Unit 53: Web Development

Unit code: K/601/3256

QCF Level 3: BTEC Specialist

Credit value: 10

Guided learning hours: 80

Aim and purpose

This unit provides an understanding of web architecture, components and technologies. It also covers the development of a specification for a website and implementation of website elements.

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 technologies used to build and operate websites. Learners investigate the web development process from identification of need, through design, build, and testing.

Learning outcomes and assessment criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

On completion of this unit a learner should:

Learning outcomes	Assessment criteria
1 Understand web architecture and components	1.1 describe the hardware and software components which enable the internet and web 1.2 explain the role of the TCP/IP protocol including IPv6 1.3 explain the role of internet service providers, web hosting services and domain name registrars 1.4 describe available types of web functionality including Web 1.0, Web 2.0, blogs, online applications and cloud computing
2 Understand the technologies that can be used to build and operate a website	2.1 explain the use of markup languages 2.2 explain the use and functionality of: • web runtime environments • web application programming languages 2.3 explain the role of database in building website and web applications 2.4 identify typical product stack combinations that can be used for web development
3 Develop a website specification	3.1 produce a pre-production proposal document for a website development project 3.2 identify the components required to develop a website 3.3 produce an implementation plan for a website development
4 Implement elements of a website	4.1 design components of a website 4.2 develop components of a website 4.3 test components of a website

Unit content

1 Understand web architecture and components

Components: hardware eg web, mail and proxy servers; routers; software eg browser, email

Protocols: transport and addressing eg TCP/IP, IPv6; application layer eg HTTP, HTTPS, SMTP

Web architecture: Internet Service Providers (ISP); web hosting services; domain structure; domain name registrars; worldwide web

Web functionality: Web 1.0, Web 2.0; blogs; online applications; cloud computing

2 Understand the technologies that can be used to build and operate a website

Languages: markup languages eg HTML, TeX, XML; web languages eg Expression Web, Dreamweaver, Flash; scripting languages eg JavaScript, VBScript; use and functionality of languages

Building websites: web runtime environments eg Windows, MAC; role of databases; product stack combinations eg Oracle, IBM Websphere

3 Develop a website specification

Proposal document: nature of interactivity required eg online transactions, static versus dynamic; client needs and user needs eg image, level of security, support, maintenance contracts, costs, visibility on search engines; end user need eg appropriateness of graphics, complexity of site, delivery of content; implementation plan eg development timescales, dependencies (critical path)

Components: hardware; software

4 Implement elements of a web-site

Design tools: concept designing eg mood boards, storyboarding; layout techniques eg frames, tables, block level containers (DIV), inline containers (SPAN); templates; colour schemes; screen designs; other eg outline of content

Software: markup languages eg HTML; client side scripting languages eg JavaScript, VBScript; software development environments

Structure: layout of pages; navigation; format of content and cascading style sheets (CSS); interactive features eg catalogue of products, shopping cart; images; animation

Tools and techniques: navigation diagram eg linear, hierarchy, matrix; building interactivity tools eg Pseudo code for client-server scripting; animation; audio/visual elements; ensuring compliance with W3C; meta-tagging; cascading style sheets

Content: proofed, correct and appropriate; information source; structured for purpose eg prose, bullets, tables

Testing: functionality testing eg user environments, links, navigation; content; check against user requirements; user acceptance; audit trail of changes

Essential guidance for tutors

Delivery

This unit has both theoretical and practical aspects. Tutors may prefer to start with the more practical elements of designing and building websites to engage interest and run this thread through the teaching and learning required for the other learning outcomes.

Learning outcome 1 can be covered with directed research, discussions and taught sessions. Learners may already have experience of the hardware from networking units and will almost certainly be familiar with ISPs and domain names but will probably not have looked at the range of options and functionality available.

Learners should use different web and scripting languages if at all possible. Simple web pages can be implemented in different languages. Learners can research product stack combinations and web runtime environments.

To enable learners to develop a website specification, case studies would be of value. Each element of a proposal can be identified and discussed to ensure understanding of the content required.

The majority of time is likely to be spent on learning the tools and techniques necessary to implement a website. The unit content gives the required range of skills and techniques to be included. Sufficient time and emphasis must be given to checking content and testing. Peer testing and feedback can be used to simulate user acceptance testing and learners should act on feedback made.

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
Web architecture and components • Revision of hardware – handouts, research, discussion • Protocols – TCP/IP, tutor led, research • Architecture – ISPs etc research, gapped handouts.
Operating websites • Web languages etc – practical, examples • Building websites – examples, research product stack combinations.
Assignment 1 - An intro to web design
Website specification • Identifying user requirements – case studies • Generating proposal documents – case studies, exercises.

Topic and suggested assignments/activities and/assessment
Assignment 2 - Specifying the need
Developing websites • Research existing sites – good and bad, use of effects/colour etc • Design tools – storyboards, exercises • HTML – exercises • Scripting – exercises • Structure, tools and techniques - exercises • Testing – formal procedures, practical exercises.
Assignment 3 – Implement a website

Assessment

It is suggested that this unit is assessed using the three assignments summarised in the *Programme of suggested assignments* table.

Assignment 1

The first assignment will cover learning outcomes 1 and 2. An appropriate scenario might be that learners have been asked to give a talk to trainee web designers and must prepare a presentation with accompanying handouts. Care must be taken with the leading verb for each criterion, ie describe and explain. An explanation requires a more detailed answer often incorporating answers to questions such as, why, or, how, eg 2.1 'explain the use of markup languages' should not just state what a markup language is but should also explain how they work (perhaps using examples) and why they are used.

Assignment 2

For learning outcome 3 learners are to prepare a pre-production document, identify components required to develop a website and produce an implementation plan. These can all be combined in a specification document. Learners will need to be given a sufficiently detailed case study to extract the information they need or the tutor might prefer to act the role of the user and give verbal answers.

Assignment 3

Following production of the specification, learners will design, develop and test a website. Evidence will come from the design documentation, completed website (screen-shots, annotations etc), witness statements, test records and user feedback. Learners should identify where they have used each of the tools and techniques outlined in the unit content.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the assessment 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 Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
1.1, 1.2, 1.3, 1.4 2.1, 2.2, 2.3, 2.4	An intro to web design	You are to give an introduction to website design to a group of trainees.	Presentation. Handouts.
3.1, 3.2, 3.3	Specifying the need	You are to develop a website proposal document.	Specification. Implementation plan.
4.1, 4.2, 4.3	Implement a website	Develop and implement your proposed website.	Design documentation. Screen-shots. Witness statement. Test records. User feedback.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

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

Level 1	Level 2	Level 3
	Web Fundamentals	e-Commerce

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 3 National Occupational Standards for IT and Telecoms Professionals (ProCom):

4.6 Human Computer Interaction/Interface (HCI) Design

5.2 Software Development.

Essential resources

Access to an internet connection is essential for this unit so that learners are able to review sample websites. All learners should have access to a PC with the following application software:

- authoring software
- web browser.

It is recommended that, where possible 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.

There is a range of organisations that may be able help centres to 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
- National Education and Business Partnership Network – www.nebpn.org
- Network for Science, Technology, Engineering and Maths Network Ambassadors Scheme – www.stemnet.org.uk
- Work-based learning guidance – www.aimhighersw.ac.uk/wbl.htm
- Work experience/workplace learning frameworks – Centre for Education and Industry (CEI University of Warwick) – www.warwick.ac.uk/wie/cei

Indicative reading for learners

Textbooks

Brannan James A - *Web Design in Simple Steps* (Prentice Hall, 2009) ISBN 0273723537

Online Training Solutions - *Microsoft Office FrontPage 2003 Step by Step* (Microsoft Press US, 2003) ISBN 0735615195

Towers J - *Macromedia Dreamweaver MX 2004 for Windows and Macintosh* (Peachpit Press, 2004) ISBN 0321213394

Vandome D - Dreamweaver MX 2004 in Easy Steps (Computer Step, 2004) ISBN 1840782811

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.excellentsite.org

www.webpagesthatsuck.com

Functional Skills – Level 2

Skill	When learners are …
ICT - Using ICT	
Plan solutions to complex tasks by analysing the necessary stages	designing components of a website
Select, interact with and use ICT systems safely and securely for a complex task in non-routine and unfamiliar contexts	developing and testing components of a website
ICT - Finding and selecting information	
Select information from a variety of sources to meet requirements of a complex task	explaining the role of internet service providers, web hosting services and domain name registrars
ICT - Developing, presenting and communicating information	
Use appropriate software to meet the requirements of a complex data-handling task	developing and testing components of a website
Combine and present information in ways that are fit for purpose and audience	describing the hardware and software components which enable the internet and web explaining the role of the TCP/IP protocol suite.