



improving learning
through technology



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Quality principles for digital learning resources

These quality principles relate to the design and use of digital learning resources to support effective learning and teaching.

This publication is intended as a guide rather than a 'checklist' for quality, and it is expected that few digital learning resources will in themselves encompass all of the quality principles. Whether you are designing a resource or choosing one, the intended educational purpose of the resource will determine which principles are most important to you.

The principles are divided into two groups, which are interrelated:

- **Core pedagogic principles**, which underpin effective learning and teaching, drawing from learning theory and commonly accepted best practice;
- **Core design principles**, covering issues such as resource design, accessibility and interoperability.

Why use these Quality Principles?

The principles can be used to evaluate the quality of digital learning resources, and inform judgements about value for money.

- If you are choosing and using digital learning resources, the principles will help to ensure that the resources you select are fit for purpose.
- If you are developing a digital learning resource, they will help to guide your design decisions to ensure that the resource is appropriate for its educational purpose.

Find out more

The full version of this publication, with links to a range of related websites, is available on the Becta website at

<http://www.becta.org.uk/partners/qualityprinciples>

Note: throughout this document the term 'pedagogy', which commonly refers to the 'art or science of teaching', is also used to include contexts in which learners have a strong role in directing learning for themselves, and those in which there is no underlying teacher/learner relationship and learners largely or wholly determine their own learning.

Core pedagogic principles

Inclusion and access

Under UK legislation, educational institutions are required to ensure that no learner is prevented from participating fully in education or disadvantaged because of factors such as:

- physical, sensory or cognitive impairment
- ethnic or social background
- gender.

The learning experience offered must be based on inclusive practices. This includes selecting appropriate pedagogies and resources.

Digital learning resources should, in most circumstances, support inclusive practices in their design and in the supporting materials they offer practitioners and learners. For example, they can do this by offering the flexibility to adapt resources to different learning preferences, or by suggesting alternative ways of addressing the intended learning objectives, where the digital learning resources are limited in relevance.

Learner engagement

Teaching and learning should engage, challenge and motivate learners. This entails an experience that:

- is motivating, in that it encourages a culture of learning, is enjoyable and is experienced positively by practitioners and learners alike
- has a worthwhile educational aim and is not simply about occupying or entertaining learners
- does not produce reactions to learning that are likely to reduce the general motivation to learn or that could discourage learners from using ICT to learn.

Engagement and motivation are achieved through a complex mix of aesthetic, technical and educational design and can be strengthened by the context.



Effective learning

The experience of effective learning promotes effective cognitive and behavioural development or change. This principle can be realised in a variety of ways, including:

- the use of a range of approaches that allows the learner to choose one that suits them, or that can be personalised for the learner, or that will extend the learner's repertoire of approaches to learning (such as 'learning how to learn')
- the provision of evidence that learning outcomes have been realised
- the satisfaction of a range of the characteristics of effective learning, including supporting appropriate learner agency and autonomy, encouraging metacognitive skills and higher order thinking, and enabling or encouraging reflection and collaboration
- the provision of authentic learning (authentic to situations outside the immediate learning environment and to the learners' existing perspectives and situations)
- the provision of multiple perspectives on a topic (another aspect of authenticity).

Assessment to support learning

In order to support learning, teaching and learning should incorporate a formative assessment of what has, or has not, been learnt or understood. This includes providing feedback to the learners on their acquisition of knowledge and skills. The feedback should be specifically aimed at improving learning and should provide or point to other activities that further support learning. This need not be limited to the provision of tests and may be achieved via:

- rapid feedback that helps learners see how they can improve and what they must do to improve
- opportunities for peer and/or self-assessment, with appropriate understanding by the learners of the criteria or standards of performance required.

To be effective, feedback needs to be personalised; that is to say specific to the individual learner's problems and needs.

Robust summative assessment

Summative assessment should be used to provide information on learner performance that can be used for guidance or selection in relation to future education or work opportunities. Not all technology-enhanced learning will encompass summative assessment, but where it does, it must be:

- valid and reliable in that it assesses what is meant to be assessed and gives consistent results for particular learners or other users
- informative in that it is usable and comprehensible by practitioners, learners, parents and employers (as appropriate)
- able to deal with a range of achievement levels
- able to be retained and accessed over time by users, if they wish to do so, as evidence to support their progress or claims about their own learning.



Innovative approaches

Digital learning resources may be innovative in their design and use of technology and/or innovative in the approach to teaching and learning that they offer.

Ease of use

As well as being clear in their intention, digital learning resources should be as transparent as possible to the user.

They should:

- provide appropriate guidance, where necessary, for learners and/or practitioners
- make appropriate assumptions about the ICT skills of users, both learners and practitioners, or provide straightforward guidance on this
- not present a barrier or impede the learning experience.

In terms of appropriate guidance for learners, digital learning resources should not require extensive training or instructions that are not themselves part of the educational aim of the technology-enhanced learning.

It is acknowledged that practitioners may need some training to use digital learning resources, but where possible this should focus on pedagogy and not on technological requirements.

Match to the curriculum

'Curriculum' refers to any programme of learning activity planned by practitioners and/or learners.

Digital learning resources should be aligned to an appropriate curriculum or programme of learning activities by having:

- clear objectives, specified at the appropriate level
- content that is relevant, accurate, trustworthy and authoritative
- learning activities that are appropriate to curriculum goals
- assessment (where it is present) that is appropriate to curriculum goals.

The better the match of the digital learning resource to the four dimensions above, and the more that match is made explicit by the developer, the easier it will be for those who use the digital learning resources to plan effective pathways and ensure that the approach or approaches adopted are appropriate for the intended objectives, the context and learners' activities and assessment.

It will also be easier for practitioners to make their planning clear to learners, so that they may engage effectively in learning.

Core design principles

Digital learning resource design

The application of this principle to product design closely reflects many of the elements found in the pedagogic principles.

Digital learning resources should exploit the opportunities provided by ICT to enhance learning and teaching. In particular, they may do this by:

- offering clear benefits over non-ICT resources
- providing appropriate educational stimulus and feedback
- offering tasks that challenge targeted learners appropriately
- enabling collaborative work, where appropriate
- enabling practitioners to exploit, adapt and differentiate resources to meet specific needs
- supporting learners in selecting their own route through the digital learning resource, where appropriate
- supporting the user in customising the resource
- using an appropriate mix of media for the learning objective (for example graphics, animation, photographs, video, sound) to engage the learner with the educational purposes
- providing record-keeping facilities for the practitioner and learner, where appropriate
- taking advantage of any specific opportunities offered by the platform used (for example PDA, tablet PC, mobile).

Robustness and support

Digital learning resources should support the user appropriately by:

- having help functions that identify common user problems and their solutions
- having navigational actions that can be undone
- giving quick, visible and audible responses to user actions
- allowing the user to exit at any point
- not being adversely affected by user experimentation and error. If users do experience an error they should be able to recover quickly and, where appropriate, be informed about the nature of the error.



Human–computer interaction

Digital learning resources should facilitate sound human-computer interaction by having:

- icons that are clear and consistently used
- navigation that is consistent and appropriate for the user
- action systems that follow generally used conventions
- functionality that is transparent, meets users' expectations and helps learners to adapt to that functionality
- appropriate visual and auditory cues and feedback
- aesthetics that support the educational objectives.

Quality of assets

Digital learning resources should ensure that assets are suitable for the context of use.

This means:

- assets can be accessed easily and consistently, are technically stable and are presented or provided in a commonly accepted or open file format
- assets are well chosen with respect to the learning objectives
- rights are appropriate for the intended use.

It may also be beneficial to users if assets can be modified and/or disaggregated (rights issues permitting). However, this point is distinct from the intrinsic quality of assets.

Accessibility

Accessible design of digital learning resources concerns ensuring that no user, practitioner or learner is unreasonably prevented from benefiting from a resource simply because of their access requirements or preferences.

There is still much debate around the best approaches to accessibility, but core aspects that all designers must address are that:

- accessibility issues must be considered from the earliest point of the development process

- accessibility is not simply a technical issue and all aspects of design must be considered, for example the user interface and the layout of information and support materials
- resources must offer relevant information on the accessibility features that are included and/or relevant technical specifications.

Important technical specifications and guidelines for accessibility already exist. Most of these focus on the technical aspects of accessibility in relation to websites. However, accessibility must be considered in relation to all digital learning resources, regardless of the delivery platform used.

It is acknowledged that some digital learning resources may be designed to address specific needs, for example to support learners with dyslexia. However, no resource should unnecessarily or unreasonably exclude users simply because they have not been considered in the development process.



Interoperability

The principle of interoperability has many potential educational benefits for learners and these apply across many aspects of education, for example the use of learning platforms and e-portfolios, and the transfer of learner data across institutions.

Although the concept of interoperability is often discussed with reference to detailed technical specifications, this should not obscure the importance or relative simplicity of the principle itself.

Digital learning resources should

- use appropriate vocabularies to describe content and learning opportunities
- be stored so that content or learning is available to all
- be easily found and identified through resource discovery services
- use recognised interoperability standards so that content runs or plays in the identified environment, for example a browser or learning platform
- be repurposed and shared wherever possible, and have their rights described in common and agreed ways.

It is acknowledged that the development of interoperability standards is ongoing.





Testing and verification

A well-planned development process with effective reviewing and feedback procedures ensures that digital learning resources are:

- suitable for the target audiences
- culturally appropriate and factually accurate
- suitably challenging
- robust and match the target environments.

It is noted that this principle is essentially about testing and verifying the resource's declared intentions and the appropriateness of its materials. It is not concerned with recommending particular development processes, project management methodologies and so on.

Effective communication

Effective communication is an underlying principle that is dependent on the implementation of the relevant core pedagogic and design principles. However, it is an important principle that should be considered for all digital learning resources.

Effective communication related to a digital learning resource is reliant on how the core pedagogic and design principles are addressed. Nonetheless, it is important to ensure that key information, user guidance and known benefits or issues are communicated clearly to practitioners and learners.

The nature of communication (whether within the digital resource itself or in supporting documentation or packaging) and the level of detail will of course differ with each digital learning resource.

Key aspects that are likely to require clear communication include:

- the learning objectives of a digital learning resource and its relevance to a curriculum and age range (Match to the curriculum)
- information about specific learning contexts for which a digital learning resource has been designed, for example to support a particular pedagogic approach or for self-directed use in the home or workplace (Effective learning)
- known inclusion and accessibility features and advice about addressing known issues and gaps (Inclusion and access and Accessibility)
- information about how effective learning can be assessed in relation to the digital learning resource (Assessment to support learning and Robust summative assessment)
- key technical information about what ICT infrastructure is required to use the digital learning resources and key technical features (Interoperability)
- clear statements about the licence terms and conditions, for example whether assets within the digital learning resource can be modified and re-used (Quality of assets).

further information

ACCAC (Wales)

<http://www.accac.org.uk>

Apple: Human interface guidelines (PDF)

<http://developer.apple.com/documentation/UserExperience/Conceptual/OSXHIGuidelines/OSXHIGuidelines.pdf>

Becta: Guidelines for website accessibility

<http://industry.becta.org.uk/display.cfm?resID=14281>

Becta: Inclusion and SEN

<http://www.becta.org.uk/schools/inclusion>

Becta: Learning resource development advice

<http://www.becta.org.uk/industry/content>

BETT Awards

<http://www.becta.org.uk/bettawards>

Centre for educational technology interoperability standards (CETIS)

<http://www.cetis.ac.uk>

DENI: Curriculum and Assessment

http://www.deni.gov.uk/index/80-curriculumandassessment_pg.htm

Design principles for educational software: Design principles database

<http://www.design-principles.org/dp/index.php>

Disability Discrimination Act 1995

http://www.opsi.gov.uk/acts/acts1995/Ukpga_19950050_en_1.htm

Disability Rights Commission Code of practice

<http://www.drc-gb.org/thelaw/practice.asp>

e-Government Schemas and Standards

<http://www.govtalk.gov.uk/schemasstandards/schemasstandards.asp>

Futurelab

<http://www.futurelab.org.uk>

IBM: Ease of use design concepts

<http://www-03.ibm.com/easy/page/567>

IMS Global Learning Consortium

<http://www.imsglobal.org>

Jakob Nielsen's Ten usability heuristics

http://www.useit.com/papers/heuristic/heuristic_list.html

JISC Legal information service

<http://www.jisclegal.ac.uk>

Qualifications and Curriculum Authority (QCA)

<http://www.qca.org.uk>

Schools Interoperability Framework (SIF)

<http://www.sifinfo.org>

Scottish Qualifications Authority (SQA)

<http://www.sqa.org.uk>

Special Educational Needs and Disability Act 2001

<http://www.opsi.gov.uk/acts/acts2001/20010010.htm>

TechDis

<http://www.techdis.ac.uk>

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