

3. E-testing guidelines

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3.1 Introduction

There are a number of influences on current thinking related to e-testing. These influences derive from technological developments, as well as from demands for more flexibility and innovation in the offer and conduct of assessment, as appropriate to 21st-century approaches to learning and employment. This section of the guide reflects these influences.

As the variety and flexibility of different assessment technologies and applications have developed in recent years, there has been a parallel demand to standardise some aspects of the conditions for e-testing in order to stabilise systems management and present user-friendly and accessible e-assessment opportunities to learners. Some of the pressures for standardisation of test conditions include:

- ◆ the increased ability of technologies to deliver more complex and flexible types of test
- ◆ the rapid rise in the number of tests being taken and the pressure on resources that this can cause
- ◆ the issues associated with on-demand testing
- ◆ the increasing range of settings/locations where tests are being undertaken when compared to paper-based testing

There are also some issues which relate specifically to e-testing as opposed to paper-based tests, such as:

- ◆ setting up the testing location to minimise distractions that may occur, for example, when it is also being used for e-learning or other purposes
- ◆ ensuring that the centre is capable of dealing with the technological aspects of e-testing, and that technical staff understand the wider issues involved in e-testing
- ◆ understanding the issues associated with candidates who may be undertaking the same tests at different times, or taking different tests at the same time
- ◆ where there is a choice of paper-based testing or e-testing, understanding the relative issues and benefits and discussing these with learners

These and other specific issues are covered within the guide.

In some instances, and for some types of qualification, e-testing arrangements (such as layout and procedures) have been well developed by some awarding bodies. Centres should refer to any specific guidelines produced by awarding bodies by whom they are approved (or intend to become approved) to offer e-testing, as well as the recommendations contained in this guide.

For information on centre organisation and the roles and responsibilities of staff involved in e-testing, please see section 2 'Roles and responsibilities'.

3.2 E-testing process guidelines and checklists

This section (3) of the guide covers recommendations and guidance for the different stages of the e-testing process. There are associated pro forma templates in annex A3, which can be used as checklists to ensure that all steps have been covered. The templates can also be used as an audit trail for problem identification and resolution, and could be used as evidence of having clear processes in place for inspection purposes. Signature boxes have been included on the templates.

3.3 The e-testing environment

General environment

Some aspects of good design, such as clearly legible screens and consistent positioning of seats, benefit all users, not only those with disabilities.

There are a number of principles that need to be followed to make sure that the general environment is suitable for conducting e-testing. These may be supplemented by specific regulations required by the awarding body.

It is not assumed that the e-testing environment is a dedicated test centre. Facilities used as test centres may also be used for other purposes at other times, or in some instances, at the same time as tests are being conducted. E-tests may also be conducted remotely from the centre.

Therefore, the following points apply to any location where e-testing sessions are held, as e-testing may be conducted away from the centre provided that all requirements are met. Any non-standard arrangements should have prior approval of the awarding body.

Preparation of the e-test location and equipment should be carried out well in advance of any e-testing session, so that there is time to correct any problems (see annex A5 for a checklist).

Candidates with disabilities should be advised to discuss their needs with the centre well in advance of taking the test to ensure that adequate provision is made.

Workstation design and layout

Note: According to ISO/IEC 23988:2007 ('Code of practice for the use of information technology (IT) in the delivery of assessments') the definition

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of a 'workstation' in this context is 'equipment provided for an individual candidate at an appropriate location, including IT hardware, seating and desk or table space'.

- ◆ To ensure a comfortable e-testing environment, attention should be given to the effects of computer use, especially the likely need for:
 - increased ventilation, because of the heat generated by equipment
 - adaptations to lighting to suit work both on and off screen
 - ◆ The layout within a work space should take into account access for the learner/candidate — the workspace should not restrict or hamper access to the equipment.
 - ◆ Each workstation should include the following features:
 - a chair with adjustable seat height and a stable base
 - an adjustable monitor, such that the input lines are situated between 20 and 45 degrees below the test subject's horizontal line of sight
 - a foot rest (if requested)
 - freedom from glare
 - sufficient depth of workstation surface to allow space for optimum positioning of keyboard, mouse and screen, including for left-handed users
 - space for any printed or other materials or equipment that may be needed for the e-test, with a document holder if requested
 - facility for making rough notes, if permitted. The paper used to make such notes should not be allowed to leave the testing environment, to ensure that the integrity of the test questions is maintained
 - ◆ Space between workstations should be sufficient for comfortable working.
 - ◆ If adjacent candidates are taking the same e-test (see note below), there should be measures to ensure that they cannot see each other's screen, by providing either of the following:
 - sufficient distance between workstations (a minimum distance of 1.25m is recommended)
 - partitions between workstations
- Note:** If arrangements have been made by the awarding body and technology provider to ensure that candidates do not receive the same e-test, for example, through the use of item pools or test forms, these specific restrictions need not apply.
- Centres should consider the need for some workstations to have additional space or facilities to cater for candidates with disabilities (for example, wheelchair access, extra equipment, larger monitor, and links to assistive technologies)

Hardware, software, peripherals and communications links

(See annex A4 for additional technical information and checklist)

- ◆ Where e-tests are delivered **on a network or intranet**, the server and connections should be adequate to give an acceptable response time at the candidate's computer or terminal, taking account of:
 - the average amount of traffic between candidate and server in one e-test (both frequency and size of transactions)
 - the likely maximum number of candidates at any one time
- ◆ Where e-tests are delivered **via the internet**, or in any other situation where speed of connections cannot be guaranteed, measures should be taken to ensure that candidates are not disadvantaged by inappropriate equipment or slow connections. It is therefore important that the centre:
 - monitors their infrastructure and/or equipment, particularly if changes are made to it
 - takes appropriate compensatory action if connection speeds become detrimental to e-testing, if necessary considering annulling the test in the event of problems
- ◆ The technology provider and/or awarding body should be involved as appropriate in discussing changes and issues of this sort.
- ◆ Each workstation should be equipped with hardware, software, peripherals and communications links to the standard specified for the e-test(s) being taken, and conforming to appropriate BSI standards (see section 8 and annexes A4 and A5).
- ◆ If sound output is required, either as part of the e-test or to assist candidates with special needs, headphones or separate areas should be provided to avoid disturbing other candidates. This may also apply to sound recording.
- ◆ Centres should consider the need for a range of assistive technologies, depending upon the expected needs of candidates and the provisions of the relevant legislation and guidance (see section 7).
- ◆ There should be adequate back-up provision in case of equipment failure. Provision can include:
 - spare workstations (of the required specification)
 - spares of easily replaced items (such as a mouse, or screen)
 - a back-up server if e-tests are delivered over the test centre's own network
- ◆ Hardware should be well maintained, with back-up equipment where possible to minimise the likelihood of failure during an e-test.
- ◆ Virus protection measures should be in place and kept up to date.

Other facilities and areas

- ◆ Some e-tests or candidates may require access to areas separate from the main area in which e-tests are taken. The reasons for this may include:
 - candidates needing special assistance or facilities that could distract others (for example, a helper or use of sound output and recording)
 - facilitating opportunities for practice e-tests

Security

- ◆ The arrangement of the workstations, and presence and position of the invigilator (and of video monitoring if used) should facilitate detection of any unauthorised activity by candidates, such as communication with others or use of unauthorised reference material.
- ◆ There should be appropriate security facilities to keep e-test content, correct responses, candidate responses and candidate details secure at the test location before or after the session, including:
 - physical security measures (normally including a safe) for any paper or removable electronic media
 - electronic protection for any information held on networks
 - securing the e-testing location and any related server/communication room(s) after confidential material has been loaded onto the network
- ◆ E-test content should be protected from unauthorised access until immediately before, during and after the e-test takes place. Candidate details and responses should be kept secure at all times.
- ◆ Consideration should be given to the need to remove all confidential data (including e-test content, responses and candidates' personal details) from generally accessible networks immediately after each e-testing session.
- ◆ If records of candidate responses are retained at centres, there should be measures to protect their security, including:
 - prevention of unauthorised access
 - prevention of tampering and substitution
 - destruction of files in accordance with the agreed timescale, for example, when receipt of the information has been confirmed by the awarding body or at the expiry of the period for external verification and possible appeals
- ◆ Security measures may include the following, as appropriate:
 - user ID and password protection of access to computers or networks
 - encryption of data
 - removal of records from networks as soon as practicable after the end of the e-testing session
 - storage of removable computer media in a safe
 - procedures for identifying records for destruction

- ◆ If responses are not intended to be stored at the centre, there should be measures to ensure that they are not inadvertently cached on the candidate's machine.

Note: Storage of data that includes personal details is subject to the provisions of the Data Protection Act 1998.

3.4 Preparing for e-testing

This section looks at the processes that should be completed prior to conducting an e-test session.

Registering with an awarding body

Candidates will normally be registered with an awarding body and entered to take their e-test at the centre where they undertake their learning programme. However, the test may be taken at a different centre or location, or indeed a test may be offered completely independently of any particular learning programme. In all instances it will be the responsibility of the centre conducting the test to ensure that all necessary candidate registration requirements have been fulfilled with the relevant awarding body.

- ◆ Learners should be assisted in making the appropriate selection of unit or qualification by:
 - explaining the specific e-testing options available
 - helping the learner to select the appropriate option(s) to meet their needs
 - explaining what support will be available to them at each stage of the e-testing process
- ◆ Learners should be registered and entered for assessment for the particular qualification or unit selected, in accordance with the specific requirements and arrangements defined by the relevant awarding body.
- ◆ Learners should be scheduled to take their e-test on a date that meets their own, the centre's and the awarding body's requirements, ensuring that sufficient time is allowed for preparation of the test location, equipment, materials and the candidate (see later sections of this guide for details on each of these aspects).

E-test location and equipment preparation

The location in which the e-test is to be conducted and its layout and associated equipment should be set up in accordance with the guidelines detailed in section 3.3, 'The e-testing environment'. See annex A5 for an accompanying checklist.

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Centres should ensure that they have the relevant information about hardware, software and communication requirements from the awarding body well in advance of the e-test session.

This should include any assessment-specific information such as special fonts or character sets, or any reference materials or aids, like calculators, that need to be provided by the centre.

- ◆ The following technical checks should be performed before the start of an e-test, particularly if the location is also used for other purposes.
 - All necessary computers and peripherals (including spares, if available) are in working order.
 - The centre's server and connections (including communications links) meet the requirements of the e-test.
 - The computer date and time are correct.
 - Specific e-test software, if necessary, has been loaded, together with any other required software.
 - The assessment software works correctly on all the equipment to be used for the assessment, using material supplied by the awarding body.
 - If necessary, software has been configured to the requirements of the specific e-test. This may, for example, involve disabling help screens and spell-checks.
 - E-test software and storage of results are working correctly (if practicable).
- ◆ Centres should be aware of the following features of any assessment, so that they can be checked, and ensure that they are explained to candidates prior to taking the e-test including:
 - any fail-safe features that have been used in the assessment, for instance, to prevent the candidate from quitting the test by accident
 - what access the assessment allows to on-screen data and aids, such as calculators
- ◆ Any additional equipment or facilities required (either by the assessment or by the candidate) should be identified in advance, made available and checked to ensure that they work with the assessment software and centre equipment, so that candidates are not disadvantaged when taking an e-test.

Centres should obtain any necessary authorisation from the awarding body for the use of any particular assistive technology or device and, where appropriate, discuss with the awarding body any additional requirements, such as a relaxation of the time limit for a candidate with particular needs.

Materials preparation

Problems or issues that arise at this stage of the process should be fed back to the awarding body or allocated representatives for immediate resolution, as they may affect the feasibility or validity of the e-test.

Centres should have sufficient information (through the awarding body) to enable them to run the assessment smoothly and to answer candidates' questions.

The conditions relating to reverting to paper-based testing, should the need arise, should be agreed in advance with the awarding body

- ◆ The awarding body should provide clear instructions on use of the assessment materials. Centres should ensure that everything is valid and working correctly by performing the following checks on the assessment materials:
 - logging on or starting the e-test (and identifying how to end the test)
 - verifying that it is the correct and most up-to-date version of the e-test, if necessary
 - knowing how the particular assessment operates, in order to recognise any problems that arise, and know how to deal with them
 - ensuring that any necessary additional materials (such as calculators) and paper for rough notes, if permitted, are available if they are to be provided by the centre
- ◆ Centres should also check the awarding body's procedures for safeguarding the security of assessment content during transmission, and the centre's involvement in that process, such as procedures for covering:
 - notification of despatch and receipt
 - security measures (comparable to those for paper-based assessment, where physical transport is used)
 - any use of cryptographic techniques
 - the transmission process
 - ensuring the integrity of records
 - ensuring the integrity of assessment content received

Preparing learners for e-testing

Learners need to become familiar with undertaking e-tests, and to understand the differences between traditional paper-based assessment and e-testing to ensure that they are not disadvantaged by taking an on-screen assessment. This is particularly important where the learner is not familiar with using PCs or has not been exposed to any of the specific item types that can be used with e-testing, such as 'drag and drop' or 'hot spots'.

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The centre is responsible for ensuring that learners are offered practice e-tests, ideally for the test system they will be using; that they understand that the purpose is familiarisation; and that they are aware of any differences between the practice tests and the actual e-test they will be taking that may have an impact on their success in completing the test.

- ◆ Centre staff need to understand the different types of practice e-test material that may be available, and be able to give appropriate explanation and support to learners in using these practice materials (both before and during the session if necessary), in order to help them prepare for formal assessment.
- ◆ Wherever possible, a learner should be offered a practice e-test linked to the qualification or unit they are undertaking.
- ◆ Practice material similar to the actual e-test should be provided, and should be made available in the appropriate format (for example, via the internet or on disk), taking into account any specific needs of the candidate(s).
- ◆ Two sources of practice e-test may be used: either an awarding body's own practice assessments, or generic practice assessments that mirror the feel and format of real e-tests. Guidance should be available from awarding bodies on the availability and use of such practice tests.

Running a practice e-test session

Note: As these practice tests do not lead directly to certification, they may be offered by any learning centre, whether or not it is an approved e-assessment centre. For practice e-tests, adhering to the strict e-test environment conditions is less critical.

- ◆ Centres should explain that a practice assessment does not 'count' towards credits or a qualification, and that its purpose is to provide an experience of the format, process, pace and pressure of a particular e-test, and to provide feedback on preparedness to succeed in a real test situation.
- ◆ Centres should draw attention to the help and fail-safe features of the software, and provide an opportunity to become familiar with navigation.
- ◆ A practice test should show:
 - all the relevant features of the software, particularly navigation, and any data protection or waivers, rules of conduct or similar content that the candidate may have to agree to
 - all item types used in the actual test
 - a sample of items similar in content, style and difficulty to those used in the actual test (not necessarily a full-scale mock test)
 - a sample of results and/or feedback

It is essential that centre staff can answer questions about navigation and the types of question used within e-tests, in order to help prepare candidates for taking a formal e-test. They may also need to answer navigation questions during the actual e-test.

- ◆ The aspects of navigation that should be covered can be summarised as follows:
 - how to navigate forwards and backwards through the e-test
 - whether it is possible to ‘jump’ to a different point in the e-test, and if so, how
 - the method for leaving items unanswered initially, and returning to them, if this is possible
 - whether it is possible to change responses to items, and if so how
- ◆ Learners should be given feedback on the results of any practice e-test they have undertaken, together with advice and guidance on their readiness to go on to formal assessment. They should be given additional practice opportunities if necessary, and support in the use of e-tests if this would be beneficial.
- ◆ The centre should ensure that learners are given advance information and guidance on taking an e-test:
 - any requirements to bring proof of identity with them when they come to take the e-test
 - any general centre procedures related to the e-test session that may affect the learner
 - any specific security features of the assessment that the learner needs to know
 - how to use any additional equipment and/or assistive technology
- ◆ As with paper-based tests, learners should be made aware of the following:
 - how the assessment will be conducted
 - any invigilation rules and regulations they need to understand, including the procedure for supervising breaks
 - when and how they should ask for assistance during the e-test
 - how the e-test will be scored (at least in general terms), and any relevant best practice in relation to completing the test, for example, not spending too long on any one question, and attempting all questions

Note: Where scoring and result determination are fully automated and used for an assessment where the result ‘significantly affects’ the candidate, they will fall within the scope of the Data Protection Act 1998, and making the rules known to the candidate is then a legal requirement.

3.5 Running an e-test session

This section looks at the procedures for running and invigilating an e-test session.

Final checks relating to e-test location, equipment and materials

Before the designated start time for the formal e-test, the centre should check that:

- ◆ the e-test location and equipment meet the required assessment conditions
- ◆ all candidates have been registered correctly (otherwise they may be unable to take the e-test)
- ◆ any test-specific instructions (those provided by the relevant awarding body, for example) have been followed
- ◆ any agreed assistive technology is in place and any time extensions agreed and allowed for
- ◆ any issues identified have been resolved
- ◆ any individual logon passwords for the candidate(s) have been obtained — these may be supplied either by the awarding body or the e-test distributor

Authentication/confidentiality

The centre should also check that:

- ◆ candidates have been identified/authenticated according to centre regulations as agreed with the awarding body
- ◆ a seating plan has been made (if required by the awarding body), linking candidates' personal data to a specific workstation
- ◆ records of attendance have been completed and processed according to awarding body requirements
- ◆ candidates have been asked to sign a confidential disclosure agreement (if required by the awarding body)
- ◆ there are processes in place to ensure that confidentiality of candidate data is maintained

Final checks relating to candidates

Before starting the test, the centre should ensure that candidates:

- ◆ are comfortably seated (in the designated place on the seating plan, if there is one) with access to any agreed assistive technology if relevant

- ◆ are familiar with the e-test instructions, procedures and regulations, including how to navigate and answer items
- ◆ know the time limit (if any) and how the e-test will be terminated
- ◆ know how to request technical or emergency assistance
- ◆ have logged on successfully (or been logged on by the centre)

Planned and unplanned breaks

- ◆ For e-tests longer than 1.5 hours and where the candidate works entirely or almost entirely at the screen, there should be provision for them to take a break. This extended time should be known and approved in advance by the awarding body.

Note: This may also apply where a candidate is allowed an extended test time due to a disability. In certain instances awarding bodies may permit an extension of this time limit for particular qualifications.

- ◆ There should be measures to ensure that there is no unauthorised access to the e-test during any break.
- ◆ The invigilator should control access to the e-test after the break.
- ◆ To restart an e-test after an unplanned break (that is, an emergency or a technical failure) the invigilator should:
 - control the restart in the same way as at the start of the test
 - ensure that candidates can re-access their previous responses where this is technically feasible and permitted by the regulations

Invigilating the e-test session

Note: In addition to the IT-specific recommendations, centres need to comply with the more general requirements of the regulatory authorities, awarding bodies and e-test suppliers. Centres also need to comply with any health and safety requirements, and safeguard the confidentiality of any personal data, including information relating to health and disability.

Unless specifically permitted by the regulations, candidates should not be given any help in understanding or answering e-test items. However, they can and should be given technical support if necessary.

General rules

- ◆ If the e-test has a time limit, timing should not begin until the candidate has had an opportunity to read the initial instructions and information relating to the test.
- ◆ If there is an option to revert to paper-based testing, the conditions relating to this should be agreed in advance with the awarding body and explained to the candidate.

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- ◆ At least one invigilator should be present in the room or be able to monitor all the candidates throughout the e-test session.
Note: In certain instances awarding bodies may set requirements for a specific ratio of candidates to invigilator.
- ◆ To fulfil their role the invigilator(s) will normally need to observe candidates' screens by patrolling the room.
- ◆ The invigilator(s) should ensure that general assessment regulations are observed.
- ◆ The invigilator(s) should ensure that candidates do not have access to outside information.

Candidate support

Candidate support needs to be available regardless of where the e-test session is being held, and suitable arrangements and processes should be determined for remote locations.

- ◆ Technical support in relation to navigation and usage should be available throughout the e-test.
- ◆ The centre should have agreed processes in place regarding access to technical help to resolve issues related to malfunction of equipment, software or the e-test itself, with the potential to re-book the session if this option is the least disruptive to the candidate.
- ◆ Other assistance to candidates may be available throughout the e-test session in accordance with the regulations for the e-test.

Emergencies, technical failures and irregularities

Invigilators should log all technical failures, delays and candidate complaints in case of appeal.

- ◆ There should be procedures for dealing with hardware, software and communication failures.
- ◆ Invigilators should record and report any candidate complaints of system delays or other unusual occurrences.
- ◆ If there are any situations where the candidate is thought to have cheated, formalised processes need to be followed for reporting to avoid conflict. All automated test results are only provisional to allow for any investigation.

Concluding the e-test session

It may be necessary for centre staff to check with candidates to confirm formally that they have completed the e-test and are ready to have their responses submitted, particularly if some items remain unanswered.

At the end of the e-test, centre staff should ensure that:

- ◆ the e-test software is closed as necessary (some may close automatically)
- ◆ any necessary back-ups are made and stored securely
- ◆ no unauthorised materials (for example, printouts) are taken from the e-testing location by candidates

3.6 After the e-test session

As these procedures will vary according to the specific e-test and awarding body concerned, there are no accompanying checklists. Centres may wish to develop documentation that reflects this aspect of the process.

Transmitting candidate details and responses

Centres need to ensure that they are aware of the relevant awarding body procedures for any e-test they administer, and can meet the required conditions for maintaining security and integrity of the associated information.

Depending upon circumstances, these procedures may include:

- ◆ notification of dispatch and receipt
- ◆ use of security measures comparable to those for paper-based assessments if physical transport is used (by disk, for example)
- ◆ use of cryptographic techniques for material sent electronically, especially via public systems
- ◆ use of transmission protocols to check integrity of records
- ◆ procedures for enabling awarding body staff to verify the authenticity and integrity of records received
- ◆ procedures for a back-up to be held at the centre, in secure conditions, at least until receipt has been confirmed

Storing response files at centres

On rare occasions records of candidate responses may need to be retained at a centre. If this is required by the awarding body, the section related to the e-testing assessment environment provides details of how these records should be held.

Equally, if responses are not intended to be stored at the centre, there should be measures to ensure that they are not inadvertently cached on the candidate's machine.

Feedback to candidates

Centre staff should be prepared (and if necessary trained) to supplement any automated feedback and results with additional feedback and guidance on next steps. If necessary they should be able to make counselling facilities available, particularly if the feedback is likely to be distressing.

This may involve the use of additional staff skills over and above the scope of this guidance.

- ◆ The level of feedback provided to the candidate by staff at the centre should be consistent with pedagogical decisions and the aims of the e-test, and this should also influence who is nominated to give the feedback.
- ◆ The level of feedback provided by the test system may consist of:
 - the overall result only
 - the score for the whole assessment, with sub-scores or results for sub-sections of assessment
 - the score for individual items
 - feedback on correct responses, together with reasons or explanations
 - hints for further study and reference to relevant learning material or information sources

Note: Under the provisions of the Data Protection Act 1998, a candidate may request details of all his/her scores and sub-scores if they are stored separately.

- ◆ The following principles should be borne in mind when providing any feedback to the candidate:
 - presentation of feedback (whether on screen or on paper, in text, graphically or otherwise) should be clear, easy to interpret and supported by any necessary explanations
 - feedback from any assessment should maintain the confidentiality of the items
 - feedback from tests related to individual units should be designed to support candidates in making appropriate choices about routes to the achievement of whole qualifications

Awarding body certification

The processes and procedures involved in the provision of certificates are likely to vary between awarding bodies, so centres will need to ensure that they are aware of these in order to keep candidates informed of the arrangements.