility and a choice of emphasis through the optional units, providing an engaging programme for those who are clear about the vocational area they wish to explore through further study or who wish to enter employment. Potentially the qualification could prepare learners for progression to an appropriate Level 3 programme in the same or related vocational area.

Pearson BTEC International Level 2 Diploma

The Pearson BTEC International Level 2 Diploma extends the work-related focus from the Pearson BTEC International Level 2 Extended Certificate, with broader coverage of knowledge and practical skills required for the vocational sector.

Potentially the qualification could prepare learners for progression to an appropriate Level 3 programme in the same or related vocational area or, for those who have decided that they wish to enter a particular area of work, for progression to employment in the appropriate vocational sector.

Other learners may want to use this qualification to extend the specialism they studied on the Pearson BTEC International Level 2 Certificate or the Pearson BTEC International Level 2 Extended Certificate programme.

2 Qualification summaries

Key information

Pearson BTEC International Level 2 Certificate in Information Technology	
Total Notional Learning Hours (NLH)	150 (including 90 Guided Learning Hours (GLH))
Qualification value (NLH/10)	15
Assessment	This qualification is internally assessed
Unit grading information	Pass/Merit/Distinction
Overall qualification grading information	Pass/Merit/Distinction/Distinction*

Pearson BTEC International Level 2 Extended Certificate in Information Technology	
Total Notional Learning Hours (NLH)	300 (including 180 Guided Learning Hours (GLH))
Qualification value (NLH/10)	30
Assessment	This qualification is internally assessed
Unit grading information	Pass/Merit/Distinction
Overall qualification grading information	Pass/Merit/Distinction/Distinction*

Pearson BTEC International Level 2 Diploma in Information Technology	
Total Notional Learning Hours (NLH)	600 (including 360 Guided Learning Hours (GLH))
Qualification value (NLH/10)	60
Assessment	This qualification is internally assessed
Unit grading information	Pass/Merit/Distinction
Overall qualification grading information	Pass/Merit/Distinction/Distinction*

For further information about Notional Learning Hours and Guided Learning Hours please see *Section 8: Programme delivery* and *Section 10: Understanding the units*.

Aim of the Pearson BTEC International Level 2 qualifications in Information Technology

The Pearson BTEC International Level 2 Certificate, Extended Certificate and Diploma qualifications in Information Technology have been developed to:

- give full-time learners the opportunity to enter employment in the IT sector or to progress to vocational qualifications
- provide education and training for those employed in IT
- give those employed in IT opportunities to achieve a Level 2 vocationally specific qualification
- give learners the opportunity to develop a range of skills and techniques, personal skills and attributes essential for successful performance in working life.

This specification provides content and structures that help learners to acquire the skills and knowledge needed to work as professionals in the IT sector. Key aspects include:

- flexibility in unit structures so that the centre and learners can choose appropriate combinations of optional units to meet their interests and aspirations
- units based on the UK National Occupational Standards and contextualised to the business environment
- simple and consistent nesting of qualifications to allow learners to choose specialist pathways later in their programmes of study.

3 Centre resource requirements

As part of the approval process, the centre must make sure that the resource requirements below are in place before offering Pearson BTEC International Level 2 qualifications.

- The centre must have appropriate physical resources (for example equipment, IT, learning materials, teaching rooms) to support delivery and assessment.
- Staff involved in the assessment process must have relevant expertise and occupational experience.
- There must be systems in place to make sure that there is continuing professional development for staff delivering the qualifications.
- The centre must have appropriate policies in place relating to the delivery of the qualification.
- The centre must deliver the qualifications in accordance with current equality legislation.
- The centre must have in place any specific unit resource requirements as listed in each unit under the heading *Essential requirements*.

4 Qualification structures

Pearson BTEC International Level 2 Certificate in Information Technology

The Pearson BTEC International Level 2 Certificate in Information Technology qualification totals 150 Notional Learning Hours (NLH).

Learners must achieve the mandatory unit **and** optional units that provide for a combined total value of 15 to achieve the qualification.

This qualification is **not** designed to allow units to be imported from other Pearson qualifications.

Mandatory unit				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
1	Communicating in the IT Industry	2	50	5

Optional units				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
2	Working in the IT Industry	2	50	5
3	Computer Systems	2	100	10
4	Business IT Skills	2	100	10
5	Supporting Organisations with IT	2	100	10
6	Project Planning using IT	2	100	10
7	Installing Computer Hardware	2	100	10
8	Installing Computer Software	2	100	10
9	Customising Software	2	100	10
10	Setting up an IT Network	2	100	10
11	IT Security	2	100	10
12	IT Support	2	100	10
13	IT Fault Diagnosis and Remedy	2	100	10
14	Mobile Communications Technology in IT	2	100	10
15	Mathematics for IT	2	100	10
16	Database Systems	2	100	10
17	Website Development	2	100	10
18	Software Design	2	100	10
19	Object Oriented Programming	2	100	10

Optional units (continued)				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
20	Procedural Programming	2	100	10
21	Event driven Programming	2	100	10
22	Doing Business Online	2	100	10
23	Computer Graphics	2	100	10
24	Telecommunications Technology	2	100	10
25	Home Entertainment Systems	2	100	10
26	Developing Computer Games	2	100	10
32	Software Design and Development	3	100	10
33	Database Design	3	100	10
34	Website Production	3	100	10
35	Digital Graphics	3	100	10
36	Spreadsheet Modelling	3	100	10

Pearson BTEC International Level 2 Extended Certificate in Information Technology

The Pearson BTEC International Level 2 Extended Certificate in Information Technology qualification totals 300 Notional Learning Hours (NLH).

Learners must achieve both mandatory units **and** optional units that provide for a combined total value of 30 to achieve the qualification.

This qualification is **not** designed to allow units to be imported from other Pearson qualifications.

Mandatory units				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
1	Communicating in the IT Industry	2	50	5
2	Working in the IT Industry	2	50	5

Optional units				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
3	Computer Systems	2	100	10
4	Business IT Skills	2	100	10
5	Supporting Organisations with IT	2	100	10
6	Project Planning using IT	2	100	10
7	Installing Computer Hardware	2	100	10
8	Installing Computer Software	2	100	10
9	Customising Software	2	100	10
10	Setting up an IT Network	2	100	10
11	IT Security	2	100	10
12	IT Support	2	100	10
13	IT Fault Diagnosis and Remedy	2	100	10
14	Mobile Communications Technology in IT	2	100	10
15	Mathematics for IT	2	100	10
16	Database Systems	2	100	10
17	Website Development	2	100	10
18	Software Design	2	100	10
19	Object Oriented Programming	2	100	10

Optional units (continued)				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
20	Procedural Programming	2	100	10
21	Event driven Programming	2	100	10
22	Doing Business Online	2	100	10
23	Computer Graphics	2	100	10
24	Telecommunications Technology	2	100	10
25	Home Entertainment Systems	2	100	10
26	Developing Computer Games	2	100	10
27	Spreadsheet Modelling	2	100	10
28	Multimedia Design	2	100	10
29	Presenting Information Using IT	2	100	10
30	Animation Techniques	2	100	10
31	Interactive Media Production	2	100	10
32	Software Design and Development	3	100	10
33	Database Design	3	100	10
34	Website Production	3	100	10
35	Digital Graphics	3	100	10
36	Spreadsheet Modelling	3	100	10

Pearson BTEC International Level 2 Diploma in Information Technology

The Pearson BTEC International Level 2 Diploma in Information Technology qualification totals 600 Notional Learning Hours (NLH).

Learners must achieve three mandatory units **and** optional units that provide for a combined total value of 60 to achieve the qualification.

This qualification is **not** designed to allow units to be imported from other Pearson qualifications.

Mandatory units				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
1	Communicating in the IT Industry	2	50	5
2	Working in the IT Industry	2	50	5
3	Computer Systems	2	100	10

Optional units				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
4	Business IT Skills	2	100	10
5	Supporting Organisations with IT	2	100	10
6	Project Planning using IT	2	100	10
7	Installing Computer Hardware	2	100	10
8	Installing Computer Software	2	100	10
9	Customising Software	2	100	10
10	Setting up an IT Network	2	100	10
11	IT Security	2	100	10
12	IT Support	2	100	10
13	IT Fault Diagnosis and Remedy	2	100	10
14	Mobile Communications Technology in IT	2	100	10
15	Mathematics for IT	2	100	10
16	Database Systems	2	100	10
17	Website Development	2	100	10
18	Software Design	2	100	10
19	Object Oriented Programming	2	100	10

Optional units (continued)				
Unit	Unit title	Level	Notional Learning Hours	Unit value (NLH/10)
20	Procedural Programming	2	100	10
21	Event driven Programming	2	100	10
22	Doing Business Online	2	100	10
23	Computer Graphics	2	100	10
24	Telecommunications Technology	2	100	10
25	Home Entertainment Systems	2	100	10
26	Developing Computer Games	2	100	10
27	Spreadsheet Modelling	2	100	10
28	Multimedia Design	2	100	10
29	Presenting Information Using IT	2	100	10
30	Animation Techniques	2	100	10
31	Interactive Media Production	2	100	10
32	Software Design and Development	3	100	10
33	Database Design	3	100	10
34	Website Production	3	100	10
35	Digital Graphics	3	100	10
36	Spreadsheet Modelling	3	100	10

5 Assessment and grading

The assessment of Pearson BTEC International Level 2 qualifications is criterion-referenced and the centre is required to assess learners' evidence against published outcomes of learning and assessment criteria.

Each unit within the qualification has specified assessment and grading criteria which are to be used for grading purposes. A summative unit grade can be awarded at pass, merit or distinction:

- to achieve a 'pass' a learner must have satisfied **all** the pass assessment criteria
- to achieve a 'merit' a learner must additionally have satisfied **all** the merit grading criteria
- to achieve a 'distinction' a learner must additionally have satisfied **all** the distinction grading criteria.

A grading scale of pass, merit and distinction is applied to all units.

BTEC internal assessment

All units in the Pearson BTEC International Level 2 qualifications are assessed through internal assessment, which means that the centre can deliver the programme in a way that suits its learners and relates to local need. The way in which the centre delivers the programme must also ensure that assessment is fair and that standards are consistent over time. To achieve this, it is important that centres:

- plan the assessment of units to fit with delivery, allowing for the linkages between units
- write suitable assessments (for example assignments, projects or case studies) or select assessments from available resources, adapting them as necessary
- plan the assessment for each unit in terms of when it will be authorised by the Internal Verifier, when it will be used and assessed, how long it will take, and how you will determine that learners are ready to begin an assessment
- ensure each assessment is fit for purpose, valid, will deliver reliable assessment outcomes across assessors, and is authorised before use
- provide all the preparation, feedback and support that learners need to undertake an assessment before they begin producing their evidence
- make careful and consistent assessment decisions based only on the defined assessment criteria and unit requirements
- validate and record assessment decisions carefully and completely
- work closely with Pearson to ensure that the implementation, delivery and assessment is consistent with BTEC quality standards.

Internal Verifiers must oversee all assessment activity to make sure that individual assessors do not misinterpret the specification or undertake assessment that is not consistent with the BTEC quality standards in respect of level, content or duration of assessment. The process for ensuring that assessment is being conducted correctly is called internal verification. Normally, a programme team will work together with individuals being both assessors and Internal Verifiers. Internal Verifiers must make sure that assessment is fully validated within the centre by:

- checking every assessment instrument carefully and endorsing it before it is used
- ensuring that each learner is assessed carefully and thoroughly using only the relevant assessment criteria and associated guidance within the specification
- ensuring the decisions of every assessor for each unit at all grades and for all learners are in line with BTEC quality standards.

Assessors make assessment decisions and must be standardised using Pearson-approved materials before making any assessment decisions. They are usually the teachers within the school or college, but the term 'assessor' refers to the specific responsibility for carrying out assessment and making sure that it is done in a way that is correct and consistent with BTEC quality standards. Assessors may also draft or adapt internal assessment instruments. Centres are required to keep records of assessment and have assessment authorised by Pearson. The main records are:

- the overall plan of delivery and assessment, showing the duration of assessment and the timeline for internal verification
- assessment instruments, which are authorised through an Internal Verifier
- assessment records, which contain the assessment decisions for each learner for each unit
- an internal verification sampling plan, which shows how assessment decisions are checked, and that must include across the sample all assessors, unit assessment locations and learners
- internal verification records, which show the outcomes of sampling activity as set out in the sampling plan.

Learner preparation

As Pearson BTEC International Level 2 qualifications are all internally assessed, it is important that learners are prepared for assessment. Learners:

- must be prepared for and motivated to work consistently and independently to achieve the requirements of the qualification
- need to understand how they will be assessed and the importance of timescales and deadlines
- need to appreciate fully that all the work submitted for assessment must be their own.

Centres will need to provide learners with an induction and a guide or handbook to cover:

- the purpose of the assessment briefs for learning and assessment
- the relationship between the tasks given for assessment and the grading criteria
- the concept of vocational and work-related learning
- how learners can develop responsibility for their own work and build their vocational and employability skills
- how learners should use and reference source materials, including what would constitute plagiarism.

The centre must communicate assessment grading rules to all learners at the beginning of the programme.

For full guidance on all of the rules surrounding internal assessment for BTEC qualifications please see the *Guide to Internal Assessment for BTEC Firsts and Nationals* which can be located in the key documents section of our website: www.btec.co.uk/keydocuments

Final assessment decisions

Final assessment is the culmination of the learning and assessment process. Learners should be given a full opportunity to show how they have achieved the outcomes of learning covered by a final assessment. This is achieved by ensuring that learners have received all necessary learning, preparation and feedback on their performance and then confirming that they understand the requirements of an assessment, before any assessed activities begin.

There will then be a clear assessment outcome based on the defined assessment criteria. Centres must devise an assessment plan that will set a clear timeline for assessment decisions to be reached. Once an assessment has begun, learners must not be given feedback on progress towards criteria. After the final assignment is submitted, an assessment decision must be given.

An assessment decision:

- must be made with reference to the assessment criteria
- should record how it has been reached, indicating how or where criteria have been achieved
- may indicate why attainment against criteria has not been demonstrated
- must not provide feedback on how to improve evidence to meet higher criteria.

Centres' Internal Verifiers and assessors must work together to ensure that assessment decisions are reached promptly and validated before they are given to the learner.

Late submission

Centres must encourage learners to understand the importance of deadlines and of handing work in on time. For assessment purposes, it is important that learners are assessed fairly and consistently according to the assessment plan that the Internal Verifier has authorised and that some learners are not advantaged by having additional time to complete assignments. Centres are not required to accept assessment work that was not completed by the date in the assessment plan. Learners may be given authorised extensions for legitimate reasons, such as illness at the time of submission. If a late completion by a learner is accepted, the evidence should be assessed normally, unless it is judged to not meet the requirements for authenticity. It is not appropriate to give automatic downgrades on assessment decisions as 'punishment' for late submission.

Resubmission of improved evidence

Once an assessment decision is given to a learner it is final in all cases, except where the Internal Verifier approves **one** opportunity to resubmit improved evidence. The criteria used by the Internal Verifier to authorise a resubmission opportunity are always:

- initial deadlines or agreed extensions have been met
- the teacher considers that the learner will be able to provide improved evidence without further guidance
- the evidence submitted for assessment has been authenticated by the learner and the assessor
- the original assessment can remain valid
- the original evidence can be extended and re-authenticated.

Centres will need to provide a specific re-submission opportunity that is authorised by the Internal Verifier. Any resubmission opportunity must have a deadline that is **within 10 days** of the assessment decision being given to the learner, and within the same academic year.

Centres should make arrangements for resubmitting the evidence for assessment in such a way that it does not adversely affect other assessments and does not give the learner an unfair advantage over other learners. Centres must consider how the further assessment opportunity ensures that assessment remains fit for purpose and in line with the original requirements. For example, the centre may opt for learners to improve their evidence under supervised conditions, even if this was not necessary for the original assessment, to ensure that plagiarism cannot take place. How centres provide opportunities to improve and resubmit evidence for assessments needs to be fair to all learners.

Care must be taken when setting assignments and at the point of final assessment to ensure that the original evidence for assessment can remain valid and can be extended. The learner must not have further guidance and support in producing further evidence. The Standards Verifier is likely to want to include evidence that has been resubmitted as part of the sample they will review.

Retaking assessment

Pearson BTEC International Level 2 qualifications do not allow for compensation – this means that learners must achieve every pass criterion in order to successfully achieve the qualification.

Conditions for retaking a new assignment

If a learner has met all of the conditions set out above for *Resubmission of improved evidence*, but has still not achieved the targeted pass criteria following the resubmission of the assignment, the Internal Verifier may authorise **one** retake opportunity to meet the required pass criteria. The Internal Verifier must only authorise a retake in exceptional circumstances where they believe it is necessary, appropriate and fair to do so.

The criteria used by the Internal Verifier to authorise a resubmission opportunity are always:

- the retake must be a new task or assignment targeted only to the pass criteria which were not achieved in the original assignment – an assessor cannot award a merit or distinction grade for a retake
- the assessor must agree and record a clear deadline before the learner starts the retake
- the learner and assessor must sign declarations of authentication as they both did for previous submissions

Standards Verifiers will require the centre to include evidence of any retakes in sampling. Retakes should not be required as a matter of course. Centres should keep a record of the number of retakes required on any programme to support the centres' own quality monitoring.

Calculation of the qualification grade

Pass qualification grade

Learners who achieve the minimum eligible value specified by the rule of combination will achieve the qualification at pass grade (see *Section 4: Qualification structures*).

Qualification grades above pass grade

Learners will be awarded a merit, distinction or distinction* qualification grade by the aggregation of points gained through the successful achievement of individual units. The number of points available is dependent on the unit level and grade achieved and the value of the unit (as shown in the table overleaf).

Points available per unit value at specified unit grades and levels

The table below shows the number of points scored per unit value at the unit level and grade.

Unit level	Points per unit value		
	Pass	Merit	Distinction
Level 1	3	4	5
Level 2	5	6	7
Level 3	7	8	9

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table below will achieve the qualification merit or distinction or distinction* grade (or combinations of these grades appropriate to the qualification).

Qualification grade

Qualification	Points range above pass grade		
	Merit	Distinction	Distinction*
Pearson BTEC International Level 2 Certificate	85–94	95–99	100 and above
Pearson BTEC International Level 2 Extended Certificate	170–189	190–199	200 and above
Pearson BTEC International Level 2 Diploma	340–379	380–399	400 and above

Annexe A: Calculation of the qualification grade gives examples of how qualification grades above a pass are calculated.

6 Centre and qualification approval

The centre must be approved by Pearson before delivering and assessing Pearson BTEC International Level 2 qualifications on Pearson's Self-regulated Framework. Centres that have not previously been approved will need to apply for, and be granted, centre recognition as part of the process for approval to offer these qualifications.

Before you offer these qualifications you must meet both centre and qualification approval requirements.

Approvals agreement

All centres are required to enter into an approval agreement that is a formal commitment by the head or principal of a centre to meet all requirements. If the centre does not comply with the agreement this could result in the suspension of certification or withdrawal of approval.

7 Quality assurance

Quality assurance is at the heart of Pearson BTEC International Level 2 qualifications on Pearson's Self-regulated Framework. The centre internally assesses these qualifications and is responsible for making sure that all assessors and Internal Verifiers adhere to their internal verification processes, to ensure consistency and validity of the assessment process.

Pearson uses quality assurance to check that all centres are working to the agreed standard. It gives us the opportunity to identify and provide support, if needed, to safeguard certification.

For guidance, please refer to the *Pearson's Self-regulated Framework (SRF) Quality Assurance Handbook* which is on our website at:
www.edexcel.com/quals/cust/pages/srf.aspx

8 Programme delivery

Pearson BTEC International Level 2 qualifications consist of mandatory units and optional units. Optional units are designed to provide a focus to the qualification and give more specialist opportunities in the sector.

In Pearson BTEC International Level 2 qualifications each unit shows both the Guided Learning Hours and the Notional Learning Hours.

Guided Learning Hours are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study, for example in open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments where the learner is not present.

Guided learning hours form part of the Notional Learning Hours for a unit. Notional Learning Hours are defined as the total amount of time a learner is expected to take, on average, to complete the unit to the required standard, including teaching, study and assessment time.

Centres are advised to consider both of these definitions when planning the programme of study associated with this specification.

Mode of delivery

Pearson does not define the mode of study for Pearson BTEC International Level 2 qualifications. Centres are free to offer the qualifications using any mode of delivery that meets their learners' needs. Please refer to the policy pages on our website at:
www.edexcel.com/policies

Whichever mode of delivery is used, centres must ensure that learners have appropriate access to the resources identified in the specification and to the subject specialists delivering the units. Centres must have due regard for Pearson policies that may apply to different modes of delivery.

Resources

Physical resources need to support the delivery of the programme and the proper assessment of the outcomes of learning and should, therefore, normally be of industry standard.

Staff delivering programmes and conducting the assessments should be familiar with current practice and standards in the sector concerned. Centres will need to meet any specific resource requirements to gain approval from Pearson.

Where specific resources are required these have been indicated in individual units in the *Essential requirements* sections.

Delivery approach

It is important that centres develop an approach to teaching and learning that supports the specialist vocational nature of Pearson BTEC International Level 2 qualifications and the mode of delivery. Specifications give a balance of practical skill development and knowledge requirements, some of which can be theoretical in nature. Delivery staff and assessors need to ensure that appropriate links are made between theory and practical application and that the knowledge base is applied to the sector. This requires the development of relevant and up-to-date teaching materials that allow learners to apply their learning to actual events and activity within the sector. Maximum use should be made of the learner's experience.

An outline learning plan is included in every unit as guidance, which demonstrates one way of planning the delivery and assessment of the unit. The outline learning plan can be used in conjunction with the programme of suggested assignments.

Support and training

Pearson offers an extensive package of training to support all aspects of BTEC delivery, including:

- **Teaching and published resources** – we provide an extensive selection of published materials along with our innovative range of digital teaching tools. In addition, we offer guides to support planning and delivery and to help students study. For more information please visit our website: www.edexcel.com/international/iama/teacher/
- **Subject Advisors** – our subject experts are on hand to answer any questions centres may have on delivering the qualification and assessment. For more information visit our website: www.edexcel.com/Aboutus/contact-us/teachers-hods
- **Training** – many of our training events form part of the added value service offered by Pearson. As well as standard events, we can create bespoke training programmes to meet centres' specific needs. These can be delivered face-to-face or online so that centres can choose where, when and how training takes place. For more information please visit our website: www.edexcel.com/training/ or email us at: internationaltfp@pearson.com

If you would like further information please contact your local Pearson representative – to find out how visit:

www.edexcel.com/Aboutus/contact-us/international-customers/

9 Access and recruitment

Pearson is committed to providing qualifications with no artificial barriers. A full statement, included in our *Equality Policy*, can be found on our website at: www.edexcel.com/policies

Equality and fairness are central to our work. We are committed to making sure that qualifications do not discriminate and all learners achieve the recognition they deserve from undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

Restrictions on learner entry

These qualifications are suitable for learners aged 14 and above. Centres must give due regard to Pearson's policies that apply to the fair and equal recruitment of learners to all Pearson qualifications.

Centres are required to recruit learners to Pearson BTEC International Level 2 qualifications with integrity. This will include ensuring that applicants have appropriate information and advice about the qualifications and that the qualification will meet their needs. Centres should take appropriate steps to assess each learner's potential and make a professional judgement about their ability to successfully complete the programme of study and achieve the qualification. This assessment will need to take account of the support available to the learner within the centre during their programme of study and any specific support that might be necessary to allow the learner to access the assessment for the qualification.

Centres will need to review the entry profile of qualifications and/or experience held by applicants, considering whether this profile shows an ability to progress to a Level 2 qualification. For learners who have recently been in education, the profile is likely to include one of the following:

- a BTEC Level 1 qualification in information technology or a related vocational area
- a standard of literacy and numeracy supported by a general education equivalent to four GCSEs/International GCSEs at grade D-G
- other related Level 1 qualifications
- related work experience.

More mature learners may present a more varied profile of achievement that is likely to include experience of paid and/or unpaid employment.

Recognition of Prior Learning

Recognition of Prior Learning (RPL) is a method of assessment that considers whether a learner can demonstrate that they can meet the assessment requirements for a unit through knowledge, understanding or skills they already possess and so do not need to develop through a course of learning.

Pearson encourages centres to recognise learners' previous achievements and experiences whether at work, home and at leisure, as well as in the classroom. RPL provides a route for the recognition of the achievements resulting from continuous learning. RPL enables recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable for accrediting a unit, units or a whole qualification. Evidence of learning must be sufficient, reliable and valid.

10 Understanding the units

All units in these qualifications have the following sections.

Title

The title is a short description of the content of the unit. This form of words will appear on the learner's Notification of Performance (NOP).

Level

The level of the unit indicates the complexity and demand expected to achieve it. The level places the unit on a framework of comparability with other units and qualifications at that level.

Notional Learning Hours (NLH)

Notional Learning Hours (NLH) are the total amount of time a learner is expected to take, on average, to complete the unit to the required standard, including teaching, study and assessment time.

Guided Learning Hours (GLH)

The Guided Learning Hours (GLH) are defined as all the times when a tutor, trainer or facilitator is present to give specific guidance towards the learning aim being studied on a programme. This definition includes lectures, tutorials and supervised study in, for example, open learning centres and learning workshops. It also includes time spent by staff assessing learners' achievements. It does not include time spent by staff in day-to-day marking of assignments or homework where the learner is not present.

Unit value

The unit value is calculated by dividing the Notional Learning Hours (NLH) by 10.

SRF unit code

The unique approval code for the unit.

Unit aim

Says what the aims of the unit are in terms of what is covered and what the unit will enable learners to do.

Unit introduction

The introduction gives a short description of the unit, and details the key knowledge, skills and understanding the learner will gain through studying the unit. The introduction highlights the focus of the unit and how it links to the vocational sector to which the qualification relates.

Outcomes of learning

Outcomes of learning state what a learner can be expected to know, understand or be able to do as a result of completing a programme of learning for the unit.

Assessment and grading grid

The assessment and grading grid gives the criteria used to determine the evidence that each learner must produce in order to achieve a pass, merit or distinction grade. It is important to note that the merit and distinction grading criteria require a qualitative improvement in a learner's evidence and not simply the production of more evidence at the same level.

Unit content

In the unit content section topics are listed as bullets to provide detail on what is required to design and deliver a programme of learning. Not all topics have to be covered to be able to meet the assessment criteria. Centres are able to select the topics they deliver, ensuring learners produce evidence of sufficient depth and breadth to meet the assessment criteria.

Information for delivery staff

This section gives delivery staff information on delivery and assessment. It contains the following subsections.

Essential requirements – identifies any specialist resources needed to allow learners to generate the evidence required for the unit. The centre will need to ensure that any requirements are in place when it seeks approval to offer the qualification.

Employer engagement and vocational contexts – gives examples of agencies, networks and other useful contacts for employer engagement and for sources of vocational contexts.

Delivery guidance – explains the content's relationship to the outcomes of learning and offers guidance on possible approaches to delivery of the unit. This section includes an example outline learning plan which demonstrates one way of planning the delivery and assessment of the unit. The delivery guidance section is based on the more usual delivery modes but is not intended to rule out alternative approaches.

Assessment guidance – gives information about the evidence that learners must produce, together with any additional guidance if appropriate. This section should be read in conjunction with the assessment criteria and grading criteria. It also includes a programme of suggested assignments which demonstrates how assignments match and cover the assessment and grading criteria. This is provided for guidance only and it is recommended that centres either write their own assignments or adapt any suggested assignments to meet local needs and resources.

Suggested resources – indicates resource materials that can be used to support the teaching of the unit, for example books, journals and websites.

Units

Unit 1: Communicating in the IT Industry

Level:	2
Notional Learning Hours:	50 (including 30 GLH)
Unit value (NLH/10):	5
SRF unit code:	20702G

This unit is internally assessed

Unit aim

The aim of this unit is to enable learners to use IT tools to communicate and exchange information safely, securely and effectively with different audiences. Learners will also consider the impacts of IT on individuals, communities and society.

Unit introduction

Communication skills are key to success in any sector but are particularly important in highly technical sectors such as IT where the language used can become full of jargon. It is important that learners are able to communicate with technical and non-technical staff and understand how interpersonal skills affect communication.

IT provides opportunities for us to communicate more effectively using many different tools. Therefore, as well as developing interpersonal skills through more traditional methods of communication such as the spoken word, learners will be introduced to the software packages and tools that are used to present information.

Learners will be prompted to consider their audience when discussing IT-related information. Explaining an IT-related topic to a non-technical person can be challenging and avoiding jargon difficult. Learners will communicate with people with technical knowledge as well as those without.

Learners will also consider the positive and negative effects that IT has on individuals, communities and society.

It is recommended that this unit is delivered alongside *Unit 2: Working in the IT Industry*. Together, these units introduce the relevant employability skills for those interested in a career in the IT industry.

Additionally, these units could be taught in conjunction with other units from the programme to emphasise vocational contexts and make use of naturally occurring assessment opportunities.

Outcomes of learning

On completion of this unit a learner should:

- 1 Be able to communicate information to suit audience, purpose and content
- 2 Be able to use IT tools to communicate and exchange information
- 3 Understand the impact of IT on individuals, communities and society.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Demonstrate effective interpersonal skills in communication		
P2 Produce material to communicate IT-related information to a technical audience		
P3 Produce material to communicate IT-related information to a non-technical audience		
P4 Demonstrate the safe use of IT tools to effectively communicate and exchange information		
P5 Select and implement a specialist communication channel to communicate and exchange information	M1 Produce a report justifying why a specialist communication channel is effective for a given purpose	D1 Produce a report explaining how to ensure safe and secure use of a specialist communication channel
P6 Explain the positive and negative impacts of the use of IT	M2 Discuss the potential threats which the use of IT has introduced	

Unit content

1 Be able to communicate information to suit audience, purpose and content

General communication skills:

- adapting content and style to audience, e.g. modulating voice, terminology, format
- providing accurate information
- techniques for engaging audience interest, e.g. changing intonation, use of technology such as multimedia or use of animation in presentations
- ensuring the message gets across, e.g. asking questions to check understanding

Interpersonal skills:

- methods for communicating interpersonally, e.g. verbal exchanges, signing, lip reading
- techniques and cues, e.g. body language, use of intonation, use of emoticons, capitalisation of text in emails
- positive and negative language
- paying attention and active engagement, e.g. nodding, summarising or paraphrasing

Communicate in writing:

- following guidelines and procedures
- identifying and conveying key messages in writing, e.g. letter, fax, email
- using correct grammar and spelling
- reviewing and proofreading own written work
- reviewing and editing documents created by others
- note taking

Audience:

- technical, e.g. frequent IT user, IT technician
- non-technical, e.g. casual or non-IT user

2 Be able to use IT tools to communicate and exchange information

Communicating and exchanging information:

- e.g. word-processed documents
- presentations
- web pages
- email

IT tools:

- software, e.g. word-processing
- presentation
- other, e.g. email, specialist software for the visually impaired
- proofing tools, e.g. thesaurus, spell-checkers
- other, e.g. conversion of tabular information to graphics, text readers

Specialist communication channels:

- e.g. blogs, wikis, vlogs, podcasts, video conferencing

Safety:

- personal information
- viewing digital content
- uploading digital content
- respect towards others
- data protection regulations
- securing data, e.g. encryption, firewalls, backups, secure sites

3 Understand the impact of IT on individuals, communities and society

Impacts:

- social, e.g. effects on local communities
- economic, e.g. employment structure, working practices, sustainability
- legal, e.g. ownership, copyright, plagiarism
- ethical, e.g. privacy of information
- unequal access

Unequal access:

- implications, e.g. locally, nationally and globally

Abuse of IT:

- threats, e.g. cyber bullying, spam, phishing, denial of service attacks

Information for delivery staff

Essential requirements

Learners will require access to a computer which has communication software installed together with any required peripherals.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

The outline learning plan (OLP), which follows this section, gives an indication of how time can be allocated between the various topics in the unit content.

There are two major ways in which this unit can be delivered; one is as a conventional, continuous unit, and the other is to run it in parallel with other units to gain the maximum benefit from using naturally occurring evidence for assessment purposes.

Whichever method is chosen, the logical plan for delivering the unit will be the same; they will just have different elapsed times. The OLP included in this document follows the sequence of the outcomes of learning.

Some tutors may prefer to vary the order of delivery, which is acceptable.

The first topic to look at is likely to be the general communication skills that are required in the industry.

The various skills are listed under the content for outcome of learning 1. The basic principles can be delivered through whole class teaching and learners can be given a checklist of basic skills. Learners can take part in role-play situations and their peers can assess them against the checklist.

The next area for outcome of learning 1 is interpersonal skills. Some basic information can be given out as information sheets and checklists. Learners should be encouraged to use this list and make notes whilst watching television, various tutors, peer groups, etc which can then be discussed in a whole-class situation.

Role-play and practice presentations can also be used to provide additional scenarios with peers using the checklist to assess these activities. The use of role play where learners wear earplugs or blindfolds and try to communicate are quite useful.

The third topic for this outcome of learning is communicating in writing. Learners should consider a wide variety of examples of writing, containing good practice and less good practice. With tutor guidance they will analyse the writing, picking out elements of good and less good practice. They will also attempt to identify different styles of writing and determine where it would be appropriate to use them.

Learners will undertake small exercises to enable them to practice writing in different styles.

Tutors will also lead discussions and give demonstrations of how to check work (for errors in spelling, grammar, layout, etc) and review work (content). Learners will practise checking and reviewing their own work and that of their peers.

The fourth topic is the audience. Three types of audience are listed in the unit content and learners will take these into account when working on the first three topics.

The second outcome of learning focuses on using IT tools to communicate effectively, which can be based on practical application. The first topic listed in the unit content deals with communicating and exchanging information. Tutors may have to demonstrate some of the techniques, although learners may already be familiar with much of the software. Learner exercises in using word processing, presentation, web page production, and email software will provide the basis. Learners will carry out exercises using the spell-checker and thesaurus available in their word processor software together with at least one other specialist tool.

Learners need to be aware of the pitfalls which occur when relying on, for instance, the spell-checker, where words are correctly spelt, but used in the wrong way, are not identified. The problem with using auto-correct within the spelling check, or in using a grammar checker, also need to be emphasised.

The second topic, specialist communication channels, leads on from the first. Learners will develop their skills further by using different methods of communication. Blog, wiki, vlog and podcast production, plus VoIP software will provide basis.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Communication skills: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on general communication skills followed by learner exercises ● whole-class exercise – tutor presentation on interpersonal skills followed by learner exercises ● whole-class exercise – tutor presentation on written skills followed by learner exercises ● whole-class exercise – tutor presentation on making a communication fit for audience followed by learner exercises.

Topic and suggested assignments/activities/assessment
Assignment 1 – Communicating in IT
Communicating using IT: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on safety • whole-class exercise – tutor demonstration of communication channels followed by whole-class practical • whole-class exercise – tutor demonstration of software and tools followed by whole-class practical exercises.
Assignment 2 – Specialist Communication Channels

Assessment guidance

It is suggested that this unit is assessed using two assignments as summarised in the programme of suggested assignments table.

Finding a scenario which covers all aspects of all criteria is difficult, but the one suggested is acceptable. It places the user in a role which is at an acceptable level for their experience, which is important when devising assignments.

Some of the evidence required to complete the assignments could be naturally occurring within learners' work for other units within the qualification, or for other courses they are undertaking, and tutors are encouraged to use such evidence.

Learners should provide evidence for P1 over a period of time and should involve a variety of interpersonal skills in communication. As much naturally occurring evidence as possible should be used, in fact there should be no need to set up simulated circumstances. Good evidence is a compilation of videos of a variety of formal and informal face-to-face communication. An alternative would be detailed observations by tutors, and other appropriate people, backed up by any relevant documentary evidence. There should be at least three separate and different examples of interpersonal skills in communication.

For P2, learners should produce IT-related material for a technical audience specified either by learners or the tutor. The material produced as evidence must specify the audience for each item. The material may have been produced in a different unit.

P3 is similar to P2, except that the audience is non-technical, requiring learners to adjust their language accordingly. As with P2, the material produced as evidence must specify the audience for each item, and the material may have been produced for a different unit.

For P4, learners need to show that they can use various software tools to help them check communications in order to exchange information effectively. There should be evidence of using proofing tools (at least two) and one other tool type. Tools can be selected by learners or the tutor. Much of the evidence will be naturally occurring in the preparation of documents for this and other units.

For P5, learners should select and implement a specialist communication channel to communicate and exchange information. Evidence can come from screen grabs and/or a written report. Learners should identify common safety issues and use appropriate methods to protect themselves and their data.

For P6, learners need to explain the positive and negative impacts of the use of IT on individuals, communities and society. While the descriptions included should be clear, at this level learners are not required to explain the concepts involved in an in-depth way.

To obtain a merit grade, learners must successfully complete all pass criteria, and the merit criteria.

For M1, learners will need to use one of the specialist communication channels selected in P5 or something similar. Having used the software learners should explain how their choice is effective for a given purpose.

Their justification should show an understanding of user requirements and appropriate characteristics of the chosen specialist channel.

For M2, learners must show an awareness of the severity of particular threats, and briefly discuss possible solutions to issues introduced by IT.

To obtain a distinction grade, learners must successfully complete all pass, merit and distinction criterion.

For D1, learners must explain how they use appropriate methods to ensure safety and security when setting up and using a specialist communication channel to communicate and exchange information. This should cover personal safety as well as the security of data being transferred. Evidence for this criterion can come from screen grabs or a written report.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4	Communicating in IT	You are to produce user guides to using email. These should be available as a word-processed document for complete beginners, a presentation aimed at casual IT users and a web page aimed at frequent IT users. Each guide should include a section on safety measures appropriate for the level of user.	User guides Proofs (before/after)

Criteria covered	Assignment title	Scenario	Assessment method
P5, P6, M1, M2, D1	Specialist Communication Channels	You work for a recruitment agency and deal with clients face to face, over the telephone and through video conferencing. You are to use video sessions you have participated in to demonstrate your interpersonal skills and produce a blog explaining how to use video conferencing.	Videos, blogs

Suggested resources

Book

Maggio R – *The Art of Talking to Anyone: Essential People Skills for Success in Any Situation* (McGraw Hill Higher Education, 2005) ISBN 007145229X

Website

www.mindtools.com

Explains the importance of communication skills

Unit 2: Working in the IT Industry

Level:	2
Notional Learning Hours:	50 (including 30 GLH)
Unit value (NLH/10):	5
SRF unit code:	20703G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of the available job roles involving professional IT and the characteristics employers demand in the IT industry.

Unit introduction

With the IT industry continuing to grow and computers becoming increasingly fundamental to how organisations function, employers are increasingly looking for people with specialised knowledge. In addition, businesses are also looking for certain 'soft skills' which enable an individual to function more effectively as part of an organisation.

Soft skills relate to an individual's ability to communicate and work effectively with others, use appropriate language, be dependable and conscientious, and generally behave in an acceptable manner in the workplace.

Soft skills complement hard skills, which are the knowledge, understanding and technical skills required to carry out a job. It is this combination of technical and soft skills which can improve a person's employability.

This unit provides an opportunity for learners to explore the personal attributes which can play an important role in establishing a successful career as an IT professional.

As part of this unit, learners will become familiar with the range of job roles available to people with professional IT qualifications and consider the personal attributes these roles require.

It is recommended that this unit is delivered alongside *Unit 1: Communicating in the IT Industry*. Together, these units introduce the relevant employability skills for those interested in a career in the IT Industry.

Additionally, this unit could be taught in conjunction with other units from the course to emphasise vocational contexts and make use of naturally occurring assessment opportunities.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the characteristics that are valued by employers in the IT industry
- 2 Know the common job roles undertaken by people working in the IT industry.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the characteristics valued by employers in the IT industry		
P2 Describe common IT industry job roles		
P3 Explain the characteristics required for a specific job role in the IT industry	M1 Explain why certain characteristics are important for a specific job role	D1 Justify a choice of an appropriate job role for a given set of employee characteristics

Unit content

1 Know the characteristics that are valued by employers in the IT industry

Industry specific:

- technical knowledge, working procedures, health and safety knowledge

General:

- skills, e.g. interpersonal skills, planning skills, organisational skills, time management, team working, numeric skills, creativity, problem solving

Attitudes:

- preferred, e.g. determined, independent, integrity, tolerant, dependable, leadership, confidence, self-motivation

2 Know the common job roles undertaken by people working in the IT industry

General IT:

- roles e.g. solutions architecture, solution development and implementation, network management, information security, technical writers, data administrators, IT service management and delivery
- hardware specific, e.g. manufacturing, repair, supply, installation, networks
- software specific, e.g. applications programmers, systems programmers, website developer, communications programmers

Investigation and design:

- analysts
- designers
- project managers

Information for delivery staff

Essential requirements

There are no essential resources for this unit.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

There are two major ways in which this unit can be delivered, one is as a conventional, continuous unit, and the other is to run it in parallel with other units to gain the maximum benefit from using naturally occurring evidence for assessment purposes.

Whichever method is chosen, the logical plan for delivering the unit will be the same, just different elapsed times.

It is recommended that tutors start with an introduction to what is meant by 'attributes' and why they are important. This may have to be delivered initially by whole class teaching since it is probably beyond the experience of many of learners. A good exercise to reinforce information on attributes is to give learners a checklist of the type of attributes which are important, and for learners to use this to start to prepare a profile of useful IT-specific characteristics.

Learners can scan job adverts to identify general attributes implied in the job descriptions. In small groups learners can add items to the profile they are building.

Attitude in relation to the workplace will probably need to be explained since learners may not be too familiar with the subject. Tutor-led class discussions on why attitudes are important to employers can be followed by small groups of learners discussing and adding this information to the profile they are building.

Groups will feed back their profile information to the whole class from which the class will build a composite list. This list can then be refined into a generic profile by class discussions.

This can be followed by looking at jobs in the IT industry. Today there is sometimes less division of the discipline into specific jobs, with one job role covering several disciplines. Tutors can divide the topic as they like providing their delivery covers the relative sub-divisions. Jobs and job titles change quite rapidly in IT related industries and it is assumed that tutors will change their subject delivery to reflect this.

A visiting speaker or learner visits can provide excellent primary and supporting evidence for although it is recognised that this is not always available. The use of case studies which illustrate various job roles is a useful alternative.

The following suggestions are designed to add some variety to the basic format.

Hardware-based jobs can be introduced by learners looking through example job descriptions and advertisements before looking at case studies or talking to visiting speakers.

Software-based jobs can be introduced by setting learners some directed study to investigate three different job roles. This can be reinforced by tutor-led class discussions on the sum of their investigations. The use of example work produced in some of these job roles can be helpful in supporting case studies.

Jobs in investigation and development can be dealt with in a similar manner where examples of the work of, for example, analysts and designers can be used to illustrate the work of these practitioners, when combined with tutor-led discussions.

Other jobs in IT need to be identified and a list compiled, possibly by groups feeding back to compile an overall list. The use of case studies and examples will support the basic information.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Characteristics that are valued by employers: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on industry specific job attributes• whole-class exercise – tutor presentation on general job attributes• group discussions – which attitudes are important and why they are important• directed research – job descriptions and employer requirements.
Assignment 1 – Skills and Attributes for IT Roles
Common job roles: <ul style="list-style-type: none">• whole-class exercise – discussion of various general IT roles• individual exercise – look at investigation and design roles• directed research – investigating the range of IT jobs.
Assignment 2 – IT Jobs on Offer

Assessment guidance

It is suggested that this unit is assessed using two assignments as summarised in the programme of suggested assignments table which follows this guidance.

Some of the evidence required to complete the assignments could be naturally occurring within learners' work for other units within the qualification, or for other courses they are undertaking, and tutors are encouraged to use such evidence.

For P1, learners must describe the characteristics that are valued by the IT industry. The characteristics should encompass the three elements outlined in the unit content.

For P2, learners need to describe common job roles in the IT industry. This is a straightforward descriptive criterion, where learners purely describe the job, for example what the person does. Learners do not need to describe why they do that job. Learners can select the jobs for themselves or the tutor can direct them.

For P3, learners will select a specific job role and explain in detail the characteristics required for the job. This could be an extension of the work for P2.

In order to gain a merit grade, learners must achieve all the pass criteria, and the merit criterion.

For M1, learners need to show understanding as well as knowledge when evidencing this criterion. Learners need to explain why the characteristics they have highlighted for P3 are important. The characteristics should cover job-related and general attributes and attitudes.

In order to gain a distinction grade, learners must achieve all pass criteria, the merit criterion and the distinction criterion.

For D1, learners need to suggest a job role suitable for a given set of employee characteristics. This may be combined with P1. The characteristics may be supplied by the tutor or devised by learners. Learners should give valid reasons for their choice of job role.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, D1	Skills and Attributes for IT Roles	An IT recruitment agency wants to place an article in a trade magazine describing the characteristics valued in the IT industry and suggest complementary job roles.	Article (paper-based or web-based)
P2, P3, M1	IT Jobs on Offer	An IT recruitment agency wants to advertise available job roles to include ideal employee attributes.	Advertisement (paper-based or web-based)

Suggested resources

Book

NCCER – Employability Skills: Trainee Guide 00108-04 (Prentice Hall, 2005)
ISBN 0131600125

CD

Teaching-you Communication Skills (Focus Multimedia Ltd, 2005)
ASIN B000A6BBH0

Websites

www.bcs.org/server.php?show=nav.5677 The Chartered Institute for IT

www.computingcareers.co.uk Information on careers for IT professionals

www.mindtools.com Information on careers skills

Unit 3: Computer Systems

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20704G

This unit is internally assessed

Unit aim

The aim of this unit is to introduce learners to the basic hardware and software components that make up computer systems and for learners to carry out basic installation and configuration.

Unit introduction

Most learners will set up a computer system at some stage, which may belong to them or someone else and it may be a desktop, laptop, personal digital assistant (PDA) or games console. To do this, learners need to know about the different elements of a computer system and how hardware works with software and how all the elements communicate to make the system function.

There are many different manufacturers of computer systems and each manufacturer will produce a wide range of models with different specifications. Being able to understand a computer system's technical specification (what all the jargon means) is important. Learners will spend some time in understanding the function of hardware and software components and assessing potential risks to systems.

In order to decide the requirements for a computer system and typical tasks it will be used for, learners will specify hardware and software for different user requirements.

Learners will need to demonstrate that they can connect hardware devices safely and configure different types of software for a defined user. For this unit learners do not need to assemble a base unit but they will be connecting peripheral devices.

Individuals have different needs and the ability to configure software specifically to suit those needs is necessary in order for individuals to make the best use of the technology.

Health and safety issues are always important when setting up and using electronic equipment and this unit will raise learners' awareness of the hazards involved in both setting up and using computer systems.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the common components of computer systems
- 2 Know the different uses of computer systems
- 3 Be able to connect computer hardware
- 4 Be able to configure computer software.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify the common components of a computer system	M1 Describe different ways to connect to a computer network	
P2 Describe the purpose of different types of computer systems		
P3 Produce representations of how data flows around a computer system		
P4 Produce a system specification of suitable components to meet user requirements	M2 Justify choice of components to meet a given need	D1 Describe alternative setups based on user feedback
P5 Demonstrate the safe connection of hardware safely to a computer system, testing for functionality	M3 Produce material to explain working practices and health and safety procedures when connecting hardware devices	
P6 Demonstrate the configuration software for a given user requirement		D2 Discuss how the configuration of software will help a given user perform their tasks
P7 Identify potential security risks		

Unit content

1 Know the common components of computer systems

Computer system:

- types, e.g. PC, base unit, laptop, netbook, PDA, mobile phone, games consoles, tablet, server, embedded devices (inside phones, domestic appliances, cars)

Hardware components:

- processor speed and type
- memory, e.g. RAM, cache
- storage devices, e.g. hard disk drive, memory stick, CD ROM, flash drive, DVD
- input devices, e.g. touch screen, graphics tablet, gaming controller, microphone, mouse, keyboard
- output devices, e.g. printer, monitor, sound
- computer network connectivity, e.g. 3G, Wireless, Bluetooth, NIC
- costs

Software components:

- system software, applications software, software utilities

Security:

- risks, e.g. phishing, malware, viruses, spam

Data flow:

- between components, e.g. input, output, memory, processor
- representations, e.g. block diagrams, flow chart, images

2 Know the different uses of computer systems

Components:

- hardware
- software

User:

- types, e.g. home, office

User requirement:

- business need, e.g. graphics design, company accounts
- home use, e.g. internet connectivity, online games
- other, e.g. portability, cost, accessibility features

Performance requirements:

- characteristics of component, e.g. processor speed and type, data transmission speeds, storage capacity, battery life

3 Be able to connect computer hardware

Connections:

- peripheral devices, e.g. printer, speakers, digital camera, USB devices, scanner, web cam, barcode reader, graphics tablet
- appropriate connection, e.g. network card, Bluetooth, USB, Cat5, Wireless

Testing:

- functionality, e.g. for required use

Health and safety:

- electrical hazards
- manual handling
- impact on individuals

Working practices:

- working procedures
- assess and minimise risks, e.g. obtaining resources, recording relevant information
- communicating progress and outcomes

4 Be able to configure computer software

Requirements:

- users, e.g. office, home
- tasks, e.g. data recording, photo editing, media playback

Systems software:

- e.g. operating systems, systems software tools, diagnostic tools, file managers, disk utilities, back up, synchronisation
- network connections, e.g. workgroups, file sharing, internet access, email

Applications software:

- office applications software, e.g. word processing, spreadsheet, database, graphics, presentation
- games software
- communications, e.g. web browser, email

Utilities:

- clean up tools, e.g. for cookies, internet history, defragmentation
- drive formatting

Configure:

- editing the desktop, e.g. icon size, font size, colour, background, icon choice
- creating start-up options
- creating and reconfiguring application toolbars
- folder management, e.g. access control, file permissions

Security:

- virus protection, firewall, other, e.g. password protection, physical security

Information for delivery staff

Essential requirements

Learners should have access to at least two additional peripheral devices, for example digital camera, scanner, webcam, barcode reader, graphics tablet and any associated software and cabling.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

Learners will appreciate a practical approach to the delivery of this unit and, wherever possible, small group activity in supported workshops supplemented by structured lessons to the delivery of the underpinning theory would be appropriate.

The use of actual or realistic scenarios that might be encountered in a workplace will make this unit relevant to learners who may move on to employment in a technician role.

Some of the unit content could be delivered using case studies. Contact with actual IT practitioners who can describe their jobs should be encouraged; technicians and network administrators in schools and colleges are invaluable as are any outside visitors. Work experience would be valuable, if available.

This unit links directly to a range of other BTEC units in the qualification.

The term 'computer system' is becoming considerably more ambiguous. The emphasis in this unit is directed towards a desktop machine but can be equally suited to a range of laptops, netbooks, tablets and mobile devices so long as the outcomes of learning are addressed fully.

Gaining an understanding of individual types of hardware would best be achieved through structured practical tasks in workshops but this may not always be possible. A good exercise can be for learners to research the meaning of technical jargon found in advertisements for computer systems and compare these systems based on a variety of parameters such as speed, storage capacity etc. Working in groups to produce a poster describing the main elements of systems will also help develop understanding.

Learners do not need to dismantle machines, although they will enjoy this activity if it can be arranged, but a variety of peripheral devices will need setting up and configuring as part of formative skills development. The creation of appropriate materials (preparation – task instructions – follow-up checks) for a range of particular tasks would be valuable. Not all learners need to be working on the same task at the same time.

In terms of the understanding of the various types of software, a practical approach would be useful where possible. Individuals or small groups of learners could take particular items of software and give demonstrations perhaps based on some existing knowledge.

Configuration should be simple at this level and learners should practice configuring to particular requirements as suggested in the unit content.

Before undertaking any practical activities involving electrical equipment, learners must be aware of and follow appropriate health and safety procedures. It is strongly advised that learners are supervised during such activities to ensure the safe completion of tasks and the validity of individual evidence.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Hardware connections: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on health and safety ● whole-class exercise – tutor presentation on working practices ● whole-class exercise – learners will investigate and experiment with a range of different devices ● individual exercises – learners will conduct detailed investigations of selected devices.
Assignment 1 – What’s What!
Software: <ul style="list-style-type: none"> ● whole-class exercise – learners will investigate and experiment with a range of different systems software, including operating systems and software tools ● individual exercises – learners will conduct detailed investigations of selected aspects of systems software ● whole-class exercise – learners will investigate and experiment with a range of application software and software utilities ● individual exercises – learners will conduct detailed investigations of selected aspects of application software and software utilities.
Assignment 2 – The Best System for You
Whole-class exercise – learners will set up and configure systems to meet a range of tutor-selected scenarios.
Assignment 3 – Setting Up the System

Assessment guidance

As this is an IT qualification, it is expected that IT equipment will be used wherever possible to create the different forms of evidence.

Where descriptive or explanatory evidence is required, appropriate observation records completed by both learners and tutor may form part of the evidence. Practical activities must be accompanied by observation records or witness statements (perhaps in the context of work or work placement experience). This should not usually be the only form of evidence for an individual criterion.

To achieve a pass grade, learners must achieve all the pass criteria listed in the assessment and grading criteria grid.

The suggested assignments are based on a requirement for a small business system.

For P1, learners can produce a leaflet describing the main components (both hardware and software) of a computer, including peripherals. This could also be evidenced through a webpage or any other format. The descriptions need only be brief but should be meaningful.

For P2, learners can again produce a leaflet or any other appropriate format to describe different types of system as suggested in the unit content.

For P3, it is expected the evidence will be diagrammatic and follow the standard input – process – output structure.

For P4, the hardware specification should include the computer system plus any peripherals that are required.

The software specification should include systems, applications and utility software. It is suggested that this evidence is presented as a presentation, but any format may be used. It is important to note that learners will need feedback from this in order for them to work towards D1.

P5 and P6 must be evidenced practically, either in a supervised workshop environment within the centre, or during work or work placement activities. For P5, at least two peripherals should be connected. Depending on the resources available these may be identified by the tutor or chosen from a range available by learners.

This could involve connecting a printer, webcam, wireless laptop etc. Evidence for practical activities must include observation records or witness statements, as appropriate, which should be carefully prepared to ensure that all steps in the connection of the peripherals have been completed individually by learners, and be supported by visual (e.g. photographic, video) or written evidence. Tutors may find it convenient to prepare a checklist to record completion of each step in the connection and testing process, which should be signed and dated and included with learner evidence. The tutor should ensure learners follow acceptable and safe working practices.

For P6, the specific purpose could be a user need or to meet the requirements of a business or both.

Learners must configure systems, application and utility software. In order to show that adjustments have been made to the configuration, the software should be in its default state at the start of the process, the requirement clearly stated, and evidence provided of the results of the configuration process. This criterion should be documented through a combination of some written evidence and some visual evidence (such as screenshots, photographs) and appropriate observation records or witness statements showing pre- and post-configuration states.

For P7, learners should identify the potential risks to the system. The suggestion is that this is evidenced at the same time as P4, through a presentation to the user.

To achieve a merit grade, learners must achieve all of the pass criteria and all of the merit grade criteria.

For M1, the evidence can be incorporated with that for P1 or if this makes the leaflet too confused, a separate leaflet can be produced.

M2 naturally follows from P4. Tutors should identify a given user need which allows learners to justify their choice of hardware and software. The evidence would form part of the presentation.

M3 follows from P5 and learners can relate working practices and health and safety issues to the peripherals connected in P5. This is probably best evidenced with a written 'report'.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction grade criteria.

For D1, learners need to suggest alternative setups. These can be suggestions for different hardware or software but should be based on feedback from the users following the presentation of the specification for P4.

D2 follows on from P6, configuration. This requires learners to explain to the user how the configuration helps them. It is suggested this could be presented as a memo to the user pointing out what has been done and why. Alternatively, a simple 'user guide' could be produced.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	What's What!	A small business has asked you to set up a computer system for them. They would like information leaflets describing different types of systems, the components of systems and how it all links together.	Information leaflets Diagrams
P4, P7, M2, D1	The Best System for You	Produce a proposal for a computer system to present to the managers of the business.	Presentation Supporting handouts
P5, P6, M3, D2	Setting Up the System	Set up a computer system by installing and testing peripherals and configuring software.	Witness statements Observation records Screenshots Memo/user guide

Suggested resources

Books

Mueller S - *Upgrading and Repairing PCs* (Que Publishing 21st edition)
ISBN 9780789750006

White R and Downs T – *How Computers Work* (Que, 2003) ISBN 0789730332

Journals

Which? Computer

Computer Weekly

Websites

www.bized.co.uk

A business education website

www.computerweekly.com

A computer magazine

Unit 4: Business IT Skills

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20705G

This unit is internally assessed

Unit aim

The aim of this unit is to enable learners to solve business problems by finding information, developing and presenting ideas and evaluating business solutions.

Unit introduction

Businesses often want to consider alternatives when faced with particular problems and spreadsheet models are a useful tool to help inform management decisions. IT practitioners need to be able to use spreadsheet models with confidence.

The focus of this unit is on finding information and using a spreadsheet as a tool for solving problems. It is not focused on the expert use of spreadsheet software although learners will need to develop spreadsheet skills sufficient to manipulate data, use automated tools and ask 'what if ...' questions.

The first part of the unit concentrates on investigating business requirements and identifying the inputs, outputs and processes that will be needed to create a spreadsheet model. Finding valid, reliable data for the model is critical and learners will be made aware of the different sources of information they can access.

Learners need to understand that not everything found on the internet is accurate or reliable.

The practical part of the unit concentrates on setting up spreadsheet models and developing the skills to generate useful and valid information in different formats, e.g. graphs or charts and answers to 'what if' questions. Having generated lots of information learners need to be able to present the information in different formats to suit the audience. For example, they may produce a PowerPoint presentation incorporating graphs and charts to present their findings to the business managers and produce a user guide for the spreadsheet model.

Finally, learners will be evaluating their solutions and also their use of IT tools in developing models and presenting solutions.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the requirements for solving business problems
- 2 Know how to find information to support business solutions
- 3 Be able to use spreadsheet models to support business solutions
- 4 Be able to present business solutions
- 5 Be able to evaluate business solutions.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain information requirements for solving a business problem		
P2 Prepare a business plan	M1 Justify choices made in the business plan	
P3 Identify and select data from appropriate sources to solve a business problem	M2 Validate sources and acknowledge copyright	D1 Evaluate sources for accuracy, currency, completeness and reliability
P4 Set up and test a spreadsheet model including automated features to solve a business problem	M3 Explore possibilities by answering 'What if?' questions	
P5 Develop the model based on user feedback		
P6 Present a business solution using a range of software tools to suit the audience	M4 Justify the use of software tools	
P7 Carry out an evaluation of a business solution		

Unit content

1 Understand the requirements for solving business problems

Information requirements:

- investigating, e.g. talking to users, observing activities, checking existing documents
- expected outcomes, e.g. management reports, graphs, charts, simulations
- benefits, e.g. inform management decisions, cost effective solution
- constraints, e.g. budget, existing systems, resources, business preferences, supplier contracts

Business problems:

- understanding the problem
- typical problems, e.g. networking an office, setting up a company website, launching a new product or service, upgrading an existing IT system

Business plan:

- inputs, e.g. resources required
- outputs, e.g. reports, graphs, charts
- processes, e.g. calculations, logical operations, macros, models
- timelines
- research

2 Know how to find information to support business solutions

Data:

- carrying out research, e.g. products, technologies, manufacturers, suppliers
- looking at alternatives, e.g. cabled versus wireless, Blackberry versus PDA
- investigating costs, e.g. set up, ongoing, staffing, training

Sources:

- range, e.g. internet, trade magazines, retail outlets, advertisements
- copyright

3 Be able to use spreadsheet models to support business solutions

Spreadsheet models:

- purpose, e.g. to estimate costs, returns, alternatives, business impact, break even points, 'what if' questions

Automated features:

- generating graphs or charts
- other, e.g. macros, script, user interface

Developing model:

- seeking feedback from users
- assessing fitness for purpose
- making improvements

Test:

- functionality
- user testing
- fitness for purpose

4 Be able to present business solutions

Present:

- software tools, e.g. word processing, presentation, spreadsheet, graphics

Business solution:

- recommended solution with justification

5 Be able to evaluate business solutions

Evaluate:

- solution against original requirement
- use of IT tools
- development of the model
- suggesting improvements

Information for delivery staff

Essential requirements

Learners will need access to suitable spreadsheet and other software.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

The focus of this unit is on solving business problems, not on becoming an expert spreadsheet user as this is covered in another unit. However, depending on learners' prior knowledge, a considerable amount of time might be required to develop their skills with the spreadsheet software, before concentrating on how to use it as a tool to solve business problems.

Starting with practical spreadsheet work and continuing a practical strand throughout the unit will add interest.

Wherever possible, setting exercises in a business context will help reinforce the use of spreadsheet as a tool not as an end in itself.

The first two outcomes of learning are theoretical in nature but can be delivered using case study examples, or ideally a local business scenario. Different types of simple business 'problems' can be introduced – the more diverse the better – and discussed to work out how a spreadsheet could be used to help come up with a solution. A visiting speaker would be a useful here.

Learners do not have to undertake all the techniques outlined under 'investigating' for assessment but these skills will be used in other units so any practice here will be of value. An exercise based around 'information requirements' would ensure learners have a checklist of all the elements they will need to cover when it comes to assessment.

Developing a business plan at this level is basically identifying inputs, outputs and processes.

Finding data should not be confined to using the internet. Learners must be encouraged to identify and use other sources such as trade magazines, local newspapers and promotional literature. Understanding that data, especially from the internet, is not always reliable and must be double checked is an essential lesson.

Presenting information in different formats to suit different audiences is considered in *Unit 1: Communicating in the IT Industry* but here learners will need to combine software, for example insert graphs into a PowerPoint presentation. These skills will need to be practised.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Requirements for solving business problems: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on investigation methods and outcomes• whole-class exercise – tutor presentation on benefits and constraints• whole-class exercise – tutor presentation on business problems and plans• individual exercises – learners use tutor-set scenarios to look at business problems, gathering information and developing solutions• individual exercises – learners use spreadsheet software to present information.
Assignment 1 – Planning a Solution
Finding data to support business solutions: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on research methods and data sources• individual exercises – learners research and collect data to use in tutor-set scenarios.
Assignment 2 – Finding the Data
Using spreadsheet models: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on modelling• individual exercises – learners use tutor-set scenarios to practise aspects of modelling.
Assignment 3 – Modelling
Presenting and evaluating business solutions: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on presentation tools• individual exercises – learners use tutor-set scenarios to practise aspects of presentation• whole-class exercise – tutor presentation on evaluating a solution.
Assignment 4 – Presenting and Evaluating

Assessment guidance

To achieve a pass grade, learners must achieve all the pass criteria listed in the assessment and grading criteria grid.

For P1, learners must explain the information required to solve a given problem. What the problem is, how they will research the information, what the outcomes should be, and the benefits and constraints should all be included. This can be presented as a report or in any other format.

For P2, learners must prepare a business plan. This should include the elements indicated in the unit content and can be combined with evidence for P1.

P3 deals with data collection, and learners should show that they have identified suitable sources and collected appropriate data. A range of sources should have been identified and data collected by interrogating a database in at least one case.

P4 and P5 are likely to take the majority of the time. Learners must demonstrate that they have been able to set up a spreadsheet model to solve the business problem (printouts, screenshots, witness statements), include some automated features which need not be complex (screenshots showing formulae etc), test for functionality (test plans and results), user test (user feedback, e.g. completed questionnaire), and develop the model based on the user feedback (before and after screenshots). It is likely the tutor will act as the 'user' but peer evaluations will also be of value.

For P6, learners must present their spreadsheet model using different software tools for example as a PowerPoint presentation including graphs and charts for presentation to management and as a user guide which may be paper based or digital.

For P7, learners must evaluate their solution covering all the elements in the unit content.

To achieve a merit grade, learners must achieve all of the pass and merit grade criteria.

M1 is an extension of P2 and learners must explain why they have chosen the inputs and processes outlined in their business plan including why alternatives have been rejected.

M2 is an extension of P3 and learners must demonstrate they have validated the sources used by checking the reliability of the source and where appropriate, cross checking data with another source. All sources should be acknowledged.

For M3, learners will have answered what if questions. This does not mean learners have to use What if statements although they may be included. Suitable screenshots or printouts must make it clear what changes have been made.

For M4, learners must justify the software tools they have used to present their solutions, i.e. why each method is suitable for the audience and purpose.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction criterion.

D1 is associated with P3 and M2 and requires learners to evaluate their sources for accuracy (validation), currency (up to date?), completeness (anything missing?) and reliability (regular updates, well-known source etc).

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	Planning a Solution	You have been asked to recommend the hardware and software required for a local area network.	Requirements report Business plan
P3, M2, D1	Finding the Data	Identify suitable sources for the data needed and extract the data required.	Sources list Data (in spreadsheet)
P4, P5, M3	Modelling	Produce, test and develop a spreadsheet model to consider alternative setups and their costs. Generate a breakeven graph and consider alternatives if budget changes are made.	Screenshots Printouts Test plans and results User feedback
P6, P7, M4	Presenting and Evaluating	Present your model to the client and evaluate your solution.	Presentation/written report/web page Evaluation

Suggested resources

Books

Beattie V, Pratt K – *Business Reporting: Harnessing the Power of the Internet for Users* (Institute of Chartered Accountants of Scotland, 2001)
ISBN 101871250900

Harvey G – *Excel 2007 for Dummies* (John Wiley & Sons, 2006)
ISBN 100470037377

Tapscott D – *Digital Capital: Harnessing the Power of Business Webs*
(Nicholas Brealey Publishing, 2000) ISBN 101857882091

Waller D – *Basic Projects in Excel 2007* (Payne-Gallway, 2008)
ISBN 9781905292424

Journals

Computing

Computer Weekly

Unit 5: Supporting Organisations with IT

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20706G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge and understanding of how and why IT is used by organisations, enabling them to plan an IT working environment. The unit also covers the impact that IT has on organisations and individuals.

Unit introduction

The focus of this unit is on understanding the ways, reasons for and impacts of the use of IT within organisations.

IT is used extensively by organisations and continues to spread into more and more diverse areas using increasingly powerful and innovative technology. This unit starts by giving learners the background to the use of IT in business.

The unit encourages learners to consider how IT supports business functions and to understand why IT is used for those purposes. The introduction of IT into organisations has not only been used to automate existing systems and processes but in many cases has allowed and prompted fundamental changes to be made in the way organisations function. It is assumed that learners will have some knowledge of the capabilities of general applications software before undertaking this unit, although they do not have to have acquired the skills to use the packages.

Learners will discover the positive and negative aspects of using IT for both employers and employees. The impact of the use of IT on individuals within organisations has progressively increased. In particular the life span of particular skills has decreased and this generates a need for constant re-skilling and adaptation. IT technologies are being developed all the time and the latest trends in IT development will be considered.

IT has affected not only employers and employees but the whole business environment. In this unit learners will come to understand the issues of ergonomic design and health and safety that relate directly to IT, and ask questions such as are employees sitting comfortably, do they have enough space, do they need specialist equipment to overcome repetitive strain injuries?

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the ways in which organisations use IT
- 2 Understand the reasons why organisations use IT
- 3 Understand the impact of IT on individuals and organisations
- 4 Be able to plan a working environment to incorporate IT.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify the ways in which organisations use IT to manage information	M1 Explain how and why a particular organisation uses IT to meet its objectives	D1 Recommend changes that could be made to the way that a particular organisation uses IT
P2 Describe how businesses use IT for communication		
P3 Discuss the factors that drive organisations to use IT		
P4 Explain the impact of IT on individuals		
P5 Explain the impact of IT on organisations	M2 Explain the potential risks for an organisation which uses IT	D2 Evaluate how trends in IT can impact on organisations
P6 Produce a report on how working environments are affected by IT		
P7 Produce a suitable room plan to incorporate IT	M3 Produce material explaining how health and safety issues have been taken into account in a room layout	

Unit content

1 Know the ways in which organisations use IT

Business use:

- promotional, e.g. marketing, advertising, recruitment
- technical, e.g. manuals, specifications

Communication:

- internal, e.g. email, intranet
- external, e.g. letter, invoices, websites, direct mail shots

Managing information:

- storing, e.g. customer details, sales records
- competitor details
- online services, e.g. banking, shopping
- manipulating, e.g. interpreting data, e.g. accounts, trends
- decision making, e.g. forecasting, budgets

2 Understand the reasons why organisations use IT

External factors:

- penetration into new digital markets, e.g. voice recognition, multi-touch input, new consumer devices and platforms
- changing external requirements, e.g. supplier expectations, changing market needs, changing legislation

Internal factors:

- meeting business needs, e.g. cost effectiveness, increases in output, increases in data storage, speed, gaining a competitive edge, adapting to changing customer requirements, access to resources
- other commercial drivers, e.g. efficiency gains, consolidating data

3 Understand the impact of IT on individuals and organisations

Impact on individuals:

- re-skilling employees, e.g. support and training needs
- de-skilling, e.g. automation of previous user tasks
- outsourcing of tasks, e.g. network support, storage
- home working
- reduced job security

Impact on organisations:

- risks, e.g. security, compatibility, health and safety, impact on staff

Trends:

- changes, e.g. new applications, wireless technologies, operating systems, innovative software platforms
- changing market leaders
- future developments

4 Be able to plan a working environment to incorporate IT

Working environment:

- ergonomics, e.g. workstation layout, furniture design, positioning of equipment
- health and safety issues, e.g. repetitive strain injury, eye strain, electrical equipment safety, trailing cables

Room layout:

- positioning of office furniture, e.g. desks, chairs, filing cabinets, photocopiers
- positioning of IT equipment, e.g. workstations, cabling, servers, printers
- lighting
- air-conditioning

Information for delivery staff

Essential requirements

Case studies and examples are an essential to the delivery of this unit and tutors will need to have a sufficient stock of them.

Access to an organisation or personnel from an organisation which uses IT is essential.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

The outline learning plan which follows this section gives an indication of how time can be allocated between the various topics in the unit content. It is designed only as a guide and tutors will use knowledge of their learners to adjust the allocation of time accordingly.

All of the criteria for this unit tend to be theoretical in nature, and at this level it is important to find a variety of more innovative ways of delivering the subject matter. The use of as many methods of delivery as possible may be used to make the subject matter more palatable for the level 2 learner.

The fact that evidence asks for work relating to a real organisation should encourage visiting speakers or learner visits as part of the delivery. If this is not possible then the tutor could visit and feedback information to learners.

Tutors may use specific examples to show where IT is used to support organisations. There should be special emphasis on the topic headings presentation, manipulation of information, communication and managing information.

The first of these topics is the use of IT for presentation purposes. Case study material or examples of various presentational uses form an important part of this delivery and give an indication of the breadth of uses.

Particularly important is the emphasis that it is not just PowerPoint; printed material and web-based or other electronic material should also be mentioned.

Moving on to the manipulation of information, tutors need to refer learners to what they already know about software such as spreadsheets, databases and word processors, and relate this to their use in organisations.

This can be developed further by looking at why organisations need to manipulate information and in particular the interpretation of data and decision making.

Delivery of the communication aspects of the subject can begin with simple diagrams showing examples of internal and external communication. This can be extended by supplying examples of departments in an organisation and the type of things they need to communicate, and encourage learners to draw their own simple 'communication diagrams' to represent this information.

For the final section on how organisations use IT to deal with managing information, a little time should be used to define the concept of management in this instance.

Having established knowledge of how organisations use IT, the logical continuation is into why organisations use IT. Once again case study materials, or specific examples, are extremely valuable in dealing with this subject. If a visiting speaker, or a visit to an organisation, or even a training video, can be arranged the benefits are considerable especially since some of the assessment relates to a named organisation.

The increased complexity of the use of IT has meant that organisations can now carry out things, which even a few years ago were impossible. This has brought its own problems with it. The use of case studies and examples to explain the impact of this is a useful way of imparting basic information. Discussion groups and internet research can be used to support this information.

A good place to start when considering trends is for learners to research specific trends over recent years.

Learners should be given specific topics to research, either individually or in groups, and asked to make notes on their findings to feed back to the whole class. One group must include the rise and fall of various hardware and software market leaders over the years.

The final outcome of learning is about ergonomics and health and safety related to the IT working environment.

After some tutor-led discussions, learners can research ergonomic designs in office furniture and computer equipment. This should be related to health and safety. For example, there are many mouse designs available for users with problems with repetitive strain injury (RSI). The issues of general office safety such as tidy cabling, filing cabinet positions etc should also be discussed.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction.
Know the ways in which organisations use IT: <ul style="list-style-type: none">• use of presentation software• information an organisation may want to manipulate and the reasons why• simple block diagrams to show the type of communication which takes place in an organisation and between organisations• defining the term 'management of information'• visiting speaker/visit/directed research.

Topic and suggested assignments/activities/assessment
Understand the reasons why organisations use IT: <ul style="list-style-type: none"> • case study material to explore external factors • case study material to explore internal factors • directed research.
Assignment 1 – Using IT
Understand the impact of IT on individuals and organisations: <ul style="list-style-type: none"> • case studies to identify potential skill changes • directed research – trends which have brought us to the current position (learners could investigate various aspects in small groups and feedback to the whole class).
Assignment 2 – Impact of IT
An overview of ergonomics: <ul style="list-style-type: none"> • directed research – the latest ergonomic designs • health and safety in the office • planning layouts – exercises.
Assignment 3 – Ergonomics

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments table which follows this guidance.

Note that M1 and D1 are about a specific organisation. Visits or visiting speakers as mentioned in the delivery guidance are probably the best methods of obtaining the information needed for these criteria, but if these are not available there is quite a lot of relevant information on the internet.

The nature of this unit makes deriving a scenario for assessment purposes quite difficult. The programme of suggested assignments table suggests a local newspaper-based scenario where, in common with many local and national newspapers, the news provision covers webpages, pull-out supplements and sometimes giveaway CDs, as well as pure news sheets. This basic scenario is used across all three assignments.

The suggested types of evidence are all related to the scenario but they are not the only methods appropriate to the particular criteria.

The tasks require learners to prepare material to assist with the finished published articles the newspapers are going to produce on the use of IT in organisations.

For P1, prepared material will identify ways in which organisations use IT to manage information. Learners need to give examples from each of the sub- categories in the unit content. Learners should select these examples themselves.

For P2, learners are describing how organisations use IT for communication. Again, reference should be made to the unit content.

For P3, learners must describe reasons why organisations use IT. Learners should include both external and internal factors. Ideally, learners should select the factors themselves although some outline guidance by the tutor is acceptable.

For P4, learners should describe the impact on the complexity of an individual's work and on their capacity to produce work. The learner is only required to produce draft material, but it should contain proper descriptions of the subject.

For P5, learners should consider the impact of IT on organisations involving positive and negative aspects. The positive impact will be related to the reasons for using IT.

For P6, the learner needs to produce a report showing how the use of IT impacts the working environment. These should be selected from the unit content.

For P7, learners are asked to produce a layout design for an office environment incorporating IT. Learners should be given basic room dimensions with any fixed points such as doors and windows shown and told how many people will use the room and possibly any existing equipment that is to be retained. Learners should submit an annotated plan, which may be drawn using IT but need not be. They could give a presentation to introduce their plan.

In order to gain a merit grade, learners must achieve all of the pass, and merit criteria.

M1 requires knowledge of an actual existing and named organisation. It is not possible to undertake this unit without information about a real organisation, which can be commercial or non-commercial in nature. In some ways the criterion should perhaps be expressed as 'why and how' since it makes sense to determine why the organisation needs to use IT, and then to explain how the IT has been implemented to undertake this usage.

For M2, three different potential concerns should be considered, and for each of these concerns learners needs to describe the concern and then recommend a way to reduce the associated potential problems. At level 2 it is permissible for the tutor to give guidance on the selection of potential concerns, but at merit level they must not make the final selection for learners.

M3 is an extension of P7 and requires learners to explain where they have taken health and safety into account in their plan. This may be included in the presentation if that method is used to present evidence or added using any appropriate written format.

In order to gain a distinction grade, learners must achieve all of the pass, merit, and distinction criterion.

For D1, learners must state possible changes to the way in which IT is used by the organisation. For each of these changes at least one potential benefit and at least one possible disadvantage should be identified. The changes do not have to be obvious improvements in this instance since it is only 'change' that is required, for example, extending or introducing a network, developing a webpage or introducing PDAs are acceptable. The important thing is that learners are able to identify and explain the results, potentially positive and negative, of the change.

For D2, learners are looking at trends in IT and evaluating how these will impact on organisations. Learners should have researched trends and possibly asked an organisation how these may affect them.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, D1	Using IT	Your local newspaper is producing a series on the use of IT in organisations. You have been asked to help prepare materials for it.	Newspaper article Supplements
P4, P5, M2, D2	Impact of IT	The newspaper was delighted with the help you provided. They now want you to prepare follow-up materials on the impact of IT.	Webpages or leaflets
P6, P7, M3	Ergonomics	The newspaper realise their office needs rearranging. They have asked you to plan a new look for them taking into account ergonomic design and health and safety issues.	Presentation Layout design/s Report/wiki

Suggested resources

Books

Campbell-Kelly M and Aspray W – *Computer: A History of the Information Machine* (Westview Press Inc US, 2004) ISBN 0813342643

Ferry G – *A Computer Called LEO: Lyons Tea Shops and the World's First Office Computer* (Fourth Estate Ltd, 2003) ISBN 1841151866

Rheingold H – *Smart Mobs: The Next Social Revolution* (Perseus Books, 2003) ISBN 0738208612

Warschauer M – *Technology and Social Inclusion: Rethinking the Digital Divide* (The MIT Press, 2004) ISBN 0262731738

O'Reagan G - *A Brief History of Computing 2nd Edition* (Springer, 2012) ISBN 9781447123583

Ceruzzi P - *Computing: A Concise History* (The MIT Press, 2012) ISBN 9780262517676

Bauerlein M - *The Digital Divide: Arguments for and Against Facebook, Google, Texting, and the Age of Social Networking* (Tarcher 2011) ISBN 9781585428861

Journals

Computer Weekly

Computing

Websites

www.forrester.com

Technology research company

www.gartner.com

Information technology research and advisory company

www.ovumkc.com

The Knowledge Centre

Unit 6: Project Planning using IT

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20707G

This unit is internally assessed

Unit aim

The aim of this unit is to introduce learners to the fundamental concepts of project planning using IT tools and to enable them to plan, implement, and review a project in a real-world scenario.

Unit introduction

It is common to read or hear about large-scale projects that over-run their deadline dates or cost very much more than it was thought at the start and this is often because of poor project planning.

In this unit learners will be expected to apply project planning skills to an individual project that produces a product or service. The skills and knowledge developed in this unit can apply equally to non-IT or IT-based projects.

The first part of the unit looks at the activities involved in carrying out a project from the initial request and gathering of information to implementation and review. The factors influencing projects, such as the finance or resources available, are also considered.

Planning projects is vitally important and learners will focus on the production of a project plan that will be used throughout the project. Working within agreed timescales and allocated resources is vital and this is reflected within the assessment of this unit. However, internal or external circumstances can result in plans needing to change and tracking the progress of the work and keeping other people informed of progress is essential.

The final part of the unit involves reviewing the product or service that has been developed.

The choice of the project is entirely open. It can be based on existing skills or skills and knowledge developed in other IT units such as website development or database development, or it can be based on work for other subjects or an extra-curricula event.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know how to prepare for a project
- 2 Be able to produce a project plan
- 3 Be able to follow a project plan to implement a project
- 4 Understand how to review a project to ensure it meets its goals.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify the factors that influence projects	M1 Explain why projects fail to meet intended outcomes	
P2 Describe the activities which comprise the project lifecycle		
P3 Gather information required for a project		
P4 Plan the scope of an intended project including the resources required	M2 Justify the resources required for the project	D1 Report potential problems that could arise during project development
P5 Produce an outline project plan		
P6 Monitor the progress of a project against the project plan, making adjustments as necessary	M3 Produce material documenting the adaptation of plans to deal with issues experienced during the project	
P7 Review a project against a project plan		D2 Evaluate the project plan suggesting possible improvements

Unit content

1 Know how to prepare for a project

Factors that influence projects:

- internal factors, e.g. time, money, expertise, urgency, resources, likely benefits, constraints
- external factors, e.g. finance, holidays, work placements, expertise, legislation

Unsuccessful projects:

- reasons, e.g. unrealistic expectations, poor initial project design, additional unforeseen developments

Gathering information:

- appropriate techniques, e.g. questionnaires, observation, interviews, market research

Project life-cycle:

- activities, e.g. outline proposal, alternative proposals, gather information, produce project plans, gain permission, design a solution, produce a solution, monitor progress, test, review, user acceptance, maintenance

Scoping:

- requirements, e.g. purpose of project, why a solution is needed, who is it for, timescale, resources needed, constraints

2 Be able to produce a project plan

Reasons for planning:

- reasons, e.g. setting timescales to meet deadlines, factoring in known constraints (holidays etc), making sure resources are available at the right time, costing the project accurately

Project plan:

- ordered lists of activities
- timescales
- milestones
- resources, e.g. staffing, money, hardware, software

Produce a plan:

- using software, e.g. dedicated project management software, spreadsheet

3 Be able to follow a project plan to implement a project

Monitor progress:

- methods, e.g. work logs, update reports, interim testing
- interim reviews
- adjustments, e.g. milestones, handover date

4 Understand how to review a project to ensure it meets its goals

Review:

- aspects of the planning, e.g. appropriateness of project plan, timescales, use of resources
- the product, e.g. meets the requirement, impact on users, usability, functionality, 'hit or miss'

Information for delivery staff

Essential requirements

Learners will need access to hardware and software appropriate to the projects undertaken.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Local, regional business links – www.businesslink.gov.uk Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

For outcome of learning 1, case studies of existing projects or presentations by people who have recently completed projects can be used to make learners aware of the various factors that influence projects; what can go wrong and what stages the project went through.

A practical approach is recommended to reinforce the learning of the underpinning project planning skills. The assessment does not require an IT-based project and a simple non-IT related example could be used. One example might be to consider a project to organise an end-of-year party. In this example, learners would first have to find out what was needed, e.g. style of music, food and times. This gives opportunities for interviewing or generating questionnaires to gather learner feedback. Planning considerations might involve booking the venue and DJ etc, ordering the food, fund raising, checking health and safety issues etc. Various potential other solutions could also be considered (alternative venue and dates, volunteer 'police' etc).

To create a project plan learners can be introduced to any suitable project management software or simply use a spreadsheet. It is not a requirement at this level to use specialised software. The important thing is that learners are able to organise the project activities into a sensible order, put realistic timescales on each activity and identify the resources needed.

Monitoring progress is hard to do in theory, therefore any opportunities that arise to practice keeping logs and setting milestones should be identified. This could be applied to learners' assignment schedules from any units they are studying.

Reviewing is a skill that has to be practised. Learners find it hard to go beyond stating that something was OK or not. The indicative content can provide headings for what should be reviewed and providing supplementary questions using 'why' and 'how' can help learners amplify their responses.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit
Preparing for a project: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on factors which influence projects and why projects go wrong• whole-class exercise – tutor presentation on the project life-cycle• individual exercise – learners gather information and produce project proposals for tutor-set scenarios.
Assignment 1 – Groundwork
Planning a project: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on planning, activities, timescales, resource management, software• individual exercise – learners gather information and use software to produce project plans for tutor-set scenarios.
Assignment 2 – Planning
Following a project plan: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on monitoring methods• individual exercise – learners apply monitoring methods to a suitable project/part of a project.
Assignment 3 – Implementing
Reviewing a project: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on reviewing projects• individual exercise – learners review a suitable project/part of a project.
Assignment 4 – Evaluating

Assessment guidance

Learners themselves do not need to identify the topic for the project. It is recommended that some element of choice will allow learners to engage with the topic and thus achieve to the highest level of their ability.

Evidence for the unit may be produced via one or more assignments, and although ideally one project would be undertaken, each criterion could be met individually from different projects occurring naturally within the context of other unit study, at work or work placement, or in simulated activities. This strategy may be particularly relevant where criteria cannot be met easily in a single project.

It is essential that projects are completed individually by learners. Group projects, where project tasks are divided amongst group members, are not acceptable evidence for this unit.

Practical activities must be accompanied by observation records or witness statements, but this should not be the only form of evidence for an individual criterion.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

P1 and P2 could be evidenced via an introductory task, undertaken before project topics are identified, and covering the factors listed in the unit content under outcome of learning 1. Alternatively, as for the suggested assignment, P1, P2 and P7 can be completed at the end of the project.

Criteria P3-P7 naturally follow the steps involved in undertaking a single project, i.e. the establishment of project requirements, gathering information, the production of a project plan, completing the project with associated monitoring, followed by a review of activities undertaken and the impact of implementation.

All criteria could be evidenced by a project portfolio or report. If this form of evidence is chosen, it should contain appropriate sections relating to individual criteria, such as an introduction (to cover P3 and P4, i.e. identifying particular requirements and the gathering of information), required resources, a project planning section (using the planning techniques associated with P5, which may be produced using appropriate models, spreadsheets, flowcharts, project management software), project activities (P6 to include notes, observation records, photographic evidence etc as appropriate to the topic selected), a monitoring section (P6 could take the form of an annotated project plan, diary, work log) and a review section (P7 to include review of the project plan).

This strategy should enable tutors to assess achievement against individual criteria accurately, whilst allowing learners to provide a variety of forms of evidence. It may be appropriate at some stages for reviews to be undertaken via oral or visual presentation and any slides or notes produced included in the portfolio or as an appendix to the report.

To achieve a merit grade, learners must achieve all of the pass grade criteria and the three merit grade criteria.

If evidence for these criteria is presented as part of an overall project portfolio or report, assessment will be made more efficient if sub-headings indicating the specific content relating to these criteria are introduced to relevant sections identified in the portfolio or report sections identified above.

M1 is linked to P1 and P2 and learners should include examples of failed projects (there are always plenty being reported).

For M2, learners should be able to give reasons for their choice of resources for the project over suggested alternatives.

For M3, learners should provide evidence of adapting their project plans as issues arise. This can be evidenced with before and after versions of the plans or annotated plans. In the unlikely event that everything ran smoothly and to time, tutors may give learners simulated problems and ask them to explain how they would have adapted their plans if these events had arisen.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction criteria.

For D1, learners should write a report on the potential problems that may arise throughout the various stages of the project life-cycle, suggesting how such problems may be avoided or their impact limited.

For D2, learners must evaluate their project plan and suggest possible improvements. They may consider what would happen if a project is not well planned.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P3, P4, M2, D1	Groundwork	Investigate the requirement and develop some ideas.	Research information Project proposal
P5	Planning	Produce a project plan for a given timescale.	Project planning documents
P6, M3	Implementing	Carry out the project according to plan, monitoring progress and adapting plans as required.	Evidence of project completion Records of monitoring Annotated plans
P1, P2, P7, M1, D2	Evaluating	Describe the project life-cycle and the factors that influence projects and review the completed project.	Short report

Suggested resources

Books

Butterick R – *Project Workout: A Toolkit for Reaping the Rewards from All Your Business Projects* (FT Prentice Hall, 2005) ISBN 0273681818

Maylor H – *Project Management*, 4th Edition (FT Prentice Hall, 2010)
ISBN 9780273704324

Dennis Lock – *Project Management* (Gower Publishing Ltd, 2007)
ISBN 0566087723

Journals

Projects magazine

Project Manager Today

Websites

www.businessballs.com/project.htm Project management tools and tips

www.mindtools.com Career training and ideas

www.projectsart.co.uk Project management resources

Unit 7: Installing Computer Hardware

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20708G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge, understanding and skills in the installation of hardware components in a computer system.

Unit introduction

Installing and upgrading hardware is typical of the day-to-day tasks that an IT support technician carries out. Installing new hardware components and carrying out simple upgrades of existing hardware, such as replacing a video or network card or adding additional memory or storage are examples of these types of tasks. The tasks may be needed because of routine maintenance, fault repairs, upgrades or new software installations.

This unit covers the skills and knowledge required to replace, upgrade or install computer hardware components. In this unit learners will first consider why hardware needs replacing and the implications of installing new hardware components, such as the potential retraining of users. Learners will also look at the risks involved and will be reminded of the importance of health and safety and Electro-Static Discharge (ESD) when dealing with electronic equipment.

Preparation for installation is key and it is necessary to understand the type of installation or upgrade required and prepare the required resources (including tools and facilities). There is also a need to check any relevant information, such as the compatibility of the component to be installed with the existing system.

The practical part of the unit covers the skills and techniques required to successfully carry out and test the installation. Testing will include using specialised utilities and knowing how to respond to error messages.

Finally, the unit covers the need to record the outcome of the task and deal with any required documentation such as product registration.

This unit has a considerable amount of practical content.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the reasons for and implications of installing hardware components
- 2 Understand risks involved and precautions needed when installing hardware components
- 3 Be able to install and test hardware components
- 4 Be able to document an installation or upgrade.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the reasons for and implications of installing hardware components		
P2 Explain potential risks to consider and precautions to take when installing hardware components	M1 Discuss precautions that can be taken to avoid problems	
P3 Prepare a computer system for a specified hardware installation or upgrade		D1 Justify the resources chosen for a hardware installation or upgrade
P4 Install hardware components safely, configuring associated software		
P5 Test the computer system for functionality	M2 Suggest possible solutions to resolve hardware functionality issues	
P6 Produce updated documentation for the modifications	M3 Explain the benefits of registering with the hardware provider	

Unit content

1 Know the reasons for and implications of installing hardware components

Reasons:

- routine maintenance
- fault repair
- upgrade

Upgrade:

- reasons, e.g. user requirements, compatibility, increased capacity, increased speed, increased reliability, software requirements

Implications:

- training
- compatibility
- decommissioning
- service level agreements

2 Understand risks involved and precautions needed when installing hardware components

Risks to systems:

- electrostatic discharge
- equipment damage
- risk to data, e.g. data loss, data corruption
- other risks, e.g. service loss

Electrostatic discharge:

- damage to components, e.g. printed circuit boards, memory cards

Precautions:

- checking health and safety regulations
- antistatic equipment, e.g. anti-static packaging, wrist straps, antistatic mats
- use of appropriate tools
- back up data

3 Be able to install and test hardware components

Hardware:

- components, e.g. memory card, video card, optical drive, hard drive, network device, connectors, ports

Preparation:

- tasks, e.g. test selection, test configuration, reading instructions, following procedures, safety check
- obtain resources, e.g. tools, hardware, access rights, associated installation software
- check equipment
- other tasks, e.g. backing up data, recording serial numbers

Install:

- fit component
- reassemble computer, e.g. reassemble system, reconnect, clean, carry out safety checks, test components, system test
- other tasks e.g. restore data, software installation (e.g. printer driver), software configuration

Test:

- using tools, e.g. utility, run-time analysers
- test procedures, e.g. gathering test information, validating information, responding to test information (error messages, inconsistent data), checking specification

Troubleshooting:

- loose connections, jumper settings, power supply, Power On Self Test (POST), diagnostic software

4 Be able to document an installation or upgrade

Documentation:

- installation records
- updated manuals, e.g. technical manuals, user manuals

Product registration:

- product registration methods, e.g. online, by post
- storing receipts

Information for delivery staff

Essential requirements

Learners will need access to practical resources and suitable technology. Simulators or multimedia tools can be used to gain prior experience before handling 'live resources'.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

This unit could effectively be delivered within a workshop environment to allow learners time to learn through exercises, examine case study examples and use computing facilities. Learners will have varying levels of knowledge about hardware on entry and therefore delivery must cater for this differentiation. Although there is theoretical knowledge to be delivered, the main emphasis of the delivery must be on practical application and practice. Group work will work well for a lot of this unit.

The unit content can be approached in the order that it is presented here, however an integrated approach that involves other units is strongly encouraged. Not every aspect of the content will be able to be mapped to one of the other units but there are elements of *Unit 3: Computer Systems* that overlap with this unit and evidence may also address criteria in other units.

The unit starts with an introduction to why hardware needs to be replaced. The reasons may seem obvious and learners could brainstorm this topic to come up with a list, which will probably contain the suggestions in the content. Discussions can then focus on the implications, which are less likely to be easily identified. There are opportunities to use quizzes and gapped handouts.

Understanding the health and safety requirements when handling hardware components is obviously vital before learners start any practical work. A number of other units also touch on this subject so care should be taken when planning when this is introduced and how much depth and breadth is required. As a matter of course learners should become accustomed to routinely using static mats etc whenever handling electronic components.

Learners may have been introduced to the main hardware components in *Unit 3: Computer Systems*, so the main focus of this unit can be installation. However, if learners have not studied a hardware unit, some time may need to be set aside to ensure they understand the components they will be working with.

A section on preparing for installation looks at planning the installation, getting the resources needed, carrying out checks and planning how to test the installation was successful. Learners can come up with checklists to follow when carrying out installation tasks.

Testing is an important and frequently overlooked aspect of installation so this should be emphasised. Discussing what happens when testing is not thorough enough can reinforce the learning.

Finally, learners need to be aware that their involvement does not end when hardware is installed and working properly. The elements outlined in the unit content offer a list of topics.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Reasons and implications: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on reasons for installation • whole-class exercise – tutor presentation on implications of installation • directed study – learners look at tutor-set scenarios to decide on the reasons for and implications of installation in specific cases.
Risks and precautions during installation: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on health and safety law followed by learner exercises • whole-class exercise – tutor presentation on electrostatic discharge • individual exercise – learners research and report on risks to systems.
Assignment 1 – Why Install?
Preparation for installing and testing hardware: <ul style="list-style-type: none"> • individual exercise – learners choose the right hardware for tutor-set scenarios • individual exercise – learners make sure preparation tasks are done • directed study – learners research and prepare testing and troubleshooting plans.
Assignment 2 – Groundwork
Install and test hardware: <ul style="list-style-type: none"> • individual exercise – learners practice the reassembly tasks • individual exercise – learners practice the installation and configuration of software and restoration of data • individual exercise – learners practice testing and troubleshooting.
Assignment 3 – Installation
Completion of installation: <ul style="list-style-type: none"> • individual exercise – learners complete product registration through a range of methods • individual exercise – learners complete necessary documentation.
Assignment 4 – Paperwork

Assessment guidance

Where descriptive or explanatory evidence is required by a particular criteria, appropriate observation records and Witness statements completed by both learners and tutor may form part of the evidence. Guidance on the use of these records is provided on the Edexcel website.

To achieve a pass grade, learners must achieve all the pass criteria listed in the assessment and grading criteria grid.

For P1, learners must describe the reasons for and implications of installing new hardware components as outlined in the content. Evidence can be written work, a presentation, or a poster.

For P2, learners must be able to explain the potential risks when installing hardware components, i.e. not just describe risks but also say why they are risks. Going further and explaining how the risks can be avoided will cover M1. For P2, learners must show that they can identify all the key aspects listed in the unit content for outcome of learning 2. For laws and guidelines, learners needs only to be able to articulate outline knowledge. As with P1, evidence can come from written work, a presentation, or a poster.

For P3, learners needs to show they can carry out all of the steps necessary to prepare a system for a specific installation profile. This should involve carrying out all or most of the tasks listed. This should be judged on tutor observation of learners at work and associated documentation.

For P4 and P5, learners need to demonstrate they can take a prepared system, install hardware components into it and then test them to ensure the system works. The criteria should be judged with reference to the unit content and should be evidenced by written tutor observations and witness statements.

For P6, learners must show that they can follow procedures for properly documenting installation of the different computer components.

To achieve a merit grade, learners must achieve the pass and merit criteria.

To achieve M1, learners should expand the work for P1 by explaining in more depth how potential problems can be avoided by taking appropriate precautions.

For M2, learners must extend the testing done for P5 and suggest how any hardware problems could be resolved. This should encompass the suggestions

For M3, learners should include an explanation of the benefits of registering with a hardware provider within the documentation for P6.

To achieve a distinction grade learners must achieve all the pass and merit criteria and the distinction grade criterion.

For D1, learners must justify the resources they have identified in the preparation task for P3. This should include identifying alternative resources and explaining why they chose the particular resources.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1	Why Install?	For a job interview, create a presentation on hardware installation and the risks associated with it.	Presentation
P3, D1	Groundwork	You are helping out in a small business which repairs computers. Carry out the preparation tasks for upgrading a business system and explain the resources you have chosen for the job.	Observation record Witness statement Documentation
P4, P5, M2	Installation	Carry out the installation work and test the completed system suggesting solutions for problems.	Observation records Witness statements Test plans and records
P6, M3	Paperwork	Complete the documentation required for the installation.	Documentation

Suggested resources

Books

MacRae K – *The Computer Manual: The Step-by-step Guide to Upgrading and Repairing a PC* (Haynes Group, 2010) ISBN 1844259285

MacRae K and Marshall G – *Computer Troubleshooting: The Complete Step-by-step Guide to Diagnosing and Fixing Common PC Problems* (J H Haynes & Co Ltd, 2008) ISBN 1844255174

Websites

www.computerhope.com/issues/cha dd.htm Website offering computer help and information

www.pcstats.com Website containing computer information

Unit 8: Installing Computer Software

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20709G

This unit is internally assessed

Unit aim

The aim of this unit is to introduce learners to the process of software installation in order to enable them to prepare, install and test software.

Unit introduction

Installing software is a typical part of the day-to-day work of an IT support technician. For example, installing a new application's software package, upgrading an existing item of software to the latest version or loading software to support a new peripheral, such as a printer.

Installation of software is not often a complicated task. Software manufacturers have worked hard to make the installation of their products as easy as possible but there are still important procedures that the professional IT technician needs to be aware of. For example, before the software is installed the suitability of the computer hardware needs to be checked and the licensing rules of the software should be reviewed to ensure that they are not being broken.

The software itself can be loaded onto the computer using a number of methods, including by CD or DVD.

Many software products can be downloaded over the internet and installed without physical media, or now in the case of many mobile devices, downloaded and installed by a synchronisation application such as iTunes.

This technique may involve additional tasks such as unzipping files or making a backup of the downloaded software. Downloading software from the internet may have potentially damaging repercussions so should be carried out with care.

Having installed the software, learners will need to confirm that the installation has been successful and the software works as it should, including user testing.

Once the software is installed there are a number of tasks that should be carried out: the software will probably need to be registered, so that the manufacturer can supply additional information, updates and support; the software medium itself must be stored correctly along with any additional supporting information, such as licence keys and instructions; log or work sheets should be completed.

On completion of this unit learners should be able to complete a software installation or upgrade, including preparing for the installation, installing the software and completing the required tasks following the installation.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand software installation processes
- 2 Be able to prepare for software installation
- 3 Be able to install and configure software
- 4 Be able to test and document software installation.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Compare types of software licences and legal requirements of their use	M1 Explain the benefits of software registration	
P2 Describe the processes involved in installing software	M2 Explain the potential benefits and implications of installing software	
P3 Demonstrate appropriate preparation for software installation		
P4 Demonstrate the installation of an item of software		
P5 Configure new software to specified requirements		
P6 Produce documentation for tests after carrying out a new software installation	M3 Produce a report suggesting possible solutions to resolve software functionality issues	D1 Produce a report reviewing the installation, suggesting improvements to the processes

Unit content

1 Understand software installation processes

Reasons for installation:

- changing needs
- benefits, e.g. additional functionality, increased speed
- implications, e.g. compatibility, hardware upgrades required, training, viruses
- other threats, e.g. spyware

Processes:

- identify user need
- prepare for installation
- install
- test and complete installation
- register software as required
- deal with problems

Software licences:

- types, e.g. open source, single licence, multi-user licence
- legal requirements
- software piracy
- registration, e.g. release of sensitive information, access to support, further information on updates

2 Be able to prepare for software installation

Preparation:

- determine loading facilities, e.g. CD, DVD, internet, synchronisation application
- check file management documentation, e.g. supplied instructions, organisational instructions
- check compatibility, e.g. specifications of software, storage requirements, user requirements
- backup data
- rollback, e.g. setting a restore point, uninstalling software
- obtain resources, e.g. software itself, licence keys, configuration details
- other, e.g. uninstalling old software

3 Be able to install and configure software

Install:

- new software, e.g. application package, operating system, programmed solution

Upgrade:

- new versions
- patches

Loading facility:

- download, e.g. from CD / DVD, internet

Configure:

- setting up, e.g. to user requirements, to organisational requirements

4 Be able to test and document software installation

Testing:

- functionality
- user requirements check

Document:

- work records, e.g. preparation tasks, installation date, by whom, hardware detail, problems encountered

Information for delivery staff

Essential requirements

Learners will need access to practical software resources and suitable technology. Simulators, emulators or multimedia tools can be used to gain prior experience before handling 'live resources'.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

It is likely that many learners will have experience of installing software. However, it is also likely that they will not be familiar with any formal procedures or be aware of the wider issues that would be relevant when working in an organisation.

Many items of software come with automated systems or wizards that guide the installer through the process and this aspect of installing and upgrading software has become easier. It is important that learners appreciate that software installation is not only about the actual loading of the software. The necessary preparation and completion tasks are essential to effective performance. This should be emphasised in the whole delivery and learner experience.

It is expected that much of the delivery of the unit content will be based around practical workshops and it is recommended that actual installations and upgrades are packaged in a form that enables learners to see the activities in context and that also encourages good practice. These packages should include instruction sheets, check sheets and logbooks which will help to establish a rigorous and methodical approach.

It is advised that learners are directed to use logbooks or diaries to record all practical activities.

Visits from or to technical support will add value and visiting speakers should be prepared to give examples of the types of user requirements, constraints and problems they face in their work.

Useful developmental activities could be based around case studies. Learners could be given software installation instructions and asked to check the suitability of particular hardware specifications and also prepare checklists for the installation. In this way, learners will be able to relate to a wider set of situations and hardware than might be available to them at the centre.

There is some theoretical content in terms of software and the law. Learners could research the legal aspects of software downloads etc including piracy and why they should not do it.

The use of open source and freely available software is ideal, but may bring additional hazards and risks not present in other commercial software, e.g. spyware, viruses, etc. Learners need to understand these risks and ways of minimising the negative effects. Such open source software should be treated with caution.

Ideally this unit could be delivered using an emulation/virtualisation environment (Virtual Box, QEMU or VM Ware player). The installation of software may be directly onto a personal computer system, or via a personal computer system to a parasite device such as a mobile phone. The unit does not preclude any operating system or any application/utility software.

Care needs to be taken to choose appropriate software and tasks that allow learners to meet the assessment requirements for this unit.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Software installation and upgrade processes: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on installation processes followed by learner exercises • whole-class exercise – tutor presentation on loading facilities followed by learner exercises • individual exercise – directed research into software licencing and the law followed by tutor-led discussion.
Assignment 1 – Software Know How
Preparation for an installation: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on how to prepare for a software installation • individual exercise – directed research into potential risks involved in software installation followed by tutor-led discussion.
Assessment 2 – Ready to Install?
Carrying out an installation and upgrade of software: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on creating a work record • individual exercise – learners install software • individual exercise – learners upgrade software • individual exercise – learners practice configuring installed software • individual exercise – learners create work records.
Assessment 3 – Installation!
<ul style="list-style-type: none"> • Group exercise – how to test software installations • Whole-class exercise – tutor presentation on documenting installations • Directed study – learners research and prepare appropriate documentation.
Assessment 4 – Completion

Assessment guidance

Where descriptive or explanatory evidence is required by a particular criterion, appropriate observation records completed by both the learners and tutor may form part of the evidence.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

For P1, learners must provide evidence that they can compare different types of software licences, and the legal requirements that govern their use. The descriptions must be accurate and detailed, with evidence that learners have clear comprehension of all the different types, as mentioned in outcome of learning 1, and also the associated legal requirements. Evidence can come from written work, a presentation, a poster, a wiki etc.

For P2, learners must be able to describe the processes involved in installing software. As with P1, evidence can be in any format.

For P3, learners need to demonstrate all of the steps necessary to prepare a system for a specific installation profile. This should involve learners' carrying out all or most of the tasks listed. The criterion should be assessed through tutor observation of learners at work supported by any relevant documentation.

For P4, learners must show they can install one piece of software. This should be evidenced by screen grabs and written tutor observations.

For P5, learners must configure the installed software to meet specified requirements. This does not need to be a complex configuration.

For P6, learners must show that they can correctly follow procedures for properly testing software installation and produce or amend associated documentation. This can be assessed in combination with P4, through a mixture of tutor observation, and the written documentation each learner produces.

To achieve a merit grade, learners must achieve the pass and the merit criteria.

To achieve M1, learners should be able to give a clear explanation of software registration and its benefits. This can be done in combination with the P1 criterion.

For M2, learners must be able to explain the potential benefits and the implications of installing software. As with M1, this criterion can be assessed as an extension of the work learners do for P1 and P2.

M3 is an extension of P6 and learners should be able to identify potential software functionality issues and suggest how they can be resolved.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction grade criterion.

For D1, learners must review the whole process of installation and include suggestions as to how they might have improved their planning, execution and/or documentation of the work.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, M2	Software Know How	How a small computer maintenance business has asked you to produce a presentation on software licences, legal requirements and software installation processes for a job interview.	Website, poster or wiki
P3	Ready to Install?	Prepare to install a new software application.	Observation record Documentation
P4, P5	Installation!	Prepare and carry out software installation for a small business.	Observation sheet Screen grabs Documentation
P6, M3, D1	Completion	Test the software installation and produce appropriate documentation, reviewing and suggesting improvements.	Witness statements Test records Review

Suggested resources

Book

Berenbach B, Paulish D J, Kazmeier J, Rudorfer A – *Software & Systems Requirements Engineering: In Practice* (McGraw-Hill Osborne, 2009)
ISBN 0071605479

Websites

www.softspecialist.com

Reviews of software

www.worldstart.com/

Software download advice website

www.youtube.com

There are numerous videos showing installation and use of a wide range of software. e.g.
https://www.youtube.com/results?search_query=software+installation+guide

Unit 9: Customising Software

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20710G

This unit is internally assessed

Unit aim

The aim of this unit is to familiarise learners with the software tools and techniques used to customise software and understand how to tailor software to user requirements using templates, shortcuts and macros.

Unit introduction

Modern application packages such as office applications and image editing software provide general frameworks and window layouts which can be used for a wide variety of situations. In effect, the user interface can be adjusted by a user without specialist programming skills. An important skill is to take the benefits of application packages and customise them to suit particular individuals and situations.

In workplaces, computers are used with application software for many different purposes. This unit shows how application software, such as word processors, spreadsheets, presentation software or databases can be customised and what the benefits are, for example, to provide better interfaces, to make them easier and quicker to use or more accurate and attractive.

Learners will be shown how systems can be built using application software templates to help users to produce quick, consistent results and ensure data is entered correctly. Automating simple actions with macros will also be introduced. Learners will practice producing templates and macros for specified business or individual needs using a variety of application packages.

Learners will also consider the customisation of interfaces, such as the desktop appearance and setting of custom dictionaries and auto functions.

This unit builds upon learner appreciation of hardware, software, data communications and computer usage from other units by showing how producing user-friendly front-ends and other automations can enhance applications.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand why application software is customised
- 2 Be able to customise application software
- 3 Be able to create templates in application software
- 4 Be able to create macros and shortcuts in application software.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain why software may be customised to meet user requirements		D1 Evaluate the benefits and drawbacks of customisation
P2 Demonstrate and document customisation of application software to meet user requirements		
P3 Carry out and document tests of customised software to ensure it meets user requirements		
P4 Create templates to meet user requirements in different application packages	M1 Produce a report, evaluating how effectively the templates meet user requirements	
P5 Create and test a macro to meet a given requirement	M2 Produce a report, explaining the benefits of using macros	
P6 Create and test shortcuts		

Unit content

1 Understand why application software is customised

Software:

- e.g. application software
- utilities, e.g. anti-virus software
- system, e.g. firewall
- suitable packages, e.g. word processors, spreadsheets

Types of customisation:

- changing default settings
- menus and toolbars
- templates
- forms
- macros
- shortcuts

Benefits:

- speed, e.g. reducing key strokes
- accuracy, e.g. control data entry
- ease of use
- style consistency, e.g. standard templates
- improved productivity

Drawbacks:

- problems caused, e.g. training required, increased complexity, support needs

2 Be able to customise application software

Resources:

- help facility
- software manuals
- website FAQs

Default settings:

- files, e.g. location, directories, file names
- hardware, e.g. printer, storage media
- others, e.g. language

Interfaces:

- toolbars
- menus
- desktops, e.g. wallpaper, icon type, icon arrangement, clock
- others, e.g. colour schemes, mouse settings

Specific tools:

- tools, e.g. custom dictionaries, autocorrect, auto-summarise, auto-save
- format, e.g. paragraph, theme, style
- others, e.g. frames

Testing:

- test functionality
- check against defined requirement

3 Be able to create templates in application software

Application packages:

- document production, e.g. Word, Publisher
- data manipulation, e.g. Excel, Access
- other, e.g. PowerPoint

Templates:

- user need, e.g. design, data entry
- other features, e.g. use of logos, form fields
- testing

4 Be able to create macros and shortcuts in application software

Macros:

- define user need
- recording macros
- assign, e.g. toolbar button, menu item, key combination
- storage, e.g. in document
- in templates and documents
- test

Shortcuts:

- types, e.g. keyboard, hyperlink, drive mapping

Information for delivery staff

Essential requirements

Learners need extensive access to systems which are loaded with applications packages such as MS Office, Open Office, or Libre Office. The package should contain, as a minimum, word processing, spreadsheet, database and presentation software.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

Over half of the grading criteria are practical in nature and learners need to acquire the appropriate skills. Hence a good way of delivering this material is by tutor demonstration reinforced by learner exercises.

The outline learning plan (OLP) which follows this section gives an indication of how time can be allocated between the various topics in the unit content. It is designed only as a guide and tutors will use knowledge of their learners to adjust the allocation of time accordingly.

Outcome of learning 1 is in many ways the most difficult since it tends to be theoretical in nature, yet it is the foundation of the whole unit. The OLP suggests delivering it first, basic insight into the topic, but tutors may perhaps prefer to deliver it later in the unit.

By combining whole class teaching, discussions, simple case studies and practical demonstrations, the suggestion in the OLP aims to integrate the theoretical aspects of customisation.

Simple demonstrations of actual customisations using at least two different general applications packages will give a flavour of the type of tasks learners will be able to do once they have completed the unit.

The use of quizzes and gapped handouts, particularly if electronic, can add variety to the delivery of the first three blocks of the OLP which cover types of customisation, benefits and potential disadvantages.

Having completed the teaching and learning associated with the theoretical side of the unit, learners move on to the first group of practical elements, those dealing with customisation of default settings, interfaces, tools and functions.

Probably the best way of delivering this part of the unit is by a tutor demonstrating various techniques, including using the techniques to process specific user needs, followed by learners undertaking exercises in using those techniques. At least two pieces of general applications software will be used, and default settings, interfaces, tools and functions will all be covered. Initially the exercises will be simple, straightforward tasks, but later they will develop into processing statements of user need. Learners will acquire the techniques and then apply them to work related situations where the tutor will play the part of the user for the purpose of the exercises.

It is important that whilst the demonstrations and exercises are taking place, the tutor uses the work to reinforce the theoretical aspects considered previously.

The final aspects of outcome of learning 1 deal with testing and getting assistance. Some basic concepts of testing need to be imparted before learners undertake any practical testing. Learners need to be aware of facets such as meeting user needs, operating correctly at all times, working not only in the scenario in which they have developed the customisation but also within the system as a whole. Learners very often have no concepts of the overall needs, or practices used, for testing. Tutors will demonstrate various aspects to reinforce the concepts.

Learners need to be able to use the help facility throughout all of the practical work for the unit and if that fails to answer a question, then to use software manuals and FAQs on the software websites. Much of this can be completed by directed study and simple research. It is important that learners at this level are at least aware of where they can go for assistance without constantly having to ask the tutor.

This leads directly to the first suggested assignment which covers criteria P1, P2, P3, M1 and D1.

Outcome of learning 2 deals with customisation of templates. This is a logical continuation from outcome of learning 1, although some tutors may prefer to deliver it last since the associated assignment is the most demanding of the three suggested. The unit content is however less demanding than that included in outcome of learning 3. It is entirely up to the tutor which order they deliver and assess the subject.

A good place to start delivering this is to make learners aware of what templates already exist in various pieces of application software, and what benefits they bring. This might be through the tutor demonstrating the use of templates from at least two pieces of general application software (for example word processor, spreadsheet, database, presentation package) and discussing the reasons why those templates are used and the benefits they bring. Discussion groups and brainstorming sessions may be useful. This will be followed by learner exercises following straightforward rules to use existing templates.

The templates theme is then developed further into designing, creating and testing templates to meet user needs. The tutor will demonstrate how to pick a statement of user need and design a template to fit, and will then create the template and test it. Learners will undertake exercises of increasing complexity to reinforce the information. The demonstrations and exercises should encompass at least two general applications packages.

Finally, the tutor will demonstrate how to design, customise and test a template which includes a data input form and this will be followed by learners undertaking exercises to do the same.

When delivering the content for outcome of learning 2 the tutor should take every opportunity to emphasise how templates can benefit organisations and how they can be used to capture and present information. This lends itself to inclusion in the commentary or narrative given by the tutor whilst they are demonstrating the techniques, or whilst learners are performing the techniques in their exercises. Tutor should show the technique, talk about how it is used to capture or present information, and explain how it can benefit an organisation. With level 2 learners this method is more acceptable than conventional whole class teaching, although the use of handouts to emphasise the important points can be very useful.

This leads to the second suggested assignment which covers criteria P4 and M1. Outcome of learning 3 deals with automating functions with macros and shortcuts. It is important that learners understand the meaning of these two terms and a brief introduction, or the use of handouts, should be used to start this part of the course.

Tutors will then demonstrate how to create, assign and test macros in at least two applications packages, using at least two different methods of assignment. The demonstrations will include naming macros, their storage and their use in templates and documents. Tutors will discuss the benefits and disadvantages of different methods of assignment whilst they are demonstrating those methods. Learners will reinforce their skills by undertaking simple exercises following specific instructions. The tutor will emphasise ways in which the macros in the demonstrations, and those in learners' exercises, can help productivity in an organisation.

The tutor will then show how, on receiving a statement of user need, it is possible to design, create, assign and test macros to meet that need. Again, there should be some discussion on how macros can help in the productivity of the organisation for which they are being created. Different methods of assigning the macros can be included once more to reinforce that knowledge and those skills. This will be followed by learners undertaking tasks which require them to create, assign and test macros for specific user needs.

Finally, the focus of the work on macros is repeated for shortcuts. Tutors will demonstrate the creation, assignment and testing of shortcuts in general and also to meet specific user needs. Learners will then attempt the same using small, exercises focussing firstly on following instructions and then on interpreting a user need.

This leads to the final suggested assignment which is designed to cover criteria P5, P6 and M2.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Why software needs to be customised: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on types of customisation ● whole-class exercise – tutor presentation on simple benefits ● individual exercise – learners look at the drawbacks in customisation.

Topic and suggested assignments/activities/assessment
Customising application software: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on the meaning of 'default settings' • whole-class exercise – tutor presentation on the different types of interface • individual exercise – learners practise using tools to customise software • individual exercise – learners investigate different methods for testing.
Assignment 1 – To Meet a User's Needs
How to make templates: <ul style="list-style-type: none"> • individual exercise – learners investigate different applications packages • whole-class exercise – tutor presentation on how to create templates followed by individual exercises.
Assignment 2 – Templates and their Uses
Creating macros and shortcuts: <ul style="list-style-type: none"> • individual exercise – learners practise creating working macros • individual exercise – learners practise customising keyboards using shortcuts.
Assignment 3 – Macros and Shortcuts

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments table which follows this guidance.

For P1, learners must explain how application software can be customised. The explanations should mention different types of customisation as listed in the unit content. This means that the description of benefits must include references to speed, accuracy, ease of use and consistency of style, with options to discuss other elements.

For P2, learners will customise application software to meet the defined requirement. This should include customisation of a default setting, an interface, a tool and a function (two tools or two functions would also be acceptable). Learners must be seen to carry out the customisation required, and produce evidence of the customisations they have undertaken.

For P3, learners must carry out a test on the software customisations done in P2. Learners must be observed to have carried out a logical and rigorous testing procedure paying attention to meeting the defined requirements, and produce evidence of this testing.

For P4, learners will create and test one template for two different application packages to meet the user requirement given by the tutor. The user requirement must be sufficiently complex to challenge learners, but not to an excessive degree. In order to achieve P4, templates created by learners must meet the defined requirements.

For P5, learners must record and test a macro. As with other criteria, the user must produce evidence of having gone through a logical process to create the macro, ideally using screen grab. Similar evidence of having tested the macro to ensure it functions correctly should also be provided. Only if the macro produced functions correctly and meets the defined requirement should learners pass the criteria.

For P6, learners must fulfil a defined requirement by producing at least three keyboard shortcuts that function correctly. Evidence of going through a logical process to create the grabs must be provided. Once the three shortcuts have been produced, they must also be methodically tested, and again, screen grabs taken to provide evidence for this.

For M1, learners must show that they have understood the user requirements. They must evaluate the templates which they created in P4 in terms of their effectiveness in meeting those requirements. The evidence should be in the form of a written report with screen grabs.

For M2, whilst demonstrating the macro in P5, learners can explain in written report form the benefits of using the techniques. The explanation must be detailed, clear and logically argued to pass the criteria.

For D1, learners must extend the work from P1 and M1 to include well-reasoned and clear evaluation of the benefits and drawbacks of customisation. This should be produced as part of the written report for criteria P1 and M1. The evaluation should also be balanced and neutral in its examination of the positives and negatives.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, D1	To Meet a User's Needs	A firm has requested software tools customised for its use, and a report describing how the customisation that has been done helps the firm.	Software customisations Screen grabs Written report
P4, M1	Templates and their Uses	A firm has asked for examples of customised templates.	Screen grabs Written report
P5, P6, M2	Macros and Shortcuts	The firm is now asking for a series of macros and shortcuts to help its employees work better.	Screen grabs Written report

Suggested resources

Book

IBM Redbooks (editor) – *Enterprise Software Configuration Management Solutions for Distributed and System Z* (Vervante, 2008) ISBN 0738431885

Websites

www.openoffice.org

Open Office - productivity suite

www.libreoffice.org

Office productivity suite

office.microsoft.com/en-us/help/default.aspx

Microsoft Office productivity suite

Unit 10: Setting up an IT Network

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20711G

This unit is internally assessed

Unit aim

This unit develops learners' understanding of the role of IT networks in organisations, including their features, services and components and skills at setting up a small network for personal or commercial use.

Unit introduction

This unit starts by investigating the role of networks in organisations and how their services can be utilised to manage resources. The components that make up networks, including hardware devices and software, are investigated and the knowledge and understanding gained is used to setup and test a simple local area network.

The practical activities in this unit can be addressed using a range of technologies and can be adapted to current devices, communication mediums and methods. Learners will gain knowledge of the individual hardware and software components and how they interconnect within a whole system.

Networking skills are particularly valued in the IT industry and this unit provides a solid foundation for learners to gain theoretical knowledge and practical application skills in networking.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the current use of computer networks
- 2 Know the features and services of local and wide area network technologies
- 3 Understand how network hardware and software components are connected
- 4 Be able to set up a simple local area network.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe how the use of computer networks can improve communications for individuals and organisations	M1 Explain how networks may improve productivity for individuals and organisations	D1 Evaluate the features and services provided by a local and a wide area network
P2 Describe how a network is used by an organisation to manage its resources		
P3 Describe potential issues with computer networks	M2 Suggest possible solutions to resolve connectivity problems	
P4 Describe the features and services of local and wide area network technologies		
P5 Explain how hardware, software and addressing combine to support network communications		
P6 Set up and test a simple local area network	M3 Set up and configure security on a local area network	D2 Explain how security issues can be minimised

Unit content

1 Know the current use of computer networks

Communication:

- individuals, e.g. blogs, email, forums
- organisations, e.g. email, wikis, file storage, data centres
- collaborative, e.g. social networking
- conferencing, e.g. desktop sharing, video, audio
- file sharing

Resource management:

- data
- hardware
- software

Issues:

- speed, e.g. bandwidth, contention
- costs
- staff skills
- down time
- security issues, e.g. unauthorised access, loss of data, malware, virus protection
- backup, e.g. recovery
- hacking
- firewalls

2 Know the features and services of local and wide area network technologies

Features:

- topologies, e.g. star, bus, circle
- types, e.g. peer-to-peer, client server
- data rates
- addressing, e.g. IP, MAC

Services:

- communication, e.g. email, conferencing
- file transfer
- login
- security
- software deployment

Protocols:

- TCP/IP
- purpose and function, e.g. addressing, network, transport, application

3 Understand how network hardware and software components are connected

Hardware:

- network cards, e.g. ethernet, wireless
- workstations
- servers, e.g. file, printer, web
- routers
- switches
- wireless devices

Communication:

- network cabling, e.g. fibre optics, UTP, STP, coaxial
- connectors
- addressing
- WAN connectivity, e.g. ADSL, ISDN, broadband

Software:

- application-based, e.g. internet browsers, firewalls, email
- operating system
- utility

4 Be able to set up a simple local area network.

Preparation:

- components, e.g. cabling, devices, network interface cards, software

Set up:

- hardware
- software
- security
- health and safety awareness

Simple LAN:

- e.g. peer to peer, client-server

Faults:

- commonly occurring, e.g. address conflict, network card failure, faulty cable
- loss of service, e.g. print, file, email

Testing:

- functionality
- connectivity
- addressing

Security:

- e.g. firewall configuration, file and folder permissions, access control, user rights

Use:

- communication
- transfer files
- others, e.g. allocate user rights, allocate file space

Troubleshoot:

- problem solving, e.g. connectivity, IP addresses

Information for delivery staff

Essential requirements

Learners will need access to networking equipment and communications technology, they can also use simulators such as Packet Tracer to develop their understanding of concepts.

For this unit learners will need good background materials in the form of handouts and diagrams of network structures and network operations. These can be placed into context by the use of case studies or local examples.

Learners need also to have access to research materials and case study examples. A suitable course textbook may also prove effective in providing essential background reading.

Some hardware and software will be needed for the practical aspects of the unit. As a minimum, each candidate will need access to two PCs with network cards, cabling and appropriate software and simple manuals for the setting up and testing of the network. The practical activity, although limited, should take place in a well-appointed workshop with appropriate tools and, take account of health and safety requirements.

Access to technical support is seen as valuable, unless the assessor is well experienced in such practical activity.

For support to demonstrations and theory sessions, a wide range of currently available components should be available for learners to study and handle.

Employer engagement and vocational contexts

Visits to a local ISP or using the academic centre network as a suitable vocational context.

There is a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

An emphasis on the practicality and application of different types of IT network is encouraged, together with the use of focused visits to a workplace and demonstrations by experienced practitioners such as school or college network staff. Talks by technicians are likely to be particularly valuable and will help to provide the required, realistic perspective. The IT network is not specified, and centres may use wired, wireless or a combination of the two as a solution for learners to resolve.

A work scheme can broadly follow the ordering of the unit content. However, introducing practical activities involving the identification of network components and use of network software early in the unit, would add motivation and interest as well as putting the theory in context. Constant reference should be made to real components as their functions and purpose are described, in order that learners feel comfortable in recognising and handling them. Large wall displays with diagrammatic representations of networks would be useful.

Some benefits and disadvantages of using networks can be identified by the study of questionnaires given to a range of end users or through talks and visits – ideally, visiting speakers should be primed to cover various aspects of their networks and the content that relate to this unit using appropriate and consistent terminology.

Case studies can be used to provide opportunities for the selection decisions about the need for a network and the type of network chosen. Case studies should contain detail about the business need as well as detailed user requirements.

The internet could be introduced as one example of a wide area network and the easy availability of this network can be used to provide access to some of the services and functions of networks in general.

Although there is opportunity for learners to set up and test a network, it will be expected that, at this level, this will be carried out in a controlled and limited environment and that detailed instructions will be made available to learners. Although there are resource implications, the benefits to learners in respect of positive feedback and satisfaction will be considerable. Examples include simple peer-to-peer networks involving low specification computers and low cost network cards and communicators. It is expected that the set up process will include the installation of network cards and this will involve careful consideration and planning in respect of health and safety. Small groups in dedicated workshops are recommended.

The testing of functionality can be introduced via activities whereby learners find introduced faults in set-up networks. This enables them to gain experience in troubleshooting, even if their own network functions correctly.

Diagrammatic representations of networks should be used throughout the delivery of the unit. The unit must be completed with 'real practical' resources, but simulation packages such as packet tracer may be used to support learning.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
How are networks used? <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on how we communicate with networks ● whole-class exercise – tutor presentation on how networks are used to manage resources ● whole-class exercise – tutor presentation on what issues come with using a network.
Assignment 1 – What’s the Use?
LANs and WANs: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on the features and services of LANs and WANs ● directed research – learners investigate protocols, what they are, how they work ● individual exercise – learners use tutor-set scenarios to look at the main security issues networks face.
Assignment 2 – Insecure?

Topic and suggested assignments/activities/assessment
Understanding network hardware and software: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on network hardware, followed by individual exercise • whole-class exercise – tutor presentation on network software, followed by individual exercise • whole-class exercise – tutor presentation on how to communicate through a network, followed by individual exercise • directed research – learners look at common faults in a network system.
Assignment 3 – Network
Setting up a LAN: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on the required components • individual exercise – learners practice setting set up a LAN • individual exercise – learners test a network and troubleshoot issues.
Assignment 4 – Applying the Knowledge

Assessment guidance

In order to achieve a pass, learners must achieve the six pass criteria listed in the assessment and grading criteria grid.

For P1, descriptions provided do not need to relate to a given case study or organisation. Learners should cover how networks can improve communications between internal and external bodies as well as making standard ways of working possible. 'Improvements' should be understood to mean a comparison with situations where no network is available. The evidence could be a poster presentation.

Evidence for P2 could be derived from a given case study or a structured workplace visit. Learner evidence needs to include how networks allow sharing of information, hardware, software and staffing. Tutors may guide learners towards researching and describing the Data Protection Act as it applies to shared data. A presentation would be the most appropriate evidence.

Evidence for P3 could include slowing down of response times, security issues, broken connections, hardware failure, software problems and user errors. Evidence could be a leaflet or a report.

For P4, learners will describe the features and services of local and wide area network technologies. The network technologies chosen should be complex enough to involve features, services, protocols and data security issues as detailed below and can be based on case studies. Features should include topologies, peer-to-peer, client server and network access methods. Services should include communication, file transfer and online databases. Protocols should include their purpose and function with an example. Data security issues should include access control, virus protection, backup, hacking and firewalls. A verbal presentation or report could be used as evidence.

For P5, learners could use either a peer to peer or client server network with internet connectivity and explain how users connect to and use resources and access the internet.

P6 is a practical activity where learners need to be observed setting up, using and testing a simple local area network. Learners may work in small groups due to resource issues but it is important that evidence for each learner is available for how they prepared, set up, tested and used the network. It is acceptable for the centre to prepare check lists and sign off sheets in order to provide a framework for learners which can then be submitted with hard copy or observational evidence. Acceptable evidence would be a signed observation record with a report from each learner detailing how they completed this task.

To achieve a merit grade, learners must achieve all of the six pass and the three merit criteria.

M1 naturally follows from P1 and P2, but asks learners to explain in more detail. It is expected that there will be some advantages to both approaches and that M1 will be an opportunity for learners to recognise these issues and to reach an overall conclusion on where most of the advantages are. A presentation would be the most appropriate evidence type for these criteria.

M2 naturally follows from P3. Learners should extend their evidence from P3 to explain how connectivity problems could be corrected. Evidence could be a leaflet or a report.

M3 is a practical activity where learners need to be observed setting up, using and testing security systems such as firewalls, file and folder permissions, access controls, user rights, anti-virus and anti-spyware on a local area network. It is acceptable for the tutors to prepare check lists and sign off sheets in order to provide a framework for learners which can then be submitted with hard copy or observational evidence. Acceptable evidence for M3 is a signed observation record with a report from each learner detailing how they completed this task.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction criteria.

To achieve D1, learners need to compare and evaluate the features and services provided by a local and a wide area network. This will build upon the evidence generated for P4 to compare how these are implemented in an actual LAN and WAN. Evidence types appropriate for D1 should be included as part of the poster exercise for P1, P2 and M1.

For D2, learners are to explain how security risks can be minimised in a network. For this they may expand upon their evidence for P6 and M3 with accurate explanations on how security systems help to reduce security risks. Evidence types appropriate for D2 include a leaflet or a report.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	What's the Use?	A firm's manager would like you to create a poster explaining to employees how a new IT network will help the organisation work better.	Poster
P3, M3, D2	Insecure?	The same firm now wants a pamphlet for its staff explaining network issues and how they can be dealt with.	Create a pamphlet or leaflet
P4, P5	Network	The firm's senior management wants a special briefing on how to set up, manage and maintain a network.	Individual presentation
P6, M2	Applying the Knowledge	Finally, the company wants you to set up a basic network and troubleshoot it.	Practical task with report

Suggested resources

Books

Donahue G A – *Network Warrior* (O'Reilly Media, 2007) ISBN 0596101511

Lowie D – *Networking for Dummies* (For Dummies (Computers)) (John Wiley & Sons, 2007) ISBN 0470056207

Hogan C J, Chalup S R and Limoncelli T – *The Practice of System and Network Administration* (Addison Wesley, 2007) ISBN 0321492668

Journal

Network World

Websites

www.networktutorials.info/index.html Online networking tutorials for learners

www.practicallynetworked.com/ Troubleshooting and advice website

Unit 11: IT Security

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20712G

This unit is internally assessed

Unit aim

This unit will develop learners' knowledge and skills to maintain the security of IT systems including the data, network and its environment.

Unit introduction

Individuals and organisations need to be confident that IT systems are reliable and secure. This is particularly important in such activities as emailing, internet purchases, online services and instant data retrieval. Where this cannot be relied upon then the whole use of IT systems is undermined.

Learners will explore ways of maintaining the integrity of IT systems by controlling and monitoring physical access, protecting data, protecting hardware and implementing contingency plans. This requires knowledge of both physical and access control security and their application in a real world situation.

Security, however, should not unnecessarily impede access or effective use. Breaches in security may be caused by human actions, either accidentally or by malicious intent, negligence or through incorrect installation, configuration or operation.

Attacks against computer-based systems are commonplace and increasing and therefore the IT practitioner needs to develop skills to be able to combat such threats. This unit enables learners to understand why security is necessary, what potential dangers exist and be able to protect systems and data.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the potential threats to the security of IT systems
- 2 Understand how to protect IT systems
- 3 Be able to apply security measures.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify the potential threats to the security of IT systems	M1 Discuss which IT security threats are most common and why	D1 Explain the potential impacts of IT security threats on organisations
P2 Outline the legislation that requires an organisation to protect its IT systems and data		
P3 Discuss security methods for protecting IT systems and data	M2 Evaluate access control methods for protecting IT systems	
P4 Create a security plan for a small office or home network		
P5 Implement a security plan	M3 Evaluate implemented security methods	D2 Recommend and justify security improvements
P6 Test a security plan for its effectiveness		

Unit content

1 Know the potential threats to the security of IT systems

Weak external security on LAN:

- software, e.g. firewall, web server, mail server, wireless LAN (Local Area Network)
- vulnerabilities, e.g. unsecured wireless access points, VPN (Virtual Private Network), weaknesses
- failure to install network system security updates

Unauthorised use without damage:

- violations, e.g. by using someone else's username/password
- damage physical system
- poorly protected passwords
- social engineering

Unauthorised removal or copying:

- damage, e.g. data, code
- destruction, e.g. data, code
- inside the system
- outside the system
- hackers inside
- hackers outside

Malware:

- threats, e.g. viruses, rootkits, worms, Trojans, spyware, adware
- phishing, identity theft

Hardware and media loss or theft:

- devices, e.g. laptops, portable hard drives, CDs, DVDs, flash memory devices, iPods, BlackBerrys, mobile phones
- missing security patches
- poorly written software

Folder and file permissions:

- password levels, e.g. folders, files, data
- folder and file attributes, corrupted email attachment
- infected email attachments
- internet downloads
- access to malicious websites

Relevant legislation:

- e.g. Data Protection Act 1998, The Privacy and Electronic Communications (EC Directive) Regulations 2003, Computer Misuse Act 1990

Impact to small office and home networks:

- data loss
- confidentiality breached
- security and privacy breached
- legal proceedings
- criminal activities
- key information systems attacked, e.g. finance, payroll
- communication loss
- loss of control and management of systems
- stolen equipment
- vandalised equipment
- loss of business

2 Understand how to protect IT systems

Physical security:

- hardware and peripheral security, e.g. locks, biometric controls, CCTV (Closed-Circuit Television) and their configuration
- shielding, e.g. cable screening, Faraday cages
- deploying firewalls to control network traffic
- securing mail and web servers
- diskless networks

Access control:

- password policy to prevent password guessing and cracking
- allocating access authority
- types and appropriate uses of access records and authorisations
- patch management and policies
- application security

Limiting visibility of data:

- positioning of monitors
- hardware mechanisms, e.g. disk encryption
- data security software, e.g. virus protection, spyware protection
- password levels on software and data
- safe storage
- encryption, e.g. confidential files, application-specific tools, recovering encrypted data
- digital signatures

Backing up and restoring data:

- storage servers, data warehousing, in-house virus third party storage

3 Be able to apply security measures

Designing a system security plan:

- for a small business
- or a home network
- implementing password policy
- locking down user accounts
- securing administrator's permissions
- installing or updating security software, updates

Security:

- policies, e.g. backup and recovery schemes
- installing and upgrading data security software
- monitoring the use of data in organisations, e.g. file monitoring, folder monitoring
- configuring antivirus software
- avoiding risks with emails and attachments
- file and folder permissions

Testing:

- potential risks
- software testing
- hardware testing
- security audits
- test documentation, e.g. test plans

Information for delivery staff

Essential requirements

Learners will need access to practical resources and suitable technology; they can also use simulators or multimedia tools to gain prior experience before handling 'live resources'. It is essential that learners work in an environment that does not allow them to access system critical resources.

Employer engagement and vocational contexts

Using a local ISP or engaging in a 'structured' discussion with the ICT network management of your centre.

There is a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

Talks by external practitioners and technical support staff could be a very useful way of enabling learners to understand the security issues that relate to their own and other organisations with different business needs and technologies.

The nature of IT security threats is changing constantly, as is the UK and international legislation designed to combat them. To take this into account tutors should try to remain up to date with the latest IT security news, and add this information into the unit's delivery as appropriate.

To start with, the unit should focus on the nature of IT system breaches. It is suggested that the tutor initiate discussions to find out learners' perceptions of IT security. The tutor could also introduce the subject using recent examples of IT systems breaches that have been in the news, such as the loss/theft of important information from government databases and large companies.

For outcome of learning 1, learners could be taught about different kinds of threats separately, with emphasis placed on dividing threats into pre-meditated attacks, such as hacking and identity theft, and those that are caused by accidents, e.g. the loss of DVDs, CDs, laptops etc. The different nature of the damage caused by these threats could be discussed. It is important for learners to realise how much damage can be done to IT systems, and the subsequent impact it has with businesses.

Delivery for outcome of learning 2 could use centre security procedures as a vehicle for delivering the unit content. Once learners are familiar with the systems they could be divided into groups and analyse the strengths and weaknesses within the system. Demonstrations showing configuration of security software, encryption, digital signatures and backup/restore procedures could enhance this section. Learners should know the difference between system and data security methods. It would be useful to bring in an external practitioner, ideally an IT security professional, to talk about how the different parts of IT security work, and how they come together to create a coherent approach to protecting an organisation's IT infrastructure from breaches of all kinds.

Outcome of learning 3 could be delivered using a case study or by learners working in groups to investigate a real world small-medium enterprise (SME) and develop a security plan for their systems and data. Backup/restore and security software configuration could be carried out on a lab machine or in an emulated/virtualised system using Virtual Box, QEMU, VM Ware or similar.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
<p>The need to protect IT systems:</p> <ul style="list-style-type: none"> • directed research – learners to investigate in groups, researching into security breaches • whole-class exercise – tutor-led discussion on different types of security breach • whole-class exercise – tutor presentation on the causes of security breaches, followed by individual exercise • whole-class exercise – discuss real world examples of security breaches • whole-class exercise – legislation that effects IT security – students to research legislation and give presentation • whole-class exercise – tutor presentation on different kinds of IT systems.
Assignment 1 – Impact of IT System Breaches
<p>Protect the data of individuals and organisations using appropriate security measures:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on data protection methods, followed by individual exercise • whole-class exercise – tutor presentation on physical security methods, followed by individual exercise • individual exercise – learners look at organisational security procedures.
Assignment 2 – Managing IT Security
<p>Applying security measures:</p> <ul style="list-style-type: none"> • individual exercise – learners look at case studies of small businesses or actual examples and design security plans for these examples • individual exercise – learners carry out practical security procedures • individual exercise – learners carry out practical security testing • individual exercise – learners devise a security plan for a small business • individual exercise – learners implement the plan on a dummy or virtual system • individual exercise – learners test the security plan.
Assignment 3 – Configuring IT Security

Assessment guidance

To achieve a pass grade, learners must achieve the six pass criteria listed in the assessment and grading criteria grid.

For P1, learners should identify all of the different ways in which an IT system can be breached as they are listed in outcome of learning 1. An oral presentation or a report could be used as evidence.

For P2, learners should be able to give some detail about all the pieces of legislation described in outcome of learning 1.

However, tutors should note that legislation changes over time and new laws on IT security should be incorporated into this criteria as required. Learners should not have to reproduce large volumes of text from the legislation, but must relate their answer to either a real organisation or case study provided. An oral presentation or a report could be used as evidence.

For P3, learners will describe the security methods available for protecting IT systems, with reference to the list in outcome of learning 2. This could be set in the context of a real-world organisation or learners could be given a case study. Tutors should look for learners to be able to produce a broad rather than a deep understanding when describing physical security methods at this level. An oral or electronic presentation, or a poster would be appropriate evidence for these criteria.

For P4, learners must understand the security requirements of a small business or a home network and create a security plan. As with P3, this could be set in the context of a real-world organisation or case study. A written report could be used as evidence.

For P5, learners must implement the security plan that they created in P4 using IT systems. A written report with screenshots showing how configuration is performed would be an appropriate form of evidence.

For P6, learners must test the security plan for effectiveness that they have implemented in P5 by carrying out security audits, checking the installation and upgrade of hardware and software systems, all of which can be documented in a test plan. Acceptable evidence for P6 is a signed observation record with a report and annotated test plan from each learner detailing how they completed this task.

To achieve a merit grade, learners must achieve all of the pass criteria and the three merit grade criteria.

For M1, learners are required to discuss which IT system breaches are most likely to occur and why. To pass this criterion, learners must come to their own judgement of the kinds of threats organisations face. For this criterion it is less important that learners get the 'right' answer, than that they show the tutor they can think about and judge the nature of IT system threats. M1 naturally follows from P1 but asks learners to discuss the threats identified in more detail. An extension to the P1 report or a separate electronic presentation could be used as evidence.

For M2, learners must evaluate a range of security methods, which could be set in the same context as P3.

The evaluation should weigh up the pros and cons of the methods that are used building on the work they have done for criterion P3. An electronic presentation, or a further poster would be appropriate evidence for these criteria.

For M3, learners must evaluate the security methods they implemented in P5, and make a judgement on whether they feel there has been an improvement to security within the IT system. An extension for P5 report could be used as evidence.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and both the distinction criteria.

For D1, learners should extend the work for M1 to explain the impact IT system breaches have to businesses.

As with M1, this could be set in the context of a real world organisation or case study. D1 naturally follows from P1 and M1 but asks learners to explain the impact of the threats identified. A further extension to the report for P1 or a separate electronic presentation could be used as evidence.

For D2, learners must show they have fully analysed all aspects of the selected organisation's security model, and where possible recommended improvements that will make the system more secure, justifying their reasons. As this is a distinction, learners will be required to go into detail and present logical and sound arguments for their recommendations. A written report drawing on the work for in P5 and M3 could be used as evidence.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Impact of IT System Breaches	Management has asked you for a report on how the organisation's IT system could be breached, and what its legal responsibilities are. They have also asked you for a report on the impact IT system breaches has on their business.	Oral presentation Written report
P3, M2	Managing IT Security	The boss has read your report, and is interested in hearing about how the organisation can guard against IT system breaches.	Oral presentation Poster
P4, P5, P6, M3, D2	Configuring IT Security	Devising a security plan for a small SME or home network. Implementation and testing of the plan on a dummy or virtual system.	Written report Screenshots of security configurations Test documentation

Suggested resources

Books

Alexander D, Finch A, Sutton D, Taylor A – *Information Security Management Principles: An ISEB Certificate* (British Computer Society, 2008)
ISBN 9781902505909

Mcillwraith A – *Information Security and Employee Behaviour: How to Reduce Risk Through Employee Education, Training and Awareness*
(Gower Publishing Ltd, 2006) ISBN 0566086476

Osborne M – *How to Cheat at Managing Information Security* (Syngress, 2006)
ISBN 1597491101

Website

[webarchive.nationalarchives.gov.uk/
20120823131012/http://www.businesslink.gov.uk
/bdotg/action/layer?topicId=1075423257](http://webarchive.nationalarchives.gov.uk/20120823131012/http://www.businesslink.gov.uk/bdotg/action/layer?topicId=1075423257) UK Government website with
IT security information

Unit 12: IT Support

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20713G

This unit is internally assessed

Unit aim

This unit will develop learners' knowledge and understanding of problems IT users experience on a daily basis and enable them to provide practical support to resolve common IT problems.

Unit introduction

Computers are relied on more and more in workplaces as well as by home users and the consequences of not solving problems quickly can be significant. This means that individuals who supply technical advice and guidance to keep the organisation running, and people using the technologies effectively, are key employees.

The importance of these roles has increased because of the rapid pace of change in the technologies. This often means that the nature of the support changes to one of supporting people developing new skills in addition to supporting them because of failures of the actual technology.

Learners will gain experience in capturing user problems and requests into structured systems that meet these needs, including mechanisms to escalate problems, when appropriate. They will also be able to identify trends which may indicate underlying issues and develop this into proposing possible solutions.

The unit builds on learners' existing knowledge of IT, perhaps gained through other units. It covers both how IT support systems operate and the work of individuals who provide technical advice.

It is recommended that this unit be delivered early in the programme, as it helps learners understand the workings of IT support systems before practising practical IT support skills.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the common issues IT users may experience
- 2 Be able to record user support requests
- 3 Be able to provide IT support
- 4 Understand the importance of trends in IT support requests.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the common issues IT users may experience		
P2 Identify the benefits of having an IT helpdesk facility	M1 Describe the potential benefits of moving an IT helpdesk facility offsite	D1 Explain the potential drawbacks of moving an IT helpdesk facility offsite
P3 Record information about end-user requests following defined procedures		
P4 Use different sources of information to communicate about specified errors	M2 Design and test a fault-finding procedure for users	
P5 Respond appropriately to multiple user support requests	M3 Manage support documentation for multiple user support requests	
P6 Identify trends in problems reported by users		
P7 Explain the importance of trends in IT support requests		D2 Explain actions for reducing commonly occurring problems identified from trends

Unit content

1 Know the common issues IT users may experience

Common requests:

- issues, e.g. forgotten login details, device issues, drive mappings, internet connectivity, email, lost files
- hardware, e.g. replacements, upgrades
- software, e.g. upgrades, new software
- services, e.g. intranet access, internet access
- permissions
- remote access

Support:

- levels, e.g. first, second, third-line support

Benefits:

- advantages, e.g. staff confidence, efficiency

IT helpdesk:

- types, e.g. online, phone support, services offered
- advantages
- disadvantages

2 Be able to record user support requests

Types of problems:

- errors, e.g. hardware faults, installing software, reconfiguring software, network issues
- supplying consumables
- advice on software applications, e.g. use of spellchecker, saving files

User interaction:

- methods of recording user problems, e.g. software forms, email, verbal reports, error messages, diagnostic reports

3 Be able to provide IT support

Communicating information:

- good practice, e.g. being supportive, dealing with stressed individuals, being calm
- providing progress reports
- verbal feedback
- written feedback
- escalation of problem, e.g. irregular requests, outside responsibility
- archiving requests and responses, e.g. use of computerised databases

Advice and guidance:

- basic functions, e.g. of hardware, software, networking features
- maintenance procedures, e.g. cleaning CD/DVD readers, printer head cleaner utilities, running diagnostic software
- troubleshooting advice, e.g. replacing broken equipment, running testing applications, identification of an upgrade/replacement needed

Procedures:

- recording end-user requests
- fault-finding
- record problems, e.g. time constraints
- use sources of information, e.g. reference manuals, specifications, frequently asked questions, websites
- fault resolution flowcharts

4 Understand the importance of trends in IT support requests

Trends:

- types, e.g. commonly occurring problems, problems reported by users

Effect of technology:

- developments, e.g. function, capacity
- new ways of working
- impact on users, e.g. stress, new opportunities
- increased support need

Information for delivery staff

Essential requirements

Learners will need access to practical resources and suitable technology; they can also use simulators or multimedia tools to gain prior experience before handling 'live resources'.

Employer engagement and vocational contexts

Using a local computer retailer, the centre's IT supplier as well as support from the in-centre IT support as well as practical vocational job related tasks.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

This unit will prepare learners for working in a support role. It is focused on advice and guidance rather than on the identification and fixing of faults. It would suit learners who wish to progress into an IT helpdesk type role rather than that of a traditional technician.

Access to work experience opportunities will be preferred by many learners and will give a context and reality that will add value. However, simulations can also be designed which have the benefits of consistency and facilitating assessment. Visits to IT helpdesks or talks by IT helpdesk operators will be valuable.

It will be necessary to define for learners some aspects of the working environment that they will need to operate within. This environment may include:

- easy access to manuals, specifications or other sources of information
- clearly defined procedures for documenting requests and advice given possibly using simple flowcharts or other structure diagrams. These procedures should include points where problems may be resolved and where outstanding matters are escalated to a higher level
- rules for escalation of difficult problems or problems outside the scope of the learners' defined role.

In addition, job descriptions could be provided and tailored to suit individuals in such things as the areas of expertise that they are able to respond to and guidelines for escalation. Learners do not need in-depth skills in the areas that they deal with.

There should be a variety of types of sources of information in order to give opportunities for M3. Steady building of learners' confidence and smooth running of the programme will be facilitated by good preparation of scenarios and related materials so that learners are not discouraged early by a lack of source information that relates to the requests they are presented with.

With P3-6, learners will need a range of tasks to complete during class time in what may be considered a 'realistic working environment'. For the purpose of definition, multiple in the context of P5 implies that learners must have addressed at least three requests.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Identifying advice and guidance which may be required by IT users: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on how to explain hardware, followed by individual exercise • whole-class exercise – tutor presentation on how to explain software, followed by individual exercise • whole-class exercise – tutor presentation on benefits of providing advice and guidance to users • individual exercise – learners look at the features of an IT helpdesk • individual exercise – learners practise IT helpdesk procedures.
Assignment 1 – Helping the User
Providing advice and guidance: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on communicating information to a range of users, followed by individual exercise • pairs exercise – interacting with the user • individual exercise – learners identify different types of problem.
Assignment 2 – Supporting the User
Identifying trends in user support requests: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on types of trends, followed by individual exercise • individual exercise – learners look at the effects of advances in technology.
Assignment 3 – Review Support

Assessment guidance

To achieve a pass grade, learners must achieve all of the pass criteria listed in the assessment and grading criteria grid.

For P1, a written report or a presentation with supporting notes (such as speakers' notes) would be an appropriate form of evidence. Work should be based on a visit to an IT helpdesk facility or talk given by an external visitor. Care should be taken to direct learners to include examples of all types of advice and guidance as indicated in the unit content.

For P2, learners must identify at least two benefits to the individual and two benefits to the organisation of having an IT helpdesk facility. A written report based on a case study provided by the tutor would be an appropriate form of evidence.

For P3, it is required that enough requests need to be recorded to be confident that learners appreciate and become comfortable with the process. At least ten would be appropriate and they should cover the areas indicated in the unit content for P1. Learners will need the procedures detailing for them but they do not need to design the data capture forms or databases. The recording can be made using either a paper-based or computer system. Evidence could be in the form of completed paper-based forms or an appropriate report printed out from a computerised system.

For P4, learners will benefit from being presented with a wide variety of sources of information. These could be listed for learners and include paper- or web-based manuals or specifications, CD-ROM, flowcharts and databases. The evidence provided for P3 could be used as an appropriate source of information. Evidence for P4 could be a written report or an oral or electronic presentation.

P5 is entirely observation based and can be managed with a check sheet or witness statement.

For P6, learners could be given sufficient simulated records or be asked to identify trends in the records documented in P3. Evidence for P6 could be a written report or a presentation.

P7 follows on from P6 and requires learners to explain the importance of trends which could be those identified in P6. Evidence for P7 could be a written report or a presentation.

To obtain a merit grade, learners must successfully complete all of the pass and the merit criteria.

Evidence for M1 could be a written report or, more creatively, learners could act out responses or produce screenplays that describe appropriate and inappropriate responses. In the latter case, care should be taken to avoid a superficial approach and to provide supporting notes that annotate and clarify the basic evidence.

For M2, the evidence could most appropriately be provided as a flowchart, where learners are provided with an example such as faults that might occur with a particular printer or problems that individuals might have with saving files onto an external storage device. It would be appropriate that there should be at least three stages within the fault-finding process.

For M3, the witness statement or check sheet used for P5 would be ideal, with multiple support requests.

Each could be for a different user in a different context where the learner is the class/team lead for some tasks on a specific occasion.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the two distinction criteria.

For D1, a written report is appropriate and learners must show understanding of the potential disadvantages as well as the advantages in order to justify. It is not expected that learners provide a commercial justification in terms of costs but they should be aware that keeping people working by providing swift and effective responses to requests for advice and guidance does have a cost benefit.

Evidence for D2 could naturally develop from previous evidence or tutors could provide a volume of simulated records. At least two common faults need to be identified and the actions proposed should be appropriate and could include training, upgrading hardware or software. A written report based on records provided by the tutor would be an appropriate form of evidence.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Helping the User	Manage an inter-departmental helpdesk and support helpdesk requests. Report on how it went.	Observation Presentation
P3, P4, P5, M2, M3	Supporting the User	Participate in the management and support of multiple users (at least three). Standardised documents and tutor observation.	Presentation
P6, P7, D2	Review Support	Using data you have gathered and other information supplied to you, carry out trend identification data analysis.	Report or presentation using a spreadsheet or chart-based application.

Suggested resources

Books

Bruton N – *How to Manage the IT Help Desk: A Guide for User Support and Call Center* (Butterworth- Heinemann, 2002) ISBN 0750649011

Sanderson S – *Introduction to Help Desk Concepts and Skills* (McGraw-Hill Osborne, 2003) ISBN 007821677X

Website

www.dmoz.org/Computers/Software/Help_Desk Computer help and information forum

Unit 13: IT Fault Diagnosis and Remedy

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20714G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' understanding of IT diagnostic procedures and equip them with skills required to identify and repair common faults.

Unit introduction

Many everyday activities in the modern world use, or are influenced by, computers and it is important that technical faults within such systems are diagnosed and rectified quickly as the impact of faults can have severe effects on companies and individuals.

This unit is designed to help learners diagnose common faults in IT equipment by the applying application of diagnostic tools, gathering and recording relevant information and the analysis of this information to identify the cause of common faults. The unit also deals with appropriate remedies for some common technical faults.

Learners are asked to demonstrate their knowledge of the investigation process and their ability to use some common diagnostic tools, applying appropriate investigative and diagnostic techniques that are suitable for the particular system under investigation.

Health and safety issues must be considered every time learners are involved with electronic items and it is expected that all learners will work safely and have a thorough understanding of the associated health and safety issues involved.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the procedures used in the IT diagnostics process
- 2 Be able to identify the cause of common faults
- 3 Be able to apply suitable remedies to identified faults.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain the process of diagnosing faults	M1 Explain the importance of a systematic approach to diagnosing faults	D1 Evaluate different types of diagnostic processes in terms of their ease of use and effectiveness
P2 Explain organisational issues associated with fault diagnosis	M2 Explain the impact of system faults on users, business and customers	
P3 Demonstrate the use of diagnostic tools to identify common faults	M3 Review current diagnostic tools and explain their functionality	
P4 Carry out identified fault remedies, checking they function correctly		
P5 Produce a record of diagnostic information		

Unit content

1 Understand the procedures used in the IT diagnostics process

Procedures:

- fault validation, information gathering, information analysis, solution identification

Diagnostic process:

- information sources, e.g. automatic error messages, helpdesk records, questioning the user, technical manuals
- specific fault identification procedures, e.g. using flowcharts
- fault validation
- minimise disruption
- escalation
- communicating with user, e.g. estimate time for repair, estimate cost

Organisational issues:

- fault rectification policy, e.g. problem description, problem history, problem location, technical information on the system under investigation, any parts used, actions taken and their outcome, time and expense records
- business impact, e.g. loss of service, customer dissatisfaction, errors in information
- other considerations, e.g. repair cost vs. replacement, resource availability, skill availability, ease of repair

2 Be able to identify the cause of common faults

Types of fault:

- hardware, e.g. component failure, communication problem, peripheral
- software, e.g. inappropriate printer driver, out-of-date version, virus, software bug
- user related issues
- compatibility issues

Diagnostic tools:

- physical devices, e.g. multi-meter
- software applications, e.g. PC Tools
- operating system tools, e.g. MS Windows Device Manager
- others, e.g. power on self-tests

3 Be able to apply suitable remedies to identified faults

Fault remedies:

- identification of suitable remedy, e.g. repair, refer problem, replace component, upgrade software, work-around

Diagnostic information:

- record of work content, e.g. date, name of person, location of fault, location of device, error code, parts used, problem detail, symptom, action taken, problem history
- record of work, e.g. log, diary, pre-printed form

Information for delivery staff

Essential requirements

Learners will need access to appropriate hardware and software resources based in a specialist computing workshop. Specific equipment will vary based upon the actual activities undertaken.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

This unit could link to *Unit 12: IT Support* by enabling learners to identify common system faults and their remedies.

At level 2, learners are asked to deal with routine faults that may be intermittent but do have an impact on a service or customer.

It is likely that learners will have a natural curiosity and possibly a competitive drive to identify faults and this may well provide motivation. It is also likely that they may not have sufficiently formal or rigorous problem solving skills that will allow reliable diagnosis. In respect of a delivery strategy, this can be addressed using such tools as checklists and flowcharts together with an insistence on documentation and following a procedure.

It is advised that a series of development activities are generated that simulate typical faults that are realistic but limited and solvable and this will build confidence. Formative feedback offered should include the process of diagnosis and the completion of logbooks etc, not just on the accuracy of the diagnosis.

Wall displays showing flowcharts that are used to identify faults will help confirm the process and any final 'NO' that puts the diagnosis out of learners' scope should direct them to escalate the issue.

Work shadowing would provide excellent opportunities to broaden learners' experience in a controlled way and access to real work logs are invaluable ways of providing the complexity needed to develop analytical skills.

As well as contact with technicians, insights can be gained through visits or talks with managers who make decisions or purchases. As well as record-keeping and a methodical approach, effective technicians also need to develop effective techniques in observation and concentration. These tend to develop an ordered and calm environment and the production of a set of workshop rules is advised.

In terms of the sequence of delivery, reflecting the ordering of the unit content would be appropriate.

However, introducing a range of progressive but limited workshop activities could be explored to maintain interest. Essential theory and understanding can be built into preparation or conclusion of individual activities and significant amounts of self-directed learning can take place. Tasks could be based around a series of questions that require research or other learning as well as simple checks to confirm that a logical approach was taken.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Fault finding procedures: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on gathering information, followed by individual exercise • whole-class exercise – tutor presentation on the diagnostic process, followed by individual exercise • guided research – learners look at types of fault and diagnostic tools • whole-class exercise – tutor-led discussion plus support desk talk; developing checklists.
Assignment 1 – How to Diagnose Computer Faults
Organisational issues: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on policies, followed by individual exercise • whole-class exercise – tutor presentation on business impact, followed by individual exercise • whole-class exercise – tutor-led research into other organisational issues. • Visiting speaker. • Other issues.
Assessment 2 – Faults and the Organisation
Applying remedies: <ul style="list-style-type: none"> • individual exercise – learners identify remedies for scenarios given by the tutor • individual exercise – learners make appropriate records of their fault-diagnosis process • individual exercise – work shadowing.
Assessment 3 – Solving the Problems

Assessment guidance

This unit tends to allow for a wide range of types of evidence to be used. Observation records, logbooks and completed checklists are examples of evidence that are naturally occurring and are to be encouraged. In other situations, written materials may be appropriate but ideally they should be considered in a realistic context such as in support of presentation and demonstration to peers about how a particular tool works or a leaflet designed to inform new technicians.

To achieve a pass grade, learners must achieve all the pass criteria listed in the grading grid. To achieve a merit grade, learners must achieve all pass grade criteria and the three merit grade criteria. To achieve distinction grade, learners must achieve all of the pass and merit criteria and the distinction grade criteria.

The suggested scenario is that the learner is training to work on an IT helpdesk.

It is suggested that the evidence for these criteria is produced in the format of an information leaflet but any other appropriate format may be used.

For P1, learners are to explain the process of diagnosing faults. The content for this can be drawn from the unit content under the headings 'procedures' and 'diagnostic process'. Learners should attempt to include at least three of the main procedures.

For M1, learners should include examples of the benefits and also examples that show negative results of a non-systematic approach.

For M3, learners could research the most recent diagnostic tools and explain what they do.

For D1, three types of diagnostic process are sufficient and should be derived from the examples in the unit content or similar.

Following on from the first assignment, learners should now consider faults from an organisational view point.

Learners will need to be given a case study or collect information about a real organisation. This could be evidenced using a presentation.

For P2, at least three issues should be identified and explained.

For M2, evidence could relate to a real world business or be based on a case study of an organisation.

To gather evidence for this assignment, learners must act as a helpdesk support technician and deal with user computer problems. The tutor will probably have to deliberately set up faults ready for diagnosis.

For P3, a table could be used identifying faults and the tools used to diagnose them, e.g. a checklist of questions.

For P4, the evidence could be in the form of a table indicating the fault, the remedy and how the system was checked.

For P5, logbook evidence or observation records are appropriate, however, there must be some evidence from a tutor that the faults were correctly identified, for example an observational record signed by a tutor that confirmed that the remedy was successful. Alternatively, other sources of evidence are acceptable including written reports and screenshots.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, M3, D1	How to Diagnose Computer Faults	You are training to work on an IT helpdesk and have been asked to prepare a leaflet describing the diagnostic process and the issues surrounding it.	Information leaflet
P2, M2	Faults and the Organisation	You are to give a presentation outlining organisational issues related to computer faults.	Presentation
P3, P4, P5	Solving the Problems	You are to work on a helpdesk and diagnose correct and record faults.	Records/logs of activities Witness statement Observation record

Suggested resources

Books

British Computing Society – *BCS Glossary of Computing and ICT* (British Computer Society, 2013) ISBN 9781780171500

Meyers M - *CompTIA A+ Certification All-in-One Exam Guide*, 8th Edition (McGraw-Hill Osborne, 2012) ISBN 9780071795128

Websites

www.tomshardware.com

A useful IT website and forum

www.answersthatwork.com

A useful website for finding drivers, details of processes and general advice

Unit 14: Mobile Communications Technology in IT

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20715G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of the uses and features of mobile communications devices and give them the skills required to set up mobile communications devices. Learners will develop an understanding of the implications of mobile communication technologies.

Unit introduction

The full range of mobile communications technology embraces more than just the telephone. With the introduction of new operating systems and the increasing prevalence of broadband connectivity, wireless technologies have become a commercially-successful mainstay in the IT industry. An increasing number of devices come equipped with wireless connectivity as standard. Households often have more than one computer and wireless networking enables the remote sharing of printers, file exchange and fast internet connection. This same technology has also liberated private and commercial networks from traditionally structured cabled solutions and provided internet access in public places such as railway stations, cafes and parks (via so called 'hotspots'). It has also revolutionised the Small office/Home office (SoHo) environment by offering greater freedom and flexibility to the way that people live, work and talk to each other.

Mobile communications is not without its problems and challenges; most notably the malicious attempts by hackers to intercept and interfere with network data.

This unit shows learners the different (and often competing) wireless technologies which are currently available, the mobile devices which benefit them and how these can be used to offer solutions that would have previously been impossible. Additionally, learners will be shown how to create and configure simple wireless communication networks, securing them with current tools and available protocols. Consideration of the technology's impact on the individual and on society as a whole will also be encouraged.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the uses and features of mobile communications devices
- 2 Know the communication technologies used in mobile devices
- 3 Understand the implications of mobile communications technology
- 4 Be able to set up mobile communications devices.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify different types of mobile communication device		
P2 Describe the features of different types of mobile communication devices		D1 Evaluate the features of mobile communication devices
P3 Identify the protocols used by mobile communication devices, giving examples of their use	M1 Explain protection methods used to improve the security of data in mobile communications	
P4 Describe the technology used by a mobile communication device	M2 Compare different mobile transmission technologies	D2 Justify a choice of mobile transmission technology for a given requirement
P5 Explain the benefits of mobile working in organisations		
P6 Explain the social and legal implications of using mobile technologies	M3 Explain how social and legal implications of using mobile technologies may be addressed	
P7 Set up and configure a mobile communications device to meet a defined requirement		

Unit content

1 Know the uses and features of mobile communications devices

Devices:

- types, e.g. mobile phones, digital cordless phones, PDAs, laptops, palmtops
- other, e.g. radio frequency identification devices (RFID)

Uses:

- business, e.g. email, word processing, conferencing, calendar
- specialist, e.g. graphic design, bespoke software, monetary transactions, service management
- personal, e.g. online gaming, messaging, web browsing

Features:

- e.g. video link, texting, internet access, email, picture messaging, GPS tracking, geocaching, synchronisation, cloud storage

2 Know the communication technologies used in mobile devices

Transmission technology:

- types, e.g. infrared, Bluetooth, Wireless Fidelity (WiFi), GSM, GPRS, 2.5G, 3G
- data transfer rates
- effective ranges

Standards and protocols:

- types, e.g. 802.11 for WiFi, IrDA for Infrared
- wireless access protocols
- SMS protocols

Wireless networking:

- wireless access points, e.g. hotspots
- wireless network adaptors

Protection:

- methods, e.g. wireless encryption methods (WEP, WPA, AES, EAP)
- interference from other devices

3 Understand the implications of mobile communications technology

Benefits:

- efficiency, e.g. group communication, information sharing, paperless working

Social implications:

- human interaction, e.g. text messaging, multimedia messaging, emails, virtual offices
- health issues, e.g. posture, RSI, eye strain
- environmental effects, e.g. visual impact of phone masts, disposal of components
- illegal imagery

Legal implications:

- data security, e.g. accidental loss, theft
- hacking activities, e.g. wardriving, piggybacking, packet sniffing

Disadvantages:

- effective range of equipment
- interference
- perceived health hazards, e.g. radiation

4 Be able to set up mobile communications devices

Devices:

- types, e.g. mobile phones, digital cordless phones, PDAs, laptops, palmtops
- other, e.g. radio frequency identification devices (RFID)

Set up:

- select devices
- connect devices
- configuration, e.g. date and time, address books
- test data transfer

Requirements:

- functions, e.g. email, SMS, connection types

Mobile working:

- service management, e.g. repairs, sales, package delivery

Evaluation:

- check, e.g. meets requirements, stress testing, general usability

Information for delivery staff

Essential requirements

For this unit learners will need good background materials in the form of handouts and diagrams of wireless networks and mobile devices. These can be placed into context by the use of case studies or local examples.

Learners need also to be advised where to look for materials that can back up their work with research, for example links to resources on the internet, magazines or library. A suitable course textbook may also prove effective in providing essential background reading. Access to a sample range of mobile devices and wireless technologies is also essential for practical exercises and assessment opportunities. Learners may be encouraged to use their own devices to complement centre resources.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding to a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

There is a balance between theory and practical content in this unit and keeping learners engaged will be easier if the practical activities are embedded into the theoretical content.

Some of the early content may be quite complicated for learners who have not done any networking units before and tutors may want to use the mobile devices that learners own as a continuing frame of reference.

When the learner is engaging with the standards and protocols that may otherwise seem a distant and unfamiliar concept, the tutor can refer them to the functionality on their own handsets.

Practical issues within institutions, e.g. policies on the use of mobile telephones, may have a significant effect on the delivery of this unit. It is very likely, however, that this unit will be attractive to learners and provide many opportunities to link their own personal use of mobile devices with formal studies. With these influences in mind, clear setting of working guidelines to learners about the use of their own devices will be necessary.

Significant opportunities exist within the delivery of this unit to cover many of the practical issues around the use of mobile devices, particularly mobile phones. On completion, learners should be much more aware of such aspects as costs, perceived health hazards and other pitfalls of using phones and these could be of great value to them.

It would be beneficial for learners to have access to mobile technologies such as smart phones, PDAs, netbooks or mobile broadband modems (dongles). Centres may wish to procure or borrow these items but must ensure that the learner is able to experience all aspects of their functionality such as Bluetooth connectivity and access to a PC software suite designed for use with a particular device.

For those tasks which involve examining mobile working, it would be useful for learners to meet a guest speaker who has experience using mobile technology in a business setting. A suitable guest could be a manager of the local branch of a delivery business that tracks its vehicles using mobile devices, or an IT consultant familiar with mobile technology.

A formally structured and delivered programme is recommended. Consideration should be given before the start of this unit as to whether learners may bring and use their own personal devices as this could be disruptive.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Characteristics of mobile devices: <ul style="list-style-type: none"> ● whole-class exercise – learners will experiment with different devices ● whole-class exercise – tutor presentation on uses of mobile communication devices, followed by whole-class practical ● whole-class exercise – tutor-led discussion of the different services available. Communication technologies used in mobile devices: <ul style="list-style-type: none"> ● whole-class exercise – tutor-led discussion regarding transmission technology ● directed research – what standards and protocols are available ● whole-class exercise – tutor presentations on licensing issues ● whole-class exercise – understanding the different wireless network access points.
Assignment 1 – Mobile Technology
Implications of mobile communications: <ul style="list-style-type: none"> ● whole-class exercise – discussion of how mobile device change the way you do things ● directed research – legal implications of mobile communication technology ● directed research – social implications of mobile communication technology ● whole-class exercise – tutor presentation on ways to protect a wireless network, followed by a class practical ● whole-class exercise – tutor presentation on disadvantages of mobile communications devices.
Assignment 2 – Benefits and Drawbacks
Taking advantage of mobile communications: <ul style="list-style-type: none"> ● whole-class exercise – tutor-led discussion of how firms use mobile technology ● individual exercise – learn how to set up a wireless network ● individual exercise – learn how to check a wireless network is working properly.
Assignment 3 – Mobile Devices

Assessment guidance

Evidence for this unit can be gathered from learners undertaking project work based around real-world case studies. It would be realistic for learners to present one integrated assignment but evidence can be built up from a number of tasks including practical exercises. Learners may use their own mobile devices for practical activities and subject matter.

To achieve a pass grade, learners must achieve the six pass criteria listed in the assessment and grading criteria grid.

For P1 at this level, tutors should direct learners to identify different kinds of mobile communication device.

This criterion should be completed with reference to the first part of the content for outcome of learning 1. A variety of strategies could be used to provide evidence including visual or online presentation, leaflet, poster or report.

For P2, learners should describe the features of different types of mobile communication device. P2 follows on naturally from P1 and will probably address the same devices. Evidence may include a visual or online presentation, leaflet, poster or report.

For P3, learners should identify the standards and protocols used by a mobile communication device. A variety of strategies could be used to provide evidence including visual or online presentation, leaflet, poster or report.

For P4, learners should describe the technology used by a mobile communication device, and as with P3, should reference the appropriate part of the 'Standards and Protocols' section of the content for outcome of learning 2.

Evidence may include a visual or online presentation, leaflet, poster or report.

For P5, learners should be able to explain at least two benefits of using mobile technology to help an organisation work more efficiently. Learners will not only need to describe which technologies will benefit organisations, but also to state why and give examples, such as the management of a large mobile workforce at a utility firm or a delivery company. Evidence for this criterion could come from a report written for a hypothetical firm that is actively looking at mobile technology to help it become more efficient.

For P6, learners are expected to explain the social and legal implications of using wireless technologies.

Learners could produce a table listing these in a column. The deeper impact they have on society might not be considered. A variety of strategies could be used to provide evidence including visual or online presentation, leaflet, poster or report.

For P7, learners should set up a mobile communications device to meet a defined need. The defined need can be chosen by either learners in consultation with the tutor, or be set out by the tutor. Either way, learners must show that they can achieve the criterion.

Evidence for this practical activity is expected to be a written report by learners identifying how they met the defined needs with witness statements. Evidence of how learners have tested the device could be shown with a demonstration, recorded with an observation record.

To achieve a merit grade, learners must achieve all of the pass criteria and the three merit grade criteria.

M1 follows on from P3 and requires learners to explain protection methods used to improve the security of data on mobile communications that use the standards and protocols described in P3. Evidence may include a visual or online presentation, leaflet, poster or report.

M2 requires learners to compare different mobile transmission technologies. Learners should demonstrate a firm understanding of the technologies, and how they differ from each other. A variety of strategies could be used to provide evidence including visual or online presentation, leaflet, poster or report.

For M3, learners will add to their evidence for P6, explaining how social and legal implications of using wireless technologies may be addressed. Whereas P6 identifies the implications, M3 explains what can be done to minimise negative aspects as well as including suggestions on how the more positive elements of mobile communications technology may evolve.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the two distinction grade criteria.

D1, requires learners to evaluate the features of mobile communication devices. Learners should compare similar features on a range of devices and present conclusions in a clear and logical manner. The evaluation should be balanced and neutral in its examination of the positives and negatives of each device. A leaflet or report would be an appropriate form of evidence.

For D2, learners will add to their evidence for P4 and M2, justifying a choice of mobile transmission technologies for a given requirement. An appropriate requirement should be set by the tutor, the one used for P7 may be appropriate. An online presentation, leaflet, poster or report could be used to provide evidence.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, M2, D1	Mobile Technology	A business has asked you to help it understand mobile technology better, by writing a short guide to a mobile device and a real world application.	Leaflet or poster
P5, P6, M3	Benefits and Drawbacks	The business would now like you to give a short presentation on the benefits, and the social and legal implications, of mobile technology.	Presentation

Criteria covered	Assignment title	Scenario	Assessment method
P7, D2	Mobile Devices	The business has selected a mobile device it thinks would be useful. It wants you to set it up for use, and check it is right for them.	Written report

Suggested resources

Books

Briere D and Hurley P – *Wireless Home Networking for Dummies* (Hungry Minds Inc US, 2003) ISBN 0764539108

Davis H – *Absolute Beginner's Guide to Wi-Fi Wireless Networking* (Que, 2004) ISBN 0789731150

Hansmann U – *Pervasive Computing: The Mobile World* (Springer-Verlag Berlin and Heidelberg GmbH & Co K, 2003) ISBN 3540002189

Vos I and de Klein P – *The Essential Guide to Mobile Business* (Prentice Hall PTR, 2001) ISBN 013093819X

Journals

Mobile News

What Mobile

Unit 15: Mathematics for IT

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20716G

This unit is internally assessed

Unit aim

This unit will develop learners' understanding of and skills in using the mathematical techniques they will need to progress as an IT professional.

Unit introduction

In order to work effectively as an IT professional, individuals need to have mathematical knowledge and be able to apply this knowledge. The purpose of this unit is to provide an introduction to a number of key mathematical ideas, to provide opportunities to develop useful skills and techniques and to be able to apply them in different areas of IT.

The unit starts by looking at how numbers are represented in computer memory. Learners will be expected to carry out a range of calculations using different number systems including binary, octal and hexadecimal and show how decimal numbers and integers are represented in different size computer registers.

Boolean algebra is introduced where the variables (0 and 1) are logical and the application includes mathematical and digital logic. The relation of Boolean algebra to digital electronics is explored.

Simple functions, such as straight lines and trig graphs, are defined and investigated by applying their use in software, to understand how functions can be represented visually using computers.

Finally the maths of statistics is explored with the collection and graphical representation of data used to apply statistical techniques.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know how numbers are represented in computer memory
- 2 Be able to apply Boolean algebra
- 3 Be able to use simple functions
- 4 Be able to apply statistical techniques.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Show how natural numbers are represented in computer memory	M1 Show how octal and hexadecimal numbers can be converted to binary and represented in computer memory	D1 Explain how fixed and floating point decimals can be converted to binary and represented in computer memory
P2 Perform basic operations on numbers in power and scientific notation		
P3 Demonstrate how errors are introduced when rounding decimal numbers		
P4 Demonstrate Boolean operations using logic gates and truth tables	M2 Describe how Boolean algebra is utilised in digital electronics	
P5 Use Venn Diagrams to represent Boolean operations		
P6 Demonstrate the application of different types of function	M3 Use software to represent the application of different types of function	D2 Explain the significance and use of inverse linear and trig functions
P7 Use appropriate statistical techniques to meet a defined need	M4 Interpret the use of statistical techniques graphically to meet a defined need	

Unit content

1 Know how numbers are represented in computer memory

Numbers:

- natural numbers (1, 2, 3...)
- integers (...-2, -1, 0, 1, 2, ...)
- real numbers (integers, fractions, decimals)
- binary numbers
- number systems (base 10 (decimal), base 2 (binary), base 8 (octal), base 16 (hexadecimal))
- rounding
- degree of accuracy
- errors
- powers
- scientific notation
- floating point notation
- fixed point notation

Calculations:

- basic operations (addition, division, multiplication, subtraction) on number systems, on powers, using scientific notation
- rounding errors

Computer memory:

- representing integers and real numbers, e.g. two's complement, Binary Coded Decimal
- registers, e.g. 8, 16, 32 bit

2 Be able to apply Boolean algebra

Boolean operations:

- AND
- OR
- NOT
- conjunction
- disjunction
- negation or complement
- logic gates
- truth tables
- Venn Diagrams for logic gates

Digital electronics:

- representing binary states as two voltage levels
- use of logic gates in integrated circuits

3 Be able to use simple functions

Definition:

- dependent and independent variable
- inputs (domain)
- outputs (range)
- notation $y=f(x)$

Types:

- linear
- quadratic
- trigonometric
- examples, e.g. $y = mx+c$, $y=ax^2 + bx + c$
- simple trig functions and their inverses
- linear functions and their inverses
- applications, e.g. if f denotes converting Fahrenheit to Centigrade then f^{-1} denotes converting Centigrade to Fahrenheit, distance as a quadratic function of time in Newton's Laws of Motion, alternating current as a sine curve

Graphs:

- using software to represent linear, quadratic and trig graphs, e.g. spreadsheet, graphics package

4 Be able to apply statistical techniques

Statistical techniques:

- mean
- median
- mode
- rank
- quartile range, interquartile range
- maximum
- minimum

Classification of data:

- collection, e.g. tally charts
- tabulation
- frequency tables

Interpretation of graphical representations:

- charts, e.g. column, bar, line (scattergrams, linear equations, frequency curves), pie
- analyse summary data
- prove hypothesis
- identify trends and patterns

Information for delivery staff

Essential requirements

Learners will need access to a computer with a spreadsheet package. Graphing facilities, capable of satisfying the outcomes described, will need to be available if not provided by the spreadsheet. A good range of case study examples and exercises is needed.

Delivery guidance

This unit could be delivered effectively within a workshop environment to allow learners time to progress through exercises, examine case study examples and use computing facilities. Learners will have varying levels of mathematical knowledge on entry and therefore teaching must cater for this differentiation. Although there is theoretical, the main emphasis of delivery must be on practical application and practice.

A comprehensive initial assessment will identify the level of each learner's skills and understanding and this could form the basis for a system that tracks each learner's skills and knowledge development. The content for the tracking system should include at least the content of this unit, however it is important that any other mathematical programmes that learners are undertaking are also taken into account and connections made with other tutors as required. Regular formative assessment is necessary and this could be facilitated by the use of IT systems.

The unit content can be approached in the order that it is presented here, however an integrated approach that involves other units is strongly recommended. Learners will need to be given provided with a number of significant data sets and the context of these should be IT-related and examples could be summary data from reported problems to computer services or results from IT-related questionnaires.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
<ul style="list-style-type: none">• Whole-class exercise – tutor presentation on the use of mathematics in a range of different numeric systems, followed by individual exercise.• Whole-class exercise – tutor presentation on how to perform calculations which use different numeric systems, followed by individual exercise.
Assignment 1 – Number Systems
<ul style="list-style-type: none">• Whole-class exercise – tutor presentation on how to perform calculations on a computer (including extended calculations), followed by individual exercise.• Whole-class exercise – tutor presentation on calculation errors caused by switching between different numeric systems and by computer calculations, followed by individual exercise.
Assignment 2 – Calculations and Errors

Topic and suggested assignments/activities/assessment
<p>Spreadsheet modelling:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on types of Boolean operations, followed by individual exercise. • whole-class exercise – tutor presentation on Venn diagrams, followed by individual exercise. • individual exercise – learners research the use of Boolean operations in digital electronics.
Assignment 3 – The Logical Choice
<ul style="list-style-type: none"> • Whole-class exercise – tutor presentation on using mathematical functions, followed by individual exercise. • Whole-class exercise – tutor presentation on how to use built-in spreadsheet features and functions, followed by individual exercise. • Whole-class exercise – tutor presentation on presenting data graphically, followed by individual exercise. • Whole-class exercise – tutor presentation on charts, what are they good for and how to represent data, followed by individual exercise.
Assignment 4 – The Correct Function
<p>Statistical techniques:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on different statistical techniques including mean, median, mode, rank, quartile range, interquartile range. Followed by individual exercise • whole-class exercise – tutor presentation on how can data be classified to aid understanding • whole-class exercise – tutor presentation on how to interpret data from charts, followed by individual exercise.
Assignment 5 – The Best Model

Assessment guidance

It may be appropriate to use prepared exercises to provide evidence for some of the criteria in this unit, but it is recommended that where possible these be set into a vocational context. Such exercises could be included in one or more assignments to be completed to a deadline, but centres are advised that timed tests or examinations would be outside the scope of the unit, which does not require calculations to be completed within a set time period.

Any exercises used must be assessed by the tutor against the relevant criteria in the grading grid, informed by the range of unit content and must not be marked in terms of numerical or percentage achievement. Where a particular set of calculations required to be completed by the unit content, then all calculations must be completed successfully and it is expected that workings will be shown where appropriate. Care must be taken that such activities are completed individually and that there is no scope for the sharing of answers between learners. Opportunities for collaborative work for particular criteria are indicated below, but where this occurs, evidence must be provided by each learner individually.

It is inevitable that much of this unit will be evidenced on paper or using a spreadsheet but, where possible, centres are encouraged to vary strategies to include verbal presentations, posters and other forms of visual evidence and to set activities within a vocational context.

Where descriptive or explanatory evidence is required, appropriate observation records completed by both learners and tutor may form part of the evidence.

To achieve a pass grade, learners must achieve all of the seven pass criteria listed in the assessment and grading criteria grid.

For P1, learners must provide evidence that they can show how natural numbers are held in computer memory in the ways listed in the unit content for.

For P2, learners must provide evidence that they can describe the full range of calculations indicated in the unit content for different numeric systems including integers, decimals, fractions and binary numbers. Evidence may be provided from one or more exercises, or may occur naturally within the context of case studies or assignments; it would also be appropriate to provide evidence of the successful completion of calculations from appropriate activities in other units within this qualification. For final assessment, it is necessary for learners to show only that they know how to carry out each calculation.

For P3, learners need to demonstrate the different ways in which the use of computers introduces rounding errors when performing calculations on decimal numbers.

To achieve P4, learners must be able to demonstrate Boolean operations as listed in the unit content for outcome of learning 2.

To achieve P5, learners must be able to demonstrate using Venn Diagrams to represent Boolean operations as listed in the unit content for outcome of learning 2.

For P6, learners must provide evidence that they can use the full range of functions indicated in the unit content outcome of learning 3. Evidence may be provided from one or more exercises, or may occur naturally within the context of case studies or assignments; it would also be appropriate to provide evidence of the successful use of functions from appropriate activities in other units within this qualification. For final assessment, it is only necessary for learners to show that they know how to use each function.

For P7, learners must show they can use statistical techniques to meet a specified need. This criteria will require learners to do work in a spreadsheet or other suitable software package and process data in the ways detailed in the unit content. It is recommended that tutors provide suitable data sets; it is not expected that learners provide the data sets themselves unless they wish to do so (if this choice is made then tutors should guide learners to appropriate data sets from which the range of graphical formats can be evidenced).

To achieve a merit grade, learners must achieve the seven pass criteria and the four merit criteria.

To achieve M1, learners need to be able to use and apply mathematics to solve problems. Tutors must provide a suitable range of mathematical problems, which allows learners to solve problems using different numeric systems.

M1 follows naturally from P1 and learners must show how octal and hexadecimal numbers can be converted to binary and represented in computer memory in the ways listed in the unit content for outcome of learning 1. M2 follows naturally from P4 and requires learners to describe the use of Boolean operations in digital electronic devices.

M3 follows from P6 requires learners to use software to represent the application of different types of function. This is likely to involve the use of spreadsheets to produce charts but other software representations are possible.

M4 follows from P7. Learners must show they can graphically interpret the use of statistical techniques to meet a specified need. This criterion will require learners to do work in a spreadsheet or other suitable software package to process data and produce appropriate charts of the types detailed in the unit content.

To achieve a distinction grade learners must achieve all of the pass and merit criteria, and the two distinction grade criteria.

D1 follows naturally from P1 and M1 and learners must explain how fixed and floating point decimals can be converted to binary and represented in computer memory in the ways listed in the unit content for outcome of learning 1. D2 follows from P6 and M3. Learners must explain the significance and use of inverse linear and trig functions.

This could be done by means of a report or presentation or by suitable annotation of charts produced in M3.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	Number Systems	A business has asked you to put together a brief guide to number systems, base 10 (decimal), base 2 (binary), base 8 (octal), base 16 (hexadecimal). The business would like you to support your brief guide by demonstrating how to convert to binary from each of the other systems.	Guide
P2, P3	Calculations and Errors	A business has asked you to put together a brief guide to using calculations. The business would like you to support your brief guide by demonstrating how calculations can solve problems and how errors can occur.	Guide

Criteria covered	Assignment title	Scenario	Assessment method
P4, P5, M2	The Logical Choice	A business has asked you to demonstrate Boolean operations and Venn Diagrams and describe Boolean operations in digital electronic devices.	Observation Report Presentation
P6, M3, D2	The Correct Function	A business has asked you to demonstrate the application of different types of functions and explain their significance.	Observation Report Presentation
P7, M4	The Best Model	A business has asked you to graphically interpret statistical techniques.	Spreadsheet Charts

Suggested resources

Books

Cameron P – *Introduction to Algebra* (OUP Oxford, 2007) ISBN 0198527934

Lawler G – *Algebra: Basic Algebra Explained* (Studymates LTD, 2005)
ISBN 1842850687

Lawler G – *Understanding Maths: Basic Mathematics Explained*
(Aber Publishing, 2007) ISBN 1842850865

Rowntree D – *Statistics without Tears: An introduction for Non-Mathematicians*
(Penguin, 2000) ISBN 0140136320

Websites

www.mindpicnic.com/course/statistics-for-dummies Statistics learning resource

www.themathpage.com Learning resource for mathematics learners

Unit 16: Database Systems

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20717G

This unit is internally assessed

Unit aim

This unit develops learners' understanding of database systems and practical skills to translate that understanding into the design and creation of databases.

Unit introduction

Database software is one of the most commonly used application packages in business. Therefore, it is important that all IT users have a working knowledge of this type of software and an understanding of the advantages and disadvantages so that they can identify appropriate situations in which to use a computerised database.

Learners will gain an understanding of the basic principles of database design and the structures and terminologies associated with databases as well as developing useful practical skills such as creating single table databases with associated forms, queries and reports. Databases deal with structured information that can be broken down into lots of similar records, each having the same fields.

Sometimes people want to see all of the fields of all of the records but in other cases, they may only want to see some of the fields or maybe a limited set of records for a particular purpose. For example in a stock file, someone might only want a list of products that are out of stock for when we want to re-order. Queries are used to restrict the information seen and learners will understand how to create queries and use them as the basis for forms or printed reports.

When databases are used to store information, it is important that people can rely on this information. There are various methods for ensuring that the information contained within databases is correct and a number of these will be considered. Particularly effective techniques are those that control and validate the information as it is being entered.

Documentation is necessary for every application and system so that they can be maintained and adapted over time. Learners will gain knowledge of the documentation needed to support the databases that they create, to show how it works and what features have been used. They will also learn how to check their databases to ensure that everything works correctly.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the principles of database systems
- 2 Be able to create non-relational database systems
- 3 Be able to use database software tools.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain the principles of database systems	M1 Explain the importance of maintaining data integrity in a database system	
P2 Design a non-relational database system, including different data types	M2 Explain the choice of fields, data types and primary key in a non-relational database system	
P3 Create a non-relational database system from a given design	M3 Explain the need to calculate data storage requirements	D1 Test a non-relational database system to meet a given design
P4 Import data into a non-relational database system	M4 Sort records in a non-relational database system	
P5 Produce queries to extract meaningful data from a non-relational database system	M5 Produce meaningful reports based on database queries	D2 Explain the benefits of using reports
P6 Create and use data entry forms		
P7 Export data from a non-relational database system		
P8 Produce user documentation for a non-relational database system		D3 Justify improvements that could be made to a database system

Unit content

1 Understand the principles of database systems

Database basics:

- example uses
- advantages
- disadvantages
- objects, e.g. tables, queries, sort, reports, forms
- data types
- size estimation

Database structures:

- tables
- fields
- records
- primary key

Data integrity:

- data accuracy
- consistency
- validation rules, e.g. lookup lists, default values, upper limits, lower limits

Table:

- single (non-relational)

Database design:

- table structure (table, fields, data types, field properties, primary key, validation)
- query structure (table, fields, criteria)
- report structure (table, query, format, presentation)
- form structure (table, vents, format, presentation)

2 Be able to create non-relational database systems

Table:

- single (non-relational)

Design:

- structure diagrams
- screen designs (input, output)

Creating tables:

- fields
- data types, e.g. text, numeric, date/time
- field properties, e.g. length, format, default value, fieldname
- validation
- modification

Naming objects:

- how to name
- why it is important
- making appropriate

Data storage requirements:

- why, e.g. legal requirements
- estimation, e.g. calculating disk space needed

Testing:

- test plan
- test data
- data, e.g. spell check, sorting, comparison
- query processing
- query output
- report output

Importing data:

- external sources, e.g. other databases, spreadsheets, text files

3 Be able to use database software tools

Sort:

- fields
- order, e.g. ascending
- descending (alphabetical order, numerical order)

Queries:

- single criteria
- multiple criteria
- AND
- OR
- selecting fields
- sorting, e.g. date, numeric, alphabetical order
- improving efficiency, e.g. shortcuts
- meaningful data, e.g. relate a purpose to the context

Reports:

- benefits
- role of tables
- queries
- automatic creation e.g. wizards
- layouts
- adding
- editing
- special fields, e.g. date/time
- multiple criteria

Forms:

- automatic form creation, e.g. wizards
- formatting forms, e.g. titles, labels, data entry order

Exporting data:

- query results
- report results, e.g. spreadsheet database

User documentation:

- user guide

Information for delivery staff

Essential requirements

Learners will need access to relevant software (Microsoft Access or similar), plus hardware capable of running the software (including a printer).

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding to a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

It is important to note that at this level, learners are expected to develop and work with only single table, non-relational databases. Centres will need to check the content and revisit existing exercises and teaching materials to ensure that they are still fit for purpose at this level.

The delivery schedule can be broadly based on the ordering of content as provided, however it is recommended that the theory and practical aspects are directly linked where possible.

Case studies could be valuable at the start of the programme so that learners have opportunities to understand the range of uses and the advantages and disadvantages of databases. The importance of data integrity is often missed by learners because in their normal work there is no real consequence of errors, however, this can be reinforced through case studies or through visits to companies or visiting speakers.

In both of these, good preparation and negotiation will help to ensure that the activity covers the required aspects of the content.

A significant proportion of the programme could be based around progressive small formative tasks that will allow learners to develop skills and understanding at a pace appropriate to their previous experience with databases and their ability.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
What are database systems? <ul style="list-style-type: none">• Whole-class exercise – tutor presentation on the purpose and functionality of database system with well supported examples.• Class discussion – discuss advantages and disadvantages of database systems, including the benefits of using database tools (queries, forms, reports, macros).• Class discussion – explain how database systems are used to support businesses (or other contexts).• Whole-class exercise – tutor presentation on the basics of databases.• Whole-class exercise – tutor presentation on the structure of databases.• Individual exercise – learners look at what is meant by data integrity.
Assignment 1 – Why Use a Database?
How to design a database system <ul style="list-style-type: none">• whole-class exercise – tutor presentation on designing database systems (including table structures, forms, queries and reports)• individual exercise – learners produce relevant design documentation (structure diagrams, screen designs).
Assignment 2 – Design a Database
How to order information in a database: <ul style="list-style-type: none">• individual exercise – learners create a database table, enter and amend records• whole-class exercise – tutor introduces tables, fields, records and primary keys to learners, followed by practical• individual exercise – learners identify and rectify problems with tables.
Data entry, editing and organisation of structured information: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on how to create tables, followed by a whole-class practical• individual exercise – using tutor-prepared materials, work to understand why and how naming works in databases• directed research – under tutor guidance, learn about data storage requirements and how they are calculated• whole-class exercise – tutor presentation on how to sort records in a table or query• whole-class exercise – tutor demonstrates how to check a database for errors, followed by class practical• whole-class exercise – tutor shows how to import information into a database from external sources.

Topic and suggested assignments/activities/assessment

How to use the database:

- whole-class presentation followed by individual exercises – tutor presentation on how to create queries, and searching for records using single and multiple criteria
- whole-class presentation followed by individual exercises – tutor presentation on how to develop reports using existing tables and queries
- whole-class presentation followed by individual exercises – tutor presentation on how to develop forms using tables and queries
- whole-class exercise – tutor presentation on how to export data from a database, followed by a practical.

Assignment 3 – Create a Database

Individual exercise – learners produce user support documentation.

- Whole class presentation followed by individual exercises – tutor presentation on how database systems can be developed with further enhancements.

Assignment 4 – Wrapping it Up!

Assessment guidance

Learners should not be expected to find their own database project, but should normally be given an appropriate case study that allows them to develop a system that meets the requirements of the assessment criteria.

Learners should be assessed on their ability to understand basic database design principles and apply these to their own practice.

To achieve a pass grade, learners must achieve the eight pass criteria listed in the assessment and grading criteria grid. P1 requires learners to explain the principles of database systems. Learners should consider the advantages and disadvantages of using databases. This work could be based on a case study provided by the tutor and chosen to ensure that at least two advantages and two disadvantages can be identified and described.

For P2, it is appropriate to give learners a number of scenarios that are known to involve only single table non-relational tables. If learners are allowed to choose a database to implement then it should be checked beforehand to ensure it is not unnecessarily complex or too simple. Learners are expected to design a database from a given scenario, and produce structure diagrams and screen designs to represent a design model. Learners should clearly justify the design of tables, fields, field properties, validation, query design, report design and form design.

For P3, learners are expected to take their design model and create a database using a single table. The creation of the table must take account of the full content detail, including validation of data entry. Choice of type is one way of validating data but it is expected that other techniques (at least two) are used, for example setting a range of acceptable values or lookup lists. Another aspect that must be included is an estimate of the storage requirements and this requires that the scenarios presented must indicate the likely numbers of records. Clear indications of local naming conventions should be provided and evidence checked that these are conformed to. The databases must have at least one shortcut, this could be as simple as a keyboard shortcut or the use of macros attached to buttons on a menu form. The table must have a primary key.

The evidence for P3, P4, P5, P6 and P7 is likely to come from an extension to the activity used to supply evidence for P2. At least two forms are needed. These can be based on the underlying table or on queries.

Much of the evidence for P3, P4, P5, P6 and P7 will include printouts, but could also include observation records or presentations if supported by notes. A formal check of the database is required and this could be a short report or an observation record. The check should include the content itself as well as a check that the reports, queries and forms match the user need. It is difficult to be precise about the number of test records, however, they should each be meaningful and enough to force report printouts of at least two pages.

P8 covers the production of database documentation which should contain technical and user guides for database administrators and users.

To achieve a merit grade, learners must achieve the eight pass criteria and the five merit grade criteria.

For M1, learners can extend the work for P1 by explaining the importance of maintaining data integrity in a database system. Learners could base a written report or presentation on a case study provided to them or on a database they have created. If the second option is allowed, the case must be taken in the original scenario provided to allow sufficient scope that learners can cover the prescribed 'data integrity' content.

For M2, learners can extend the work for P2 by explaining the choice of fields, data types and primary key in a database system.

For M3, learners must explain the need to calculate data storage requirements. The wording here is deliberate, and specifically does not require learners to actually be able to carry out the necessary calculations.

Learners need to show a clear understanding of what data storage requirement means in this context, and why it is needed.

For M4, learners must be able sort records either in a table or as part of query.

To achieve M5, learners must produce at least two reports displaying meaningful data from the database.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and all three of the distinction grade criteria.

For D1, learners must show that they can test a database system, and ensure that all aspects of the database system is working correctly, including data entry forms. Test documentation with screen printouts would be appropriate to evidence.

For D2, learners could extend the work for P5 and M5 by explaining the benefits of using reports. Learners could apply a vocational context, for example a business when explaining the benefits reports can bring to a business.

For D3, it is recommended that the evidence be based on a sufficiently complex case study in order for improvements to be able to be justified. Typical improvements might be based on an appreciation of additional fields that could be added in order to add functionality or additional shortcuts to aid the users.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D2	Why Use a Database?	A business wants help to store its information more efficiently. It has asked you for a short report weighing up the advantages and disadvantages of using databases, and how data integrity can be maintained.	Observation Presentation
P2, M2, M3	Design a Database	The business has decided that databases are the way to go, and has asked you to design a database.	Portfolio Presentation
P3, P4, P5, P6, P7, M4, M5, D1	Create a Database	The business has decided that databases are the way to go, and has asked you to work on creating one for it.	Portfolio Standardised documents and tutor observation
P8, D3	Wrapping it Up!	The business wants you to explain more about the work you have done so far, and how to use the database.	Portfolio Standardised documents and tutor observation Presentation

Suggested resources

Books

Heathcote F – *Basic Access 2000-2003* (Payne-Gallway Publishers, 2004)
ISBN 1904467784

Heathcote F – *Further Access 2000-2003* (Payne-Gallway Publishers, 2004)
ISBN 1904467741

Oppel A – *Databases Demystified: A Self-teaching Guide*
(McGraw-Hill Osborne, 2004) ISBN 0072253649

Website

[www.tutorialsforopenoffice.org/
category_index/base.html](http://www.tutorialsforopenoffice.org/category_index/base.html) Training website for Open Office software

Unit 17: Website Development

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20718G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of how websites function and their understanding of their purpose as business tools. Learners will then develop the skills required to design and create a multiple page website.

Unit introduction

The worldwide web has given rise to a new medium of communication. Websites can allow us to 'walk into' a world with very few boundaries. We can find MP3 files and download them with ease. Our digital images can be sent to relatives overseas in seconds. We can go shopping without leaving our homes and source the very best prices with the click of a mouse button.

Essential to developing the worldwide web are the people who design effective documents that can be 'read' by a web browser. Web designers have the fascinating task of taking text, images, video and other resources and crafting them into high quality documents for broadcasting across the world via the internet. Their brief is to produce attractive and informative sites that are accessible to everyone. This includes users with disabilities, where, for example, features can allow speech synthesisers to read out pages for blind users. In this unit learners see the potential of the web and will develop a skill set which will be highly valued by industry and commerce as well as being a useful personal skill for leisure pursuits. Web design is a skill that is becoming more and more popular as the worldwide web expands and as companies see the advantage of using browser technology for their company intranets. The unit provides a firm grounding in the concepts of web design which will help learners to progress to employment or to another educational course and to become valued employees with the key skills needed in their chosen employment.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know web architecture and components
- 2 Understand how websites can be used by organisations
- 3 Be able to design website components
- 4 Be able to create website components.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify the hardware and software components which enable internet and web functionality		
P2 Describe the role of web architecture in website communications		
P3 Explain the uses of websites in organisations		
P4 Design website components, considering client needs	M1 Explain the techniques that can be used on web pages to aid user access to information	D1 Evaluate different design features of a website
P5 Use appropriate formatting tools, styles and templates to prepare content for the website	M2 Describe the use of interactive websites and the techniques that can be used to provide interactivity	
P6 Create website components to meet client needs	M3 Use automated features in web development software	
P7 Review website components, suggesting improvements	M4 Refine website components based on user feedback	D2 Explain how a created website meets the defined requirements

Unit content

1 Know web architecture and components

Components:

- hardware, e.g. web, mail and proxy servers
- routers
- software, e.g. browser, email

Web architecture:

- Internet Service Providers (ISP)
- web hosting services
- domain structure
- domain name registrars
- worldwide web

Web functionality:

- Web 2.0
- blogs
- online applications

2 Understand how websites can be used by organisations

Uses of websites:

- customer-facing, e.g. marketing, online product catalogue, business information
- internal, e.g. intranets, information repositories, training facilities

3 Be able to design website components

Design:

- tools, e.g. storyboards, sample pages
- style, e.g. layout, corporate image, use of logos

Construction features:

- frames, templates, action buttons
- hyperlinks, visited hyperlinks; hotspots
- download speeds, e.g. affected by browser, memory size of pages
- interactive features, e.g. email links, registration login

Interactivity:

- user input, e.g. keyboard, mouse clicks
- form design

Client need:

- target audience
- user need, e.g. clear navigation, fast download speeds
- language, images, appropriate formats, e.g. layout, colour, font

4 Be able to create website components

Format and edit:

- common web functions, e.g. bookmarks, hyperlinks, graphics, fonts, text formatting, background colours, images
- simple HTML, e.g. editor programs, file extensions
- HTML tags, e.g. <html>, <p>, <body>, closing tags
- editing tools, formatting tools

Combining information:

- different sources, e.g. scanner, digital camera, application packages, original artwork, clip art

Checking:

- image resolution
- colours
- links not working
- inappropriate content
- text
- formatting

Publishing:

- uploading files, e.g. to intranet, to local server
- maintaining contents
- file management, e.g. naming files, folder structures, moving files, deleting files

Web development software:

- specialist software, e.g. Expression Web, Dreamweaver
- embedded facility in other packages, e.g. Word
- other, e.g. Flash
- use of HTML
- wizards

Automated features:

- wizards, e.g. tables, frames, templates

Review:

- feedback, e.g. appropriateness, unnecessary animation, inappropriate graphics, unclear graphics, inappropriate content, slow download speeds, navigation problems, bad font choice, bad colour combinations
- improvements, e.g. response times, interactivity, clarity

Information for delivery staff

Essential requirements

Access to an internet connection is essential for this unit so learners are able to review sample websites and, later in the course, upload their websites to a server.

All learners should have access to a PC with the following application software:

- authoring software
- web browser.

Where possible it is recommended that learners use a web authoring system to create their pages. This will maximise their productivity and leave more time for researching and applying good design techniques. Whilst it is possible to use a text-based editor such as Windows Notepad to write the HTML coding, this can be laborious and the overall benefit to the learner is questionable. However, HTML code should be discussed as part of the unit so that learners have an understanding of its place in the process of web design.

There are various web authoring packages available. For example, Microsoft Front Page, Adobe Dreamweaver, all make website production a fairly intuitive task. In addition, Netscape Navigator includes Composer which enables the user to create web pages directly from within the browser.

Ideally, learners should produce websites that look 'authoring tool independent'. The emphasis in this unit is on learners using a range of tools to complete their sites. They should be able to adjust background colours, use background images, apply text formatting/colours, bullets, etc. Tools that complete multiple actions by the click of a button should be discouraged, for example the use of themes to build comprehensive websites.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

There is scope in this unit for learners to be creative and this should be encouraged. It is relatively easy to develop working websites using dedicated application packages and wizards but it is not easy to ensure that the finished website meets the intended purpose and, in particular, the needs of the expected audience.

Delivery strategies should be developed accordingly. If learners are to develop professional websites, then they must be fully aware of the relevant laws and guidelines and the practical implications of the legislation.

When researching websites in the early stages, it is recommended that learners' investigations are structured according to the internal and external uses as identified in the content. It would be valuable to present learners with a structured format for these investigations that covered the relevant content. As learners experience different types of websites they should be encouraged to compare and contrast in order to reflect on what constitutes good practice in the world of web design.

Early emphasis on reviewing existing websites for fitness of purpose will enable learners to develop a critical eye that should aid in their designs and implementations.

It is possible that some learners have already produced web pages and feel confident that they do not need instruction. Given the increasing competition for attention on the web, sites must be interesting and informative enough to capture users effectively. This can be achieved only by good design and the delivery sessions must emphasise this. There is not a standard design methodology but paper-based designs that show the intended house style and structure need to be justified and critical formative assessment should question details such as why particular fonts are used. Design documentation could include the use of pictorial representations illustrating the overall website design, individual page layouts and notes on navigation. Issues such as the choice of font and layout are important and learners should be encouraged, through the use of appropriate support materials, to understand the aesthetic and image considerations of their work.

The practical workshop activity should not be wholly focused on the production of the website that will be submitted for assessment. Small developmental activities that cover the content and ensure learners are confident on a wide variety of techniques are recommended and these might involve other technologies such as digital cameras, creating thumbnails, animated GIFs, sound recording, etc. The content requires that learners edit HTML, and so some aspects of HTML will need formal teaching. Learners could be taught with examples of lines that have been produced in the package used and gain skills developed through small practical's that build confidence in a number of specific techniques. Time spent on the production of the website submitted for assessment purposes should be limited and candidates directed to focus on a site that covers all of the required content, rather than a large and complex site with duplicated features.

The content of this qualification maps very closely to the UK National Occupational Standards (NOS).

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
The purpose of websites: <ul style="list-style-type: none">● whole-class exercise – tutor presentation on the purpose of websites● directed research – understanding client needs.

Topic and suggested assignments/activities/assessment
Assignment 1 – Exploring Websites
Principles of a multi-page website: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on the different construction features of websites • individual exercise – learners practise with web design tools.
Assignment 2 – Create a Website
Publishing a multi-page website: <ul style="list-style-type: none"> • individual exercise – learners investigate different web development packages • individual exercise – learning basic HTML • individual exercise – learners investigate testing a website for functional navigation and content coherence.
Assignment 3 – Testing and Maintenance

Assessment guidance

In preparing to assess this unit, it is advised that tutors give learners strict parameters for carrying out research using the internet, making a range of sites available via an intranet or links to a range of suitable websites with appropriate content for their level of maturity and experience which will allow them to consider a range of different design styles. As much of the evidence is related to website review and production, this may be provided in any suitable medium, as long as it can be made available remotely to an external verifier if required. Practical activities must be accompanied by observation records or witness statements, but this should not usually be the only form of evidence for an individual criterion.

To achieve a pass grade, learners must achieve the eight pass criteria listed in the assessment and grading criteria grid.

For P1, learners must be able to identify clearly the hardware and software components which are used to connect to the internet securely, and which facilitate communication and representation of information for users.

P2 follows on from P1 by asking learners to describe the role of web architecture. As specified by the content, learners should be describing ISPs, web hosting and domain name registrars as fundamental aspects of the architecture behind the worldwide web.

For P3, learners should consider the main functions of websites, including the latest developments in online practices.

Descriptions of live business websites may be used to explore the different uses of websites in organisations. Learners should explain how organisations use websites and intranets to improve productivity, efficiency and gain revenue.

For P4, learners should be given an appropriate scenario from which to design website components, considering the needs of the client.

For P5, learners must complete the practical task of using formatting tools, styles and templates to prepare content for a website. Whilst it is not stated in the grading criteria, it would obviously be useful if this criterion is used as a follow on from the previous ones. In line with this, the content could be produced in accordance with the points considered in P2 and P3.

For P6, learners should show that they can publish web components on a web server so that it can be viewed over the internet.

For P7, learners should review the website uploaded for P7 to ensure that all aspects of it are working correctly. Learners must be seen to go through the website, testing it methodically to ensure that there are no errors in its navigation or content.

Evidence can come from a mix of tutor observation and learner-completed documentation.

To achieve a merit grade, learners must achieve all the pass criteria and the four merit criteria.

M1 focuses on explaining the techniques designers use on web pages to aid user access to information. This can be treated as an extension of P5, and carried out as part of the same assignment.

For M2, a website that engages with user input is necessary, such as one that collects names and addresses for registrations or mailshots. Typically, the additional functionality needed would involve the use of a front end data capture form with some validation database to store the user input.

For M3, learners should use automated features such as automatic frames and wizards to create web components. Learners should not be introduced to these features until they have an understanding of how to generate the same components manually.

For M4, a number of websites must be reviewed in order to identify and explain suggested improvements. Websites created by learners in P6 may be included for peer or self-review and suggestions may include improving usability, extending content, graphics or functionality (such as improving download or page loading speeds).

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction criteria.

For D1, evidence could be linked to the website components created for P6 and the evaluation should cover all the features listed in the unit content. Suitable forms of evidence could include annotated screenshots, included in a written report or a visual presentation.

For D2, learners should give a detailed explanation of the ways in which the finished product meets the original user requirements. This could take the form of a short report on the websites successes and also relate areas for further improvement.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, D1	Exploring Websites	A small firm has asked you to research competitor websites.	Report

Criteria covered	Assignment title	Scenario	Assessment method
P5, P6, P7, M2, D2 M4	Create a Website	The firm asks you to propose and create a website.	Practical exercise Presentation
M3	Testing and Maintenance	Test the website to ensure that there are no problems with navigation or content. Suggest how it can be extended further.	Written report

Suggested resources

Books

Adobe Creative Team – *Adobe Dreamweaver CS4 Classroom in a Book* (Adobe, 2008) ISBN 0321573811

Brannan James A – *Web Design in Simple Steps* (Prentice Hall, 2009) ISBN 0273723537

Cheshire Jim – *Microsoft Expression Web 3 In Depth* (QUE, 2009) ISBN 078973981X

Website

www.webpagesthatsuck.com

According to the site's creator, Vincent Flanders, the reader will 'learn good design by looking at bad design'

Unit 18: Software Design

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20719G

This unit is internally assessed

Unit aim

This unit will develop learners' knowledge of the software development process and the features of programming languages, and skills in using design tools to develop software solutions.

Unit introduction

There is a comprehensive range of generic application software and utilities available to businesses across many different sectors. Examples are spreadsheets and databases, as well as more focused packages such as payroll or computer-aided design (CAD). Sometimes, however, a business need is identified that cannot be addressed in this way, and in these situations it is necessary to build a solution using an appropriate computer language.

In order to develop a programmed software solution which meets business and user needs it is first necessary to understand the problem and be very clear in terms of user requirements. Problems are often caused by, poor understanding of user need, as well as poor planning and learners will need to be able to choose the programming language which best address the user need. A wide range of different languages is available with quite different characteristics and features. Learners will probably focus on one particular language in another unit, but in this unit they will build an appreciation of why different high-level languages are available and why they are chosen in particular situations.

The unit focuses on the design process and would be an appropriate place to start before undertake focused programming language units. The unit examines the business context within which solutions can be developed along with possible constraints.

A major part of learners' time will be spent on familiarising themselves with fundamental design tools such as data flow diagrams and algorithms. This will give learners a firm foundation to undertake the focused programming units.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the features of programming languages
- 2 Know the software development process
- 3 Be able to design software development solutions.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the characteristics of programming paradigms	M1 Describe the features of programming languages, including how sequence, selection and iteration are used	
P2 Identify the factors influencing choice of programming language		
P3 Describe the stages of the software development lifecycle		
P4 Outline a specification for a business requirement	M2 Justify the programming language to be used in a specification	
P5 Design a software solution to a business requirement using appropriate design tools	M3 Describe the data types and software structures used in a design solution	D1 Develop algorithms to represent a design solution
P6 Review the design against the original requirement		D2 Evaluate the design tools used

Unit content

1 Know the features of programming languages

Programming paradigms:

- procedural
- object oriented
- event driven
- characteristics, e.g. procedures, functions, events, objects

Features:

- sequence
- selection, e.g. case, it...then...else
- iteration, e.g. repeat – until, while ...do
- variables, e.g. naming conventions, local and global variables, logical operators
- assignment statements
- input statements
- output statements

Types of language:

- visual languages
- other, e.g. script and markup languages
- simple overviews and uses

Choice of language:

- reasons, e.g. organisational policy, suitability in terms of available features and tools, availability of trained staff, reliability, development and maintenance costs, expandability

2 Know the software development process

Software development life-cycle:

- requirements gathering, specification, e.g. scope, inputs, outputs, processing, user interface
- constraints, e.g. hardware platforms, timescales for development
- design
- code
- test
- maintain

3 Be able to design software development solutions

Design:

- structure, e.g. functions, procedures, objects
- data
- files

Tools:

- range of tools, e.g. storyboards, narratives, action lists, graphical tools, e.g. structure diagrams, data flow diagrams, entity relationship models
- algorithms, e.g. structured English, pseudo code

Data:

- types, e.g. text, integer, floating point, byte, date, Boolean, other, e.g. char, smallint

Software structures:

- e.g. functions, procedures, classes and objects
- abstraction of data
- pre-defined code
- readability, e.g. comments, appropriate names for variables, indentation
- quality of code, e.g. efficiency, reliability, robustness, usability, portability, maintainability

Review:

- against specifications requirements

Information for delivery staff

Essential requirements

Learners will need access to appropriate hardware and software development environment for practical programming tasks with online help and/or manuals, e.g. Visual Basic (any variety), JavaScript, Pascal.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

Ideally this unit will be delivered alongside one of the programming units to put the theory into context. In many ways it is an introduction to systems analysis as many of the design tools used for systems analysis, such as data flow diagrams, are included.

Delivery can follow the order of the outcomes of learning, starting with an introduction to programming languages and their features. This will be easier to bring to life if simple examples using different languages can be developed and learners able to experiment themselves. It is important that learners grasp the differences between types of languages and when each type is most appropriate.

Introducing the software development life-cycle broadens the learning to start looking at business requirements and how the whole process gets going and reaches completion. Case studies will be useful here, although a visiting speaker with first-hand experience would be even better. Learners should practise writing each part of a specification. Lots of detail is not required at this level, learners just need an appreciation of the elements of a specification and an outline of what should be included.

Learning to use different tools to help design a programming solution will take some time and a lot of practise.

If a particular language is to be used in another unit then this unit can concentrate on the particular design features appropriate to that language. Exemplar material would be useful. Structured English and pseudo code are principally level 3 skills so need only be very basic at level 2. Their use is required only to achieve a distinction grade.

Learners will probably be familiar with reviews and evaluations but time should always be allowed to practise these skills before undertaking assessment.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Features of programming languages: <ul style="list-style-type: none">• individual exercise – tutor assessing current level of knowledge• whole-class exercise – tutor presentation on programming languages – type, when used, why used• whole-class exercise – tutor presentation on programming features, followed by practical exercises• whole-class exercise – tutor presentation on data types, followed by practical exercises• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Development life-cycle: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on life-cycle• whole-class exercise – tutor presentation on determining the requirement, followed by individual exercise• mixture of tutor-led instruction, directed learning, practical exercises.
Assignment 1 – Why Program?
Design tools: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on structures, followed by practical exercises• whole-class exercise – tutor presentation on tool, followed by practical exercises• whole-class exercise – tutor presentation on data, followed by practical exercises• mixture of tutor-led instruction, directed learning, practical exercises.
Assignment 2 – Specification
Design evaluation: <ul style="list-style-type: none">• whole-class exercise – tutor-led revision of evaluation techniques.
Assignment 3 – Design

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the Programme of suggested assignments table which follows this guidance.

Learners will need a realistic business problem for which a simple, programmable solution is an option.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

The first three pass criteria and associated merit criterion are theoretical in nature but should be set within a particular business context. The suggestion is that this is evidenced by a presentation to a business explaining why programming is the answer and how they would go about implementing it.

For P1, P2 and P3 learners should refer to the unit content to ensure coverage. This is straightforward descriptive work so interest may be added by suggesting different formats for presenting the information.

P4 requires a specification, which should include the elements highlighted in the unit content but does not need to be in great detail.

For P5, learners must generate a set of documents demonstrating the design solution. This could include some or all of: data flow diagrams, data dictionaries, entity relationship diagrams, flow charts, structured English, pseudocode or others. The design needs to be clear and the appropriate tools used.

P6 is a review of the design solution against the specification. Have all the objectives been met? If not, why not. Could the design be improved?

To achieve a merit grade, learners must achieve the pass grade criteria and the merit criteria.

M1 is an extension of P1 and the elements required are in the unit content. Learners should give examples of sequence, selection and iteration.

M2 will probably be included within the evidence for P4 and learners should use reasoned arguments as to why a particular language has been chosen.

M3 is a fairly straightforward extension of P5 and should cover the elements outlined in the unit content.

To achieve a distinction grade learners must achieve all the pass and merit criteria and the distinction criteria.

D1 is part of the design process and requires learners to include an algorithm such as pseudo code in the design documents.

For D2, learners are evaluating the design tools, i.e. DFDs etc, as distinct from the design itself which is reviewed for P6. This evaluation should include how well learners felt they used the tools and if they were useful.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1	Why Program?	A small business has requested a software solution to a marketing analysis procedure. You have decided a programmed solution is best but must convince the management. Present your reasons to the board and explain the stages of development.	Presentation Supporting documents

Criteria covered	Assignment title	Scenario	Assessment method
P4, M2	Specification	Produce a requirements specification and select a programming language.	Specification
P5, P6, M3, D1, D2	Design	Generate the program design and review and evaluate the design and the design tools used.	Design documentation, e.g. DFD, ERD, structured English Evaluation

Suggested resources

Books

Flanagan D – *JavaScript Pocket Reference* (O’Reilly, 2002) ISBN 0596004117

Wang W – *Visual Basic 6 for Dummies* (Hungry Minds Inc US, 1998)
ISBN 0764503707

Willis T, Reynolds M, Crossland J and Blair R – *Beginning VB.NET*
(Wrox Press Ltd, 2002) ISBN 1861007612

Websites

www.visualbasic.about.com/ Information about Visual Basic

www.profsr.com/ Website offering free IT training

www.vbexplorer.com/VBExplorer/VBExplorer.asp Information and training about Visual Basic Explorer.asp

Unit 19: Object Oriented Programming

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20720G

This unit is internally assessed

Unit aim

This unit introduces learners to the features of object oriented programming and the object oriented development environment and develops the skills required to design, implement, test, document and review object oriented programs.

Unit introduction

Object oriented programming is an industry-proven method for developing reliable modular programs and is popular in software engineering. Consistent use of object oriented techniques can lead to shorter development life-cycles, increased productivity and therefore lower the cost of producing and maintaining systems.

Programming with objects simplifies the task of creating and maintaining complex applications. Object oriented programming is a way of modelling software that maps programming code to the real world. Object orientation is now the cornerstone of many languages; it is dominant in Visual Basic, C++, Java, the Microsoft .Net environment, Action Script and many other systems.

This unit starts by looking at the features of object oriented programming and the object oriented environment. Learners will discuss how these types of language are used and their suitability for different uses.

The unit then puts theory into practice and learners will design and develop object oriented programs to meet specified needs. There are many concepts to be learned and practised to enable learners to confidently design and implement programs.

As with all programming, a focus on developing solutions to meet identified needs is made, along with an emphasis on the importance of testing and reviewing. Good practice in testing and documenting programs will be emphasised and learners will develop techniques to ensure their program code is understandable and able to be maintained by others.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the features of object oriented programming
- 2 Understand the object oriented development environment
- 3 Be able to design and implement object oriented programs
- 4 Be able to test, document and review object oriented programs.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the key features of object oriented programming	M1 Explain the features of an object oriented language that make it suitable for creating a GUI	D1 Evaluate the suitability of object oriented programs for non-graphical applications
P2 Explain how development environment components simplify the development process		
P3 Develop an object oriented program to meet defined requirements	M2 Implement data validation for inputs	D2 Implement error handling and reporting
P4 Perform testing of an object oriented program	M3 Compare actual test results against expected results to identify discrepancies	
P5 Create documentation for the support and maintenance of an object oriented program		
P6 Review an object oriented program, suggesting possible improvements		

Unit content

1 Understand the features of object oriented programming

Features:

- key features, e.g. discrete and reusable units of programming logic, identification of objects, data abstraction, modularity, classification, inheritance, polymorphism, encapsulation, classes, methods, message passing, flexibility, suitability for graphical user interfaces (GUI), simplicity of programming, ease of development

Programming languages:

- e.g. Visual Basic.NET (VB.NET), C#, Java, Coldfusion, Perl, PHP (Hypertext Preprocessor)

2 Understand the object oriented development environment

Environment components:

- integrated development environment (IDE)
- tool boxes and controls
- toolbars
- predefined functions
- screen templates
- help menus
- debugging tools

3 Be able to design and implement object oriented programs

Design:

- classes
- objects
- methods
- control structures
- data structures
- data validation
- error handling and reporting

Classes:

- class diagram
- dependencies and inheritances
- identification attributes
- methods
- the control of scope of attributes and methods
- inheritance
- aggregation
- association
- polymorphism
- pre-defined classes, e.g. class library, downloaded, imported

Objects:

- e.g. constructors, destructors
- building a program with reusable objects
- defining relationships between objects
- implementing message passing between objects

Control structures:

- selection, e.g. if ...then...else, CASE
- iteration, e.g. while...do, repeat...until

Data structures:

- selecting, declaring and initialising variable and data structure types and sizes
- operators, e.g. logical, arithmetic, relational

Data validation:

- e.g. type, range, presence, format

Implement:

- program and debug

Error handling:

- debugging, e.g. compiler/translator
- errors, e.g. logical, syntax, run-time

4 Be able to test, document and review object oriented programs

Testing:

- test strategy
- test data
- test plan structure, e.g. test, date, expected result, actual result, corrective action
- error messages
- specialist software tools, e.g. debug

Documentation:

- listing of code
- support and maintenance documentation

Programming standards:

- use of comments
- code layout
- indentation

Review:

- against specifications requirements
- suggest improvements

Information for delivery staff

Essential requirements

Learners will need individual access to an appropriate development environment according to the particular language chosen by the centre. In addition, it would be valuable for perhaps a limited number of additional copies to be made available in open areas, such as learning resources or libraries, so that learners can practise and create assignment material outside of normal contact time.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

It is likely that, for most learners, this will not be their first contact with formal programming but it will be their first contact with object oriented programming. It is very important that they use a methodical approach to creating object oriented programs. This will be particularly valuable should learners progress to higher-level courses that involve programming.

A number of small programs should be used to demonstrate object oriented concepts. Any appropriate language can be chosen as the basis of the practical aspects of this unit. An object oriented program should include a simple object oriented design, fully documented class, code, and interfaces (screens, forms, printouts, etc).

It is recommended that learners begin to program early on in delivery of this unit. To be most valuable, these programming activities should steadily increase in complexity and provide lots of opportunity for formative feedback.

Once they have been given the focus of an assessed task, they should be encouraged to break down the task and submit material in stages for assessment. These stages might naturally be design, documented class, production of program, testing/debugging and documentation.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
The features of OOP: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on object oriented programming (what it is, when it is used, pros/cons)• whole-class exercise – tutor presentation on objects, variables, software engineering. Followed by individual exercise.
Design methods: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on classes, inheritances etc. Followed by individual exercise• whole-class exercise – tutor presentation on objects, pre-defined classes. Followed by individual exercise• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 1 – OOPs
Creating an OO program: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on techniques to develop working programs, followed by individual exercise• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 2 – Designing an OOP
Testing/reviewing: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on debugging, naming conventions etc, followed by individual exercise• whole-class exercise – tutor presentation on reviewing against requirement, followed by individual exercise• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 3 – Implementing an OOP

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments table which follows this guidance.

The programme of suggested assignments table suggests the theoretical elements of the assessment (P1, P2, M1 and D1) are covered by producing a booklet, but these could be evidenced using a presentation or any other suitable format.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

P1 requires learners to describe the key features of object oriented languages. A written report is probably the easiest format to generate evidence but a presentation or any other suitable method can be used.

For P2, learners must explain how environment components make the development process easier. This requires more than a straightforward explanation of each element outlined in the unit content, the emphasis being on their purpose.

For P3 learners are required to design and implement an object orientated program. Learners should be guided to create some form of basic object oriented design. A simplified class diagram may be used showing the class attributes, methods and its association with other classes. Class responsibility- collaboration (CRC) cards are also suitable. Centres may also incorporate use of case diagrams and sequence diagrams if they feel this is appropriate. If learners use a graphic user interface (GUI) with their program then it is important that they show evidence of the planning and design of the GUI interface at an early stage. Learners must then implement the program.

For P3 and P4, before and after screenshots of the implemented program design will demonstrate debugging.

Witness statements may be used to assess the completed design. For P4, test plans and results are also required and evidence of dealing with error messages.

For P5, documentation should include annotated and properly laid out code (to programming standards) along with the technical documentation necessary to support and maintain the program.

P6 covers the review process and should include suggestions for improvements. This can be included with the documentation for P5.

To achieve a merit grade, learners must achieve the pass grade criteria and the merit grade criteria.

For M1, learners must describe the features that make an object oriented language suitable for creating a GUI. This does not relate to a specific language.

For M2, learners must show evidence of implementing data validation on input.

For M3, a test plan showing expected test results will need to be provided along with the actual test results.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction grade criteria.

For D1, learners must evaluate the suitability of using object oriented programs for non-graphical applications.

As with all evaluations this should consider the pros and the cons.

For D2, learners should provide evidence of error handling and reporting.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	OOPs	You are to produce a booklet for trainee programmers on the basics of object oriented programming.	Booklet
P3, M2, D2	Designing an OOP	You are to design and implement a program to a given specification.	Design documentation Screenshots Witness statement
P4, P5, P6, M3	Implementing an OOP	You are to test and document the program.	Documentation Screenshots, program code etc Test plan Witness statement Review

Suggested resources

Books

Halvorson V – *Visual Basic 2013 Step by Step* (Microsoft Press US, 2013)
ISBN 9780735667044

Templeman J – *Microsoft Visual C++?CLI Step by Step: Version 2003*
(Microsoft Press US, 2013) ISBN 9780735675179

Kaldahl B – *EZ Flash MX: Animation, Action Script and Gaming for Macromedia Flash*
(Trafford Publishing, 2004) ISBN 1412006171

Cadenhead R – *Sams Teach Yourself Java in 21 Days* (Covering Java 7 and Android)
(Sams, 2012) ISBN 9780672335747

Schildt H – *C++: A Beginner's Guide*, 2nd Edition
(McGraw-Hill Education, 2003) ISBN 0072232153

Lippman S, Lajoie J – *C++ Primer*, 5th edition (Addison Wesley, 2012)
ISBN 9780321714114

Websites

java.sun.com/docs/books/tutorial/java/concepts/

Object-Oriented Programming
Concepts

www.codeproject.com

Software development and design
information resources

www.perl.org

The Perl Programming Language

www.cplusplus.com

Information resource website

Unit 20: Procedural Programming

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20721G

This unit is internally assessed

Unit aim

The aim of this unit is to introduce learners to the features of procedural programming and the procedural development environment. They will develop the skills required to design, implement, test, document and review procedural programs.

Unit introduction

Irrespective of framework or delivery platform, the development of procedural code is still at the core of many commercial applications' development projects even though the perception may be that this is old-fashioned programming. Languages such as Cobol have been around for a long time and learners will consider them to be something from computing history. However, event driven systems and procedural platforms all use procedural code for the critical command content of their objects, events and listeners. The language chosen for study is not important as long as it allows learners to access all the assessment criteria.

The unit starts by looking at the features of procedural programming and the procedural environment. Learners will discuss how these types of language are used and their suitability for different uses. The unit then puts theory into practice and learners will design and develop procedural programs to meet specified needs. There are many concepts to be learned and practised to enable learners to design and implement programs confidently.

As with all programming, the focus on developing solutions to meet identified needs is made along with emphasis on the importance of testing and reviewing. Good practice in testing and documenting programs will be emphasised and learners will develop techniques to ensure their program code is understandable and able to be maintained by others.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the features of procedural programming
- 2 Understand the procedural development environment
- 3 Be able to design and implement procedural programs
- 4 Be able to test, document and review procedural programs.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the key features of procedural programming	M1 Explain the features of a procedural language that make it suitable for creating a graphic user interface (GUI)	D1 Evaluate the suitability of procedural programs for non-graphical applications
P2 Explain how development environment components simplify the development process		
P3 Develop a procedural program to meet defined requirements	M2 Implement data validation for inputs	D2 Implement error handling and reporting
P4 Perform testing of a procedural program	M3 Compare actual test results against expected results to identify discrepancies	
P5 Create documentation for the support and maintenance of a procedural program		
P6 Review a procedural programme, suggesting possible improvements		

Unit content

1 Understand the features of procedural programming

Key features:

- procedures
- functions
- pre-defined functions
- local variables
- global variables
- parameter passing
- modularity
- programming libraries
- suitability for graphical user interfaces(GUI)
- simplicity of programming
- ease of development

Programming languages:

- e.g. Pascal, C, Cobol, Fortran, C++

2 Understand the procedural development environment

Environmental components:

- integrated development environment (IDE)
- tool boxes and controls
- toolbars
- predefined functions
- screen templates
- help menus
- debugging tools

3 Be able to design and implement procedural programs

Design:

- screen layouts
- data storage
- data structures
- control structures
- functions
- data validation
- error handling and reporting

Data structures:

- selecting, declaring and initialising variable and data structure types and sizes
- operators, e.g. logical, arithmetic, relational

Control structures:

- selection, e.g. if ...then...else, CASE
- iteration, e.g. while...do, repeat...until

Error handling:

- debugging, e.g.: compiler/translator
- errors, e.g. logical, syntax, run-time

Data validation:

- e.g. type, range, presence, format

Implement:

- program and debug

4 Be able to test, document and review procedural programs

Testing:

- test strategy
- test data
- test plan structure, e.g. test, date, expected result, actual result, corrective action
- error messages
- specialist software tools, e.g. debug

Review:

- against specifications requirements
- suggest improvements

Documentation:

- listing of code
- support and maintenance documentation

Programming standards:

- use of comments
- code layout
- indentation

Information for delivery staff

Essential requirements

Whilst some procedural languages are commercially available, there are also free languages available incorporating a diverse range of commands that are commonly used on many platforms. You must ensure that, in the case of mobile platforms, the applicable free emulators are available, or where security policies dictate, local workstations are equipped with virtualised operating systems containing the programming environment.

Employer engagement and vocational contexts

Working with a local programming based organisation or using internet-based open source projects, as well as source forge would enhance learners' experience and offer a relevant vocational context.

There are a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

It is likely that, for most learners, this will not be their first contact with formal programming but it may be their first contact with procedural programming. It is very important that they use a methodical approach to creating procedural programs. This will be particularly valuable if should learners progress to higher-level courses that involve programming.

A number of small programs should be used to demonstrate procedural concepts. Any appropriate language can be chosen as the basis of the practical aspects of this unit. A procedural program should include a simple procedural design, fully documented structures, code, and interfaces (screens, forms, printouts, etc).

It is recommended that learners begin to program early in the delivery of this unit. To be most valuable, these programming activities should steadily increase in complexity and provide lots of opportunity for formative feedback.

Once learners have been provided with the focus of an assessed task, they should be encouraged to break down the task and submit material in stages for assessment. These stages might naturally be design, production of program, testing/debugging and documentation.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
<p>Introduction to the unit.</p> <p>Procedural programming:</p> <ul style="list-style-type: none">• whole-class exercise – tutor presentation on variables and their role in procedural programming• whole-class exercise – learners work from tutor-provided materials to create basic data and control structures• individual exercise – working from tutor-provided materials, learners practise the basics of programming syntax• whole-class exercise – tutor presentation on why programming standards are needed and how to implement them.
<p>Designing a procedural program:</p> <ul style="list-style-type: none">• whole-class exercise – tutor presentation on program design• directed research – working from tutor-specified sources, research modular elements and their role in procedural programming• individual exercise – use tutor-provided exercise materials to better understand the scope of variables• whole-class exercise – tutor presentation on parameters, and how they are used to pass data• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 1 – How to Start
<p>Variables etc:</p> <ul style="list-style-type: none">• whole-class exercise – tutor presentation how to combine modular and control elements into a coherent structure• individual exercise – using tutor-provided materials, understand how to use simple type variables, data structures and parameters• directed research – using tutor-specified sources, research programming standards• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 2 – Design Work
<p>Testing and documenting:</p> <ul style="list-style-type: none">• whole-class exercise – tutor presentation on mechanisms for testing procedural coding• individual exercise – following a tutor presentation, prepare a set of support documentation• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 3 – Finishing Off

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments table which follows this guidance.

The programme of suggested assignments table suggests that the theoretical elements (P1, P2, M1 and D1) are covered by producing a leaflet or poster, but these could be evidenced using a presentation or any other suitable format.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

P1 requires learners to describe the key features of procedural languages. A written report is probably the easiest to generate evidence but a presentation or any other suitable method can be used.

For P2, learners must explain how environmental components make the development process easier. This requires more than a straightforward explanation of each element outlined in the unit content, the emphasis being on their purpose.

For P3 learners are required to design and implement a procedural program. Learners should be guided to create some form of basic procedural design. Centres may incorporate use of diagrams if they feel this is appropriate. If learners use a graphic user interface (GUI) within their program then it is important that they show evidence of the planning and design of the GUI interface at an early stage. Learners must then implement the program.

For P3 and P4, before and after screenshots of the implemented program design will demonstrate debugging.

Witness statements may be used to assess the completed design. For P4, test plans and results are required as well as evidence of dealing with error messages.

For P5, documentation should include annotated and properly laid out code (to programming standards) along with the technical documentation needed to support and maintain the program.

P6 covers the review process and should include suggestions for improvements. This can be included with the documentation for P5.

To achieve a merit grade, learners must achieve the pass grade criteria and the merit grade criteria.

For M1, learners must explain the features that make a procedural language suitable for creating a GUI. This does not relate to a specific language.

For M2, learners must show evidence of implementing data validation on input.

For M3, a test plan showing expected test results will need to be provided along with the actual test results.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction criteria.

For D1, learners must evaluate the suitability of using procedural programs for non-graphical applications. As with all evaluations, this should consider the pros and the cons.

For D2, learners should provide evidence of error handling and reporting.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	How to Start	You are working as a junior for an electronic games maker. Your managers have asked you to write a short guide to the basics of procedural programming.	Leaflet or poster
P3, M2, D2	Design Work	You have been asked to design an example procedural program to show off your coding skills.	Design work Witness statement Screenshots etc
P4, P5, P6, M3	Finishing Off	Your managers would now like you to write a set of support documentation for a program.	Screen shots, program code etc Test plan Witness statement Review

Suggested resources

Books

Davis S R – *Beginning Programming with C++ For Dummies* (For Dummies, 2010) ISBN 9780470617977

McBride P K – *Turbo Pascal Programming Made Simple* (Made Simple Computer, 1997)

McBride P K – *Turbo Pascal Programming Made Simple*, Kindle Edition (Amazon) ASIN: B0056A58S8

Parkin A – *Cobol for Students*, 4th Edition (Arnold, 1991) ISBN 034064552-0

Perry G – *C Programming Absolute Beginner's Guide*, 3rd Edition (QUE publishing, 2013) ISBN 9780789751980

Websites

www.cplusplus.com

Information resource website

www.csis.ul.ie/cobol

COBOL programming site with a comprehensive set of COBOL tutorials

Unit 21: Event Driven Programming

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20722G

This unit is internally assessed

Unit aim

This unit will introduce learners to the features of event driven programming and the event driven development environment and develop the skills required to design, implement, test, document and review event driven programs.

Unit introduction

Unlike traditional programming, where the control flow is determined by the program structure, the control flow of event driven programs is largely driven by external events. Typically, event loops are pre-programmed to look continually for information to process. Event driven programming is a very flexible way of allowing programs to respond to many inputs or events.

In this unit learners will become familiar with the underpinning concepts of event driven programming and subsequently develop particular skills in one language. The unit starts by looking at the features of event driven programming and the event driven environment. Learners will discuss how these types of language are used and their suitability for different purposes. The unit then puts theory into practice and learners will design and develop event driven programs to meet specified needs. There are many concepts to be learned and practised to enable learners to be able confidently to design and implement programs.

A variety of languages have the capacity to develop event driven solutions and it is not important which language is chosen as long as the skills being developed and evidenced relate to the key event driven focus.

As with all programming, a focus on developing solutions to meet identified needs is made along with one that emphasises the importance of testing and reviewing.

Learners will use a structured approach to the design and development of applications, ensuring the solution is well documented and thoroughly tested against the original user requirement.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the features of event driven programming
- 2 Understand the event driven development environment
- 3 Be able to design and implement event driven programs
- 4 Be able to test, document and review event driven programs.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the key features of event driven programming	M1 Explain the features of an event driven language that make it suitable for creating a graphical user interface (GUI)	D1 Evaluate the suitability of event driven programs for non-graphical applications
P2 Explain how development environment components simplify the development process		
P3 Develop an event driven program to meet defined requirements	M2 Implement data validation for inputs	D2 Implement error handling and reporting
P4 Perform and document testing of an event driven programme	M3 Produce a report, comparing actual test results against expected results to identify discrepancies	
P5 Create documentation for the support and maintenance of an event driven program		
P6 Produce a report, reviewing an event driven programme, suggesting possible improvements		

Unit content

1 Understand the features of event driven programming

Key features:

- service oriented
- time driven
- event handlers
- trigger functions
- events, e.g. mouse, keyboard, HTML object, form, user interface
- event loops
- flexibility
- suitability for graphical user interfaces(GUI)
- simplicity of programming
- ease of development

Programming languages:

- e.g. VB, VB.NET, VBA, Java, Visual C++Integrated Development Environments (IDE)

2 Understand the event driven development environment

Environment components:

- integrated development environment (IDE)
- tool boxes and controls
- toolbars
- event handlers
- triggers, e.g. key press, alarm, system event, touch screen event, mouse click
- help menus
- debugging tools

3 Be able to design and implement event driven programs

Design:

- event handling using control structures
- selecting and assigning properties to screen components
- event procedures, e.g. user input
- controls, e.g. buttons, labels, boxes
- data validation
- error handling and reporting

Data structures:

- selecting, declaring and initialising variable and data structure types and sizes
- operators, e.g. logical, arithmetic, relational

Control structures:

- selection, e.g. if ...then...else, CASE
- iteration, e.g. while...do, repeat...until

Data validation:

- e.g. type, range, presence, format

Implement:

- program and debug

Error handling:

- debugging, e.g. compiler/translator
- errors, e.g. logical, syntax, run-time

Debugging:

- compiler/translator
- errors, e.g. logical, syntax, run-time

4 Be able to test, document and review event driven programs

Testing:

- test strategy
- test data
- test plan structure, e.g. test, date, expected result, actual result, corrective action
- error messages
- specialist software tools, e.g. debug

Documentation:

- listing of code
- support and maintenance documentation

Programming standards:

- use of comments
- code layout
- indentation

Review:

- against specifications requirements
- suggest improvements

Information for delivery staff

Essential requirements

Learners will need individual access to a development environment that allows them to design and develop event driven applications. Also it is advised that appropriate numbers of manuals and help sheets are available and easily accessible to learners.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – <http://www2.warwick.ac.uk/fac/soc/cei/>

Delivery guidance

It is likely that, for most learners, this will not be their first contact with formal programming but it may be their first contact with event driven programming. It is very important that they use a methodical approach when creating event driven programs. This will be particularly valuable should learners progress to higher-level courses that involve programming.

Learners will need plenty of opportunities to develop skills in using the particular language chosen and in the event handling aspects of that language. It is advised, therefore, that several small and well-defined exercises are used to build competence. Good use should be made of formative assessments to build confidence and ensure learners are following good practice.

It is important that learners accept that solutions, however small, must be fit for purpose. This requires a focus on the capturing of requirements, defining a specification, designing a solution and then testing and reviewing it.

Such generic and underpinning skills will be of value later on, no matter what language is actually used.

Some theory is required for outcome of learning 1 and 2 but this can be drawn from the practical work – identifying features as they occur and discussing advantages and disadvantages. Learners should be made aware of the uses and differing characteristics of languages other than the one they will be working with.

Once learners have been given the focus of an assessed task, they should be encouraged to break down the task and submit material in stages for assessment. These stages might naturally be design, production of program, testing/debugging and documentation.

Learners will probably be familiar with the procedures for testing, reviewing and evaluating their work but some revision of the requirements for these aspects of the development cycle will be useful.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Event driven programming: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on event driven programming (what it is, when it is used, pros/ cons)• whole-class exercise – tutor presentation on introduction to language.
The environment: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on key characteristics, followed by individual exercise• whole-class exercise – tutor presentation on tools and techniques, followed by individual exercise• mixture of tutor-led demonstration and learner exercises, repeated over a number of sessions.
Assignment 1 – Why Event Driven Programming?
Designing an application: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on determining the requirement, followed by individual exercise• whole-class exercise – tutor presentation on design features (screen layout etc), followed by individual exercise• mixture of tutor-led instruction, directed learning, practical exercises.
Assignment 2 – Good Design!
Testing/reviewing: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on debugging, test strategy, documenting testing, followed by• individual exercise debugging, test strategy, documenting testing• whole-class exercise – tutor presentation on reviewing against the requirements, followed by individual exercise• revision as required and practical work.
Evaluating Revision of evaluation techniques.
Assignment 3 – Does it Work?

Assessment guidance

It is suggested that this unit is assessed through three assignments as summarised in the programme of suggested assignments table which follows this guidance.

The programme of suggested assignments table suggests the theoretical elements (P1, P2, M1 and D1) are covered by giving a presentation, but these could be evidenced using any other suitable format.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

P1 requires learners to describe the key features of event driven languages. A written report is probably the easiest way to generate evidence but a presentation or any other suitable method can be used.

For P2, learners must explain how environmental components make the development process easier. This requires more than a straightforward explanation of each element outlined in the unit content, the emphasis being on their purpose.

For P3, learners are required to design and implement an event driven program. Learners should be guided to create some form of basic event driven design. Centres may incorporate use of diagrams if they feel this is appropriate. If learners use a graphic user interface (GUI) with their program then it is important that they show evidence of the planning and design of the GUI interface at an early stage. Learners must then implement the program.

For P3 and P4, before and after screenshots of the implemented program design will demonstrate debugging.

Witness statements may be used to assess the completed design. For P4, test plans and results are also required and evidence of dealing with error messages.

For P5, documentation should include annotated and properly laid out code (to programming standards) along with the technical documentation needed to support and maintain the program.

P6 covers the review process and should include suggestions for improvements. This can be included with the documentation for P5.

To achieve a merit grade, learners must achieve the pass criteria and the merit criteria.

For M1, learners must explain the features that make an event driven language suitable for creating a GUI. This does not relate to a specific language.

For M2, learners must show evidence of implementing data validation on input.

For M3, a test plan showing expected test results will need to be provided along with the actual test results.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction grade criteria.

For D1, learners must evaluate the suitability of using event driven programs for non-graphical applications. As with all evaluations this should consider the pros and the cons.

For D2, learners should provide evidence of error handling and reporting.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Why Event Driven Programming?	You are to lead a session on event driven programming for a group of trainee programmers.	Presentation Handouts Demonstration
P3, M2, D2	Good Design!	You work as a programmer for a small business and have been asked to design a program to meet a particular need.	Design documentation Witness statement
P4, P5, P6, M3	Does it Work?	You are to test, document and review your design.	Screen shots, program code etc Test plan Witness statement Review

Suggested resources

Books

Halvorson V – *Visual Basic 2013 Step by Step* (Microsoft Press US, 2013)
ISBN 9780735667044

Cadenhead R – *Sams Teach Yourself Java in 21 Days* (Covering Java 7 and Android)
(Sams, 2012) ISBN 9780672335747

Sharp J – *Visual J#.NET Core Reference* (Microsoft Press US, 2002)
ISBN 0735615500

Troelsen A – *Pro C# 5.0 and the .NET 4.5 Framework*, 6th Edition
(Apress US, 2012) ISBN 9781430242338

Websites

www.codeproject.com

Information resource

www.cplusplus.com

Information resource

<http://docs.oracle.com/javase/tutorial/>

Java programming tutorials

Unit 22: Doing Business Online

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20723G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of the activities of online businesses and how to plan an online presence, and to understand the operation of and potential benefits of doing business online.

Unit introduction

More and more businesses are working towards or achieving an online business presence, making the most of rapidly developing technology and the opportunities it offers. In this unit, learners will be introduced to some of the types of online business activity, ranging from websites as merely passive information to those offering interactive product customisation and online buying.

Small online businesses using a single website can reach the same global market as a much larger business with a more complex web presence. The cost of marketing and advertising is greatly reduced and expensive retail outlets in prime locations are not needed. The business is available to customers around the clock every day of the year. Online business is particularly attractive to small, specialised businesses that might otherwise have difficulty reaching a specialised but global market. Learners will explore the benefits of having an online presence along with potential difficulties and consider the extent to which an online presence would assist with the achievement of business aims and objectives.

The market is growing, with the increasing ownership of personal computers and the growing number of internet users. Many businesses routinely quote a web address for customer ordering. Online business has a particular attraction for people who cannot travel easily to a conventional retail outlet due to problems of mobility or isolation.

The unit also considers the potential problems. Setting up an online business requires a great deal of expertise, although specialised software is making this easier. The website has to be maintained and updated constantly. Having received orders there is a considerable distribution problem to be faced together with the means of accepting payments. If there is to be a global presence, language is a problem that has to be overcome.

When learners have completed the unit they should have an appreciation of how websites are planned for and operated.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know about different online business activities
- 2 Know what to consider when setting up an online business
- 3 Understand the operation of an online business
- 4 Understand the benefits of an online business presence.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe online business activities	M1 Identify suitable website types for different businesses	D1 Recommend a website type for a specified business
P2 Outline the planning issues to consider when setting up a business online	M2 Discuss staffing options for different business website types	
P3 Describe the potential risks to an organisation when operating online		D2 Suggest ways in which a business could prepare for, and overcome, some of the risks associated with an online presence
P4 Explain the operational and financial issues for an online business		
P5 Explain how small businesses can benefit from a web presence	M3 Assess the benefits of an online presence for an identified business	

Unit content

1 Know about different online business activities

Activities:

- range, e.g. retail, commercial services, government services, information, internet services, advertising, marketing, education

Websites types:

- online services, e.g. online banking, music downloads
- offline services, e.g. mail order
- interactive services, e.g. digital image processing tools, blogs, wikis
- informational, e.g. news websites

2 Know what to consider when setting up an online business

Planning:

- deadlines, budget, domain name, resources, e.g. in-house, outsourced, software, hardware, staff expertise
- extent of operations, e.g. informational, partial interactivity, full interactivity
- identify risks

Risks:

- IT failure, e.g. hardware, software, data loss
- global selling, e.g. labelling, language, liabilities, unfamiliar trading conditions
- customer risk, e.g. payment security, ordering errors, losing information
- hostile attack, e.g. denial of service, website hijacking, fraud

3 Understand the operation of an online business

Operational issues:

- staffing, e.g. potential outsourcing of key functions, call centres
- maintenance, e.g. when, who
- review points
- dealing with service breakdowns
- partner relationships, e.g. financial services, distribution, deliveries
- customer liaison
- updates, e.g. user specification, service levels
- distribution of goods, e.g. scaling up, cost, fragile goods
- service distribution, e.g. online insurance quotes, booking flights, hotel rooms

Financial issues:

- initial investment, e.g. hardware, software, adaptation
- set-up costs, revenue forecast
- international tax liabilities

4 Understand the benefits of an online business presence

Marketing benefits:

- market research
- new market access, e.g. remote locations, poor transport links, customers with disabilities
- device access, e.g. computers, mobile phones, interactive TV
- level of response, e.g. delivery-to-door, rapid fulfilment, order tracking

Market presence:

- global presence
- 24-hour visibility
- equality of presence
- rapid customer response
- analysis opportunities, e.g. customers, rivals

Financial benefits:

- low-cost location
- low-cost labour
- low overheads
- rapid payment
- no cash handling
- ease of entry
- reduced stockholding

Information for delivery staff

Essential requirements

Tutors must ensure that all learners have access to the internet. They must also develop a bank of case study materials that link aspects of learning to internet sites so that learners can extend their research in an orderly fashion.

Employer engagement and vocational contexts

Tutors should explore local businesses and establish a directory of internet addresses for local organisations. This will enable learners to carry out research both online and face-to-face with local owners and managers, to develop their understanding of the implications of online business.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/ce

Delivery guidance

The delivery suggestions below are in the same logical order as the outcomes of learning of the unit content.

Some tutors may prefer to vary the sequence to meet more closely the needs of their particular learners.

There is very little practical IT in this unit, although much internet research can be included.

Delivery can start with a brief introduction to the topic by looking at the variety of sites available on the internet. The approach might be to say 'Look at all these different sites which do trading on line in many different products; so what is this all about? That is what we are going to find out in this unit.' An example exercise might be for learners to search the internet to find ten different businesses which operate online.

Their list should be as diverse as possible to cover the range suggested in outcome of learning 1. Learners can arrange their list of sites, grouping them by type.

The next topic deals with the organisational sectors represented on the internet. Learners can add sector to their list of sites and enter the appropriate sector alongside each. They can search the internet and add sites to the list if there are any gaps in the sectors represented.

To consider planning learners could be given a group exercise to plan their own websites and come up with ideas on what they need to think about. It is unlikely all the elements suggested in outcome of learning 2 will come out of the exercise but with internet research and discussions a comprehensive list can be achieved. Research and discussion should also address potential risks fairly thoroughly.

Operational and financial issues will need case studies to support the theory and, if at all possible, a visiting speaker would bring this to life – perhaps the centre's own website development/maintenance staff.

The final major section of delivery deals with the benefits of online business. When considering market presence, one idea is to try to find out what learners know, or think they know, about the importance of market presence. In groups they could formulate a master statement on the issue, feed back to the class and combine the statements into a class master statement. Tutor-led discussions and presentations help to form and expand the statement into something which meets with the evidence obtained.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Different online business activities: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on the range of online business using example sites • whole-class exercise – tutor presentation on sectors of activity illustrated by different sites directed research – learners find different types of business website.
Assignment 1 – Do Websites Just Sell Things?
Setting up an business presence online: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on basic planning issues • whole-class exercise – tutor presentation on potential risks • individual exercise – learners research a suitable organisation to understand its staffing directed research and exercises.
Assignment 2 – What do We Need to Consider?
How to operate an online business: <ul style="list-style-type: none"> • whole-class exercise – tutor presentation or fact sheets addressing operational risks • whole-class exercise – quiz or gapped handouts on finance issues for online businesses • directed research – from a tutor-supplied case study of an online business.
Assignment 3 – How Will We Run the Website?
The benefits of an online business presence: <ul style="list-style-type: none"> • individual exercise – learners list what is important about an online market presence • whole-class exercise – tutor presentation on marketing benefits • whole-class exercise – class debate on what constitutes the correct level of response • individual exercise – how do online businesses make money where off-line businesses cannot?
Assignment 4 – What are the Benefits Going to Be?

Assessment guidance

It is suggested that this unit is assessed by four assignments as summarised in the Programme of suggested assignments table which follows this guidance.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

For P1, learners must describe different types of business website, with reference to the list in outcome of learning 1. The businesses behind the websites should be as diverse as possible. Note that learners must describe both the business, and its activities online; 'X is a banking organisation which is involved in lending and investing money' might be a simple description, whereas 'they allow online banking where customers can move money between accounts, pay bills and arrange loans online' is a simple statement of activity. This is only an illustration; learners would be expected to add a little more to the descriptions than these simple statements but they give the general flavour of what is required. Producing an information leaflet(s) would be suitable evidence for this criterion, or as suggested in the programme of suggested assignments table it could be part of a presentation.

For P2, learners should describe the planning issues that need to be considered by a business moving into online operation. Learners need to focus on the content of outcome of learning 2 when preparing the evidence for this criterion. A leaflet or blog or any other format could be used to present the evidence.

For P3, learners must describe the potential risks to an online operation. Straightforward simple descriptions are all that are required for this criterion. It is suggested that, assuming learners have knowledge of the subject, a set of draft web pages, or a blog, would be suitable ways of providing evidence. It is suggested that this criterion is evidenced with P2 and M2.

For P4, learners must explain the issues in operation of an online business as stated in the prescriptive content of outcome of learning 3. The learner is expected to explain in their own words the majority of the prescriptive content of each. Learners must address each of operational and financial issues to be awarded the criterion. As there is quite a lot of content, this is suggested as separate presentation, which could be in any format.

For P5, learners need to explain in their own words the benefits to small businesses of having an online presence. A 'persuasive' presentation would be a good vehicle as it could cover PLTS criteria.

To achieve a merit grade, learners must achieve the pass grade criteria and the merit grade criteria.

M1 is an extension of P1 and learners should identify different business types (these may be provided by the tutor) and suggest appropriate types of website for each. One business may have a combination of more than one type of website, e.g. informational and online services, such as banking websites.

For M2, learners need to think about staffing options, e.g. an online ordering service requires staff to pack and distribute the goods, an informational website needs staff to update and maintain the site that may need specialist input for content etc.

For M3, learners will need to be given a particular business scenario to work from. They should give reasons for their choice of benefits to the business with pros and cons considered.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction grade criteria.

For D1, learners will recommend a website type for a specified business. This ties in with criteria P1, M1 and M3. The recommendation should include a justification of their choice.

For D2, learners must suggest ways in which a business could prepare for, and overcome, some of the risks associated with an online presence. This is an extension of P3 and could be based on the specified business used for D1.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	Do Websites Just Sell Things?	The managers of a small business have asked for a report on e-business and a recommendation for their company.	Presentation
P2, P3, M2, D2	What do We Need to Consider?	Managers are cautious. They want to know the risks and planning issues involved in going online.	Leaflet
P4	How Will We Run the Website?	Management now feels keen, but need to know about the operational and financial issues.	Draft web pages Wiki/blog
P5, M3	What Are the Benefits Going to Be?	Before finally committing to a web presence the management want to know what the benefits will be.	Report

Suggested resources

Books

Anderton A – *GCSE Business Studies* (Causeway Press, 2004)
ISBN 1873929846

Cumming T – *Little E, Big Business, How to Make a Profit Online*
(Virgin Books, 2001) ISBN 0753505428

Fardon M, Nuttall C and Prokopiw J – *GCSE Applied Business*
(Osborne Books, 2002) ISBN 1872962327

Holden G – *Starting an Online Business for Dummies*, 5th Edition
(John Wiley & Sons, 2007) ISBN 0470107391

Wall J and Wales N – Nuffield – *BP Business and Economics for GCSE*,
2nd Edition (Collins, 2001) ISBN 000711639X

Websites

[www.bytestart.co.uk/content/15/15_2/
online-business-start-up-guide.shtml](http://www.bytestart.co.uk/content/15/15_2/online-business-start-up-guide.shtml)

Online business start-up guide

[www.independent.co.uk/money/how-to-
start-your-own-internet-business-
461031.html](http://www.independent.co.uk/money/how-to-start-your-own-internet-business-461031.html)

Newspaper article on starting online
businesses

Unit 23: Computer Graphics

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20724G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of the hardware and software used to generate and manipulate computer generated images. Learners will then acquire the skills to produce computer graphics and use them to enhance documents.

Unit introduction

Graphics are now an everyday part of computer use. With the reduction in price of devices such as digital cameras, colour printers and high-capacity storage drives, what was once the domain of specialist graphic designers is now open to everyone.

Computer graphics are used in a wide variety of ways, from pictures enhancing the look of a website or poster, to diagrams used to simplify and explain information. Not all computer images are created from scratch: digital photographs or paper images, can be imported and modified using specialist software and hardware. With the right software, a photo can be changed to make the sky look more blue, the focus can be sharpened or softened and it can even have someone removed from it completely.

In this unit, learners will gain knowledge of how to use a variety of different software applications to create and modify computer graphics. Successful learners will create both pictures and diagrams, using a range of tools and techniques and learn how to select, edit and export images into other documents.

Before creating an image, thought needs to be given to what the image is going to be used for, e.g. advertising, illustration, who is the target audience, what size should the image be and how will it be communicated. Such considerations will affect the final image and how it is created. In a commercial context, understanding the use and purpose of an image is as important as having the ability to exploit the software.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the hardware and software required to work with computer graphics
- 2 Be able to create computer graphics to meet a user need
- 3 Be able to use computer graphics to enhance a document.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Identify the hardware and software required to work with computer graphics	M1 Describe the features of different graphical hardware devices	
P2 State the functions of a defined graphics software package	M2 Describe the features of different graphics software packages	D1 Evaluate a graphics software package on its ability to create and edit computer graphics
P3 Describe the differences between raster (bitmap) and vector graphics		
P4 Use specialist hardware to acquire images for a defined purpose	M3 Use graphics software to edit an image for a given purpose	D2 Explain the impact that file format, compression techniques, image resolution and colour depth have on file size and image quality
P5 Create an original graphic for a defined user need using graphics software		
P6 Use graphics to enhance a document incorporating acquired images and objects		

Unit content

1 Know the hardware and software required to work with computer graphics

Hardware:

- graphics specific, e.g. graphics card, graphics tablet, digital camera, printer, monitor
- general, e.g. RAM, processor
- file storage, e.g. CD ROM, hard drive

Software:

- vector graphics software, e.g. Corel Draw, Visio, Serif Draw Plus
- dedicated raster graphics (bitmap) software, e.g. Paintshop Pro, The GIMP, Paint
- dedicated photo manipulation software, e.g. Photoshop, Photoshop Elements, Serif Photo Plus
- graphics facilities other packages
- other tools, e.g. image viewers, photo galleries

File handling:

- converting files
- file sizes
- file formats, e.g. bmp, jpeg, gif
- file management, e.g. naming files, folder structures, moving files, deleting files
- compression techniques

2 Be able to create computer graphics to meet a user need

User need:

- user requirements
- constraints, e.g. house style, colours, image size

Computer graphics:

- bitmaps
- vector graphics
- comparison, e.g. type of image, file size, scaling

Tools and techniques:

- standard software tools, e.g. freehand draw, rotate, flip, resize, crop
- group/ungroup
- layout grids
- special effects, e.g. sharpen, soften, posterise
- templates, e.g. for letterheads
- other e.g. use of shape libraries, colour change, colour balance
- colour depth, e.g. 8-bit (256 colours), 16-bit (64,000 colours)

Reviewing:

- checking text, e.g. proofreading
- against objectives, e.g. size of image, download speed, image resolution
- suggestions for improvement

3 Be able to use computer graphics to enhance a document

Acquired images:

- specialist hardware, e.g. scanning, digital camera, mobile phone
- clip art library
- editing, e.g. cropping, rotating, resizing, colour correction
- inserting into document
- manipulating within document, e.g. resizing, cropping, text wrapping, positioning
- relevant laws and guidelines, e.g. copyright issues
- combining information

Objects:

- images, e.g. jpeg, bitmap, clipart, vector
- others, e.g. text, shapes, drawings

Information for delivery staff

Essential requirements

Learners will need access to a range of relevant graphics software (Paint, Visio, Photoshop or similar), plus hardware capable of running them. Access to devices that are used by learners to acquire images is necessary, e.g. scanner, webcam, digital camera, mobile phone. The organisation of the resources must allow for all learners to actually use the devices.

All learners need ready access to a high quality black and white printer and occasional access to a colour printer as required.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

This is a practical unit and the emphasis should be on the learners gaining the practical skills in a variety of graphics packages. Learners should experience a basic graphics package (such as Paint), a basic vector-based package (such as Visio), a photo manipulation package (such as Photoshop) and also be aware of the graphics facilities in packages such as Word or PowerPoint. Learners should be made aware that other more complex packages exist, but shouldn't need to tackle the complexities of full CAD packages such as AutoCAD or Pro Desktop.

Learners must have the opportunity both to create original images and to modify existing ones (these could be from clip art, digital photographs or scanned images). Learners need to be able to use suitable hardware, either a scanner or digital camera, to acquire an image for editing, rather than be provided with an image that has already been acquired.

As learners need to create and modify images for a user need, scenarios need to be provided to allow learners to meet the assessment criteria. A suitable scenario could include creating company advertising material, which could include the creation of a logo and a simplified map diagram, adding clipart and the importing of a suitably modified photograph.

Learners should work independently to create their images and documents. Assessment evidence should include a final version of their images and documents, but may be supported by witness statements as to the packages, tools and techniques used.

If possible, the user indicated in P5 could be external to the centre — it is possible that individually, learners might be able to find small companies or individuals who would be willing to define a need. The reality of working for a customer in this way would lend a perspective that would be harder to achieve with centre devised scenarios.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Know about hardware and software associated with computer graphics: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on imaging hardware, followed by individual exercise ● whole-class exercise – tutor presentation on image editing software, followed by individual exercise ● individual activity – learners investigate different types of image files and their properties.
Assignment 1 – Graphic Design for Dummies
How to create and modify images: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on understanding user need ● individual exercise – learning image editing techniques ● pairs exercise – review each other’s images and recommend improvements.
Assignment 2 – Making Images
Select and acquire images for use in other documents: <ul style="list-style-type: none"> ● whole group exercise – selecting images for documents ● individual exercise – learn how to manipulate images inside a document.
Assignment 3 – Picture Perfect

Assessment guidance

Some of the evidence needed for this unit could be generated alongside that required for other units, particularly *Unit 29: Presenting Information Using IT*

To achieve a pass grade, learners must achieve the six pass criteria listed in the assessment and grading criteria grid.

For P1, learners need to identify the hardware and software needed to create and edit computer graphics.

The unit content describes details the different types of hardware and software learners are expected to be familiar with. Learners need to do more than just list the necessary hardware and software they need to demonstrate their understanding why the particular item of hardware or software is needed. Evidence may be in the form of a written document, a presentation, or an observation record of a question and answer session.

For P2, learners must state the functions of a defined graphics software package. This is likely to be the package that they will be working with most often. Learners need to do more than just list their functions.

Statements need to be made that demonstrate understanding as to what the function does and how it might reasonably be used. Evidence may be provided in the form of written documentation or a presentation.

For P3, learners need to show an understanding of the main differences between vector and bitmap graphics and how they are used and need to illustrate their descriptions with suitable examples of both types of images. Again, evidence may be written documentation or a presentation.

For P4, learners must acquire an image using appropriate specialist hardware, such as a scanner or digital camera. The image needs to be for a defined purpose and tying this to the image editing in M3 would be useful. Evidence should contain a hard copy of the acquired image but should be supported by either written commentary or witness statements in relation to the hardware, packages, tools and techniques used.

For P5, learners need to create their own graphic from scratch, using appropriate dedicated software. Images do not have to be complex, but should make correct use of the software tools and techniques as noted in the content. These criteria could be linked to P6, so that learners create an image that is suitable for use in a multi-page document. Evidence could be most easily generated through a written document with appropriate screengrabs, showing stages in the production of the image and describing the tools and techniques used.

For P6, learners must use graphics to enhance a document incorporating acquired images and objects. The document should be multi-page and could be based on one produced for P5, D1 or D2.

To achieve a merit grade, learners must achieve the six pass criteria and all three merit criteria listed in the assessment and grading criteria grid.

For M1, learners may use their experiences of acquiring images for P4 as a basis for their description.

The obvious devices are a scanner and a digital camera but whatever is chosen, learners should have the opportunity to use the devices that are being described. Evidence is most easily generated through written work and may be presented as a table, but may also be through observation records based on formal discussions.

For M2, learners need to describe the features of different software packages used to create and edit computer graphics. The packages could include those used to create the images for P3 and P4, alongside a general package with graphics capabilities such as the drawing tools in MS Word. Features must be described, rather than just listed, and an effort should be made to look at comparable features over a range of software.

Evidence may be in the form of a written document, presentation or observation records based on formal discussions.

For M3, learners must use graphics software to edit an image for a given purpose. This purpose could be a scenario given to learners or an external client, such as the production of advertising material or a presentation. The image could be one of those created and acquired for P3, P4 and P5, but could also be one downloaded from the internet, or from clip art, for example. The finished image must satisfy the stated purpose. A real client could provide significant positive feedback to learners as well as providing valuable evidence. Learners should be encouraged to see the evidence produced for M3 as a showcase of their developing skills.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the two distinction criteria.

For D1, learners could evaluate the package used for P5 or M3. The evaluation must include comments on how well the package helps learners to meet the stated requirements, along with suggestions for improvement. Evidence could be generated most easily through a written document with appropriate screen grabs.

For D2, learners must examine different file formats, including all those listed in the unit content for outcome of learning 1.

They must explain the impact that those file formats, and the compression techniques, image resolution and colour depth associated with them, have on file size and image quality. Evidence could be presented as a written document, or presentation.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, M1, M2, D1, D2	Graphic Design for Dummies	A local business is looking for a graphic designer. It has asked you for background guidance on graphic design.	Oral presentation Leaflet, report or poster
P4, P5	Making Images	The business has now asked you to create a number of images for it.	Observation Screen grabs Leaflet or report
P6, M3	Picture Perfect	The business wants to use one of the images for a new purpose, and has asked you to make some changes for it. The image is to be placed, with others, into a publicity leaflet.	Observation Screen grabs Leaflet or report

Suggested resources

Books

Sanchez J – *The PC Graphics Handbook: A Reference Manual on PC Graphics Hardware and Software* (CRC Press, 2003) ISBN 0849316782

Walsh Macario J – *Graphic Design Essentials: Skills, Software and Creative Solutions* (Laurence King, 2009) ISBN 1856695999

Website

<http://graphicdesign.about.com/> Information resource about graphic design

Unit 24: Telecommunications Technology

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20725G

This unit is internally assessed

Unit aim

This unit develops learners' knowledge of how telecommunication systems are linked and their understanding of multiplexing and data transmission in order to connect telecommunications in a local system.

Unit introduction

Telecommunications have developed rapidly from a simple circuit switched network into the current 21st century broadband network capable of carrying a wide range of multimedia applications. Technological innovations in fibre optics have led to the construction of vast networks at a lower cost to the user. The use of cellular and wireless technologies (3G) along with the development Asymmetric Digital Subscriber Line (ADSL) techniques has resulted in the majority of people being able to access the new networks from their own homes. This unit introduces learners to the concepts, terminology and methodologies of telecommunications systems and networks.

The aim of this unit is to provide a clear introduction to the concepts and technology involved in telecommunications networks. The majority of the content is based upon the use of digital techniques and signals that continue to supplement or replace analogue techniques. Switching and transmission systems and sub-systems are addressed, together with typical characteristics of the type of signals carried over current networks. Practical work will be used to reinforce learners' understanding of concepts and theory.

Learners will use and become familiar with, a range of cabling tools and techniques as well as preparing and terminating several types of telecommunications links and cables.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know how telecommunication systems are linked
- 2 Understand how analogue and digital signals carry data
- 3 Understand multiplexing in telecommunications networks
- 4 Be able to connect telecommunications for a local system.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe different types of telecommunication links	M1 Explain the problems that can occur with telecommunication links	
P2 Compare how analogue and digital signals carry data		
P3 Explain multiplexing in telecommunication networks	M2 Explain line and exchange equipment used in telecommunications networks	D1 Discuss the use of pulse code modulation for voice communication
P4 Connect telecommunications for a local connection	M3 Terminate cables on a local telecommunications connection	
P5 Test cables on a local telecommunications connection		D2 Justify the different components used in a telecommunications network

Unit content

1 Know how telecommunication systems are linked

Copper links:

- types, e.g. 2-wire, 4-wire, multi-core cable, colour coding, physical connectors, pin-outs, shielding, co-axial, RJ45 network cabling

Optical links:

- optical fibre
- multi-mode fibres
- single mode fibres

Radio links:

- microwave, satellites, GPRS, 3G, wireless internet access

Characteristics:

- potential problems, e.g. loss, impairments, attenuation, interference, noise, distortion, truncation

2 Understand how analogue and digital signals carry data

Analogue:

- signals, e.g. analogue periodic signals, amplitude, period time, wavelength, frequency, wave equation, speech signals, sampling, modulation

Digital:

- signals, e.g. two-state signals, binary, bits, pulse amplitude modulation, digitisation, pulse code modulation, encoding/decoding, synchronisation

3 Understand multiplexing in telecommunications networks

Multiplexing in telecommunication networks:

- the plain old telephone service (POTS), e.g. distribution, switching, manual exchanges, operator patching, electro-mechanical exchanges, digital switching private branch exchanges (PBX)
- mesh connections
- multiplexing/de-multiplexing, e.g. space, frequency, time division hierarchies
- analogue and digital networks, e.g. dial-up, leased line services, contention based, mobile

Pulse code modulation:

- analogue to digital signal conversion, e.g. filtering, sampling, quantisation coding
- advantages of digital

Digital data:

- digital subscriber line (DSL) techniques, e.g. ADSL
- mobile, e.g. 3G, 4G

Multiplexing equipment:

- equipment, e.g. 30 channel system, PCM, sampling rate, data rates, multiplexing techniques

Line equipment:

- e.g. amplifiers, isolators, transformers, primary and secondary cross-connect points, street cabinets, local exchange multiplexers and de-multiplexers

Data communication equipment and interfaces:

- e.g. modems, ADSL routers, regenerators

4 Be able to connect telecommunications for a local system

Telecommunications:

- telephone sub-systems, e.g. dialling, alerting, signalling, speech circuitry, pulse dialling, tone dialling, handset digit frequencies
- line equipment, e.g. amplifiers, isolators, transformers, primary cross-connect points, secondary cross-connect points, street cabinets, local exchange, multiplexers, de-multiplexers
- data, e.g. modems, ADSL routers, regeneration, 3G, 4G

Local system:

- architecture of access networks, e.g. local exchange to customer network topologies, POTS networks, DSL, 3G, 4G

Terminating cables:

- copper links, e.g. multi-core SCART, printer cable, co-axial radio frequency cable, RJ45, RJ11

Testing cables:

- checks, e.g. testing for continuity, short circuits, near, far end cross-talk

Information for delivery staff

Essential requirements

Learners will need access to practical resources and suitable technology, they can also use simulators or multimedia tools to gain prior experience before handling 'live resources'.

Employer engagement and vocational contexts

Visits to a local ISP or using the centre telecommunications network would put the unit in a vocational context.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

This unit is designed to develop the underpinning knowledge and skills of learners in the fields of telecommunications systems and computer networking.

The focus of outcome of learning 1 will be the investigation of existing practical telecommunications networks.

Tutors should provide support in the form of guided discussion and presentations on the topics listed in the first section of the content. Initially, tutors should cover the properties of the infrastructure of the analogue local loop, the need for switching and the use of modems to convey digital data. The requirement for multiplexing voice and data signals on high capacity broadband networks should be covered with the emphasis on Pulse Code Modulation and Time Division Multiplexing. The applications of radio and wireless links, the use of optical fibres in high capacity long distance networks and fibre to the curb in the local loop should also be covered. Tutors also need cover the range of services offered and the types of traffic carried over telecommunications networks.

Outcome of learning 2 lends itself to a range of practical activities. Tutors are encouraged to prepare a series of demonstrations and/or practical experiments involving signal and pulse generators, oscilloscopes and other measuring instruments in order to allow learners to investigate the nature of analogue and digital signals.

Outcome of learning 3 may be best delivered by a combination of practical activities and tutor-led presentations.

If possible, a site visit to a local telephone exchange should be arranged.

Finally, outcome of learning 4 lends itself to a range of practical activities in the construction, terminating/ establishment and testing of communications links. Tutors should cover the relative characteristics of copper, optical fibre and radio links together with the causes of attenuation and distortion in each case.

Note that the use of examples in the content is to give an indication and illustration of the breadth and depth of the area or topic. As such not all content that follows an example needs to be taught or assessed.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
<ul style="list-style-type: none">• Current developments in telecommunications networks:• whole-class exercise – tutor presentation on multiplexing• whole-class exercise – tutor presentation on understanding pulse code modulation• individual exercise – how is digital data transmitted.
Assignment 1 – State of the Art
Telecommunications links and connectivity: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on characteristics of transmission links• individual exercise – tutor presentation on understanding copper links• individual exercise – understanding optical links• individual exercise – understanding radio links• whole-class exercise – tutor presentation on terminating cables• whole-class exercise – testing telecommunication cables.
Connect local systems involved in telecommunications networks: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on how to configure communication between two callers• whole-class exercise – tutor presentation on understanding local exchanges• whole-class exercise – tutor presentation on how does line equipment work?• individual exercise – data communication equipment and interfaces.
Assignment 2 – Data and Voice Transmission
Signals and data carried via telecommunications systems: <ul style="list-style-type: none">• individual exercise – learn about analogue signals• individual exercise – how do digital signals work?
Assignment 3 – Make the Connection

Assessment guidance

Assessment for the unit as a whole may be achieved through a portfolio of evidence produced in response to set tasks. Assignments and case studies should be employed as a suitable method of enabling learners to gather and structure evidence. The summative assessment of learners for this unit will be on an individual basis.

However, group working and the sharing of tools and equipment is reasonable for the practical exercises and should be encouraged as it adds to the learning experience and the acquisition of knowledge.

A proportion of the assessment for this unit will be through tutor observation and questioning. To support this assessment approach learners should provide supporting evidence, for example, the use of a logbook that is maintained by learners. The log could contain a description of the task undertaken, the instructions provided (annotated to record progress or difficulties), a list of tools and equipment provided and their condition, relevant photographs that have been annotated to explain procedures and problems encountered, etc.

Such supporting activity evidence would then validate the tutor or witness observation/oral questioning records and vice versa. The use of witness testimonies to confirm that learners have met the relevant assessment criteria should be encouraged.

P1 is a theoretical criterion, where learners must describe the different forms of physical transmission media.

For each transmission type, learners must give a clear and logical outline of its characteristics, using graphics as appropriate. A presentation is suggested in the programme of suggested assignments table.

For P2, learners must compare the characteristics of analogue and digital signals. Any form of evidence can be used. It may be appropriate to include this in a presentation and use graphical illustrations to support the theory.

For P3, learners must be able to explain the basics of multiplexing. In order to pass this criterion, learners need to provide an explanation of what multiplexing is, and also a basic explanation of how it works.

Learners could show their understanding in any form of written work, e.g. a report or a leaflet, or as part of a presentation.

For P4, learners can move from theory to practice, connecting telecommunications for a local exchange.

While learners must complete the task successfully to pass the criterion, emphasis should be placed on making it relatively simple to do.

P5 is about testing the cable connections of the network they connect for P4. Tutor observation and a witness statement are likely to be the best means of providing evidence.

To achieve a merit grade, learners must achieve all of the pass criteria and the merit grade criteria.

M1 is an extension of P1 and can be incorporated with the evidence for P1.

For M2, learners must explain line and exchange equipment use in telecommunications networks. As with other theoretical criterion, this should be assessed via written work, and annotated diagrams, or as part of a presentation.

As with P4, M3 is a practical criterion, requiring learners to know how to terminate local telecommunications connections. They must be able to demonstrate doing this successfully while observed by the tutor.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction criteria.

For D1, learners must discuss the use of pulse code modulation for voice communication. This should include an explanation of the process and the advantages of digital over analogue.

For D2, learners could write a report which details the route information takes when being transmitted between two different points or users. They should outline the various stages of transmission and describe how separate components work together to produce the resultant communications link.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, M2	State of the Art	A firm has asked for a short paper on current developments in telecoms.	Written report
P3, P4, M2	Data and Voice Transmission	The firm has now asked you to give a talk on signals and transmission technology.	Presentation
P5, M3, D1, D2	Make the Connection	Create a telecommunications connection for a local firm.	Tutor observation Documentation

Suggested resources

Books

Dodd A – *The Essential Guide to Telecommunications* (Prentice Hall, 2005)
ISBN 0131487256

Goleniewski L – *Telecommunications Essentials* (Addison Wesley, 2002)
ISBN 0201760320

Plevyak T, Sahin V – *Next Generation Telecommunications Networks, Services, Management* (IEEE Press Series on Network Management)
(WileyBlackwell, 2010) ISBN 047057528X

Unit 25: Home Entertainment Systems

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20726G

This unit is internally assessed

Unit aim

This unit will develop learners' knowledge of the functions, operations, components and modulation methods of home entertainment systems and they will be able to install and maintain home entertainment systems.

Unit introduction

In recent years, the world of home entertainment has changed radically. These days, many households have television receivers that get at least 50 channels, have a good-sized LCD (Liquid Crystal Display) or plasma screen, which includes DVD (Digital Versatile Disc) players and incorporates HD (High Definition) technologies.

Many satellite and cable television providers now offer customers with a wide range of entertainment packages including film, music, entertainment, sport, all of which can be viewed in high definition. Even 3D (3-dimensional) television is slowly being integrated into the world of home entertainment systems.

People are adding components to their entertainment set-up to create complete home entertainment systems, sometimes known as home cinema or theatre systems. Digital Audio Broadcast (DAB) radio receivers are gradually replacing the traditional FM radio in many homes.

This unit will enable learners to build upon their existing knowledge of the practical aspects of home entertainment systems including digital radio, television and Audio Visual (AV) systems. It will also provide an overview of digital video and audio broadcast and the key enabling technologies behind the systems. This unit will also cover the various methods of interconnecting systems in order to obtain the most effective signal strength and picture quality.

The unit will give learners an understanding of components, circuits and systems used for home entertainment and provide relevant practical skills in the testing, fault-finding and repair of home entertainment systems.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the functions and operation of home entertainment systems
- 2 Know the components used in home entertainment systems
- 3 Know the modulation methods used in home entertainment systems
- 4 Be able to install and maintain home entertainment systems.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the function and operation of a home entertainment system	M1 Compare the features and functions of different home entertainment systems	D1 Justify a home entertainment system to meet a client's requirements
P2 Describe the components used in a home entertainment system		
P3 Identify potential sources of noise interference found in home entertainment systems	M2 Describe noise interference and the impact it has on home entertainment systems	D2 Explain ways of reducing noise interference within home entertainment systems
P4 Describe modulation methods and waveforms used for broadcast systems	M3 Compare analogue and digital modulation methods	
P5 Install and test a home entertainment system to meet a client requirement		
P6 Maintain a given home entertainment system	M4 Repair faults on a given home entertainment system	

Unit content

1 Know the functions and operation of home entertainment systems

Home entertainment systems:

- home cinema, e.g. audio, radio, television, audio recording, video recording, playback systems, games systems

Home entertainment sub-systems:

- audio sub-systems, e.g. modular audio amplifiers, surround sound systems, loudspeakers
- radio sub-systems, e.g. superheterodyne methods
- television sub-systems, e.g. modulation methods
- TV picture construction, e.g. scanning ratio, aspect ratio, colour triangle, composite PAL video waveform
- TV receiver, NICAM, Dolby, High Definition Television (HDTV), IP-based streaming
- audio-visual sub-systems, e.g. MP3, MP4, CD (Compact Disc), DVD (Digital Versatile Disc) recorders and players
- aerials, e.g. directional radio receivers, omni-directional radio receivers, terrestrial TV, satellite dishes
- game systems, e.g. PlayStation, Xbox, Nintendo

2 Know the components used in home entertainment systems

Components:

- television displays, e.g. cathode ray tube, liquid crystal display, plasma, projection, high definition
- storage methods, e.g. CD, DVD, hard disc
- satellite systems, e.g. receivers, tuners
- cable systems, e.g. receivers, tuners, fibre optic
- audio systems, e.g. receivers, DAB (Digital Audio Broadcasting), amplifiers, amplifier bandwidth, oscillators, waveform generators, passive filters
- games systems, e.g. consoles, internet

Noise interference:

- noise sources, e.g. internal, external, natural, man-made
- effects of noise on signals
- attenuation
- distortion

3 Know the modulation methods used in home entertainment systems

Modulation methods:

- analogue, digital
- sinusoidal carrier, e.g. waveforms, bandwidth
- demodulation
- allocation of bands
- channel spacing
- digital modulation, e.g. Motion Pictures Expert Group (MPEG)

Waveforms:

- sinusoidal waves, e.g. amplitude, frequency, phase
- pulse waveforms e.g. mark-to-space ratio, pulse repetition frequency
- speech, music
- electromagnetic spectrum, e.g. frequency bands, wavelength bands

4 Be able to install and maintain home entertainment systems

Safe working practises:

- ensuring safety, e.g. CRT replacement, electrostatic sensitive modules, ac mains isolating transformer

Equipment installation:

- installation criteria, e.g. audio, radio, TV equipment

Cables and connectors:

- types, e.g. screened cables (multicore, coaxial)
- connectors, e.g. phono, coaxial, SCART, 'S' connector, Fire-Wire
- construct cables, e.g. coaxial, multicore
- terminate cables, e.g. conventional coaxial, phono, BNC, F, scart, S-Video connectors
- test cables, e.g. signal, noise

Maintaining and testing:

- instruments
- tools
- practical measurements
- fault-finding
- fault repair
- colour bar/pattern generators
- test cards
- disposal of waste
- check performance, e.g. signal quality, signal strength, video and audio output

Information for delivery staff

Essential requirements

Learners will need access to practical resources and suitable technology, they can also use simulators or multimedia tools to gain prior experience before handling 'live resources'.

Employer engagement and vocational contexts

Using a local home entertainment installer and creating a vocational context, where learners can emulate the process of installing a customer own system.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

This unit is designed to develop the underpinning knowledge and skills of learners in the field of home entertainment systems. Whilst all four outcomes of learning involve a large amount of learner 'hands on' investigative work, outcomes of learning 1 and 4 have the most practical content whilst outcomes of learning 2 and 3 provide most of the necessary supporting theory.

For outcome of learning 1, tutors should provide support in the form of demonstrations, guided discussion and presentations. Initially, tutors should cover home entertainment systems including audio/high-fidelity (hi-fi) equipment, compact disc (CD) or digital versatile disc (DVD) players and surround sound systems. Once learners have become familiar with audio equipment they should be introduced to radio receivers, initially traditional multi-waveband (amplitude and frequency modulation AM/FM) and then digital audio broadcast (DAB). Learners should then be introduced to television receivers, both analogue and digital with a variety of displays, e.g. cathode ray tube (CRT), liquid crystal displays (LCD), plasma, projection and high definition (HD) screens.

Outcome of learning 2 will require tutors to advise learners of the technology required for the correct operation of the systems to be covered. The range of technology covered should include some basic electronic circuits and devices including loudspeakers, television (TV) displays and magnetic and optic recording media. The factors that can cause impairments to the reproduction of sound and video signals should also be covered.

In the case of outcome of learning 3, tutors should arrange a series of demonstrations and presentations to cover the types of waves, waveforms and modulation methods to be encountered in home entertainment systems.

When delivering outcome of learning 4, tutors should arrange a series of activities whereby learners can demonstrate their competence in the installation, testing and repair of component parts. Learners should construct, terminate and test different types of screened leads. They should install various combinations of home entertainment equipment and use a variety of test equipment to determine and rectify faulty equipment.

In essence, this unit is a combination of associated theory and practical work. Learners should have the opportunity to test components and stages (modules) used in radio, TV, audio and other home entertainment equipment. Dismantling, repair, re-assembly and fault-finding on audio-visual entertainment equipment are essential activities. Since it is not always practicable to carry out repairs on the same equipment used for fault diagnosis in a teaching laboratory situation it is recommended that separate items are kept for repair only.

The level of fault finding is intended to be at unit level. The outcomes should be achieved where possible by investigation. Assignments, practical and project work should relate to current home entertainment equipment of basic design.

Note that the use of examples in the content is to give an indication and illustration of the breadth and depth of the area or topic. As such not all content that follows an example needs to be taught or assessed.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
The basics of home entertainment systems and sub-systems: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation, introduction to home entertainment systems ● whole-class exercise – tutor presentation, introduction to home entertainment sub-systems.
Assignment 1 – Entertaining Technology
Frequency ranges and modulation methods used for home entertainment systems: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on waveforms and waves ● individual exercise – what are modulation methods?
Circuits, components and factors relating to home entertainment systems: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation, basic understanding of electronic circuit ● whole-class exercise – tutor presentation on the basic components of a home entertainment system ● individual exercise – how do noise source factors affect home entertainment?
Assignment 2 – Sine of Life

Topic and suggested assignments/activities/assessment

Installation, fault-finding and repair of home entertainment systems:

- individual exercise – staying safe when working
- individual exercise – standards for installing everything properly
- whole-class exercise – tutor presentation on knowing the cables and connectors
- individual exercise – how to go about fault finding and repair home entertainment systems.

Assignment 3 – Getting the Job Done

Assessment guidance

The assessment of learners for this unit will be on an individual basis. The installation of complete home entertainment systems, with the various types of modules, interconnecting cables and peripherals should make an enjoyable and rewarding learning experience.

In order to achieve a pass, learners must achieve the pass criteria listed in the assessment and grading criteria grid. Many of the criteria are linked and it should prove possible for learners to develop their evidence in order to satisfy more than one grading criteria when attempting set assignments.

For P1, learners must give an accurate description of the function and operation of a home entertainment system. This can be achieved by producing a leaflet or poster, explaining the basics of what a home entertainment system is and what it does.

For P2, learners need to provide evidence that they can describe circuits and components of home entertainment systems clearly. This criterion is designed to be a purely theoretical one, so it is not necessary for learners to be able to deal with the technology at this stage.

For P3, learners must identify noise source factors for radio, TV and audio systems.

For P4, learners must describe the waveforms and modulation methods used for broadcast systems. Again, only theoretical comprehension is expected at this stage, though learners need to be accurate and precise about the written work they do for this criterion.

For P5, learners move over into the practical side of the unit, where they will need to show they can work on actual home entertainment systems. In this criterion, learners must show they can construct, terminate and test connecting cables to make a home entertainment system work. Learners must show they can complete this task with little or no support to pass the criterion. Assessment should come from observation by the tutor supported by a witness statement.

It is recommended that a minimum of three cables are constructed, terminated and tested and all three should be fit for purpose. Suggested cables include coaxial cable terminated in conventional coax, phono, BNC or F connectors and multicore screened cables terminated in SCART or S-Video connectors.

For P6, learners must show they can methodically and systematically maintain a home entertainment system by locating and repairing faults successfully. As with P5, this is a practical criterion, and should be judged by observations the tutor makes of learners at work, and the documentation learners produce to evidence their methodology.

To achieve a merit grade, learners must achieve all of the pass criteria and the merit grade criteria.

The achievement of M1 should flow from the work they complete on P1 and P2 and can also be incorporated in a leaflet or poster.

For M2, learners should extend the work they have done in P3 to accommodate the further demonstration of understanding that it requires. Learners must show they know the physical principles which underpin noise, interference and distortion effects, and say how these affect home entertainment systems.

For M3, learners should extend the work they have done in P4 by comparing analogue and digital modulation methods. Learners should make an active judgement about the features of analogue home entertainment systems as opposed to digital ones.

M4 is ideally an extension of the work done on P6, with the addition of finding not one but a series of faults, the number of which must be defined by the tutor. Once all the faults are found and seen to be fixed, learners must write a basic fault report stating what was wrong and how it was fixed.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the distinction criteria D1 and D2.

To achieve D1, learners need to be able to use the work done on P1, P2 and M1 by recommending a home entertainment system for a client. The client's requirements could be a sports enthusiast who enjoys watching sports from around the world in high definition, and wants to be a part of the experience by being in a surround sound environment.

To achieve D2, learners need to be able to extend the work done in P3 and M2 by explaining ways noise interference can be reduced in home entertainment systems, e.g. different choice of shielded cabling, location of home entertainment equipment to minimise noise interference.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Entertaining Technology	A local audio-visual retailer has asked you to write a guide to home entertainment technology. A sports enthusiast (client) enjoys watching sports from around the world in high definition, and wants to be a part of the experience by being in a surround sound environment.	Poster or leaflet Specification

Criteria covered	Assignment title	Scenario	Assessment method
P3, P4, M2, M3, D2	Sine of Life	The retailer has asked for another guide, this time looking more closely at waves and noise-based interference.	Poster or leaflet
P5, P6, M4	Getting the Job Done	A client of the retailer wants you to repair a home entertainment system for them.	Observation record Supporting paperwork

Suggested resources

Books

Fleischmann M – *Practical Home Theater: A Guide to Video and Audio Systems* (AuthorHouse, 2010) ISBN 0759664242

Harley R – *Complete Guide to High-End Audio* (Acapella Publishing, 2004) ISBN 0964084961

Harley R – *Home Theater for Everyone: A Practical Guide to Today's Home Entertainment Systems* (Acapella Publishing, 2002) ISBN 0964084988

Harley R – *Introductory Guide to High-Performance Audio Systems: Stereo, Surround Sound, Home Theater* (Acapella Publishing, 2007) ISBN 0978649303

Rushing K – *Home Theater Design: Planning and Decorating Media-savvy Interiors* (Rockport Publishers Inc, 2006) ISBN 1592533086

Ulick T – *Building Home Entertainment Network: Multimedia in Every Room* (QUE, 2005) ISBN 0789733188

Websites

www.hometheatre.about.com

Website resource for home entertainment systems

www.pcworld.com

Digital technology retail website for PC World

Unit 26: Developing Computer Games

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20727G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' understanding of the social impacts of computer games. Learners will also have the opportunity to design a simple game themselves and will acquire skills in testing and documenting computer games.

Unit introduction

There are many different types of computer games available. These computer games vary greatly in their look and feel, style, genre and complexity. Computer games can be played in a variety of ways, for example, over the internet, on mobile telephones or on personal computers; any of a wide range of mobile or static gaming platforms/consoles that are commercially available. A computer game is essentially a highly interactive software application so as with any complex piece of software it requires suitable design, coding, testing and documentation.

This unit is intended to prepare learners for the exciting and creative journey of designing, developing and testing computer game solutions using suitable tools, environments and techniques. As such, it is an ideal starting point for learners considering a game development career path.

The unit content is divided between exploring the computer games industry, designing game components, testing the game and producing suitable accompanying documentation for both the target audience and technical personnel. Although it is recognised that the design stage is often the most enjoyable for the developer, equal emphasis is purposely placed on testing and documentation.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the different types of computer game
- 2 Understand the impact of computer games on society and individuals
- 3 Be able to design a computer game
- 4 Be able to test and document a computer game.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the features of different genres of computer games	M1 Discuss current game development areas	D1 Compare the features of different computer game platforms
P2 Explain the impact of computer games on society and individuals		
P3 Produce a design specification for a computer game	M2 Use appropriate design software tools to create concept art	
P4 Test a computer game, suggesting possible refinements		
P5 Produce basic user documentation for a working game		D2 Present complex user documentation for a working game

Unit content

1 Know the different types of computer game

Genres:

- types, e.g. action games, Role-Playing Games (RPGs), adventure games, strategy, simulations, sports, educational, massively multiplayer online (MMO)

Games development areas:

- technology, e.g. graphics, artificial intelligence (AI), control method (standard controller, motion sensing), audio, gameplay (what the player does), scripting
- interaction design, e.g. using graphical user interfaces (GUI)
- integration

Gaming platforms:

- devices, e.g. personal computer, portable hand held console, mobile phone
- other, e.g. browser, network, emulators

2 Understand the impact of computer games on society and individuals

Games in society:

- concerns, e.g. excess playing time, social isolation, cost, separation from reality, education
- benefits, e.g. hand-eye coordination, brain training, thinking and strategy skills, future impact, impact on 'mainstream' app development

Individuals:

- psychological factors, e.g. use of sound, high score listings, competitive games, peer pressure, fun, educational value, expectations, levelling
- health, e.g. RSI, exercise routine (increase, decrease), eye strain

3 Be able to design a computer game

Design:

- elements, e.g. graphics, look-and-feel, host platform, genre, story, control method
- tools, e.g. storyboards, pseudo code, narratives, action lists, graphical tools, concept art
- choice of programming language e.g. VB, VB.NET, VBA
- Java
- Visual C++, Integrated Development Environments (IDE)

Program:

- choice of development environment
- choice of language, e.g. object oriented, procedural or event driven
- other, e.g. development facilities, menus, editing techniques, saving files, building or compiling code, built-in help facilities
- good programming practise, e.g. suitable comments, small unitary code blocks, invocation, consistent indentation, descriptive identifiers

Coding:

- use of program structures
- syntax rules for the language
- assigning values
- operators
- input/output statements

4 Be able to test and document a computer game

Testing:

- test strategy
- test data
- test plan structure, e.g. test, date, expected result, actual result, corrective action
- error messages
- specialist software tools, e.g. debug

Presentation of documentation:

- document analysis
- design
- implementation
- professional standards, e.g. contents page, sections, headers and footers, binding

User documentation:

- specified game applications
- purpose of game
- operation of game
- FAQs

Documentation:

- basic, e.g. user interface method design, playing guide, fault instructions, installation guide
- complex, e.g. control methods (selection, iteration) data dictionary
- algorithm designs
- other, e.g. action charts, action tables, input-process-output tables, class and instance diagrams, data flow diagrams

Information for delivery staff

Essential requirements

Learners should have access to appropriate hardware and software development environment for practical programming tasks with online help and/or manuals, e.g. Dark Basic, C++, C#, Java, .NET.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Delivery guidance

At this level, learners are not expected to be able to use programming in order to produce a working computer game. The emphasis is instead on the concepts of the industry and the design stage of a product.

Tutors may implement programming code or help learners to finalise pre-compiled programs to illustrate a working game, possibly including some learners' ideas.

There is an opportunity to combine the delivery and assessment of this unit with one or more of the programming units, for example *Unit 19: Object Oriented Programming* or *Unit 21: Event Driven Programming*.

Learners could potentially achieve the assessment criteria for programming by implementing the design produced for this unit. It should be reiterated that level 2 learners are not expected to produce a working computer game, but may produce working elements which fulfil the assessment criteria of the programming units.

This unit provides broad coverage of the development of computer games with an overview of the industry.

Learners should be able to differentiate the video game development cycle from that of a normal computer application. Tutors should have an understanding of the chosen programming platform as well as a good understanding of the video games industry.

Outcome of learning 1 is concerned with knowing the different genres of computer games and it is here that the tutor's knowledge of the industry is most required. This part of the unit is an excellent opportunity for learners to experience different types of platforms within the classroom. Any in-class game play should be structured and if resources are permitting then the different genres and platforms could be made available for experiential learning.

Whilst discussing the different development areas it is important that learners understand the scale of development of a modern computer game compared to a normal software application.

Outcome of learning 2 deals with the effects of games on society which takes the focus off industry and onto groups of people and individuals. Learners may have difficulty initially transferring their attention from one to the other and the tutor can aid their understanding with newspaper clippings or reports. Learners will need to discuss and understand how video games are perceived by some and the affects that they can have, both positive and negative.

For outcome of learning 3, learners should be directed to explore design possibilities in terms of programming language and platform choice, as well as the artistic and visual elements. Any appropriate language can be chosen as the basis of the practical aspects of this unit. A game should include well-organised code, appropriate modules, objects and data structures and suitable interfaces (screens, forms, printouts, etc).

Outcome of learning 4 deals with the testing and documentation of a game. This could be a partly-functional prototype of a simple 2D game provided by the tutor, or exemplar work from level 3 learners, if available.

It would be appropriate show the prototype at different stages of development so that learners are able to document the creation and testing of the game.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Know the different types of computer game: <ul style="list-style-type: none"> ● directed research – learners use tutor-provided sources to research what the different genres of games are ● whole-class exercise – tutor presentation on games development, followed by whole-group discussion of which areas are suited to a set of skills ● directed research – use tutor-provided source materials to research different gaming platforms.
Understand the impact of computer games on society and individuals: <ul style="list-style-type: none"> ● whole-class exercise – tutor sparks class discussion of computer games and their effect on society ● whole-class exercise – tutor presentation on the psychology of gaming.
Assignment 1 – Understanding the Games Industry
Be able to design a computer game: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on different design tools, followed by practical work on creating a narrative for a computer game ● whole-class exercise – tutor gives presentation on good coding, followed by practical exercises ● individual exercise – learners present design specifications.
Assignment 2 – Designing a Game

Topic and suggested assignments/activities/assessment

Test and document a computer game:

- whole-class exercise – group discussion of when to use testing tools
- whole-class exercise – tutor-led discussion of how to document your work
- individual exercise – learners write mock user documentation.

Assignment 3 – Test and Document

Assessment guidance

To achieve a pass grade, learners must achieve the five pass criteria listed in the assessment and grading criteria grid.

For P1, learners should describe the different types of computer game. This could be assessed through class discussion, in which case tutors are advised to guide learners through structured discussions based on the content. Learners should be able to clearly describe most of the genres mentioned in the content. It is likely that learners will have prior knowledge of certain types of computer games, but should be encouraged to consider a range of genres and the features inherent within each.

P2 could be assessed by a written assignment, or by way of an extension to the discussion in P1. In this case, learners could be divided to construct arguments regarding the positive and negative impacts of computer games.

For P3, it is suggested that learners are guided to illustrate the structure of the game and its code using any suitable method. Diagrammatical and text-based methods may be used to provide evidence, e.g. storyboards, pseudo code, narratives, action charts and graphical tools such as flowcharts, structure diagrams and class diagrams.

Tutors may provide a number of ideas that will be the basis of the game learners will design. If learners wish to implement their own ideas, the tutor should ensure that the scope is achievable within the assessment time.

For P4, learners must execute a test plan for a computer game. Each test should include a log of the result and make reference to screenshots as evidence of test execution.

P5 may be evidenced by a word-processed user guide for a computer game written by learners. At this level, it is expected that emphasis will be given to the user documentation which should include screenshots and clear instructions on how to start and interact with the computer game.

To achieve a merit grade, learners must achieve all of the pass grade criteria and the two merit grade criteria.

For M1, learners may find it more engaging to discuss the most cutting edge advancements in computer games. Although care has been taken to include the latest examples in the content for outcome of learning 1, tutors are encouraged to introduce concepts and technologies which develop after publication.

For M2, learners have the opportunity to explore ideas for the look-and-feel of their computer game. This may include a design for a simple scrolling background as well as foreground objects. Evidence could take the form of annotated computer-generated or hand-drawn images or audio clips for sound design and should show progression of ideas from concept through refinement.

To achieve a distinction grade, learners must achieve all of the pass and merit grade criteria and the two distinction grade criteria.

For D1, learners could extend their discussions from P1 and M1 to include a comparison of different platforms. It may be useful to divide learners into groups to briefly research different platforms. Learners can then draw comparisons from shared information within the group.

For D2, user documentation must include complex information which is not designed for the user, but which includes specifications of the game's technical details as specified in the content for outcome of learning 4. The distinction learners will also provide more professionally designed user documentation which may include more comprehensive instructions and higher-resolution images and diagrams.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Understanding the Games Industry	In preparation for an interview, an employer requests a short guide to the different genres of games and their effect on society and individuals.	Class discussion followed by written evidence or presentation.
P3, M2	Designing a Game	A mobile phone games development house wants you to design a video game based on a recent movie.	Short report and practical design documents.
P4, P5, D2	Test and Document	The firm approves your design and produces a prototype. You are required to ensure it works and write accompanying documentation.	Practical work and a written documentation.

Suggested resources

Books

Harbour J, Smith J and LaMothe A (editor) – *Beginner's Guide to Darkbasic Game Programming* (Muska & Lipman Publishing US, 2003) ISBN 1592000096

McShaffrey M – *Game Coding Complete*, 2nd Edition (Paraglyph Inc US, 2005) ISBN 1932111913

Websites

darkbasic.thegamecreators.com	The Game Creators
darkbasicpro.thegamecreators.com	The Game Creators
en.wikipedia.org/wiki/Game_programming	Game Programming
www.gamedev.net	Gamedev
www.gameprogrammer.com	Game Programmer
www.gametutorials.com	Game Tutorials
www.gpwiki.org	The Game Programming Wiki
www.talula.demon.co.uk/allegro	Allegro
www.thegamecreators.com	The Game Creators
www.ultimategameprogramming.com	Ultimate Game Programming

Unit 27: Spreadsheet Modelling

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20774G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of the uses of spreadsheets and enable them to develop, test and document spreadsheet models.

Unit introduction

Although traditionally associated with financial applications and mathematical calculations, spreadsheet software is very versatile. A spreadsheet can be used to store, manipulate and analyse data and to present it in easy-to-understand formats, such as charts and graphs. Many people also use spreadsheets in preference to word processing software when creating complex tables. Learners will investigate different ways of using spreadsheets, find examples of real uses and develop the practical skills needed to use spreadsheet software effectively.

Spreadsheets can be used in many different situations, such as finance and engineering and the unit content includes a wide range of spreadsheet features, formulae and functions. In addition, spreadsheet users need to be able to choose from a variety of different ways of presenting and analysing spreadsheet data, including producing graphs and filtering and sorting lists of data. Learners will be able to combine the skills developed to produce a spreadsheet model that is tailor made for the specific needs of the user.

To speed up the use of spreadsheets, shortcuts are often used to enter data or duplicate particular combinations of keystrokes. Learners will be able to create such shortcuts and recognise their potential in improving efficiency.

In the IT industry, documentation is necessary for every application and system so that they can be maintained and adapted over time. It is important that creators of spreadsheets are able to check and if necessary sort out problems with their solutions to ensure that everything works as it should and that it is fit for the intended purpose.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know what spreadsheets are and how they can be used
- 2 Be able to develop spreadsheet models
- 3 Be able to test and document spreadsheet models.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the uses of spreadsheet software		
P2 Explain why spreadsheets may need to be converted to alternative file formats		
P3 Develop a spreadsheet model to meet particular needs	M1 Refine a spreadsheet model by changing rules and values	D1 Evaluate a spreadsheet model suggesting further refinements
P4 Use simple formulae and functions to process information		D2 Use automated features in the spreadsheet model
P5 Use data types and formatting to present information	M2 Justify choice of tools for presenting data	
P6 Use appropriate tools to present data	M3 Analyse data from a spreadsheet model	
P7 Test a spreadsheet to ensure that it is fit for purpose		
P8 Produce user documentation for a spreadsheet model		

Unit content

1 Know what spreadsheets are and how they can be used

Use of spreadsheets:

- presenting information, e.g. clarify relationships, interpret data
- calculations, e.g. payroll, statistics
- list management, e.g. large datasets
- interpreting data, e.g. sorting, filtering
- nature and purpose, e.g. manipulating data, information presentation, manipulation of lists
- terminology, e.g. cells, rows, fields, columns
- workbooks
- business uses

Alternative formats:

- converting to other formats, e.g. xls, csv, txt, xms, html

2 Be able to develop spreadsheet models

Spreadsheet model:

- entering and editing data
- cell referencing, e.g. absolute, relative
- autofilling cells
- linking cells
- use of paste
- combining information, e.g. from application packages (inserting graphs, CSV files, importing data)
- file handling, e.g. file management (naming files, folder structures, moving files, deleting files)

Formulae:

- simple, e.g. add, subtract, divide, multiply
- complex e.g. calculations of pay, VAT, totals, compound interest

Functions:

- statistical, e.g. sum, average, min, max, count, countif
- logical, e.g. IF, OR, AND

Refine:

- improving efficiency, e.g. shortcuts, aiding navigation
- formatting, e.g. fonts, use of colour, conditional formatting

Presenting data:

- data types, e.g. text, currency, date
- formatting cells, e.g. colours, shading, alignment, borders
- other formatting, e.g. decimal points, merging cells
- formatting charts, e.g. titles, labels, resizing, moving
- chart type
- formatting sheets, e.g. headers, footers, page setup, page breaks

Automations:

- features, e.g. macro, links between spreadsheets, ActiveX control, Control Toolbox, Visual Basic or other appropriate language

Analysing and interpreting data:

- convert data, e.g. charts, graphs
- lists, e.g. filtering, sorting

Tools:

- charts and graphs, e.g. titles
- labels, e.g. axis scales, colours, annotation
- select appropriate type, e.g. line, bar, column, pie, xy (scatter)
- justifying choices

3 Be able to test and document spreadsheet models

Test:

- manual calculations, e.g. formula, functions
- sensible outcomes, e.g. layout, values
- suitability for audience

Documentation:

- user guide, e.g. instructions, troubleshooting

Information for delivery staff

Essential requirements

Learners will need access to relevant software (Microsoft Excel, Open Office Calc, or similar, Microsoft Word, Open Office Writer, or similar, packages compatible to allow combining of information), plus hardware capable of running including printers.

Delivery guidance

This is essentially a practical unit. A key focus should be on the development of spreadsheet models that are fit for purpose and take account of user need rather than an isolated set of skills. Development exercises should be based, wherever possible on real-world problems.

It is likely that some learners may have already experienced spreadsheets, either through formal ICT programmes or through their use in other subjects. Knowing the extent of their existing knowledge and skills will be valuable in planning delivery. If, as is probable, a range of previous experience is found, learners could find individualised and tracked programmes in workshops particularly valuable, at least when covering the unit content. Where this approach is taken, the developmental activities, formative assessments and tracking should be based on the content.

The work scheme can in general follow the order as indicated in the content; however learners should gain an overall perspective of the whole development cycle early in the delivery including checking and fixing problems.

A large number of example spreadsheets will be needed to provide opportunity for demonstration, individual and group discussion as well as those that will provide the basis of the assessment. Example spreadsheets should be provided with accompanying documentation that gives the context for the spreadsheet and how it operates. Prepared spreadsheets should be documented and presented in a way that sets standards and exemplars for learners to follow when producing work for assessment.

In the developmental stage, learners would benefit from working with incomplete spreadsheets or with spreadsheets with problems that need fixing.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Understanding spreadsheets: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on the nature and purpose of a spreadsheet• whole-class exercise – group discussion, what should we use spreadsheets for?• directed research – use tutor-provided materials to understand user needs• whole-class exercise – tutor presentation on how to convert a spreadsheet to a different file format, followed by practical work.
Assignment 1 – Explaining Spreadsheets

Topic and suggested assignments/activities/assessment
<p>Learning formulae, functions and features:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on entering and editing data followed by practical work • individual exercise – learners create a series of simple formulae • individual exercise – learners create some simple functions • whole-class exercise – group discussion, how can features be used to make spreadsheets work better? • whole-class exercise – tutor presentation on what combining data means, and why it is useful • individual exercise – learners use tutor-provided materials to practise file-handling tasks.
Assignment 2 – Formulae Demonstration
<p>Present, analyse and interpret:</p> <ul style="list-style-type: none"> • individual exercise – learners look at different types of data presentation • group exercise – how can data in spreadsheets be analysed to provide meaning? • individual exercise – learners use tutor-provided materials to create charts or graphs.
Assignment 3 – Chart Demonstration
<p>Check and document:</p> <ul style="list-style-type: none"> • individual exercise – how to check for common errors in a spreadsheet.
Assignment 4 – Check, Evaluate and Refine

Assessment guidance

At this level, learners are not expected to find their own spreadsheet problems. Suitable scenarios should be provided that allow the learners to meet all the assessment criteria. These could involve monthly expenditure and sales figures or cash flow forecasts.

To achieve a pass grade, learners must achieve the eight pass criteria listed in the assessment and grading criteria grid.

For P1, learners must be able to describe the uses of spreadsheet software, i.e. presentation of information, repetitively and accurately performing calculations and list management. This could be assessed via a written document or using an observation record to record a question and answer session but learners must show an understanding of the calculations and functions used.

For P2, learners should be able to say why they would need to carry out a conversion, and what the converted file could be used for. Evidence could involve practical work, with annotated screenshots used to help support written explanations where needed.

For P3, learners must develop a spreadsheet model to meet particular needs. The tutor should produce a reasonable scenario, with detailed requirements for learners to work from. The documentation produced should be limited, the user need will already have been defined and the formulae and functions can be documented using annotated printouts or records of question and answers.

For P4, learners should be able to produce simple functions and formulae. Artificial activities should be avoided and the term 'spreadsheet solution' can involve multiple sheets in order to bring in additional opportunities to demonstrate skills. The spreadsheet may be an extension to the work done in P3.

For P5, evidence may be based on the spreadsheets used for P3 and/or P4, examples of inappropriate choice of data type would be use of text for dates, text for entries that might need to be sorted numerically or numeric for currencies. A check against the unit content should be made. The list of examples in the content will indicate the type and level of formatting required. Inappropriate formatting might include using colour if this created confusion when printed out in black and white or the choice of a bar chart to represent continually changing data.

The documentation produced should be limited, the user need will already have been defined and the formulae and functions can be documented using annotated printouts or records of question and answers.

For P6, learners need to create either a chart or graph to represent information for a defined user need.

The chart or graph can be created from a data set provided by the tutor, and does not need to be overly sophisticated. At this stage, what is required of the learner is that they understand the basic mechanism for making a graph or chart, not that they have mastered its intricacies.

Checking must be evidenced for P6 and written reports or records of questions and answers are appropriate.

Formal test plans are not required and if learners provides the evidence in written form informal notes are sufficient as long as they clearly show that learners has checked the functionality and that the spreadsheet meets the original user needs. If required, the checking and fixing can be based on pre-prepared spreadsheets that include a range of problems and functions rather than learner's original work.

For P7, learners should produce and carry out a suitable test plan for a spreadsheet. This might be one that has been created in an earlier task or it could be one prepared by the tutor. Evidence here may be a short report with suitable screen grabs or an annotated test plan with reported results and witness statement.

For P8, learners need to produce spreadsheet documentation which should contain technical and user guides for a spreadsheet model.

To achieve a merit grade, learners must achieve all pass criteria and all the three merit criteria.

M1 requires learners to refine the spreadsheet created in P3 by changing rules and values. The refinements should improve the spreadsheet by making it a more accurate model and easier to use. A short report with annotated screen prints would be a suitable form of evidence.

M2 follows from P5. Learners must justify their choice of tools for presenting data. The most likely the form of evidence here will be an extension of the evidence given in P5.

For M3, pre-prepared data sets and scenarios can be provided.

To achieve a distinction grade, learners must achieve all of the pass and merit criteria and the two distinction grade criteria.

D1 follows on from P3 and M1. Learners must evaluate their spreadsheet, together with any improvements that they have made, suggesting further refinements that would be appropriate. Evidence may be presented as a report or presentation. No actual refinements need to be implemented but the tutor must be sure that the refinements are realistic.

For D2, learners are expected to add automated features as listed in the unit content. It would be appropriate to use macros, links and one other automation method supported by the software being used. Evidence could be submitted as a written report or through observation records based on formal discussions.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2	Explaining Spreadsheets	You have been asked to write a short user guide to spreadsheets for a group of small businesses.	Pamphlet or leaflet
P3, P4, D1, D2	Formulae Demonstration	To go along with the guide, you need to create a spreadsheet to show the things it can do.	Observed practical exercise Report or presentation
P5, P6, M2, M3	Chart Demonstration	Create a series of annotated screenshots to guide someone through file conversion and creating graphs and charts.	Annotated screenshots
P7, P8	Check Evaluate and Refine	Test and document your work to ensure it is all correct before it is submitted to the clients with a user guide.	Written report

Suggested resources

Books

Heathcote P – *Successful ICT Projects in Excel* (Payne-Gallway Publishers, 2002)
ISBN 1903112710

Heathcote R – *Further Excel 2000-2003* (Payne-Gallway Publishers, 2004)
ISBN 1904467768

Heathcote R – *ICT Projects for GCSE* (Payne-Gallway Publishers, 2002)
ISBN 1903112699

Websites

[http://office.microsoft.com/
en-us/excel/default.aspx](http://office.microsoft.com/en-us/excel/default.aspx)

Microsoft Office website for Excel

www.free-training-tutorial.com/

Information and training on spreadsheets

Unit 28: Multimedia Design

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20733G

This unit is internally assessed

Unit aim

This unit will develop learners' understanding of different types of digital media and equip them with the skills required to design, develop, present and review multimedia products.

Unit introduction

Who develops interactive multimedia? Web developers add interactivity, sound and motion to their webpages. Animators create animation for output to videotape or streaming web movies. Developers create single-user games for distribution on CD or DVD. Educators create interactive learning and testing materials for distribution over the web or on CD.

This unit will enable learners to explore techniques associated with the production of an interactive multimedia product.

Learners will learn how interactive multimedia products have been designed and developed, whilst also building a multimedia product of their own. At this level it is important that those considering a career in the interactive multimedia industry have a basic appreciation of how authoring hardware and software are used to produce an interactive multimedia product. In this unit learners are able to experience the effective use of interactive multimedia development tools to produce a basic interactive multimedia product.

This unit also allows learners to take an experimental and creative approach, gaining new production skills whilst discovering the effects of digital multimedia manipulation. This involves the use of authoring software and the creative integration of audio and visual material to produce a final product. The learners should be able to select and use a wide range of intermediate audio or video software tools and techniques to record and edit audio or video sequences that are at times non-routine or unfamiliar.

It is essential that the product is focused on the needs of the user throughout. Screen design and layout are important but the final functioning interactive multimedia product created for this unit must be easy to use and understand.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand different types of digital media
- 2 Be able to design multimedia products
- 3 Be able to develop multimedia products
- 4 Be able to present and review multimedia products.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain the purpose of different types of digital media		
P2 Design a multimedia product to meet a given specification	M1 Present a clear, fully documented design of a multimedia product	D1 Assess copyright issues relating to the design of a multimedia product
P3 Develop a multimedia product		
P4 Demonstrate the use of appropriate tools to manipulate multimedia products	M2 Justify choice of design tools	D2 Evaluate the effectiveness of the design tools used
P5 Present a multimedia product to a defined audience		
P6 Complete a review of a multimedia product	M3 Refine a multimedia product based on audience feedback	

Unit content

1 Understand different types of digital media

Digital media:

- video, audio, still and moving images, animation, simulations

Purposes:

- industries, e.g. entertainment and leisure, education and training, marketing, virtual reality, publishing, customer services

2 Be able to design multimedia products

Multimedia products:

- with limited interactivity, e.g. digital posters, adverts, quizzes, movies
- fully interactive, e.g. information points, digital stories, virtual tours

Specification:

- number of pages, features, audience, input methods, e.g. keyboard, mouse, voice recognition, touch screen, stylus, digital video or still camera, dictaphone, microphone

Content:

- types, e.g. text, images, graphics, video, sound, animation
- interactive features and transitions, e.g. menus, submenus, buttons, links, pop-ups, video clips, sound clips

Design documentation:

- elements, e.g. storyboards, scripts, flow charts, annotations, visuals, timelines
- layout, e.g. size, frames, orientation, consistency

Copyright constraints:

- effect of copyright law, e.g. on music downloads or use of other people's images
- acknowledgment of sources
- avoiding plagiarism

3 Be able to develop multimedia products

Develop:

- combine information
- manipulate images and graphic elements
- use tools
- test

Combine information:

- functions, e.g. insert, size, position, wrap, order, group

Manipulate images and graphic elements:

- size, crop, position, maintain proportion, border styles, colours and font schemes: existing styles and schemes

Tools:

- graphics e.g. image editing, illustration, animation
- sound, e.g. sequencers, editing, recording
- development, e.g. flash, silverlight

Test:

- for functionality, usability, accessibility, performance

4 Be able to present and review multimedia products

Presentation:

- method, e.g. on-screen, interactive, group

Review:

- gather feedback, e.g. questioning, observation
- use feedback, e.g. to identify errors, suggest further enhancements, comment on performance

Information for delivery staff

Essential requirements

Learners will need access to computer hardware with appropriate accessories such as scanners and printers, and to appropriate software such as Director, Flash, Dreamweaver, Fireworks, Adobe PhotoShop/Image Ready and FTP.

Employer engagement and vocational contexts

Within this unit there are opportunities for tutors to support learners with their understanding of the range of hardware and software currently used as industrial standard. Many of these applications and hardware are now accessible to learners. Providing learners with access to relevant software manufacturers' manuals and other textbooks, the internet, and a range of examples of current multimedia practice should be encouraged.

There are a range of organisations that may be able to help centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

Good multimedia project management depends on having a clear picture of the steps involved in a particular process. Multimedia products can become extremely complex and tutors will need to plan, in some detail, how they will support learners when building multimedia products, especially when creating special effects.

Learners do not need to investigate every kind of multimedia platform or format in detail. It is sufficient that they have an understanding of a range of possible multimedia products such as iPod applications, presentations, DVDs, CD-ROMs etc and know the different purposes for developing multimedia products.

To this end they can be encouraged to source multimedia products and investigate their content, navigation etc with a series of targeted questions.

Time should be spent on investigating and experimenting with the different forms of inputting content, e.g. video cameras or microphones. Learners could collect different formats themselves, e.g. videoing learner facilities in the centre, which may later be used for their own multimedia products.

Learners may need considerable time to understand the features and facilities of the chosen software package.

Although learners will prefer to design directly using the software, time must be given to developing their skills with design elements such as storyboards, scripts, layouts and flowcharts. Simple specifications can be used as exercises.

It is possible to develop a multimedia product with very little editing and possibly no manipulation of images and/or graphic elements. To achieve the higher grades, learners must practise these skills. Attention should be given to the layout meeting the needs of the user and aesthetics (size, colour and position of buttons, text etc).

All types of testing must be practised and learners should become familiar with suitable formats for documenting test results.

User testing, as opposed to functional testing, will require using questioning techniques, whether this is face to face or through the use of questionnaires. Developing suitable questions can be practised by looking at specifications (meeting requirements) and from learners' own critiques of existing products.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Understanding digital media: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on multimedia, purposes, types and products ● whole-class exercise – tutor presentation on inputs – what, how ● whole-class exercise – tutor presentation on content, types, interactive features ● whole-class exercise – tutor presentation on copyright issues.
Design documentation: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on storyboards, flowcharts etc. Followed by individual exercise ● whole-class exercise – tutor presentation on layout considerations. Followed by individual exercise.
Assignment 1 – What's It All About?
Creating a product: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on combining information, followed by individual exercise ● whole-class exercise – tutor presentation on editing, followed by individual exercise ● whole-class exercise – tutor presentation on manipulating images, followed by individual exercise.
Testing: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on types of testing ● whole-class exercise – tutor presentation on test plans ● individual exercise – learners develop test plans.
Assignment 2 – Producing the Goods
Reviewing: <ul style="list-style-type: none"> ● whole-class exercise – tutor presentation on gathering and using feedback ● whole-class exercise – tutor presentation on evaluating products ● individual exercise – learners evaluate each.
Assignment 3 – Is it What We Want?

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments table which follows this guidance. A specific scenario has been suggested here but any topic providing sufficient scope to cover the assessment criteria may be used to suit particular learners.

Evidence for P1, P2, M1 and D1 can be produced in the format of a presentation. One possibility is that learners produce self-playing presentations with slides and special effects playing automatically or produce manually advancing presentations, i.e. slides and text advance only on the click of the mouse. Special effects can be set to go off automatically or by a mouse click.

Whatever the format, the presentation will need to be backed up with detailed handouts.

Learners must be given a detailed scenario, sufficient for them to design a basic multimedia product for a defined need, e.g. for course information for prospective learners. Learners could introduce their presentation with an overview of the different digital media available and what they are used for, covering P1.

For P2, learners should include an introduction (outlining the specification they are working from) and appropriate design documentation such as a storyboard, flow charts, examples of visual elements etc. Several design ideas should be included with comments on why each was considered. The designs should show how the different elements of the content will combine, identify what elements will be interactive and demonstrate transitions. The type of content should be clear and include a mixture of text, images, interactive features etc as appropriate.

To achieve M1, the documentation should be sufficient for another developer to pick up and implement.

There should be a sense of thoughtfulness in learners' work. For example, the storyboards that outline the navigation and content for their multimedia project will denote why they have chosen to use particular images, fonts, music etc to engage with their chosen audience. They will also show experimentation and that multiple solutions had been produced when considering the organisation and layout of information to be included within their projects.

For D1, learners should acknowledge their sources and assess the issues of copyright law relating to the design of a multimedia product.

For P3, learners will now implement their designs, combining information and editing and manipulating objects. Observation records, annotated screenshots and a witness statement can provide evidence.

For P4, the evidence of manipulation of graphic elements must be specific and more detailed than a general observation record or witness statement.

M2 requires a justification of the tools used, e.g. why the product needed sound, and for D2 learners must evaluate how effective the tool is in meeting the needs of the specification.

Having developed a functioning multimedia product, learners must now present their completed product to an audience, for P5, and collect user feedback. The 'users' will probably be other learners who must be briefed on the requirements. It would be useful if learners undertaking the testing were not directly involved with the unit (perhaps another IT group) but in all cases the use of a detailed questionnaire would be helpful, especially if a number of users are to be involved. The completed questionnaires would provide evidence towards P6 and M3.

The results of the review should be analysed and summarised by learners. A summary of the comments made and a list of suggestions for improvements, along with the completed questionnaires would provide evidence for P6 and M3.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	What's it All About?	You are to design informational web pages for a college website outlining a Pearson BTEC International Level 2 qualification.	Presentation Handouts/supporting documentation
P3, P4, M2, D2	Producing the Goods	Create, edit, format and test your multimedia product.	Observation records Witness statements Screen shots Test strategy Test results Evaluation
P5, P6, M3	Is it What We Want?	User test, review, adjust and evaluate your product.	Questionnaires/ interview notes Review Refined product

Suggested resources

Books

Andrews P – *Adobe PhotoShop Elements 11* (Focal Press, 2012)
ISBN 9780415824453

Boyle T – *Design for Multimedia Learning* (Prentice Hall, 1997)
ISBN 0132422158

Chapman, Dr N and Chapman J – *Digital Multimedia* (John Wiley & Sons, 2009)
ISBN 0470512164

Kalbach J – *Designing Web Navigation: Optimizing the User Experience*
(O'Reilly Media, 2007) ISBN 0596528108

Gatter M – *Software Essentials for Graphic Designers: Photoshop, Illustrator, InDesign, QuarkXPress, Dreamweaver, Flash and Acrobat*
(Laurence King, 2006) ISBN 1856694992

Kerman P – *Sams Teach Yourself Macromedia Flash MX in 24 Hours*
(Sams, 2003) ISBN 0672325942

Maciuba-Koppel D – *The Web Writer’s Guide* (Focal Press, 2003)
ISBN 0240804813

Sengstack J – *Sams Teach Yourself Adobe Premiere in 24 hours* (Sams, 2004)
ISBN 0672326078

Websites

www.yellow-llama.com/	WordPress
www.hi-res.net	Digital communications information
www.ingredient.co.uk	Digital/media communications company
www.tomato.co.uk	Multi-media company

Unit 29: Presenting Information Using IT

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20734G

This unit is internally assessed

Unit aim

The aim of this unit is for learners to understand the purpose of different document types, know the software available to produce them and enable them to produce and review appropriate documents for differing audiences.

Unit introduction

The effective application of IT requires learners to understand enough about different software applications to be able to choose which tools and techniques are most suitable and use them competently.

Learners will become familiar with examples of tools and techniques so as to be able to exploit the different software to produce effective communications. Creating original artwork is not a primary focus of the unit but the ability to use appropriate graphics in different formats to assist with clarity and communication is essential.

Learners must be able to use the software effectively, but in addition to being able to generate output that meets the need of specific purposes and audiences, they must be able to enter and edit information, combine material of different types and format the document to suit the communication using particular layouts and house styles as necessary. Advanced software features such as tables of contents, indexes, shortcuts etc will also be explored.

The ability to review and adjust finished documents is essential if learners are to generate high quality materials that meet user needs. This is achieved through a combination of in-built tools such as spellcheckers as well as critical re-reading to identify other problems. The review must also include checks against the original purpose and target audience to be sure that the document is appropriate.

It is recommended that this unit is delivered early in the programme of learning, as many of the skills learned will be transferable to other situations and units.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the purpose of different document types
- 2 Know appropriate software to present and communicate information
- 3 Be able to produce appropriate documents for different audiences
- 4 Be able to review documents.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain the purpose of different document types		
P2 Describe the features of applications which make them suitable for presenting and communicating information		
P3 Produce documents that meet the needs of defined audiences	M1 Create a document template for a given requirement	D1 Demonstrate use of appropriate language and layout in documents
P4 Demonstrate the use of tools and techniques to enhance the presentation of information	M2 Demonstrate the use of advanced formatting tools and techniques to enhance the presentation of information	D2 Create a complex document that combines textual, numerical and graphical information appropriate for a defined audience
P5 Carry out a document review	M3 Perform adjustments to a document following user feedback	D3 Carry out a review of a complex document and justify choice of tools and techniques used

Unit content

1 Understand the purpose of different document types

Types of document:

- short, e.g. memo, email, letter, order form, invoice, agenda, minutes
- extended, e.g. article, newsletter, report, user guide
- graphical, e.g. illustrations, charts, flow charts, diagrams
- promotional, e.g. advertisement, leaflet, web page
- informal documents, e.g. texting, email, creative writing
- formal documents, e.g. agenda, report

Purpose:

- to meet the needs of the audience, e.g. to inform, to query, to advertise, to record

Audience:

- types, e.g. commercial customers, individual adults, internal staff, children, friends, the public at large

2 Know appropriate software to present and communicate information

Applications:

- text based, e.g. text editors, word processors
- graphics based, e.g. graphic tools in packages, standalone graphic packages
- presentation based, e.g. desk top publishing, PowerPoint
- other software, e.g. text on mobile phones, email, multimedia

Features:

- interface, e.g. windows, icons, menus, pointer (WIMP), graphical user interface (GUI)
- voice recognition and voice output options
- integrated packages
- variety of outputs, e.g. audience notes, speakers' notes, different file formats
- automated procedures, e.g. wizards, short cuts, use of templates, mail merge

Information:

- types, e.g. text, numbers, images, graphics, charts, tables
- structured and unstructured information

3 Be able to produce appropriate documents for different audiences

Appropriate documents:

- in a style which meets the needs of the audience

Document types:

- short
- extended
- graphical
- promotional
- informal
- formal

Style:

- use of language, e.g. formal/informal, spelling, punctuation
- layout, e.g. use of white space, presentation techniques

Presentation techniques:

- choice of font, font size
- use of colour
- layouts, e.g. columns, tables, headers, footers, styles, titles, headings, bullets
- graphic images
- advanced formatting, e.g. tables of contents, indexes
- speaker notes

Formatting and editing tools:

- formatting text, e.g. characters, paragraphs, pages
- editing text, e.g. insert, edit, delete
- formatting graphics, e.g. basic shapes, images, charts, tables
- editing graphics, e.g. draw, resize, align, rotate, flip
- use of copy and paste
- inserting special characters
- advanced tools, e.g. crop, paste special, arrange, paragraph styles, animation, racking
- combining information
- other tools, e.g. readability tests, netiquette, summaries, templates

4 Be able to review documents

Review:

- use of media, e.g. choice of packages, choice of techniques, choice of tools, layout
- quality of finished document, e.g. accuracy, functionality, aesthetics, spellchecking, grammar checking, thesaurus
- fitness for purpose
- proofreading

Adjust:

- gather user feedback
- act on user feedback

Information for delivery staff

Essential requirements

Learners will need access to a variety of application software suitable for generating documents and presenting information.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

This unit recognises that every document has an implicit audience and that its appearance, structure and presentation of information is very important to achieving its purpose.

The software packages required to create documents for this unit are:

- text-based packages for example text editor, word processing
- a graphics facilities (embedded tools in a text-based package or standalone graphic package)
- presentation packages.

Documents created in this unit should be as realistic and purposeful as possible, applying layout styles and formatting skills to communicate information effectively. They could range in content size from a mobile phone text message to an extended presentation and report.

Learners should be guided to check and improve the accuracy and readability of information content and, as a recipient, to evaluate documents.

Learners should be made aware that the recipient/audience determines the style of the document content and that business information content is mainly formal whilst social information content is mainly informal.

Many information recipients have expectations of information content, structure and formatting and may feel uncomfortable and distracted when these expectations are not met.

Learners should be encouraged to use their judgement when creating content for example formal/informal, keep sentences short, use words that the recipient/audience can understand, be consistent with terminology, use bulleted lists, avoid sexist or biased language.

Skills in creating documents both by creating original material and combining material from different sources, is considered important in this unit. Original material created should be sufficient to test formatting and layout skills.

Learners should appreciate that both technical and awareness skills are necessary to present information effectively and that there are many facilities available to enhance presentation in common IT packages.

The depth of use and range of facilities in each of the software packages will be determined by the examples given and tasks set.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
<p>The purpose of different types of document:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on different types of documents and their purpose • directed research – discussion of what appropriate communication means • whole-class exercise – tutor presentation on different audience types • individual exercise – appropriate language.
<p>Using appropriate software:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on different applications used for communication • individual exercise – learning features that assist communication • whole-class exercise – looking at different types of information.
Assignment 1 – The Right Tool for the Job
<p>Producing the right document:</p> <ul style="list-style-type: none"> • individual exercise – learn to format and edit a document • individual exercise – learners to examine how style choices change the presentation of a document.
Assignment 2 – You Too Can Produce Quality Documents!
<p>Review:</p> <ul style="list-style-type: none"> • whole-class exercise – what is review and how to review documents • individual exercise – gathering user feedback.
Assignment 3 – Review Stage

Assessment guidance

It is recommended that mapping the evidence requirements of this unit against other units would avoid the unnecessary repetition of tasks involving the creation of documents using a variety of software applications.

By linking with other topics, document presentation of documents may be considered in a vocational context rather than for its own sake, and give learners a wider range of opportunities to establish and meet user needs and to use tools and techniques to communicate information effectively. Additional tasks may also need to be set so learners can provide the full range of evidence required for different types of document, tools and techniques.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

The document types are listed in the unit content, and for at least one example of each learners must explain the structure and purpose in order to achieve P1. Evidence could be via verbal or online presentation, using examples of documents, which may be annotated, or as part of a wider assignment as suggested in the programme of suggested assignments table.

For P2, learners must describe the features of applications which make them suitable for presenting and communicating information. The features and different categories of applications are given in the unit content.

Evidence can again come from many sources and can be combined easily with the evidence for P1.

P3 and P4 should be considered together. For P3, learners should create examples of each document type and present in a format appropriate for assessment (hard copy, screenshots). Note, document types may be combined, short formal, extended informal. The defined audience need may be identified by the tutor or negotiated with learners, but the focus, for P4, should be on the appropriate use of the tools and techniques identified in the unit content to create documents suitable to meet the identified audience need. M1, M2 and D1 can be combined with these criteria.

It is expected that, to achieve P5, learners will review and check documents produced in terms of the unit content. Suitable evidence of this could be, for example, the use of logs or checklists completed during document production, 'before' and 'after' printouts, and screenshots recording the use of tools to improve quality such as spelling and grammar checking facilities.

To achieve a merit grade, learners must achieve all the pass and merit grade criteria.

M1 requires learners to create a document template for a given requirement (not to use an existing template).

This should be taken into account when setting the assignment tasks and user needs.

To achieve M2, advanced formatting tools and techniques available in the software application packages used must be shown to enhance the presentation of information. To evidence this, learners should show that the use of these tools and techniques can improve the presentation of information in an existing document (perhaps produced as evidence for P3).

For M3, learners must gather user feedback on at least one document and show that they have adjusted the document in response to that feedback. Evidence should include copies of the user feedback as well as before and after examples of the document.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction criteria.

For D1, learners should use appropriate language (formal/informal, spellchecked etc) and layout (standard document layout, use of space etc) in all their documents.

For D2, learners must produce a complex document, which includes text, graphics and number. This should involve importing information from other packages.

Evidence for D3 may follow naturally from the production of a complex document for D2 or from a different complex document, using annotated printouts showing where and why particular tools and techniques were chosen to enhance communication.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2	The Right Tool for the Job	You are involved in setting up a stand for a local software retailer at a trade exhibition. Information leaflets are to be available explaining the features of the various application packages and how these help produce different types of documents.	Leaflet
P3, P4, M1, M2, D1, D2	You Too Can Produce Quality Documents!	Examples of different documents are to be available demonstrating use of different tools and techniques.	Documents (paper and/or screen based)
P5, M3, D3	Review Stage	Before your documents can be used by the public they must be checked and reviewed.	Review checklist User feedback Before and after copies Justification report

Suggested resources

Books

Etherington S – *Formatting and Printing* (Dorling Kindersley, 2003)
ISBN 0751364290

Wong D – *The Wall Street Journal Guide to Information Graphics*
(W. W. Norton & Company, 2013) ISBN 139780393347289

Websites

www.openoffice.org

OpenOffice resource

www.libreoffice.org

LibreOffice source software

[office.microsoft.com/
en-us/help/default.aspx](http://office.microsoft.com/en-us/help/default.aspx)

Microsoft Office resources/support

[webstyleguide.com/wsg3/3-information-
architecture/4-presenting-information.html](http://webstyleguide.com/wsg3/3-information-architecture/4-presenting-information.html)

Web Style Guide online resource

Unit 30: Animation Techniques

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20735G

This unit is internally assessed

Unit aim

This unit aims to introduce learners to the practical processes of animation and to develop their knowledge of historical and contemporary animation techniques. Learners will work on design, character, setting and narrative and will then focus on a specific technique for the production of an animation sequence.

Unit introduction

Animation production is a significant activity in the creative media sector, not only in high-profile television programmes but also in feature films, mobile phone content, the internet, television advertising and the computer games industry. Whilst there is still room for the traditional 'craft' techniques such as cel animation, computer-generated and aided animation is increasingly being used, and in ways that allow for as much creativity as traditional methods.

Learners will research the content and production techniques used in historical and contemporary examples of work. Learners will develop understanding in such things as persistence of vision, frame rates, stop-frame techniques and the production of cells. This background will inform planning and production of work using one of the traditional methods or a digital application for animation and provide a basis for exploring and experimenting with animation techniques and content.

A successful career in animation requires good visual awareness and attention to detail. It requires the ability to develop fresh ideas for content which will engage the chosen audience. A good animator will take into account at all stages the role of animation as communication, whether this be for entertainment or information. Learners should always aim to move beyond simply creating moving shapes on a screen.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know about animation techniques
- 2 Be able to develop ideas for an animation sequence
- 3 Be able to create an animation sequence
- 4 Be able to review own animation production.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Outline techniques employed in animation	M1 Describe techniques employed in animation in some detail and with reference to appropriate illustrative examples	D1 Evaluate techniques employed in animation with reference to precise and detailed illustrative examples
P2 Present an idea for an animation sequence	M2 Present a developed idea for an animation sequence	D2 Present an imaginative idea for an animation sequence
P3 Use animation techniques to create an animation sequence that realises main intentions	M3 Use animation techniques competently to create an animation sequence that realises intentions	D3 Use animation techniques skilfully to create an animation sequence that clearly realises intentions
P4 Review strengths and weaknesses of own animation production work	M4 Describe strengths and weaknesses of own animation production work in some detail and with reference to appropriate illustrative examples	D4 Evaluate strengths and weaknesses of own animation production work with reference to precise and detailed illustrative examples

Unit content

1 Know about animation techniques

Techniques:

- zoetrope
- kinetiscope
- flick book
- cel animation
- rotoscoping
- drawn on film
- digital applications
- photographic stills
- claymation
- stop frame

Influential animation:

- e.g. Walt Disney, Hanna Barbera, Warner Bros, Norman McLaren, Len Lye, Aardman Animations

Contemporary uses:

- e.g. music videos, advertising, television programmes, computer games, mobile phones, internet

2 Be able to develop ideas for an animation sequence

Considerations:

- audience
- technique
- style, e.g. straight, comic, satirical, fantasy, anime

Genres:

- e.g. children's, music video, advertisement

Generation of ideas:

- visualisation
- characters
- backgrounds
- storylines
- audio
- working within technical limitations

Development of ideas:

- designs
- drawings
- storyboarding
- consideration of movement
- continuity
- frames per second
- perspective
- soundtrack design
- point of view, e.g. changes or extents of an action or movement

3 Be able to create an animation sequence

Pre-production:

- e.g. scripts, sketches, models, materials, storyboard, set, music, sound effects

Production:

- e.g. model making, set building, drafting, layout, point of view, key frames, copy writing, audio recording, filming

Post-production:

- e.g. editing (cuts, transitions, timing, frame numbers), special effects, sound mixing, soundtrack editing, soundtrack synchronisation

4 Be able to review own animation production

Finished product:

- compared with original intentions
- appropriateness to audience
- technical qualities
- aesthetic qualities
- content
- style

Production process:

- pre-production, e.g. research, planning
- production, e.g. time management, project management, technical competencies, creative ability, own work, teamwork
- post-production, e.g. time management, project management, technical competencies, creative ability, own work, teamwork

Sources of information:

- self-evaluation
- documentation, e.g. notes, sketches, storyboards, production logs
- comments from others, e.g. audience, peers, tutors, client

Information for delivery staff

Essential requirements

Access to a rostrum camera, an animation table and lighting will be required, as well as camera equipment capable of frame capture and remote shutter control. Many DV cameras come with animation modes and whilst some of these are less than frame accurate, their use can be combined with existing video editing applications.

Access to animation production software is required with domestic level applications being suitable. Construction space will be required to enable learners to make sets or models, as well as sufficient studio space for a number of sets to be in place over the period of an assignment.

Recording, editing and post-production facilities for sound will be required.

Libraries should have DVD resources as well as relevant and current information on animation, filming techniques and digital animation and contemporary film-makers.

Employer engagement and vocational contexts

Centres should aim to develop relationships with local animation companies, freelancers and model makers to develop a programme which includes visiting speakers, workshops and work placements.

Animation is now widely commissioned by a range of organisations wishing to use this medium to convey messages on websites. Some live brief work with external clients will be valuable.

Publicly funded media centres will also provide a range of opportunities and collaboration and contact details for these will be available through regional screen agencies. These agencies exist to develop film and media in the UK. Their websites provide much material for research and many of them include clips of production work. They do not fund production work by students, but offer information about the production, distribution and exhibition initiatives taking place across the UK:

- www.bfi.org.uk – British Film Institute
- www.em-media.org.uk/pages/home – East Midlands Media
- www.filmagencywales.com – Film Agency for Wales
- www.filmlondon.org.uk – Film London
- www.firstlightmovies.com – First Light
- www.northernirelandscreen.co.uk – Northern Ireland Screen
- www.northernmedia.org – Northern Film and Media
- www.northwestvision.co.uk – North West Vision and Media
- www.scottishscreen.com – Scottish Screen
- www.screeneast.co.uk – Screen East
- www.screensouth.org – Screen South
- www.creativeengland.co.uk – Creative England
- www.screenyorkshire.co.uk – Screen Yorkshire.

Skillset, the Sector Skills Council for the creative media sector, has a substantial section of its website dedicated to careers, including job descriptions. Guidance about industry roles and careers in animation is on Skillset's website www.skillset.org/animation.

Further general information on work-related learning can be found at the following website:

- www.vocationallearning.org.uk – Learning and Skills Network.

Delivery guidance

The unit could be taught through a variety of activities. Short introductory practical exercises might include the production of flip books and zoetrope strips to demonstrate early development of the illusion of movement.

Further practical experimentation with various animation techniques can be encouraged with screenings of professionally produced examples in advertising, music videos and experimental film. Discussion of these examples should concentrate on the animation method employed – they could, for example, be broken down frame by frame to demonstrate the way in which the animation has been constructed, whether it be claymation, pixilation, cel, cut-outs, mixed media or stop frame. Analysis of specific texts should therefore be given great emphasis, looking particularly at the strategies employed and the relationship of those strategies to the technique used and the audience. This understanding will then inform the production work.

Centres might opt to teach one form of animation to all their learners, in which case a series of demonstrations, workshops and exercises designed to develop the basic skills for that technique might be produced to take learners through a structured programme. Alternatively, centres may prefer to let learners follow their own interests, in which case the tutor's role will be more that of a facilitator, guiding learners towards sources of information and ensuring that they keep their ambitions related to the potential of the available facilities.

Animation is a time-consuming business so, whichever approach is adopted, tutors should guide learners carefully to ensure that they do not take on over-ambitious projects. In considering what length of production they might think appropriate, tutors should, of course, take into account the chosen method of production.

Initial ideas development and pre-production work can be broken down into specific tasks by the tutor, or learners can negotiate the ordering of their own work at this stage. Learners should be encouraged at this stage to concentrate on the process of animation itself, rather than getting too caught up in associated aspects of production such as set construction.

It is suggested that production and post-production tasks be monitored by the tutor during a series of workshop sessions, with more formal sessions, including group presentations, being used for evaluation of the production work.

Screenings of completed work should occur within the centre, possibly as part of an exhibition event to a wider audience. Completed productions might also be screened elsewhere in the locality, entered for festivals or uploaded to appropriate websites. Learners will require some input into the process of reviewing their own completed work.

Lectures and discussions should be incorporated into the teaching, along with a programme involving visiting speakers or visits to, for example, animation studios, festivals or cinema screenings.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction (two sessions): <ul style="list-style-type: none">• unit aims and assessment• range and development of animation• techniques, formats and styles• principles of animation.
Seminar session – screenings of productions chosen by tutors and learners demonstrating range of animation.
Workshop on persistence of vision using paper-based materials to illustrate technique.
Workshop on stop motion using found objects or people on a camera with still frame capture facility.
Workshop on computer application: using introductory software to animate on-screen object.
Assignment 1 – Web Video Learners record a talking heads video describing significant examples of animations, identifying the key features and the animation technique used, and illustrating the video with stills.
Visiting speaker: animator working in a range of techniques.
DVD documentary of animators discussing techniques used to make their work.
Workshops: <ul style="list-style-type: none">• model making• drawing characters and backgrounds• set design and construction.
Exercise – prepare and produce a simple ten second sequence of animation using one of the techniques explored in workshops.
Workshops: <ul style="list-style-type: none">• creating ideas• constructing characters and narrative.
Assignment 2 – Proposal Learners will devise the content of a 30-second animation with drawings and designs for characters and backgrounds, create a proposal and pitch their ideas to tutor or a visiting professional.
Lectures and workshops: <ul style="list-style-type: none">• communicating with an audience• how to assess animation looking at examples of existing work.
Visit to studios, screening or exhibition.
Workshop on soundtrack production.

Topic and suggested assignments/activities/assessment
Assignment 3 – Animation production (Animation of 30-second sequence devised in Assignment 2).
Assignment 4 – Screening (Screening of animation produced in Assignment 3).

Assessment guidance

Evidence for achievement of outcome of learning 1 could be a written report, video piece or a presentation by the learner. Presentations should be recorded for internal and external verification purposes. Learners could also hand in notes on animations they have watched.

Achievement of outcome of learning 2 can be evidenced through various forms of recording of exercises or group development activities. Notes, ideas boards and spidergrams are all acceptable forms of evidence, along with sketches, photographs, designs and storyboards. These can also be supported by tutor observation.

Practical recording and editing activities that are monitored and notes by tutors would provide evidence for achievement of outcome of learning 3 as would the final product. It is essential that for any group work all individual work is evidenced in order to award an individual learner a grade for the unit. This should be supported with initial minuted group discussions and role allocations, and final evaluation of own work and team activity.

Evidence for achievement of outcome of learning 4 can be in the form of a presentation, a written report, or a structured statement in an audio or visual medium.

For some learners a viva voce type assessment might be appropriate for outcomes of learning 1 and 4. When more than one learner in a cohort is assessed in this way care must be taken to ensure that all learners are asked the same lead questions, and that all are given equal opportunities to expand or clarify their answers.

Interviewers must also ensure that questions are not phrased in such a way as to provide or suggest an answer. Presentations and vivas must be recorded for internal and external verification purposes.

When applying the grading criteria tutors should follow the advice given below. Please note that the examples of evidence given here are indicative only. This advice is not inclusive and the examples need not be included in a learner's work in order for that learner to achieve the exemplified grade.

To achieve a pass grade, learners must achieve all the criteria at pass level. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

For P1, learners will name major animators or animation companies and will provide unelaborated, outline descriptions of animations which those animators have produced. These descriptions will be accurate, will correctly identify the techniques employed and will cover the main or most obvious elements of the content for this learning outcome. Where there are any illustrative details from the animations referred to they will not be well chosen or appropriate.

For P2, learners will generate an idea for the production of an animated sequence and present that idea either orally or in writing. Any techniques, skills or technologies required to realise the idea will be named or very briefly described. The idea will be feasible but simple, and the presentation of it will be basic. Notes, summaries, scripts and artwork will be brief and roughly presented.

For P3, learners will follow pre-production, production and post-production procedures as specified in the unit content and employ relevant techniques correctly at a basic level. The completed animation sequence will be recognisably related to the original idea, and will demonstrate that the learner has applied relevant techniques in its completion but with a rather uneven or rough result. Learners will be hampered in expressing their intentions fully by their limited grasp of technology and skills, so that their final product will only partially match what they had in mind when they envisaged the product. Pass grade learners are likely, for example, to produce a sequence in which movement is very jerky and the narrative confused.

For P4, learners will provide an unelaborated, outline description of their work – ‘work’ meaning both the process and the product resulting from following that process. This description will be relevant to the production process and the product but will mainly be confined to a historical account of activities (for example, ‘I decided to do a sequence based on a clockwork mouse finding its way round a maze. First I had to think up what the maze would look like and build the set. Then I had to find a clockwork mouse... etc’). Accounts which are mostly taken up with irrelevant detail (such as lengthy accounts of how the mouse was obtained and how it subsequently misbehaved) should not be considered as meeting the pass grade.

Evaluation of the work itself will be relevant but very generalised and at the level of assertion – for example, ‘the filming went quite well and I was really pleased with the finished sequence which I thought was funny.’

To achieve a merit grade, learners must achieve all the pass and all the merit grade criteria. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

For M1, learners will describe historical and contemporary animation techniques using appropriate illustrative examples. They will show evidence of having seen and reflected upon a range of animations and be able to describe the signature elements and visual style of major animators or animation companies, selecting illustrative details from examples of their work and identifying aspects of particular appeal to an audience. Any examples given will be relevant but will not be elucidated further. It may, therefore, be noted that a named animation system was an advance on previous systems as the movement was ‘more lifelike’ but there will be no explanation as to how this was achieved.

For M2, learners will show competent levels of ideas development and design. The proposal will be appropriate to the technique used to produce it. Learners will take care over the development of the idea, both in terms of working on the idea and in the presentation of drawings, designs and scripts. Work will show realistic intentions in relation to the technique used, the medium and the audience.

For M3, learners will show ability in the handling of equipment and care in relation to pre-production, production and post-production procedures. They will be sufficiently competent in technical skills to be able to express their intentions or achieve what they aim to achieve to some degree. Aesthetic decisions will be based on some thought and will be on the whole satisfying. Merit grade learners are likely, for example, to produce a sequence in which the movement of on-screen elements is fluid, the narrative logical and the point of view consistent.

For M4, learners will reflect upon their production work through discussion of strengths and weaknesses.

Commentary will thus be more detailed, with examples to support comments, but will still be at the level of statement or assertion rather than being supported by explanation or argument – for example, 'This idea wasn't as easy to develop as I thought it would be. The maze the mouse was to go through had to be very simple as I didn't have time to show it going through a large or difficult one. I also had to think up some incidents that would hold it up so as to make it funnier.'

To achieve a distinction grade, learners must achieve all the pass, all the merit and all the distinction grade criteria. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

For D1, learners will describe in detail a full range of historical and contemporary animation techniques, looking at the strengths and weaknesses of each in relation to aesthetics, narrative and audience appeal, supporting points made with reference to precise, well-chosen illustrative details taken from a wide range of past and current examples. For example when discussing the fluidity of movement, learners will be able to identify frame rate as a key factor.

For D2, learners will show high-level skills and creativity. When developing an idea, they will achieve high quality results by taking an active, resourceful and imaginative approach to the task. The proposal will explore the technique used to produce it. Learners will develop detailed ideas and present detailed drawings, designs and scripts.

For D3, there will be an overall sense that learners are in control of the technology they are using and are able to use it to serve their creative objectives effectively and imaginatively. The viewing experience will seldom if ever be affected by technical problems in relation to camera work, movement, narrative and point of view.

For D4, strengths and weaknesses in the learner's work will be expressed clearly and subjected to some sort of evaluative procedure or weighing up which is supported by evidence from precise, well-described examples that are explicitly linked by the learner to the point being illustrated. They will demonstrate an awareness of why they did what they did, and will justify or support comments on production decisions. A learner might note, for example, 'I only had time to construct a simple maze so I had to make up for this by adding complications for the mouse such as dangers and obstructions. I tried to make these as funny as possible because that would be more likely to keep the interest of a young viewer.'

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	Web Video	For a website, record a talking heads video aimed at fans of animation describing four animations and illustrating the video with stills.	All research notes Video
P2, M2, D2	Proposal	In response to a brief from an animation competition devise a 30-second animation.	Proposal Ideas and designs Pitch slides and notes Recording of pitch
P3, M3, D3	Animation Production	Using the pre-production work from the previous assignment, turn the concept into an animation sequence.	All planning documentation Animation
P4, M4, D4	Screening	Screen the production to an audience.	Collated notes on audience responses Evaluation

Suggested resources

Books

Baylis P and Procter N – *BTEC Level 2 First Creative Media Production, Student Book* (Pearson, 2010) ISBN 9781846906732

Baylis P, Freedman A and Procter N – *BTEC Level 2 First Creative Media Production, Teaching Resource Pack* (Pearson, 2010) ISBN 9781846907364

Baylis P, Holmes P and Starkey G – *BTEC First Media* (Heinemann, 2007) ISBN 9780435464707

Bendazzi G – *Cartoons: One Hundred Years of Cinema Animation* (John Libbey, 1995) ISBN 9780861964454

Culhane S – *Animation: From Script to Screen* (Columbus Books, 1990) ISBN 9780312050526

Grant J – *Masters of Animation* (Batsford, 2001) ISBN 9780713486287

Hall K and Holmes P – *BTEC First in Media: A Practical Handbook* (Edexcel, 2007) ISBN 9781846901980

Lord P – *Cracking Animation: The Aardman Book of 3-D Animation* (Thames & Hudson, 2004) ISBN 978050051190X

McFarlane T and Beck J – *Outlaw Animation: Cutting-edge Cartoons from the Spike and Mike Festivals* (Harry N Abrams, 2003) ISBN 9780810991519

Noake R – *Animation: The Guide to Animated Film Techniques* (McDonald and Co, 1988) ISBN 9780356158721

Priebe K – *The Art of Stop-Motion Animation* (Delmar, 2006) ISBN 9781598632442

Shaw S – *Stop Motion: Craft Skills for Model Animation* (Focal Press, 2008) ISBN 9780240520556

Wells P – *Understanding Animation* (Routledge, 1998) ISBN 9780415115973

White T – *Animation from Pencils to Pixels* (Focal Press, 2006) ISBN 9780240806709

White T – *The Animator's Workbook* (Watson Guptill Publications, 1988) ISBN 9780823002292

Wiedemann J – *Animation Now!* (Taschen, 2007) ISBN 978382283789X

Williams R – *The Animator's Survival Kit* (Faber & Faber, 2002) ISBN 9780571202284

Websites

www.aardman.com	A tour of the studio and a showcase for Aardman's current offerings
www.anim8ed.org.uk	Anim8ed is an online animation resource aimed at young people
www.awn.com	An electronic monthly publication devoted to the art, craft and industry of animation, featuring intelligent news, reviews, commentary and opinion written by the leading minds in the field today
www.pixar.com	The company responsible for the films <i>Monsters Inc.</i> and <i>Toy Story</i> . This site offers, amongst other things, information on the stages of production

Unit 31: Interactive Media Production

Level:	2
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20736G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' knowledge of the purposes of interactive media and how interactive media products are created. Learners will achieve this through a study of interactive media products, planning and producing an interactive media presentation, and reflecting on their work.

Unit introduction

The interactive media industry is huge and growing daily. The development of new technology and the growth of the internet have generated many opportunities for interactive media professionals.

Every day we use a wide range of interactive products in our work or in our play. Interactivity is the key to successful multimedia products whether through a DVD format, touch-screen kiosk or interactive TV. People entering this industry need to have a basic awareness of how interactive media products have been designed and developed.

At this level it is important that those considering a career in the interactive media industry have a basic appreciation of how authoring hardware and software are used to produce an interactive media product.

Learners must be aware of possible constraints of target platforms and their capabilities. They should experience the effective use of interactive media development tools to produce a basic interactive media product.

This unit will enable learners to explore techniques associated with the production of an interactive media product. This involves the use of authoring software and the creative integration of audio and visual material to produce a final product. It is essential that the product is focused on the needs of the user. Screen design and layout are important but the final functioning interactive media product created for this unit must be easy to use and easy to understand.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know about the elements of interactive media production
- 2 Be able to develop ideas for an interactive media product
- 3 Be able to create an interactive media product
- 4 Be able to review own interactive media production work.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Outline the elements of interactive media production	M1 Describe the elements of interactive media production in some detail and with reference to appropriate illustrative examples	D1 Explain the elements of interactive media production with reference to precise and detailed illustrative examples
P2 Present ideas for an interactive media product with reference to format and application	M2 Present developed ideas for an interactive media product with reference to format and application	D2 Present imaginative ideas for an interactive media product with reference to format and application
P3 Use interactive media technology to create an interactive media product that realises main intentions	M3 Use interactive media technology competently to create an interactive media product that realises intentions	D3 Use interactive media technology skilfully to create an interactive media product that clearly realises intentions
P4 Review strengths and weaknesses of own interactive media work	M4 Describe strengths and weaknesses of own interactive media work in some detail and with reference to appropriate illustrative examples	D4 Evaluate strengths and weaknesses of own interactive media work with reference to precise and detailed illustrative examples

Unit content

1 Know about the elements of interactive media production

Platforms:

- CD/DVD-ROM
- information kiosks
- interactive TV
- worldwide web
- hand-held devices, e.g. mobile phones, personal digital assistants (PDAs)

Software:

- e.g. Director, Flash

Assets:

- sound
- text
- video
- graphics
- animations
- 3D content

Limitations:

- size
- download time
- type of content
- requirement for plug-ins

2 Be able to develop ideas for an interactive media product

Format:

- e.g. electronic presentation, CD/DVD

Application:

- e.g. education, information, entertainment, sales

Idea development:

- mood boards
- influences of past and current practice
- brainstorming
- purpose
- audience
- style

3 Be able to create an interactive media product

Development:

- storyboards
- layout diagrams
- script
- production schedules
- proposal

Assets:

- sound
- text
- video
- graphics
- animations
- 3D content
- legal and ethical implications of importing assets from secondary sources

Production:

- screen
- interaction
- navigation
- controls
- graphics
- layout
- colour

Publish:

- e.g. for electronic presentation, CD/DVD, web

4 Be able to review own interactive media production work

Finished product:

- compared with original intentions
- technical qualities
- aesthetic qualities

Production process:

- technical competencies
- creative abilities
- time management

Sources of information:

- self-evaluation
- comments from others, e.g. audience, peers, tutors, client
- production documentation, e.g. notes, minutes of meeting, production diaries

Information for delivery staff

Essential requirements

In order to run this unit centres will need appropriate hardware and authoring software such as Director or Flash. Learners should have access to relevant textbooks, the internet, and a range of examples that illustrate current interactive media authoring. In addition they will need access to a range of copyright-free assets for use in their interactive media product, or alternatively software to create relevant assets such as Premiere or Photoshop.

Employer engagement and vocational contexts

Centres should develop links with local interactive media production studios which could be approached to provide visiting speakers, study visits or samples of typical products.

Skillset, the Sector Skills Council for the creative media sector, has a substantial section of its website dedicated to careers, including job descriptions – www.skillset.org/careers

Further general information on work-related learning can be found at the following websites:

- www.vocationallearning.org.uk – Learning and Skills Network
- www.warwick.ac.uk/wie/cei – Centre for Education and Industry, University of Warwick – work experience and workplace learning frameworks.

Delivery guidance

It is essential that learners are aware of the work of professional publishers of interactive media products and that they develop knowledge of current professional practice and of the skills and techniques associated with the chosen authoring software. They also need to build an understanding of how text, still and moving images, and sound may be combined effectively in this type of product (for example, a CD-ROM package, a touch-screen kiosk or an interactive learning game). Some time should, therefore, be spent in looking at such products. Learners could be given a number of interactive media products along with a brief questionnaire, to be completed for each one, about content, ease of use, attractiveness and techniques employed in their production. This would begin to develop a structured critical approach to interactive media production, and would give learners some idea of the sort of skills they will need to develop.

The use of a complex authoring language is not required as a number of packages are available that allow simple integration of a variety of interactive media assets (for example, sound, video, animation, 3D content) into a product. However, the differences between an interactive media product and website should be made clear. The focus must be on user interactivity and integration of a variety of media assets.

A structured approach to the development of skills and techniques associated with the production of an interactive media product should be adopted, introducing learners to one or two techniques at a time through simple, highly focused exercises.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to unit and structure of the unit assessment.
Research and demonstration of applications using interactive media authoring, emphasising interactivity and control.
Group investigation of common platforms and uses.
Demonstration and comparison of basic authoring tools.
Introduction to and research on asset types and limitations for use with authoring tools.
Assignment 1 – Principles of Interactive Media Production
Present findings of Assignment 1.
Skill building using features of authoring tools, including construction of interactivity and control techniques.
Introduction to ideas generation and planning.
Assignment 2 – Generating Ideas for an Interactive Media Product Learners will: <ul style="list-style-type: none">• consider and interpret a creative brief• generate and record ideas• find suitable assets and document their locations, including consideration of the legal and ethical implications• of their proposed work• carry out planning activities prior to production• maintain a production log throughout this process.
Assignment 3 – Creating an Interactive Media Product Learners will: <ul style="list-style-type: none">• undertake production workshop sessions following their planned ideas• test and improve a draft version• publish the interactive product• maintain a production log throughout this process.
Assignment 4 – Reviewing Own Interactive Media Work Learners will: <ul style="list-style-type: none">• gather, collate and assess responses to their work, including production log• present and review their own interactive media production work.

Assessment guidance

Evidence for achievement of outcomes of learning 1 and 2 can be provided through written reports, preparatory materials, production logs, tutor observation and witness reports, or any combination of these.

The interactive media product will be the primary source of evidence for achievement of outcome of learning 3, along with relevant pre-production and production documentation. Assets used in the production do not necessarily all need to be created by the learner but where assets are imported from other sources consideration should be given to their suitability and to any copyright issues arising.

Achievement of outcome of learning 4 can be evidenced through a written report, presentation, or structured statement in an audio or audio-visual medium. Presentations should be recorded for internal and external verification purposes.

For some learners a viva voce type assessment might be appropriate to support the evidence for outcomes of learning 1, 2 and 4. When more than one learner in a cohort is assessed in this way care must be taken to ensure that all learners are asked the same lead questions, and that all are given equal opportunities to expand or clarify their answers. Interviewers must also ensure that questions are not phrased in such a way as to provide or suggest an answer. Vivas should be recorded for the purposes of internal and external verification.

When applying the grading criteria tutors should follow the advice given below. Please note that the examples of evidence given here are indicative only. This advice is not inclusive and the examples need not be included in a learner's work in order for that learner to achieve the exemplified grade.

To achieve a pass grade, learners must achieve all the criteria at pass level. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

For P1, learners will provide an outline description of the most important elements of the technology and techniques required to produce an interactive media product. All aspects of the description provided will be accurate and relevant. If there are any details or illustrative examples they will not be well chosen or fully appropriate. For example, in relation to applications, platforms and limitations, the learner will note some of the applications of interactive media authoring and some relevant limitations, writing, perhaps, 'Interactive media presentations are used in a lot of places such as touch-screen displays in shopping centres, DVD menus and on the web, but big file sizes can sometimes make the presentations run very slowly, especially over the web.'

For P2, ideas will be sketched out roughly and without much detail. Learners will not justify their choice of final ideas for implementation. However, they will present some verbal or visual record of their ideas and will give some indication of where the ideas came from or how they were arrived at – for example, 'I will produce a five-screen interactive street map for Medhampton. The initial screen will include a video introduction and navigation links. My map will have interactive hotspots. Each screen will have an image and description with some sound. This is for an information kiosk to aid those unfamiliar with the area. I have included a layout diagram.'

For P3, learners will produce a functioning interactive media product that partially realises their intentions.

'Interactive' means that the user has the ability to control the presentation by a multimedia system – for example, navigation controls, and hotspots for material selection and the way in which material is presented.

Furthermore, the product should contain a variety of different media assets, such as image, sound, video, animation and 3D content, either generated by the learner or imported from secondary sources. Pass grade learners will be hampered in expressing their intentions fully by their limited grasp of technology and skills, so that their final products only partially match what they had in mind when they envisaged the product. Products may have limited interactivity or may not be fully suitable for purpose or target audience.

For P4, learners will identify the strengths and weaknesses of their own interactive media work ('work' meaning both the process and the product resulting from following that process) but these will usually be noted without further comment, other than at the level of simple assertion. For example, a learner might note, 'The sound recorded for the initial screen went quite well and the final edit was good.'

To achieve a merit grade, learners must achieve all the pass and all the merit grade criteria. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

For M1, learners will describe the technology and techniques required to produce an interactive media product with some detail, supporting the commentary with appropriate examples, though the examples provided will not be explicitly linked to the point they are illustrating or used to develop ideas or arguments.

A learner might note, for example, 'Interactive media presentations are used for a variety of applications. These include touch-screen kiosks which give users information in shopping centres or allow them to purchase cinema or rail tickets, educational displays in museums and galleries, and interactive DVD menus. It is important to consider making interactive media products user-friendly so they don't become difficult to navigate. Sometimes media rich websites use interactive media elements but large file sizes can sometimes make the presentations run very slowly, especially over slower web connections.'

For M2, ideas will be developed and planning of the product will be done competently – that is, showing ability in relation to planning skills but not yet employing those skills with complete confidence or with imagination. Ideas will be presented carefully through, for example, written notes or competently constructed mood or storyboards.

For M3, learners will use interactive media production software in such a way as to mainly realise their intentions and will be sufficiently competent in technical skills to be able to express their intentions or achieve what they aim to achieve to some degree. They will be able to use the software but will not yet be completely confident with it. Work will show a good level of interactivity. For example, users will be able to navigate and activate a number of different asset types via on-screen buttons, but these may still feel a little clumsy to operate. The product will be generally appropriate to the target audience. Skills attainment will be good at the technical level, but these skills will not yet be employed with imagination.

For M4, description of the strengths and weaknesses of the learner's own work will be more detailed, with examples being used to support comments. It will offer a more balanced and thoughtful consideration, though comments will still be at the level of statement rather than being supported by explanation or argument. For example, 'It was worth spending two days brainstorming my initial ideas. This helped me to produce my layout plan. I then used the scanner to scan in the pictures, cropped them and saved them at the correct size, resolution and file format to reduce their file size so they didn't take up too much room on the CD.'

To achieve a distinction grade, learners must achieve all the pass, all the merit and all the distinction grade criteria. For each of the criteria learners must present evidence that addresses each italicised sub-heading of the content for the learning outcome.

For D1, learners will explain the technology and techniques required to produce an interactive media product, comments made being supported by reference to precise, well-chosen and detailed examples.

Detail will be full, consistently appropriate and relevant, and will often itself be developed, or used to further develop ideas or arguments. Thus a learner might show specific examples of applications and compare them to each other. For example, a learner might note: 'Touch-screen kiosks give users information in shopping centres or allow them to purchase cinema or rail tickets or provide educational displays in museums and galleries. It is important to consider making interactive media products user friendly so they do not become difficult to navigate. Shown below is an example of the menu from the display at the local shopping centre which gives information about the location of the shops. The menu is clear and easy to use and you can view the shops alphabetically or by type of shop. The map is colour coded so you can find the type of shop you need easily and you can view video clips to tell you about some of the services on offer.'

For D2, when developing their ideas learners will be inventive and resourceful, though at this level they will still be working within conventions. They will think laterally and come up with ideas and solutions which others in the group have not thought of. Techniques, skills or technologies required to realise the idea will be described in good detail and ideas will be presented in a careful, well-organised manner.

For D3, learners will clearly achieve their intentions through fluent application of well-understood technical skills. There will be an overall sense that learners are in control of the technology they are using and are able to use it to serve their creative objectives effectively. A high level of competence will be evident in the application of techniques and skills, and in the aesthetic and functional qualities of the final interactive media product. Work will show high levels of interactivity and will be appropriate to the target audience.

For D4, learners will evaluate strengths and weaknesses of their own work with reference to well-detailed examples – that is, they will demonstrate an awareness of why they did what they did, and will justify or support comments on these production decisions. A learner might note, for example, 'I spent some time brainstorming my initial ideas; this helped me to produce my layout plan. The layout plan was very useful as it helped me understand the navigation links needed and the size and position of my text and graphics. I then used the scanner to scan in the pictures, cropped them and saved them at the correct size, resolution and file format to reduce their file size. I found jpeg to be the best format for photographs and gif for clip art images which helped me to make the image transparent.' The learner's use of any technical and specialist language will be correct, being consistently appropriate and accurate.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	Principles of Interactive Media Production	Contribution to online blog – article on principles of interactive media production.	Report document in word processed or electronic form.
P2, M2, D2	Generating Ideas for an Interactive Media Product	Brief from a museum or gallery to create a multimedia presentation for a kiosk display, to attract more young people.	All ideas notes, sketches and drafts.
P3, M3, D3	Creating an Interactive Media Product	As above.	Final product saved to CD. Creative development log. All production documentation. Asset audit sheet. Commentary on legal and ethical implications. Testing reports.
P4, M4, D4	Reviewing Own Interactive Media Work	As above.	Personal commentary in word processed or electronic form.

Suggested resources

Books

Baylis P and Procter N – *BTEC Level 2 First Creative Media Production, Student Book* (Pearson, 2010) ISBN 9781846906732

Baylis P, Freedman A and Procter N – *BTEC Level 2 First Creative Media Production, Teaching Resource Pack* (Pearson, 2010) ISBN 9781846907364

Austin T and Doust R – *New Media Design* (Laurence King Publishing, 2006) ISBN 9781856694315

Barron A E and Ivers K – *Multimedia Projects in Education: Designing, Producing and Assessing* (Libraries Unlimited Inc, 2005) ISBN 9781591582496

Baylis P, Holmes P and Starkey G – *BTEC First Media* (Heinemann, 2007)
ISBN 9780435464707

Counts E – *Multimedia Design and Production: For Students and Teachers*
(Allyn & Bacon, 2003) ISBN 9780205343874

Hall K and Holmes P – *BTEC First in Media: A Practical Handbook*
(Edexcel, 2007) ISBN 9781846901980

Lachs V – *Making Multimedia in the Classroom: A Practical Guide*
(Routledge, 2000) ISBN 9780415216845

Schaeffer M – *Macromedia Director MX 2004 for Windows and Macintosh: Visual
Quickstart Guide* (Peachpit Press, 2004) ISBN 9780321246677

Underdahl B, Nyquist J R and Martin R – *Macromedia Director MX 2004 Bible*
(John Wiley & Sons, 2004) ISBN 9780764569906

Vaughan T – *Multimedia: Making it Work*, 7th Edition (McGraw-Hill, 2007)
ISBN 9780072264517

Websites

www.bluelemon.de/html/en/index_1.html

Examples of interactive media
products created in Director

www.director-online.com

Articles, forums and Director
examples

Unit 32: Software Design and Development

Level:	3
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20728G

This unit is internally assessed

Unit aim

This unit develops learners' understanding of the principles of software design and ability to use tools to develop software designs.

Unit introduction

To develop a programmed software solution which meets business and user needs, it is necessary to understand the original problem and be very clear in terms of the user requirements. Issues are often caused by poor understanding of user needs as well as poor planning. A wide range of different development programming languages and paradigms is available to developers with quite different characteristics and features. Learners will build an appreciation of why different high-level languages are available and why they are chosen in particular situations.

This unit focuses on the design and development process for learners to start incorporating the systems development life-cycle, and would be an appropriate place to start looking at programming concepts before they undertake more focused programming language units. The unit examines the business context within which solutions can be developed and explores the tools that can be used to demonstrate software designs.

A major part of learners' time will be spent on familiarising themselves with fundamental software development processes and concepts. This will give learners a firm foundation to move onto the more focused programming units.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the features of programming languages
- 2 Understand the principles of software design
- 3 Be able to use tools to demonstrate software designs.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the application and limits of procedural, object oriented and event driven programming paradigms		
P2 Describe the factors influencing the choice of programming language		
P3 Explain sequence, selection and iteration as used in computer programming		
P4 Describe the benefits of having a variety of data types available to the programmer		
P5 Explain the role of software design principles and software structures in the IT Systems Development Life-cycle	M1 Explain the importance of the quality of code	D1 Discuss the factors that can improve the readability of code
P6 Use appropriate tools to design a solution to a defined requirement	M2 Justify the choice of data types and software structures used in a design solution	D2 Develop algorithms to represent a design solution

Unit content

1 Know the features of programming languages

Programming paradigms:

- procedural
- object oriented
- event driven
- supporting tools and environments, e.g. CASE tools, IDE

Types of language:

- visual languages
- other, e.g. script and mark-up languages
- simple overviews and uses

Reasons for choice of language:

- organisational policy
- suitability in terms of available features and tools
- availability of trained staff
- reliability
- development and maintenance costs
- expandability

Features:

- sequence
- selection, e.g. case, if ... then ... else
- iteration, e.g. repeat – until, while ... do
- variables, e.g. naming conventions, local and global variables, logical operators
- assignment statements
- input statements
- output statements

Data types:

- text
- integer
- floating point
- byte
- date
- Boolean
- other, e.g. char, smallint
- benefits of appropriate choice of data type, e.g. additional validation, efficiency of storage

2 Understand the principles of software design

Software development life-cycle:

- stages, e.g. determination of scope, requirements gathering and specification, design, code, test, maintain

Software structures:

- functions, procedures, classes and objects
- abstraction of data
- pre-defined code
- readability, e.g. comments, appropriate names for variables, indentation
- quality of code, e.g. efficiency, reliability, robustness, usability, portability, maintainability

3 Be able to use tools to demonstrate software designs

Requirements specification:

- inputs, outputs, processing, user interface
- constraints, e.g. hardware platforms, timescales for development

Design:

- structure, e.g. functions, procedures, objects
- data
- file

Tools:

- e.g. structure diagrams, DFDs, ERM
- algorithms, e.g. using pseudo code

Review:

- against specifications requirements

Information for delivery staff

Essential requirements

Learners will need individual access to a particular programming language and development environment. They will also need a more limited access, possibly by demonstration, to other different types of languages.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There are a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

The software development cycle should be referred to constantly as the structure for developing programmed solutions. The various design tools, such as data flow diagrams, may have been introduced to learners in other units for example systems analysis. Note that these are given as examples of design tools and the tools chosen should be appropriate to the task.

Learners will be designing, developing, testing and documenting programs and sufficient time must be allowed for revisiting the procedures for testing and modifying programs (including retesting after modification) and documenting the solutions both for the technician and the user.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit. Features of languages: <ul style="list-style-type: none">• individual exercise – tutor assessment of current level of knowledge• whole-class exercise – tutor presentation on programming languages – type, when used, why used• whole-class exercise – tutor presentation on programming features, followed by individual exercise• whole-class exercise – tutor presentation on data types, followed by individual exercise• mixture of tutor led discussions, practical exercises.
Assignment 1 – Which Language?

Topic and suggested assignments/activities/assessment
<p>Software design principles:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on development life-cycle • whole-class exercise – tutor presentation on structures and tools, followed by individual exercise • whole-class exercise – tutor presentation on moving from diagrams to flowcharts to code, followed by individual exercise • mixture of tutor led instruction, directed learning, practical exercises.
Assignment 2 – Design Workshop
<p>Designing a solution:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on determining the requirement, followed by individual exercise • whole-class exercise – tutor presentation on choosing tools, structures and data types, followed by individual exercise • whole-class exercise – tutor presentation on developing algorithms, followed by individual exercise • mixture of tutor led instruction, directed learning, practical exercises.
<p>Designing a test plan:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor presentation on debugging, test strategy, documenting testing, followed by individual exercise • revision as required and practical work.
<p>Evaluating the design:</p> <ul style="list-style-type: none"> • revision of evaluation techniques.
Assignment 3 – Good Design!

Assessment guidance

It is suggested that this unit is assessed by three assignments as summarised in the programme of suggested assignments table which follows this guidance.

As identified in the unit abstract, one key theme that should be emphasised through this unit, and the qualification, is that of creating solutions to meet defined requirements and user need. The evidence for P6 must be based on requirements that relate to a particular situation. There should be a defined client and, ideally, this should not be the tutor. If circumstances dictate that no external client can be identified and a group assignment is set, then the scenario should be richly detailed and the requirements clearly specified.

A possible scenario for the first part of the assessment could be that the learner is asked to lead a session on programming languages, to be delivered to a group of trainee programmers. The evidence for P1 – P3 could be provided through a presentation. The presentations do not need to be actually presented verbally if sufficient detail or speakers' notes are provided.

For P1, there are three different programming paradigms identified in the unit content for outcome of learning 1, learners are expected to reference each of these.

For P2, learners must describe the factors influencing choice of programming language. Specific languages are not listed in the unit content. Learners should look at a minimum of three, including one visual language.

For P3, learners should present information about the languages they referenced in P2 but should give particular attention to whichever language they would expect to use when implementing the software design that they produce in P6.

A written response for P4 may be appropriate, or a table with perhaps three or four columns: data type, example, space occupied and comment. The data types available may be different according to which language is chosen, however there is an expectation that learners know of the wider range of data types available, six would be sufficient as noted in the content.

Any context used for assignment 2 should not be the same as the one used for P6. A possible scenario for this assignment would be for learners to prepare to role play a teaching role, where they would be giving instruction to a small group. Evidence for P5 could be in the form of worksheets and teaching notes prepared by learners for the topics of design principles, software structures, and the Development Life-cycle. The role play does not need to be actually carried out, although it might be useful to do so for M1 and/or D1.

For M1, further worksheets and notes, explaining the importance of the quality of code would be required.

The evidence might also be in the form of a verbal presentation with supporting notes. Role play as discussed above may be an appropriate vehicle for this.

For D1, a discussion of the factors that can improve the readability of code is required. This might be in the form of a verbal presentation with supporting notes. Role play as discussed previously may be an appropriate vehicle for this.

The context for assignment 3 will depend on the case study used. As noted above, P6 should be based on a substantial activity. The design should include the original requirement. Evidence will be in the form of the design documentation.

Evidence for M2 can be included within the design documentation and based on the data types used in the design.

D2 requires learners to develop algorithms to represent a design solution. These may be in any reasonable format as long as they are understandable. It is expected that learners will annotate the algorithms to make it clear what they are doing and how they are doing it. The annotation should also indicate how the design requirements are being met.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1	Which Language?	You are to lead a session on programming languages for a group of trainee programmers.	Presentation Handouts Notes

Criteria covered	Assignment title	Scenario	Assessment method
P5, M1, D1	Design Workshop	You are to lead a workshop on software design for a group of trainee programmers.	Worksheets Teaching notes
P6, M2, D2	Good Design!	You work as a programmer for a small business and have been asked to design a program to meet a particular need.	Design documentation

Suggested resources

Books

Bowman K – *Systems Analysis: A Beginners Guide* (Palgrave Macmillan, 2003)
ISBN 10033398630X, ISBN 9780333986301

Flanagan D – *JavaScript Pocket Reference, 2nd Edition* (O'Reilly, 2002)
ISBN 100596004117, ISBN 9780596004118

Knuth D – *The Art of Computer Programming: Volumes 1–3, 2nd Edition*
(Addison Wesley, 1998) ISBN 100201485419, ISBN 9780201485417

Wang W – *Visual Basic 6 for Dummies* (John Wiley & Sons, 1998)
ISBN 100764503707, ISBN 9780764503702

Wender K – *Cognition and Computer Programming*
(Ablex Publishing Corporation, 1995) ISBN 101567500951,
ISBN 9781567500950

Willis T, Crossland J and Blair R – *Beginning VB.NET, 3rd Edition*
(John Wiley & Sons, 2004) ISBN 100764556584, ISBN 9780764556586

Websites

www.profsr.com Website offering free IT training

visualbasic.about.com Information about Visual Basic

[www.vbexplorer.com/VBExplorer/
VBExplorer.asp](http://www.vbexplorer.com/VBExplorer/VBExplorer.asp) Information about Visual Basic

Unit 33: Database Design

Level:	3
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20729G

This unit is internally assessed

Unit aim

The aim of this unit is to develop learners' understanding of the features of relational databases and develop the skills necessary to design, create, populate and test a relational database incorporating advanced features.

Unit introduction

Database software is one of the most commonly used application packages in business. Many jobs involve the use of databases and for this reason employees with database skills are valued. The advantages of using a relational database are extensive, including significantly reduced data storage requirements, improved record manipulation and faster access to records. As with spreadsheets, data mining software can make use of database files to interrogate records and look for trends or unusual events.

Most organisations use databases in some way to store records, for example customer information, supplier information, employee details and financial information. These records can be searched, sorted, ordered, and cross referenced using relational databases. Using a simplified chart tool, graphs and charts can also be created and embedded in reports. Importing and exporting data to and from databases will be practised in this unit.

In order to ensure that relational databases have integrity, validity and efficiency, designing the database prior to implementation is important. Failure to do this may result in a poor product. Learners will consider the validation and verification methods that can be implemented to ensure that the data stored in a database is as accurate as possible. Efficient relational database design is managed through the process of normalisation and learners will be using normalisation techniques to develop efficient and effective relationships between entities.

In this unit learners will understand the features and functions of database software and use advanced features to design and implement fully functioning relational databases to specified user requirements.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand the features of relational databases
- 2 Be able to design, create and populate a relational database
- 3 Be able to test a relational database.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain the features of a relational database	M1 Explain referential integrity and the purpose building the relationships between tables	D1 Discuss how potential errors in the design and construction of a database can be avoided
P2 Design a relational database for a specified user need		
P3 Create and populate a database	M2 Carry out the importation of data from an external source	
P4 Create features in data entry forms to ensure the validity and integrity of data		
P5 Perform queries using multiple tables and multiple criteria	M3 Carry out the exportation of data to an external source	
P6 Design the inclusion of an advanced feature in a database design	M4 Implement an automated function	
P7 Perform testing of a relational database, documenting results		D2 Evaluate a database against the specified user need, reporting results

Unit content

1 Understand the features of relational databases

Features:

- entities
- attributes
- relationships
- benefits

Entities:

- key fields, e.g. primary keys, foreign keys
- referential integrity
- auto incremented keys
- field attributes
- data redundancy

Attributes:

- field properties, e.g. data types, size, validation rules

Relationships:

- one-to-many
- one-to-one
- many-to-many
- normalisation

Benefits:

- reduced data redundancy
- other, e.g. reduced data storage, faster access, efficient updating, searching, sorting, reporting

2 Be able to design, create and populate a relational database

Design:

- relationships
- tables
- queries
- data entry forms
- reports
- design documentation, e.g. data flow diagrams (DFD), entity relationship diagram (ERD), data dictionaries, structured English

Creating relationships:

- normalisation (first, second and third normal forms)
- modifying
- cascading updates
- cascading deletes

Query design:

- selection of data types
- use of logical operators, e.g. AND, NOR, NOT

Data entry forms:

- verification routines
- validation routines, e.g. input masking, checks for completeness, data consistency
- data redundancy
- visual prompts
- dropdown
- combo boxes

Populate:

- data entry
- importing data from external sources, e.g. other databases, spreadsheets, text files

Exporting data:

- query results
- report results
- destination e.g. spreadsheet, database

Advanced features:

- creating styles for fields, tables, forms, reports
- creating styles to match user need
- consistency, e.g. using tool box
- customising: menus and toolbars, e.g. use show/hide functionality, add buttons
- automated functions, e.g. macros, scripts, program code

Errors:

- reasons, e.g. different data types, poor design, inconsistent normalisation
- rectification

3 Be able to test a relational database

Testing:

- test plan
- functionality
- against user requirements
- customer acceptance

Evaluation criteria:

- fit for purpose
- justification of features used
- suggestions for improvements

Information for delivery staff

Essential requirements

Learners will need access to appropriate hardware and software such as Microsoft Access that can handle relational databases. Learners will also require manuals and help sheets related to the actual software used.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www2.warwick.ac.uk/fac/soc/cei/

Delivery guidance

This unit assumes learners have a basic understanding of databases and database terminology and focuses on the design and implementation of a relational database. Learners need good access to computers which should be supported by theory and practical activities and by examples from industry and commerce.

Much of the unit is given over to practical work, and it is fully expected that learners will spend the majority of their time practising working on either databases that have been created by the tutor, or databases the tutor has instructed them to produce. This will mean that all learners will need individual access to PCs for nearly the entire unit.

Exercises should be realistic in content and ideally will be designed with a practical business in mind. For example, one database could be a list of a company's clients, as would be used by a sales team to keep a track of what has been said to different people about different products. Another example might be a marketing database, which contains a list of potential clients, whose details must be tracked and kept up to date. This database could be used for running queries that would generate an email-list spreadsheet file for a mass mailing.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
The purpose and features of relational databases: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on database relationships• whole-class exercise – use tutor provided materials to learn about field properties• whole-class exercise – class practical to learn how to create and modify databases• directed research – learners work from tutor-provided materials to understand key fields• whole-class exercise – tutor presentation on how to identify and remedy database errors.
Assignment 1 – Why Relational Databases?
Learning to create, populate and test a multiple database: <ul style="list-style-type: none">• whole-class exercise – design documentation and designing database structures• whole-class exercise – practical lesson on creating correct and functional data entry forms• whole-class exercise – practical on importing and exporting data• whole-class exercise – practical lesson on how to create a run good database queries.
Assignment 2 – Designing
Use advanced features of a database and test functionality: <ul style="list-style-type: none">• directed research – using tutor-provided materials to understand what data integrity is, and how is it protected• individual exercise – learning how to style a database• individual exercise – customising a database and automating it to make it more user friendly• individual exercise – learn to test and evaluate using a tutor-provided database.
Assignment 3 – Implementing
Assignment 4 – Checking it Works

Assessment guidance

This unit can either be assessed through a single project-style assignment, or through a number of smaller assignments. Whichever route is preferred, linking assessment to good business practise will help learners contextualise the subject matter.

To achieve a pass grade, learners must achieve the pass criteria listed in the assessment and grading criteria grid.

For P1, they must explain the features of a relational database. Evidence for this could be, for example, a written report, a presentation or a written discussion. Note that the features include benefits and learners need to be able to quote aspects that relate to the efficiency of storage of information with a minimum of data redundancy and also the ease by which information can be extracted from the database as required.

For P2, learners must design a relational database containing at least five tables for a specified user need. Learners must provide evidence of appropriate normalisation and database design. Documentation such as ERDs, data dictionaries, DFDs, structured English etc will provide the evidence.

For P3, learners will have implemented their design and populated the tables. Relationships should have been established and referential integrity enforced, this will allow cascaded updating and deletion of linked records. Evidence will come from annotated screen prints.

P4 should be evidenced through the creation of forms to the primary tables and through the implementation of at least three of the suggested strategies for ensuring the validity and integrity of data.

For P5, queries should be created using a minimum of two tables and a minimum of two criteria and be thoroughly tested.

For P6, learners should have included at least one of the advanced features from the unit content in their database design and document the inclusion of the advanced feature.

P7 requires full testing of the database including functionality and user testing. Learners should have a test plan and evidence will come from this and user feedback.

To achieve a merit grade, learners must achieve all of the pass and the merit criterion.

For M1, learners should show evidence that they understand the concept of referential integrity and the mechanisms that exist to support the enforcement of referential integrity within a database package. They should also be able to explain the purpose building the relationships between tables. Reference should be made to key fields.

M2 requires learners to import data from an external source (this could be from a text file, spreadsheet, word-processed table or another database package). The data could, for example, be used to form one of the tables required in the database.

M3 requires learners to export the results of either a query or report to another application. To evidence this, learners could provide a screen print of a directory containing the exported data in a suitable file format or a print of the data in its new format. Alternatively, for M2 and M3, an appropriately documented demonstration of learners exporting and importing data would be appropriate. The tutor could ask for a particular set of data to be exported to a particular application.

For M4, learners are required to implement one of the automated functions suggested in the unit content.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and the distinction criteria.

D1 is an opportunity for users to identify and explain a range of common errors in database design and construction, explaining how these types of errors can be avoided. As an example, learners could discuss the impact of errors such as the accidental deletion of a field in a query or report, the renaming of a field, changing data types etc.

D2 requires learners to evaluate their databases' success in meeting user need. Learners should not only discuss strengths and weaknesses, and justify the features and functions they have used and make suggestions for improvements.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	Why Relational Databases?	An organisation has asked you to design a relational database, and to start with they want a short guide to explain how relational databases work.	Poster or leaflet
P2	Designing	The organisation want a database to coordinate their sales, suppliers, warehouse and despatch areas. You are to design a fully normalised database structure.	Design documentation
P3, P4, P5, P6, M2, M3, M4	Implementing	Now implement your design.	Screen shots Printouts Outputs Witness statement
P7, D2	Checking it Works	Test and evaluate your database fully.	Test plans Test results User feedback Evaluation

Suggested resources

Books

Hernandez M – *Database Design for Mere Mortals: A Hands-on Guide to Relational Database Design*, 3rd Edition (Addison Wesley, 2013) ISBN 9780321884497

Kroenke D – *Database Concepts*, 6th Edition (Prentice Hall, 2012)
ISBN 9780132742924

Ponniah P – *Database Design and Development: An Essential Guide for IT Professionals: Visible Analyst Set* (John Wiley & Sons Inc, 2006)
ISBN 0471760943

Ritchie C – *Relational Database Principles and Design*, 3rd edition
(Thomson Learning, 2008) ISBN 9781844805402

Websites

www.databasedev.co.uk	Database solutions and downloads for Microsoft access
office.microsoft.com/en-gb/access-help/database-design-basics-HA001224247.aspx	Database design basics
wiki.openoffice.org/wiki/Database	Open Office information
wiki.documentfoundation.org/images/e/e8/BH40-BaseHandbook.pdf	LibreOffice Base Handbook – Managing your data

Unit 34: Website Production

Level:	3
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20730G

This unit is internally assessed

Unit aim

This unit develops learners' understanding of web architecture, the factors that affect its performance and their ability to design and create interactive websites.

Unit introduction

The number of websites on the worldwide web has increased dramatically and competition is very high. This means that designers must use increasingly sophisticated techniques to capture interest, as well as ensuring that an appropriate company image is presented. Usability issues, such as navigation methods, must be considered carefully. A poorly-designed structure could result in users becoming confused or frustrated and navigating away from the website.

The need for good web designers and developers continues to grow as more and more companies realise they must develop a web presence and keep it maintained and updated. This unit starts by exploring web architecture and the factors that influence website performance. Learners investigate the web development process from identification of need, design, build, and test through to review.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand web architecture and components
- 2 Understand the factors that influence website performance
- 3 Be able to design websites
- 4 Be able to create websites.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Outline the web architecture and components which enable internet and web functionality	M1 Explain the role of web architecture in website communications	D1 Explain the role of the TCP/IP protocol and how it links to application layer protocols
P2 Explain the user side and server side factors that influence the performance of a website		
P3 Explain the security risks and protection mechanisms involved in website performance		
P4 Using appropriate design tools, design an interactive website to meet a client need	M2 Explain the tools and techniques used in the creation of an interactive website	D2 Discuss the techniques that can be used on web pages to aid user access to information
P5 Create an interactive multi-page website to meet a client need	M3 Improve the effectiveness of a website on the basis of a client review	D3 Demonstrate that own created website meets the defined requirements and achieves the defined purpose

Unit content

1 Understand web architecture and components

Web architecture:

- Internet Service Providers (ISP)
- web hosting services
- domain structure
- domain name registrars
- worldwide web

Components:

- hardware, e.g. web, mail and proxy servers
- routers
- software, e.g. browser, email

Protocols:

- transport and addressing, e.g. TCP/IP
- application layer, e.g. HTTP, HTTPS, SMTP

Web functionality:

- Web 2.0
- blogs
- online applications
- cloud computing

2 Understand the factors that influence website performance

User side factors:

- download speed
- PC performance factors, e.g. browser, cache memory, processor speed

Server side factors:

- web server capacity, e.g. available bandwidth, executions to be performed before page load, number of hits
- file types, e.g. bitmap, vector, jpg, gif, wav, mp3
- avi, swf

Security:

- risks, e.g. hacking, viruses, identity theft

Security protection mechanisms:

- firewalls
- Secure Socket Layers (SSL)
- adherence to standards, e.g. strong passwords

3 Be able to design websites

Identification of need:

- nature of interactivity, e.g. online transactions, static versus dynamic
- client needs and user needs, e.g. image, level of security, development timescales, support, maintenance contracts, costs, visibility on search engines
- end user need, e.g. appropriateness of graphics, complexity of site, delivery of content

Design tools:

- concept designing, e.g. mood boards, storyboarding
- layout techniques, e.g. frames, tables, block level containers (DIV), inline containers (SPAN)
- templates
- colour schemes
- screen designs
- other, e.g. outline of content

Software:

- mark-up languages, e.g. HTML
- client side scripting languages, e.g. JavaScript, VBScript
- features and advantages of software languages
- software development environments

4 Be able to create websites

Structure:

- layout of pages
- navigation
- format of content and cascading style sheets (CSS)
- interactive features, e.g. catalogue of products, shopping cart
- images
- animation

Content:

- proofed, correct and appropriate
- information source
- structured for purpose, e.g. prose, bullets, tables

Tools and techniques:

- navigation diagram, e.g. linear, hierarchy, matrix
- building interactivity tools, e.g. pseudo-code for client-server scripting
- animation
- audio/visual elements
- ensuring compliance with W3C
- meta-tagging
- cascading style sheets

Review:

- functionality testing, e.g. user environments, links, navigation
- content
- check against user requirements
- user acceptance
- audit trail of changes

Information for delivery staff

Essential requirements

Learners need access to systems and software with which they can create, test, amend and upload webpages to a web server. Without access to all of these facilities the centre should not attempt to deliver this unit.

Employer engagement and vocational contexts

Any potential contact with commercial organisations working in this field will be very helpful to learners.

There is a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

The outline learning plan which follows this section gives an indication of how time can be allocation between various topics in the unit content. It is designed only as a guide and tutors will use knowledge of their learners to adjust the allocation of time, and order of delivery, accordingly.

Learners must have access to facilities which gives them the opportunity to fully evidence all of the criteria. If this cannot be guaranteed then centres should not attempt to deliver this unit.

This suggests delivery pattern discussed, follows the logical order of the outcomes of learning in the unit specification. This is not the only order which may be used and it is perfectly acceptable for tutors to follow their own preference.

The unit starts with various aspects of identification of need as stated in the unit content. A good method of delivering this is to use case studies (actual or synthesised) from which learners can observe how the various aspects of need are identified. Once the tutor has demonstrated this, learners could work in groups to practise the skills needed.

Having discussed needs, the unit moves on to the tools which are used in the design aspect of website production. Some of these may already be familiar to learners but reinforces the basics once more. Delivery should be through tutor demonstration followed by learner exercises.

The final topic of this block of delivery deals with the types of software involved. The topic opens with whole class teaching, and discussion groups, on some of the theoretical aspects such as software environments which are used to set the scene. This is followed by tutor demonstrations and learner exercises using mark up and scripting language.

Outcome of learning 2 concerns creating interactive websites, the first element of which deals with structure.

The tutor should demonstrate aspects of structure as per the unit content. This is followed by learner exercises in simple structure both creating their own and recognising structures in existing websites. Clearly, since items such as CSS are dealt with in great detail in another unit, it is the straightforward use of CSS which is required in this unit.

The second area in this block is about content. Introducing this through discussion groups is useful, perhaps different groups assembling ideas on different facets of the unit content and feeding these back to the class as a whole for comment and criticism. This is followed by examining and criticising several examples of content.

The next area of delivery concerns tools and techniques and should be carried out by tutor demonstration of the techniques followed by learner examples of the same techniques. If this is done item by item it helps to reinforce each technique in isolation. Ultimately there will be an exercise which combines all the techniques together.

The unit continues with the theme of creating websites, the first element of which deals with reviewing websites. This is also delivered through tutor demonstration backed up by learner practise. It is essential that learners practise the various processes of reviewing since this is something they find quite difficult; tutors should not underestimate the amount of time this may take. Learners can review third-party materials in the first instance, and then follow the process using material they have created in the work so far.

The final block deals with uploading a website where delivery is also by tutor demonstration followed by learner examples.

The final block of delivery deals with website performance and constraints, the first element of which deals with file types. This tends to be purely theoretical and is delivered using whole-class teaching examples of image files, sound files and animation files. Tutors should back up the information with handouts and reinforce with electronic quizzes or gapped handouts.

The other area of website performance looks at user side and server side factors. This can be introduced by using groups of learners looking at different aspects using research and directed study on the internet. Groups can feed back their particular topics to the whole class where tutor and peer comments will refine information and the class as a whole can end up with composite lists, one for client side and one for server side

Following website performance are a number of topics relating to constraints, starting with security. Learners are given directed research to undertake on the internet and gapped handouts, which may be electronic, to reinforce the knowledge.

Security protection naturally follows on from security and can be delivered in a similar way.

Laws and guidelines are major constraints to the production and use of websites and can be delivered by allocating a different piece of legislation or guideline to a number of groups of learners who will research the subject. Each group will feed back to the whole class where the tutor will lead on any amendments needed, before compiling a complete list.

The final constraint is user perception which can be delivered in a similar way. The suggestion is that the tutor leads discussions on this topic and draws out the concerns of each learner which are used to build a complete list for the whole class.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Understand constraints: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on security risks• whole-class exercise – tutor presentation on protection mechanisms• whole-class exercise – tutor presentation on laws and guidelines• individual exercise – understanding user perceptions.
Factor on performance: <ul style="list-style-type: none">• individual exercise – learn the different file types used on websites• directed research – understand user side factors• whole-class exercise – server side performance factors.
Assignment 1 – Issues in Website Design
Designing an interactive website: <ul style="list-style-type: none">• whole-class exercise – discussion of web architecture• whole-class exercise – how to identify the need for a website• whole-class exercise – introduction to web design tools• individual exercise – basics of web design programming.
Creating an interactive website: <ul style="list-style-type: none">• whole-class exercise – how are websites structured?• whole-class exercise – how to create content• individual exercise – learn the different techniques for website creation.
Assignment 2 – Creating a Website
Creating an interactive website – review: <ul style="list-style-type: none">• individual exercise – reviewing a website• individual exercise – upload a website to the internet.
Assignment 3 – Reviewing

Assessment guidance

For P1, learners should compose a brief outline of the web architecture and components which allow the internet and websites to function. Learners could represent this in a short report or flow diagram detailing the various stages and processes that information must pass through to get from server to screen.

For P2, learners will need to focus on the user and server side factors which affect website performance. A report which considers the benefits of particular server side capabilities for a company website would be appropriate, although learners should also consider the limitations of the equipment and software customers may be using to browse the website.

For P3, as well as discussing the general security risks which threaten the integrity of data, learners should define the laws and guidelines that a particular website has to adhere to. This could include, for instance, a website that stores users' details, will be legally required to comply with the Data Protection Act (DPA). Learners should write a short report, with the use of screen grabs, to evidence their understanding.

For P4, learners need to carry out the planning work for a multi-page, two-way interactive website. Particular attention should be paid to making sure learners define the requirements and purpose of the site clearly and realistically, as this is extended into D3. The plan should take the form of annotated drawings as it would in a normal web design process.

For P5, learners need to build a multi-page website. Any method of creation can be used; the unit is nonspecific on software or techniques. The website should feature two-way interactivity as well as being multi-age. Prime evidence for this is the website itself in electronic form. However, annotated prints of the website and a tutor statement of authenticity will also suffice.

In order to achieve a merit mark for the unit, learners must complete all of the pass and merit criteria.

For M1, learners should go into more detail regarding the way websites move information for communication. Learners should discuss current methods of information sharing and movements such as Web 2.0.

For M2, learners need to be able to explain the tools and techniques that can be used to make a website. This will work best alongside P4 or P5, as learners will have the chance to talk about what they have done to achieve the pass criteria. Learners must show a strong, accurate understanding of the tools they have used, and be able to articulate clearly the techniques they have employed. This criterion should be evidenced by a short presentation or an extension to the website.

M3 can work best as an extension of P5. Learners must show that they have adapted and improved the website that they worked on for P4, in a measurable ways.

In order to achieve a distinction grade, learners must complete all of the pass, merit and distinction criteria.

For D1, learners should give a technical explanation of application layer protocols in relation to the TCP/IP protocol.

For D2, learners should consider design and functionality to suggest ways of improving accessibility and ease of use on the defined website.

For D3, learners must demonstrate they have created a website which meets the defined requirements and purpose. This can be evidenced through a series of annotated screen grabs. In order to achieve a distinction grade, learners must complete all of the pass, merit and distinction criteria.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, D1	Issues in Website Design	You are working for a web production company, which has asked you look at the security, legal and performance issues involved in one of its websites.	Short report Screen grabs
P4, P5, M1, M2, D2	Creating a Website	The company has asked you to create a new website.	Annotated drawings Web pages
M3, D3	Reviewing	The company has asked you to review and evaluate your work and someone else's work.	Short report Annotated screen grabs

Suggested resources

Books

Towers J – *Macromedia Dreamweaver MX 2004 for Windows and Macintosh* (Peachpit Press, 2004) ISBN 0321213394

Veer E, Lowe D, Ray E, Ray D, Dean D, McCue C, Weadock E, Nielsen J, Aviram M, Lockwood S and Siddalingaiah M – *Creating Web Pages All-in-one Desk Reference for Dummies, 2nd Edition* (John Wiley and Sons Ltd, 2004) ISBN 0764543458

Websites

www.ico.gov.uk

Information Commissioner's Office

www.w3.org

World Wide Web Consortium

Unit 35: Digital Graphics

Level:	3
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20731G

This unit is internally assessed

Unit aim

This unit develops learners' understanding of the different types of digital graphics images and file formats and their ability to create, edit, modify and manipulate digital images of various types and complexity.

Unit introduction

Many documents incorporate an element of graphics or graphic design. From the layout of the text to the image used to promote a product, it is expected that there will be some form of graphic representation.

Technology enables the production and reproduction of images to all scales, sizes and colours. High-capacity storage devices, digital cameras, specialist software and printers mean that high quality and appropriate images can be designed and produced more easily than before. There is now little excuse for not creating documents that use graphic images effectively.

In this unit, learners will be expected to identify the technical requirements for the creation, storage and manipulation of complex artwork. They will be required to produce original images using drawing packages and also to create and edit electronically captured images. Learners will identify suitable images to enhance documents and use available tools and techniques to ensure that the finished document meets the user need.

Learners must understand and recognise the differences that file formats and sizes will make to their chosen image, for example identifying how pixelation and resizing can distort the image and looking at methods to eradicate this distortion. This may include the need to convert files from one graphic format to another and the identification of the most appropriate format in relation to the file's final use.

In order to be sure that the final product meets requirements, formal checking must take place. For example, ensuring things such as the image resolution are appropriate for the intended use or checking the loading speed if the image is intended for a website.

All artwork and chosen information must abide by the laws of copyright. It is essential that learners recognise the need to gain permission to reproduce the work of others and that they comply with the appropriate legislation.

Outcomes of learning

On completion of this unit a learner should:

- 1 Know the hardware and software required to work with graphic images
- 2 Understand types of graphic images and graphical file formats
- 3 Be able to use editing tools to edit and manipulate images
- 4 Be able to create and modify graphic images to meet user requirements.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the hardware and software used to create and edit graphic images	M1 Compare the limitations of different hardware and software packages used in graphics work	D1 Evaluate the impact of evolving output mediums on the design and creation of graphic images
P2 Explain how different types of graphic images relate to file formats		
P3 Demonstrate the use of editing tools to edit and manipulate images	M2 Justify the software, tools, file format, image resolution and colour depth used for creating graphic images	D2 Discuss the impact that file format, compression techniques, image resolution and colour depth have on file size and image quality
P4 Create original graphic images to meet a defined user need		
P5 Modify images as a result of user feedback		
P6 Explain the potential legal implications of using and editing graphical images		

Unit content

1 Know the hardware and software required to work with graphic images

Hardware:

- graphics card features
- internal memory, e.g. cache, RAM
- processors
- other hardware, e.g. digital camera drivers and card
- file storage, e.g. CD ROM, hard drive, flash cards, USB storage devices
- input devices, e.g. graphics tablet, mouse, digital camera, scanner

Output medium:

- printer
- computer monitor
- other, e.g. mobile phone, PDA, plotter

Software:

- vector based, e.g. CorelDRAW
- bitmap, e.g. Paintshop Pro, Paint
- photo manipulation, e.g. Photoshop
- others, e.g. image viewers, photo galleries, file conversion

2 Understand types of graphic images and graphical file formats

File handling:

- converting files
- file sizes
- file formats, e.g. jpg, bmp
- file management, e.g. naming files, folder structures, moving files, deleting files
- compression techniques

Graphic images:

- vector graphics
- bitmaps
- comparison, e.g. file size, scaling
- file format features, typical uses

3 Be able to use editing tools to edit and manipulate images

Graphic creation:

- image, e.g. scanning, importing, digital camera
- image creation, e.g. free hand draw, assemble shapes, pre-existing material

Tools and techniques:

- standard software tools, e.g. free hand draw, rotate, flip, crop, group/ungroup, resize
- special effects, e.g. soften, sharpen, watermark, invert
- colour, e.g. colour balance, colour depth, e.g. 8-bit (256 colours), 16-bit (64,000 colours)
- layering
- advanced techniques, e.g. 3D images, masking

Editing graphics:

- change an existing image

4 Be able to create and modify graphic images to meet user requirements

User need:

- client needs
- target audience
- user requirements
- constraints e.g. house style, image size, intended use, file size, production costs, timescale
- output media
- user feedback

Reviewing:

- checking, e.g. against client need, against user need
- proofing
- image resolution
- file formats
- other, e.g. speed of loading

Legislation and guidelines:

- as appropriate, e.g. identifying ownership, copyright, copyright free, gaining permissions

Information for delivery staff

Essential requirements

Learners will need access to a range of relevant graphics software (Paint, Visio, Photoshop or similar), plus hardware capable of running them. Access to devices that are used by learners to acquire images is necessary, e.g. scanner, webcam, digital camera, mobile phone. The organisation of the resources must allow for all learners to use the devices.

All learners need ready access to a high quality black and white printer and occasional access to a colour printer as required.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There are a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Work Experience/Workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei
- Learning and Skills Network – www.vocationallearning.org.uk
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

The outline learning plan which follows this section gives an indication of how time can be allocated between the various topics in the unit content. It is designed as a guide only and tutors will use knowledge of their learners to adjust the allocation of time, and order of delivery, accordingly.

This suggested programme of delivery follows the same sequence as the outcomes of learning in the unit specification, but tutors may have their own preference for the order of delivery which is perfectly acceptable.

The unit begins by looking at the hardware used to create graphical images. Where possible learners should see the different types of hardware, where this is not possible photographs of the hardware should be used.

Discussions on the limitations of the hardware will be useful at this point as the hardware will be fresh in learners' minds. These are the limitations on what the hardware can and cannot carry out.

This can be followed by a brief look at the output media which may be used, particularly any recent additions to, and developments in, the field of output media, and the effect that this has on the design and creation of graphic images. Directed study is one method of delivering this area.

Finally, discussions and demonstrations of examples of the software being used can take place. This can be backed up by simple learner exercises using the software, and discussion groups looking at advantages and limitations of the software. This forms a vital underpinning knowledge base, which informs the rest of the unit.

The unit moves on to consider the various aspects of file handling. Tutors should ensure that learners are familiar with file conversions, formats and compression. A tutor-led discussion is one way of delivering this element, backed up by simple exercises and handouts.

Likewise, the topic concerning graphic images where many learners will already have some knowledge, so again discussion groups can be used.

Graphic creation is an important concept and learners need to be clear in their minds as to the difference between image obtaining and image creation. This is best delivered by tutor demonstration followed by learner exercises.

The use of tools and techniques is an extremely large area which covers standard tools, special effects, colour, layering and advanced techniques. This is also best delivered using a mixture of tutor demonstration and learner exercise. It is vitally important that learners have the opportunity to become familiar with all aspects of these tools and techniques, and tutors should not underestimate the time which may be required.

The unit then moves on to defining and considering editing graphics. This is about changing an existing image and should not be confused with creating images. Tutor demonstrations and learner exercises are the best method of delivery.

In the outline learning plan the second assignment is undertaken at this point, but tutors may prefer for this to be undertaken elsewhere in the plan.

The final part of the unit concerns aspects of finished images, firstly a consideration of user need. Whole-class teaching, backed up by handouts, group discussions and the use of case studies, is the suggested method of delivery. The difference between client and user needs must be emphasised and tutors should cover occasions when these may be the same. Constraints, audience and selection of output media are all part of this area. Delivery will be a mixture of whole-class teaching, group discussions, case studies and perhaps directed study.

User need is followed by reviewing, and learners must be able to practise reviewing materials they have created and those created by someone else. A mixture of the use of case studies and reviewing actual material is a useful method of delivering this part of the unit.

Finally, the unit covers legislation and guidelines, which is pure theory and is best delivered by whole-class teaching and directed study.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Hardware and software: <ul style="list-style-type: none">• whole-class exercise – tutor-led discussion on the limitations of hardware• directed research – study of media advances in recent times and the effect they have had on the design and creation of graphic images• individual exercise – learners undertake simple exercises using examples of image editing software.

Topic and suggested assignments/activities/assessment
<p>Assignment 1 – Hardware and Software</p> <p>Image types and file formats:</p> <ul style="list-style-type: none"> • whole-class exercise – tutor-led discussion on converting files, file formats and compression • directed research – learners use tutor-provided materials to research features and uses of different file formats • whole-class exercise – tutor demonstrates how to obtain and manipulate images using a scanner and a digital camera • individual exercise – edit an existing image.
<p>Assignment 2 – The Thick of It</p> <p>Editing images:</p> <ul style="list-style-type: none"> • whole-class exercise – use tutor-supplied case studies to identify each element of user need • individual exercise – apply review techniques to some of the exercise work undertaken earlier • directed research – use the internet and tutor-recommended materials to understand legal requirements and guidelines.
<p>Assignment 3 – The Final Tweaks</p>

Assessment guidance

It is suggested that this unit is assessed using three assignments as summarised in the programme of suggested assignments (PSA) table.

A simple scenario of learners helping on a trade stand at a trade fair, for which they are going to help to prepare materials, gives plenty of scope for covering all the assessment criteria.

For P1, learners should describe the role of the components of a given computer system in the production and manipulation of graphics. Learners could produce a series of information leaflets to cover at least one item from each of the groupings in the unit content.

For P2, learners should explain the features and limitations of different file formats, drawing conclusions regarding which lend themselves to particular graphical products.

For P3, learners could capture an image using a digital camera, or use a pre-existing image to edit. Tutors should supply learners with a user need. Learners must manipulate the image to achieve a pre-defined effect which should be related to a defined user need, for example to be more eye-catching, or to draw the attention to a specific element.

For P4, learners should create original images to present, for example, on the 'company stand' specified in the programme of suggested assignments table. These images must have a defined purpose.

For P5, learners must be given feedback from 'users', which in this case may be the tutors' or other learners' responses to the company stand. They should then modify designs based on this feedback and be able to explain the desired effect of these alterations.

P6 is purely theoretical; learners need to explain some of the legal pitfalls in using and editing graphics. Essentially, this is about copyright issues and gaining permission to use copyright products.

To achieve a merit grade, learners must achieve all the pass criteria and the two merit criteria.

M1 is a comparison. Normally a comparison would consider both good and less good points, but in this case only the limitations are being compared. Within the remit that the hardware and software must relate to the production of graphics, learners can select any hardware devices and compare the limitations of those, and then select any software packages and compare the limitations of these. Whilst it is more appropriate for learners to select the items themselves, the tutor can direct them to devices and packages, or can give them a short list of appropriate hardware and software from which to select.

For M2, learners must justify the choice of tools, file format, image resolution and colour depth used when creating the images. The 'justification' asks for the reasons why those specific items were used.

To achieve a distinction grade, learners must achieve all the pass and merit criteria and both of the distinction criteria.

For D1, learners will research the ongoing changes in, and additions to, output media and the effect this has on the creation of graphic images.

For D2, learners need to use different file formats, different compression techniques, different image resolutions and different colour depths, and for each show the final file sizes and the differences between.

Some will of course be more significant than others. Learners can receive guidance in selecting each attribute type but thereafter must produce the files and the comparison independently. It makes sense for learners to reflect on what they have used in creating the three associated images, but if the tutor prefers they can supply a different set of images and a list of the tools, file formats, image resolutions and colour depth used, and learners can work with those.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, M1, D1	Hardware and Software	You work for a company that is putting on a stand at an exhibition. Recommend ways to put the graphics needed together.	Short presentation

Criteria covered	Assignment title	Scenario	Assessment method
P3, P4, P5, D2	The Thick of It	Create the graphics for the company's stand by defining needs and taking into account legal factors.	Practical and short report or presentation
P6, M2	The Final Tweaks	It has become clear that the final images need some last minute adjustments.	Practical

Suggested resources

Books

Adobe Creative Team – *Adobe Photoshop CS5: Classroom in a Book* (Adobe Press, 2010) ISBN 9780321701763

Bain S – *CorelDRAW 12: The Official Guide* (McGraw-Hill Osborne, 2004) ISBN 9780072231915

Kay D and Steinmetz W – *Paint Shop Pro 9 for Dummies* (John Wiley and Sons, 2005) ISBN 9780764579356

Kelby S – *The Photoshop Elements 5 Book for Digital Photographers* (New Riders, 2006) ISBN 9780321476739

Websites

digital-tutorial.blogspot.com	Graphic design resources
graphicdesign.about.com	Graphic design resources
www.grafx-design.com	Graphic design resources

Unit 36: Spreadsheet Modelling

Level:	3
Notional Learning Hours:	100 (including 60 GLH)
Unit value (NLH/10):	10
SRF unit code:	20732G

This unit is internally assessed

Unit aim

This unit develops learners' understanding of and skills at using complex spreadsheet modelling in order to support organisational activities such as credit control, sales forecasting and stock analysis.

Unit introduction

Spreadsheets are key software for many businesses and organisations, helping them to keep track of numerical information and analyse it quickly and more easily than with paper records.

Accounting and finance use spreadsheets to record the transactions made by organisations. They have replaced manual pages in ledgers, where income and expenditure are organised into rows and columns. Users can make use of inbuilt functionality to help them to understand the data without needing specialist mathematical skills.

Utilities such as ordering, sorting and filtering will show the same data in different ways. Charts and graphs help to display information more visually. Complex calculations can be carried out using library functions or users can choose to create their own formulae.

One of the main advantages of spreadsheet software is that it can be customised with buttons and macros. IT practitioners can use many features, for example to restrict user access to whole workbooks, spreadsheets or parts of spreadsheets.

Spreadsheets can be saved in a number of different formats. The most useful format is comma separated value (csv), as this particular format can be read by many applications which means that data created in one type of spreadsheet software can be exported easily to other programs. This technology enables organisations to be more knowledgeable about their own activities. This, in turn, allows managers to make decisions more quickly which can lead to organisations gaining competitive advantage.

As IT practitioners, learners will need to be able to use spreadsheet software competently as well as being able to support users as part of a technical or helpdesk role.

Outcomes of learning

On completion of this unit a learner should:

- 1 Understand how spreadsheets can be used to solve complex problems
- 2 Be able to develop complex spreadsheet models
- 3 Be able to automate and customise spreadsheet models
- 4 Be able to test and document spreadsheet models.

Assessment and grading grid

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

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Explain how spreadsheets can be used to solve complex problems		D1 Discuss how organisations can use interpretation methods to analyse data
P2 Develop a complex spreadsheet model to meet particular needs	M1 Refine a complex spreadsheet model by changing rules and values	
P3 Use formulae, features and functions to process information		
P4 Use appropriate tools to present data	M2 Analyse data from a complex spreadsheet model	
P5 Customise the spreadsheet model to meet a given requirement		
P6 Use automated features in the spreadsheet model to meet a given requirement	M3 Compare different automation methods	
P7 Test a spreadsheet model to ensure that it is fit for purpose		D2 Evaluate a spreadsheet model incorporating feedback from others and make recommendations for improvements
P8 Export the contents of the spreadsheet model to an alternative format		
P9 Produce user documentation for a spreadsheet model	M4 Produce technical documentation for a spreadsheet model	

Unit content

1 Understand how spreadsheets can be used to solve complex problems

Use of spreadsheets:

- manipulating complex data
- presentation to requirements
- supporting decision making, e.g. analysis of data, goal seeking, scenarios, regression, data mining

Complex problems:

- types, e.g. cash flow forecasting, budget control, what-if scenarios, sales forecasting, payroll projections, statistical analysis, trend analysis

Interpretation:

- methods, e.g. comparisons of totals, trend analysis

2 Be able to develop complex spreadsheet models

Complexity:

- multiple worksheets (with links)
- complex formulae, e.g. at least two-step process
- large data sets
- cells linkage
- data entry forms, e.g. menu systems, list boxes, drop-down boxes, event controls
- data validation
- error trapping
- lookup tables
- nested IF functions
- templates
- cell protection

Formulae:

- relative references
- absolute references
- logical functions, e.g. IF, AND, OR, NOT, SUMIF
- correct operators

Structure and fitness for purpose:

- formatting, e.g. integer, real, date, currency, text
- styling, e.g. bold, italics, borders, shading, column alignment, consistency
- context

Features and functions:

- named ranges
- file sharing
- tracking changes
- security issues
- user interface
- add-ins
- built-in functions, e.g. cell functions, lookup functions, text functions, statistical function
- finding data

Refine:

- improving efficiency, e.g. shortcuts, aiding navigation
- formatting, e.g. fonts, page orientation, header and footer, print area, use of colour, conditional formatting

3 Be able to automate and customise spreadsheet models

Sorting and summarising data:

- use of sub-totals and facilities, e.g. pivot tables
- sorting data on multiple fields
- filtering data sets

Tools:

- charts and graphs, e.g. titles
- labels, e.g. axis scales, colours, annotation
- select appropriate type, e.g. line, bar, column, pie, xy (scatter)

Presenting:

- combining information, e.g. table of data and chart
- maintaining data, e.g. between worksheets, workbooks, packages

Analysing and interpreting data:

- convert data, e.g. charts, graphs
- lists, e.g. filtering, sorting
- trends
- patterns
- data analysis
- results
- conclusions

Customisation:

- restricting data entry, e.g. hiding
- protecting
- modifying toolbars
- modifying menus
- checking data, e.g. data validation, range checking, not NULL
- error messages

Automation:

- methods, e.g. macros, ActiveX control, Control Toolbox, Visual Basic

4 Be able to test and document spreadsheet models

Test:

- manual calculations, e.g. formula, functions
- data entry forms
- validation
- calculations
- correct outcomes, e.g. layout, values
- suitability for client
- user testing
- test plans using normal, extreme and erroneous data

Feedback:

- methods, e.g. surveys, questionnaire, interview
- analyse results
- make recommendations

Alternative formats:

- converting to, e.g. xls, csv, txt, xms, xml, html

Documentation:

- user documentation, e.g. instructions, guide, troubleshooting
- technical documentation, e.g. hardware resources, software resources
- instructions
- calculations, e.g. formula, functions used
- validation procedures

Information for delivery staff

Essential requirements

Learners will need access to appropriate hardware and software.

Employer engagement and vocational contexts

The use of vocational context is essential in the delivery and assessment of this unit. Learners will require access to computer equipment to enable them to gain a practical awareness and enable them to apply their knowledge and understanding in a practical situation.

There is a range of organisations that may be able to help to centres engage and involve local employers in the delivery of this unit, for example:

- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk

Delivery guidance

This unit assumes learners have a basic understanding of spreadsheets and spreadsheet terminology. The unit should be delivered in a room containing computers so that learners can work through sample exercises or other source materials. Using practical examples, the activities undertaken in this unit should, if possible, be contextualised so learners gain the maximum benefit from learning about concepts.

Tutors should expect that the majority of time will be allotted to practical tasks, which will require, for most of the tasks and exercises, each learner to have access to a computer with some form of spreadsheet software installed.

For most of the practical work, it is strongly recommended that the tutor provides learners with a prepared spreadsheet. Ideally, these spreadsheets could be created for a specific business scenario. For instance, a spreadsheet could be created with a business's financial management in mind. Spreadsheets are normally designed to use advanced formulae and make use of many of the spreadsheet's advanced functions.

Another example of practical spreadsheet use is as a research tool for recording and analysing statistical information.

For the directed research exercises, the tutor could also give learners material to help them in directed research tasks. This material could come from a variety of sources, including websites specialising in advanced use of spreadsheet software, and from textbooks within the centre.

However, the tutor could also recommend a list of suitable textbooks that learners could obtain from local libraries, which could also help in research exercises. Most spreadsheet programs come with 'Help' functions that contain extensive 'How To' guides, and the tutor could also recommend that learners use these as research aids.

Outline learning plan

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

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

Topic and suggested assignments/activities/assessment
Introduction to the unit.
Using spreadsheets to solve problems: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on how to use spreadsheets for complex tasks• whole-class exercise – begin using the spreadsheet to solve complex problems• individual exercise – from tutor-prepared materials learn advanced formulae and use on a spreadsheet• directed research – find out the different ways in which a spreadsheet can be used to interpret complex data sets.
Assignment 1 – Embracing Complexity
Complex models: <ul style="list-style-type: none">• whole-class exercise – tutor presentation on creating and using complex spreadsheets with advanced formulae, features and functions• individual exercise – from tutor-prepared material look at higher-level formulae, features and functions• whole-class exercise – tutor presentation on formatting and styling• whole-class exercise – tutor presentation on how to automate and customise spreadsheet models using macros, Active X control, Visual Basic• whole-class exercise – tutor presentation on what sorting and summarising data means, why it's needed and how it can be done• whole-class exercise – tutor leads lesson on charts/graphs and how to manipulate them• individual exercise – learner works from tutor-prepared materials to understand how to automate and customise spreadsheets.
Assignment 2 – Making it Presentable
Test and document: <ul style="list-style-type: none">• individual exercise – learner works from tutor-prepared materials to test spreadsheet models and document test plans• whole-class exercise – tutor leads lesson on methods for capturing feedback and how to interpret the results from feedback• individual exercise – learner works from tutor-prepared materials to produce user and technical documentation• whole-class exercise – learn about conversion to other file formats.
Assignment 3 – Going to the Next Level

Assessment guidance

At this level, assessment is probably suited to assignments in the form of a mini project, where learners can apply all the principles of the unit to one business problem.

To achieve a pass grade, learners must achieve the nine pass criteria listed in the assessment and grading criteria grid.

For P1, learners will need to explain how spreadsheets can be used to solve complex problems, and they should provide examples to support their explanation.

For P2, learners will need to develop a complex spreadsheet model, where 'complex' requires that the spreadsheet contains some aspects of the following range: multiple worksheets (with links), complex formulae, for example at least two-step process, large data sets, cells linkage, data entry forms, for example menu systems, list boxes, drop-down boxes, event controls, data validation, error trapping, lookup tables, nested IF functions, templates, and cell protection.

For P3, learners should solve a complex problem using formulae and functions in the spreadsheet. This might best be through a supplied scenario such as a cash flow forecast, a budgeting problem, 'what if' analysis, payroll projections or another similar scenario. This should include some aspects of the following range: relative references, absolute references, logical functions, for example IF, AND, OR, NOT, SUMIF, correct operators, named ranges, file sharing, track changes, security issues, user interface, add-ins, built-in functions, for example cell functions, lookup functions, text functions, statistical function and finding data.

P4 requires learners to create charts and graphs from numeric data sets. This can be either the same data used in different graphical images, or a number of different charts or graphs created from different data.

Tutors should ensure that learners have created charts and graphs that are fit for purpose, they should contain appropriate titles, labels, axis scales and suitable colours, and that the chart or graph should be of the appropriate type. This would be achieved most successfully by giving learners a user need that requires them to select an appropriate graphical image from a possible range.

For P5, learners must customise the spreadsheet model. Examples of customisation include restricting data entry, for example hiding information, protecting worksheets and cells, modifying toolbars and menus, checking data, for example data validation, range checking, not NULL and display error messages.

For P6, learners should be able develop the spreadsheet model further by implementing automated features, such as macros, Active X control, Control Toolbox or Visual Basic.

For P7, learners should check the accuracy of the spreadsheet model. For example, evidencing that they have checked the spreadsheet model both in terms of the required functionality, accuracy of calculations, data validation, and to appropriate levels of detail (columns for example to two decimal places). Evidence should be in the form of test plans.

P8 could be evidenced through an observation and witness statement where learners demonstrate converting a spreadsheet file to an alternative format, and importing the converted file into the relevant software, for example an HTML file opened and printed successfully from a browser.

For P9, learners must produce user documentation with instructions on how to use the spreadsheet model, especially when navigating with user interfaces.

To achieve a merit grade, learners must achieve all the pass and the four merit criteria.

M1 builds on P2 by requiring learners to refine their complex spreadsheet model to improve efficiency.

Examples include introducing shortcuts, or other methods to aid navigation, as well as improving the presentation by applying different styles and formatting techniques. The spreadsheet model must be presentable and user friendly.

For M2, learners can use the graphs or charts they have developed for P4 as a method of analysing and interpreting data from their spreadsheet model. Alternatively, learners could use sub-totals or pivot tables, data sorting and data comparison (trends for example) techniques to analyse data. Learners will need to demonstrate that they are using these techniques to interpret the complex spreadsheet model.

M3 builds on P6 by requiring learners to compare different automation methods including macros, Active X control, Control Toolbox and Visual Basic.

M4 builds on P9 by requiring learners to produce technical documentation which includes the required hardware and software resources, instructions and an explanation of calculations used in the spreadsheet model.

To achieve a distinction grade, learners must achieve all the pass, merit criteria and two distinction criteria.

D1 builds on P1 by discussing further how organisations can use interpretation methods to analyse data.

Finally, for D2, learners must evaluate their spreadsheet model and consider feedback from others. Learners should be able to reflect on their performance in building a spreadsheet model, and what hurdles they have overcome to achieve the desired result. Did the spreadsheet model meet the given requirements? What did other people think of the spreadsheet model? Learners must also include sensible recommendations for improvements.

Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, D1	Embracing Complexity	A company has asked you to provide information on how spreadsheets can be used to solve complex problems, and how to use tools to analyse data.	Theory/practical exercises

Criteria covered	Assignment title	Scenario	Assessment method
P2, P3, P4, P5, P6 M1, M2, M3	Making it Presentable	You have convinced the company that spreadsheet models are the best way to analyse data. The company wants you to develop a complex spreadsheet to meet their needs. Exploit the full use of spreadsheet software by using advanced formulae, features and functions, and present data using charts and graphs. The company is now looking to take its work on sophistication even further, exploiting the software as much as it can with automated features.	Portfolio
P7, P8, P9, M4, D2	Going to the Next Level	The company would like to feel comfortable knowing that the spreadsheet model has been fully tested. Perform testing of the spreadsheet model. The company would also like to train their staff on the use of the spreadsheet model.	Portfolio

Suggested resources

Books

Day A – *Mastering Financial Mathematics with Excel*
(Financial Times Prentice Hall, 2005) ISBN 0764597809

Hart-Davis G – *How to Do Everything with Microsoft Office Excel 2003*
(McGraw-Hill Education, 2003) ISBN 0072230711

Heathcote R – *Further Excel 2000-2003* (Payne-Gallway Publishers, 2004)
ISBN 1904467768

Koneman P – *Advanced Projects for Microsoft Excel 2000* (Prentice Hall, 2000)
ISBN 0130885444

Simonn J – *Excel Data Analysis, 2nd Edition* (Hungry Minds Inc US, 2005)
ISBN 0764597809

Zapawa T – *Excel Advanced Report Development* (Hungry Minds Inc US, 2005)
ISBN 0764588117

Websites

<http://office.microsoft.com/en-us/excel/default.aspx> Microsoft Office website for Excel

<http://support.openoffice.org/index.html> Open Office support website

www.free-training-tutorial.com Free information on Excel

Annexe

Annexe A: Calculation of the qualification grade

Generic examples of calculation of the qualification grade above pass grade

Pearson will automatically calculate the qualification grade for learners when unit grades are submitted by the centre.

The two tables below (which are also included in *Section 5: Assessment and grading*) are used to calculate the qualification grade above pass. The generic examples that follow the tables demonstrate how the tables are used.

Points available per unit value at specified unit grades and levels

The table below shows the number of points scored per unit value at the unit level and grade.

Unit level	Points per unit value		
	Pass	Merit	Distinction
Level 1	3	4	5
Level 2	5	6	7
Level 3	7	8	9

Learners who achieve the correct number of points within the ranges shown in the 'qualification grade' table below will achieve the qualification merit or distinction or distinction* grade.

Qualification grade

Qualification	Points range above pass grade		
	Merit	Distinction	Distinction*
Pearson BTEC International Level 2 Certificate	85–94	95–99	100 and above
Pearson BTEC International Level 2 Extended Certificate	170–189	190–199	200 and above
Pearson BTEC International Level 2 Diploma	340–379	380–399	400 and above

Generic examples

Please note the following examples are generic and are not based on the units included in this specification.

Generic example 1

Achievement of pass qualification grade

A learner completing a Pearson BTEC International Level 2 Certificate, qualification value of 15, achieves the points required to gain a pass qualification grade and does not achieve the points to gain a merit grade.

	Level	Unit value	Grade	Grade points	Points per unit = unit value x grade points
Unit 1	2	5	Pass	5	$5 \times 5 = 25$
Unit 2	2	5	Pass	5	$5 \times 5 = 25$
Unit 3	2	5	Merit	6	$5 \times 6 = 30$
Qualification grade totals		15	Pass		80

Generic example 2

Achievement of merit qualification grade

A learner completing a Pearson BTEC International Level 2 Certificate, qualification value of 15, achieves the points required to gain a merit qualification grade.

	Level	Unit value	Grade	Grade points	Points per unit = unit value x grade points
Unit 1	2	5	Pass	5	$5 \times 5 = 25$
Unit 2	2	5	Merit	6	$5 \times 6 = 30$
Unit 3	2	5	Merit	6	$5 \times 6 = 30$
Qualification grade totals		15	Merit		85

Generic example 3

Achievement of distinction qualification grade

A learner completing a Pearson BTEC International Level 2 Certificate, qualification value of 15, achieves the points required to gain a distinction qualification grade.

	Level	Unit value	Grade	Grade points	Points per unit = unit value x grade points
Unit 1	2	5	Merit	6	$5 \times 6 = 30$
Unit 2	2	5	Merit	6	$5 \times 6 = 30$
Unit 3	2	5	Distinction	7	$5 \times 7 = 35$
Qualification grade totals		15	Distinction		95

Generic example 4

Achievement of merit qualification grade

A learner completing a Pearson BTEC International Level 2 Extended Certificate, qualification value of 30, achieves the points required to gain a merit qualification grade.

	Level	Unit value	Grade	Grade points	Points per unit = unit value x grade points
Unit 1	2	5	Merit	6	$5 \times 6 = 30$
Unit 2	2	5	Pass	5	$5 \times 5 = 25$
Unit 3	2	5	Distinction	7	$5 \times 7 = 35$
Unit 6	2	10	Pass	5	$10 \times 5 = 50$
Unit 8	3	5	Pass	7	$5 \times 7 = 35$
Qualification grade totals		30	Merit		175

Generic example 5

Achievement of merit qualification grade

A learner completing a Pearson BTEC International Level 2 Diploma, qualification value of 60, achieves the points required to gain a merit qualification grade.

	Level	Unit value	Grade	Grade points	Points per unit = unit value x grade points
Unit 1	2	5	Merit	6	$5 \times 6 = 30$
Unit 2	2	5	Pass	5	$5 \times 5 = 25$
Unit 3	2	5	Distinction	7	$5 \times 7 = 35$
Unit 6	2	10	Merit	6	$10 \times 6 = 60$
Unit 9	1	5	Merit	4	$5 \times 4 = 20$
Unit 10	2	10	Distinction	7	$10 \times 7 = 70$
Unit 11	2	10	Merit	6	$10 \times 6 = 60$
Unit 14	2	10	Merit	6	$10 \times 6 = 60$
Qualification grade totals		60	Merit		360



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