

Unit 30: Digital Graphics

Unit code: M/601/6630

QCF Level 3: BTEC Nationals

Credit value: 10

Guided learning hours: 60

● Aim and purpose

This unit aims to enable learners to understand different types of digital graphics images and file formats and to be able 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.

● Learning outcomes

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.

Unit content

1 Know the hardware and software required to work with graphic images

Hardware: graphics card features; internal memory eg cache, RAM; processors; other hardware eg digital camera drivers and card; file storage eg CD ROM, hard drive, flash cards, USB storage devices, Cloud storage; input devices eg graphics tablet, mouse, digital camera, scanner

Output medium: printer; computer monitor; other eg mobile phone, plotter, tablets

Software: vector based eg CorelDRAW, Adobe Illustrator; bitmap eg Paintshop Pro, Paint; photo manipulation eg Photoshop; others eg image viewers, photo galleries, file conversion

2 Understand types of graphic images and graphical file formats

File handling: converting files; file sizes; file formats eg jpg, bmp; file management eg naming files, folder structures, moving files, deleting files; compression techniques

Graphic images: vector graphics; bitmaps; comparison eg file size, scaling; file format features, typical uses

3 Be able to use editing tools to edit and manipulate images

Graphic creation: image eg scanning, importing, digital camera; image creation eg free hand draw, assemble shapes, pre-existing material

Tools and techniques: standard software tools eg free hand draw, rotate, flip, crop, group/ungroup, resize; special effects eg soften, sharpen, watermark, invert; colour eg colour balance, colour depth eg 8-bit

(256 colours), 16-bit (64,000 colours); layering; advanced techniques eg 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 eg house style, image size, intended use, file size, production costs, timescale; output media; user feedback

Reviewing: checking eg against client need, against user need; proofing; image resolution; file formats; other eg speed of loading

Legislation and guidelines: as appropriate eg identifying ownership, copyright, copyright free, gaining permissions

Assessment and grading criteria

In order to pass this unit, the evidence that learners presents for assessment needs to demonstrate that they can meet all the learning outcomes 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 [CT5]	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 [CT1]		
P5 modify images as a result of user feedback [CT6, RL4]		
P6 explain the potential legal implications of using and editing graphical images.		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers CT – creative thinkers	RL – reflective learners TW – team workers	SM – self-managers EP – effective participators
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Essential guidance for tutors

Delivery

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 as a guide only and tutors will use knowledge of their learners to adjust the allocation of time, and order of delivery, accordingly.

The suggested programme of delivery follows the same sequence as the learning outcomes, 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 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 can all seem mundane to learners who are looking forwards to creating graphical images, but this forms a vital basis to the unit, as acknowledged by the first assignment which is based wholly on learning outcome 1.

The unit moves on to consider the various aspects of file handling. Much of this will already be familiar to level 3 learners although file conversions, formats and compression will need to be emphasised. A tutor-led discussion is one way of delivering this element, backed up by simple exercises and handouts.

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 OLP 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 and/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.
Assignment 1 – Hardware and Software
Image types and file formats: <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.
Assignment 2 – The Thick of It
Editing images: <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.
Assignment 3 – The Final Tweaks

Assessment

It is suggested that this unit is assessed using the three assignments 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 formats lend themselves to particular graphical products.

For P3, learners could capture images using a digital camera, or use a pre-existing image to edit. Tutors should supply learners with a user need. Learners must manipulate images 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 meet all the pass criteria and the three 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 their limitations. 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 meet 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 them. 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 Pearson 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
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

Links to other BTEC units

This unit forms part of the BTEC in IT sector suite. This unit has particular links with the following unit titles in the IT suite:

Level 1	Level 2	Level 3
		Unit 30: Digital Graphics

Essential resources

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, eg 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:

- Learning and Skills Network
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme
- Institute for Education Business Excellence
- Local, regional Business links
- Work-based learning guidance.

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Creative thinkers	demonstrating the use of editing tools to edit and manipulate images creating original graphic images to meet a defined user need modifying images as a result of user feedback
Reflective learners	modifying images as a result of user feedback.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	justifying the software, tools, file format, image resolution and colour depth used for creating graphic images discussing the impact that file format, compression techniques, image resolution and colour depth have on file size and image quality
Effective participants	discussing the impact that file format, compression techniques, image resolution and colour depth have on file size and image quality.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Using ICT Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	demonstrating the use of editing tools to edit and manipulate images.