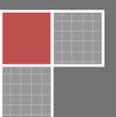


2010

Blue Dog Guide for Quality Online Quizzes



Acknowledgements

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1 What is the purpose of this guide?

This guide has been developed by Blue Dog with support provided through the Australian Flexible Learning Framework.

E-assessment and the AQTF: Bridging the divide between practitioners and auditors, a recent report by Victor Callan and Berwyn Clayton, highlighted the growth in e-assessment in the national training system. It also drew attention to the concerns that some groups, including assessors and Australian Quality Training Framework (AQTF) auditors, have expressed about the quality of e-assessment. In particular, the report highlighted the problems associated with the design and security of online quizzes, which it argues is the most common form of e-assessment in the system.

Blue Dog has been involved in delivering quality online training and assessment since 2005. The company currently delivers online training to 1400 apprentices and their employers in over 1000 organisations across Queensland. Through this work, Blue Dog has developed a secure, high quality approach to e-assessment.

This guide, which draws on Blue Dog's experience in e-assessment, is designed to provide assessors and AQTF auditors with advice on the design and security of online quizzes. In considering this advice readers should note that assessment decisions are rarely made solely on the basis of the evidence gathered through online quizzes. Assessors use this evidence in conjunction with other forms of direct and indirect evidence to make judgments about competency.

2 Who is this guide for?

The guide is for people involved in the development, delivery and auditing of e-assessment in Registered Training Organisations (RTOs). This includes:

- assessors
- individuals responsible for managing e-assessment functions within RTOs
- individuals responsible for managing quality assurance functions within RTOs
- assessors and others considering the introduction of e-assessment in RTOs
- auditors engaged in conducting audits of assessment arrangements against the *AQTF Essential Conditions and Standards For RTOs*.

3 What is in the guide?

There are two parts to this guide.

- Part A is this print document, which provides advice on the design of online quizzes.
- Part B is a multimedia package that provides examples of common technical and design issues associated with online quizzes, as well as an examples of a best practice models for online quizzes.

4 What is e-assessment?

E-assessment is a generic term that covers all assessments where digital technologies are used. This includes the design and delivery of assessments, marking

(by computers or assessors using scanners and online tools) and all processes of reporting, storing and transferring data associated with public and internal assessments.

So e-assessment is any electronic assessment process where ICT is used to present an assessment activity and record responses. This involves the end-to-end assessment process from the perspective of students, trainers, RTOs, industry regulators and the general public.

E-assessment products and services may be used to support diagnostic, formative or summative assessment. In diagnostic assessment, e-assessment products and services are used to identify a student's strengths and areas for improvement. This form of assessment often occurs at the commencement of a training program. In formative assessment, evidence is used to provide developmental feedback to students on their current skills and knowledge relative to a defined standard. This information may also be used by trainers so that instruction can be modified to provide gap training to suit student needs. In summative assessment, e-assessment products and services are used to assist assessors to gather evidence and make judgments about the competence of the student. This type of assessment often leads to the awarding of a Statement of Attainment or qualification under the Australian Qualifications Framework (AQF).

There is a growing stock of e-assessment products, such as:

- online quizzes including drills, examinations and tests
- e-portfolios
- computer based assessment recording and reporting tools.

5 What is the scope of this guide?

This guide provides advice on:

- the design of online quizzes and question banks
- the security of online quizzes
- continuous improvement of e-assessment.

6 What is an online quiz?

Recent research undertaken by the Australian Flexible Learning Framework concluded that the online quiz is the main form of e-assessment used in the VET sector.

While there are differences in the design of these online quizzes, they are essentially sets of questions delivered and marked over the internet that test students' knowledge of a topic.

These online quizzes may be used for a variety of purposes. In some cases, they are used as practice and learning tools and in others the quiz results may form part of the evidence used in a competency assessment.

In some cases, online quizzes are stand-alone products but they are usually delivered, administered and tracked by a learning management system such as BlackBoard, WebCT or the Blue Dog developed CATT (Comprehensive Assessment, Training and Tracking system).

Best practice examples of online quizzes incorporate some or all of the following features:

- questions that are supported by still images, videos and other graphics
- adaptive testing where the next question to be posed is determined by a prior response
- randomised questions
- re-ordering of answer choices to reduce chances of cheating or overuse of questions
- feedback to students indicating the correct response and potential sources of further learning.

7 What are the advantages of online quizzes?

The key advantages of online quizzes are:

- ease of quiz preparation and marking once the initial questions and answers are developed
- ability to assess student knowledge quickly and to provide regular and immediate feedback
- results can be stored centrally and readily accessed by interested parties, such as students and staff
- assessment can be offered in an open access environment
- questions can be stored and reused
- random selection of questions enables different quizzes to be prepared for individual students.

8 What are the disadvantages of online quizzes?

The key disadvantages of online quizzes are:

- set up of online quizzes is costly and time consuming
- construction of good questions requires skill
- assessment of higher order skills is difficult
- hardware and software must be carefully monitored to avoid failure during testing
- students require adequate information technology skills
- assessors need assessment design and information technology skills
- a high level of organisation is required from all parties involved in assessment, including assessors, support staff and computer services staff.

9 What are online quizzes and question banks?

An online quiz is a set of test questions selected from a question bank. The question bank is a collection of questions and answers that relate to the knowledge requirements of a unit or cluster of units of competency.

There are different ways of designing online quizzes and question banks, but consideration must always be given to:

- the knowledge areas to be assessed
- the quiz assembly rules
- the quality of the questions
- the size of the question bank.

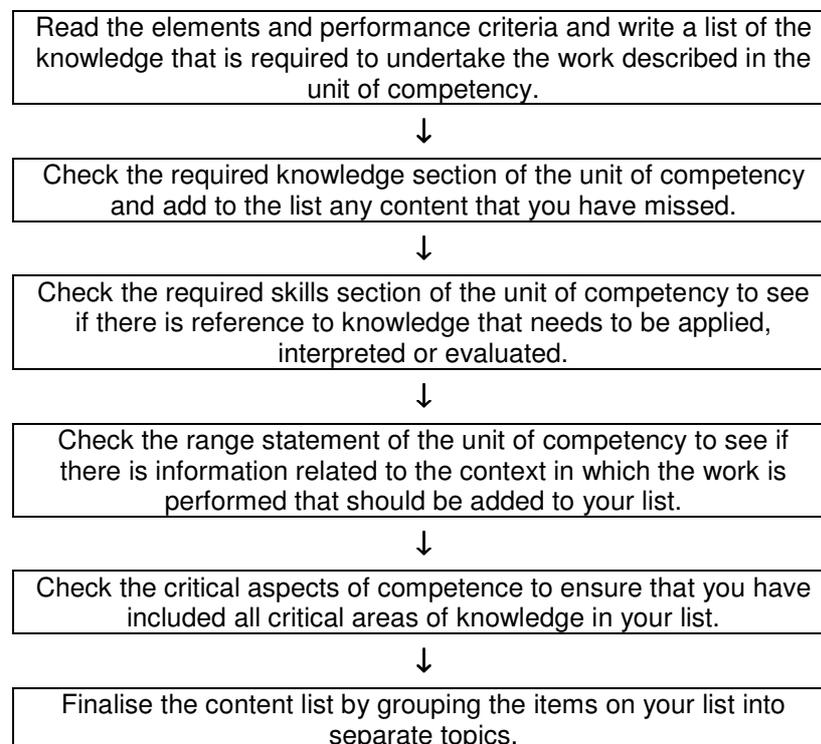
The ensuing section of this guide provides:

- general advice on the design of online quizzes and question banks
- a description of the Blue Dog approach to the design of online quizzes and question banks.

9.1 Knowledge areas to be assessed

The first step in developing a question bank is to identify the knowledge areas to be assessed. One approach to doing this is illustrated in the following diagram:

Figure 1: Approach to identifying the knowledge areas to be assessed in an online quiz



Once the list is finalised, each knowledge area should be mapped against the elements and performance criteria in the unit of competency. This ensures that all topics relate directly to the unit of competency.

9.2 Online quiz assembly rules

An online quiz is usually generated by selecting questions from a question bank. The questions for each version of the quiz are selected by the software program following a set of online quiz assembly rules. These rules are designed to ensure that each version of the quiz is comparable.

The online quiz assembly rules should address questions such as:

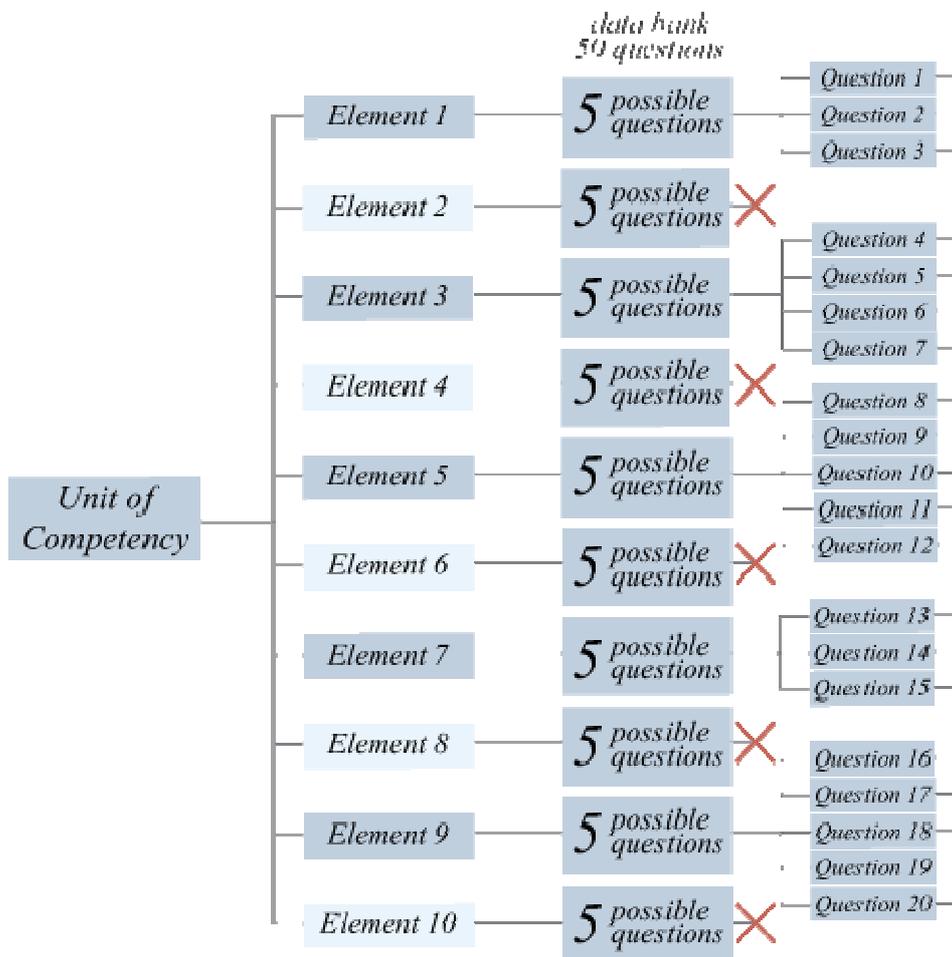
- How many questions are in the online quiz?
- Must the questions in the online quiz address all the knowledge areas to be assessed?
- How many questions on each knowledge area must be in the online quiz?
- What types of questions must be in the online quiz?
- How many questions of each type must be in the online quiz?
- How many attempts are allowed for a question?

In many cases, the online quiz assembly rules are too simplistic to support quality assessment. For example, the online quiz assembly rules, as illustrated in the following diagram, may specify that a set number of questions (for example, 20 questions) must be selected from a pool of questions (for example, 50 questions).

This is unlikely to provide a valid online quiz, as:

- some versions of the online quiz may be more difficult than others because the questions in the question bank are pitched at different levels of difficulty
- some content areas may be omitted from the online quiz (in the following example, elements 2, 4, 6, 8 and 10 are left out)
- different versions of the online quiz may not cover the same content areas
- the assessment results for different students may not be comparable because different versions of the quiz cover different topics and include questions with different degrees of difficulty.

Example of Question Bank



Online quiz assembly rules should require:

- each version of the quiz to include a specified number of questions on each content area
- the questions on each content area to have the same degree of difficulty.

The downside to this approach is that there needs to be a large pool of questions. This requires skillful question writers and is both time consuming and costly.

9.3 Quality of the questions

The questions included in the question bank must:

- comply with the principles of good test question design

- be limited to the knowledge areas to be assessed
- be mapped against the knowledge areas to be assessed
- be selected response questions (where the student chooses the correct answer from a range of options, for example multiple choice, true/false and matching questions)
- reflect the requirements of the unit of competency and the descriptor for the relevant AQF qualification. For example, if a unit of competency forms part of a Certificate I qualification, the questions should focus on the recall of knowledge that is directly related to the task described in the unit of competency. Students must not be required to use higher order cognitive skills such as analysis, comparison or explanation. Questions for a unit of competency that forms part of a Certificate IV qualification should require the student to demonstrate a broad knowledge base and an understanding of some theoretical concepts related to the task described in the unit of competency. In this case, the student would be expected to use a range of higher order cognitive skills such as interpretation, comparison and analysis
- address the dimensions of competency associated with the task described in the unit of competency, so the questions identified for a particular topic may focus on:
 - the task – questions related to tools, equipment and materials needed to perform the tasks, steps in the task and the sequence of operations
 - management of the task – questions related to the processes involved in planning, organising and performing the task, time taken to perform the task, and prioritising related work tasks
 - contingencies or problems that may be encountered when performing the task – questions related to unusual, dangerous or unexpected events that may occur
 - the work environment or context in which the task is performed – questions related to workplace procedures, legislation, regulations, Codes of Practice and safety requirements associated with the task
 - implications of transferring the task to another context or work environment – questions related to performing the task in another context such as different materials, tools, equipment or location
- be validated with other assessors or representatives of relevant industry advisory bodies (or professional or industry associations and networks) to make sure that the questions reflect current industry practice and training package requirements.

9.4 Size of the question bank

There is no set number of questions for a question bank, but it must be large enough to:

- address all the topics or content areas to be assessed
- support the development of multiple versions of the online quiz

- allow for some questions to be withdrawn if they fail to meet quality criteria or are superseded by changes in the unit of competency, legislation, Codes of Practice or work practices.

Typically, question bank writers underestimate the number of questions required to produce comparable but distinct versions of an online quiz. Figure 2 shows the numbers of questions that are likely to be repeated in two versions of an online quiz, depending on the number of questions selected and the size of the question bank.

Figure 2: Overlap of two randomly chosen student tests

Number of questions selected at random	Pool size	Average number of questions in common for two students
5	10	2.5
10	20	5.0
20	40	10.0
30	60	15.0
40	80	20.0
5	15	1.7
10	30	3.3
20	60	6.7
30	90	10.0
40	120	13.3
5	25	1.7
10	50	2.0
20	100	4.0
30	150	6.0
40	200	8.0

(Source: <http://distance.westga.edu/~distance/ojdl/summer72/rowe72.html>)

9.5 Case study – Blue Dog approach to designing online quizzes and question banks

The first step that Blue Dog takes in developing an online quiz is to identify a set of ‘tasks’ that make up the unit of competency. This involves combining the relevant performance criteria, elements, skills and required knowledge into a set of logical tasks that can be assessed. A unit of competency may contain up to 45 unique tasks.

For each task, Blue Dog develops:

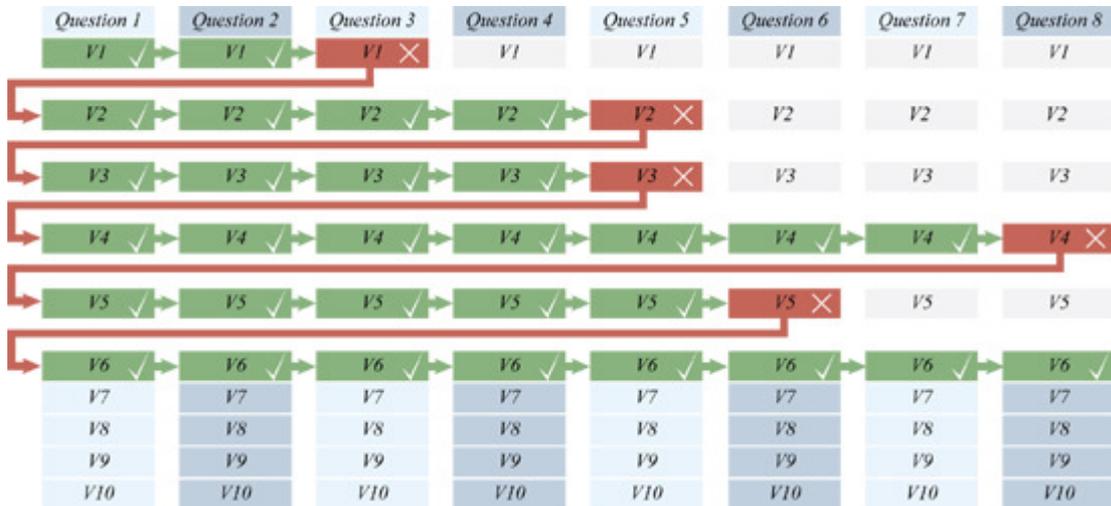
- one or more interactive learning resources that thoroughly cover the required content
- an online quiz that contains between 8 and 12 questions (the term ‘quiz’ is used to overcome fears students may have of tests).

In a Blue Dog quiz, students are required to correctly answer all questions for each task. If they answer a question incorrectly they are returned to the start of the online quiz, where they can seek help from Blue Dog, review the learning resources or retake the quiz.

If the same questions were presented to each student, the assessment outcome would not be valid and students could copy and distribute the whole question bank. This would undermine the integrity of the assessment process. To avoid this, Blue Dog provides a question bank for each question in the quiz.

The following diagram shows the process that one student followed to successfully complete one of Blue Dog’s task assessments. At the first attempt, the student correctly answered questions 1 and 2 and incorrectly answered question 3. The student was redirected back to the start for revision and was presented with a second version of each question. On the second attempt, the student incorrectly answered question 5 and was again redirected to the start for revision to answer the third

version of each question. This continued until the student successfully answered all questions. In this case, it took the student six attempts to successfully complete the assessment.



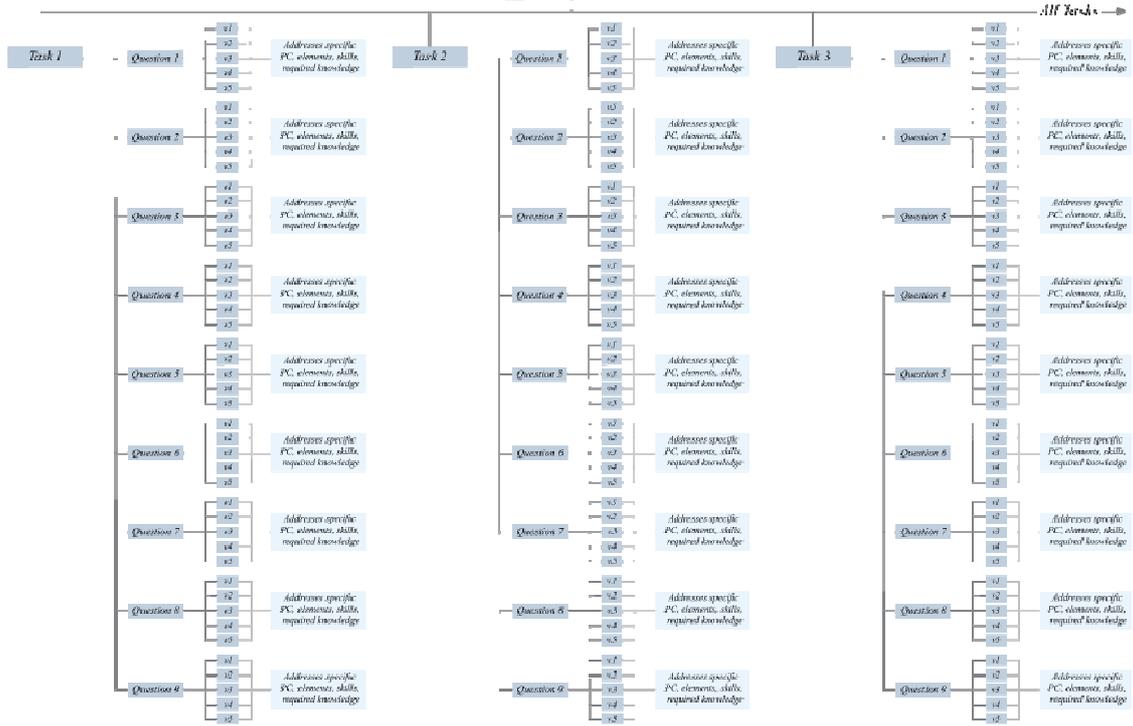
In a typical question bank for a Blue Dog assessment task, there are between 4 and 10 versions of the question and these are randomly presented to students. The chances of two students being presented with the same question is extremely low. In addition, all questions in a particular question bank have a similar degree of difficulty and address the same content. This means that, for an assessment with 10 questions and 6 variations of each question, the assessment team must write 60 questions. A unit of competency may require 30 such tasks. This requires the student to correctly answer 300 questions from a pool of 1800 questions.

While this is a time consuming and expensive process, Blue Dog's experience from observations and student feedback indicates that, if students find it much easier to learn the content/processes through a course than to cheat, they will proceed through the course. They gain confidence in the whole methodology and in their results.

Blue Dog firmly believes that almost any learning content can be delivered like this and, if done well, the result is improved student learning outcomes.

The following image shows how Blue Dog uses tasks and question banks to ensure fair, valid and reliable assessment.

Competency



Following is an example of the Blue Dog approach to developing question banks for one task. In this case, the task has 10 questions and each question has a question bank of 6 sub-questions. The questions are asked in a linear way, which allows the assessor to be confident that students have mastered the basic concepts before they are asked to demonstrate their competence with more complicated and higher order concepts. For example, there is no point in asking question 10 if the student does not have the knowledge, skills or ability to answer the earlier questions. Blue Dog puts a great deal of effort into ensuring that all students are presented with similar questions so that assessors, students and industry have confidence in the results.

The following examples show the way in which questions are structured and sequenced to ensure compatibility and increasing complexity.

With questions 1 and 4, the only change is the 'going', which ranges from 240mm to 280mm. Each student must correctly answer one version of this fairly low level question.

Q1v1

What is the "going of flight" of this stair?

The newel post is 90 x 90mm and the string is 250 x 50mm.

The rise is 175mm and the going is 250mm.

The going of flight is mm.

Q1v2

What is the "going of flight" of this stair?

The newel post is 90 x 90mm and the string is 250 x 50mm.

The rise is 175mm and the going is 270mm.

The going of flight is mm.

Q1v3

What is the "going of flight" of this stair?

The newel post is 90 x 90mm and the string is 250 x 50mm.

The rise is 175mm and the going is 275mm.

The going of flight is mm.

Q1v4

What is the "going of flight" of this stair?

The newel post is 90 x 90mm and the string is 250 x 50mm.

The rise is 175mm and the going is 280mm.

The going of flight is mm.

Q1v5

What is the "going of flight" of this stair?

The newel post is 90 x 90mm and the string is 250 x 50mm.

The rise is 175mm and the going is 240mm.

The going of flight is mm.

Q1v6

What is the "going of flight" of this stair?

The newel post is 90 x 90mm and the string is 250 x 50mm.

The rise is 175mm and the going is 260mm.

The going of flight is mm.

Q4v1

What is the "ordering length" of the string of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 2130mm.

Allow 300mm for fitting the string.

The ordering length is mm.

Q4v2

What is the "ordering length" of the string of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 1280mm.

Allow 300mm for fitting the string.

The ordering length is mm.

Q4v3

What is the "ordering length" of the string of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 1480mm.

Allow 300mm for fitting the string.

The ordering length is mm.

Q4v4

What is the "ordering length" of the string of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 1710mm.

Allow 300mm for fitting the string.

The ordering length is mm.

Q4v5

What is the "ordering length" of the string of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 1890mm.

Allow 300mm for fitting the string.

The ordering length is mm.

Q4v6

What is the "ordering length" of the string of this stair?

The rise must be between 160 and 175mm.

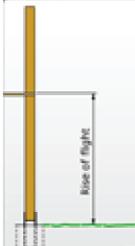
The going is 240mm and the "rise of flight" is 1020mm.

Allow 300mm for fitting the string.

The ordering length is mm.

Question 4 has been included to demonstrate how the complexity and knowledge that the student is required to demonstrate can be managed by the training team.

Q5v1



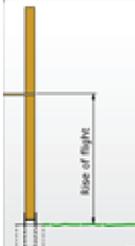
What is the **going of flight** of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 2130mm.

The going of flight is mm.

Q5v2



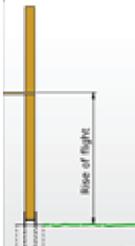
What is the **going of flight** of this stair?

The rise must be between 155 and 175mm.

The going is 275mm and the "rise of flight" is 1280mm.

The going of flight is mm.

Q5v3



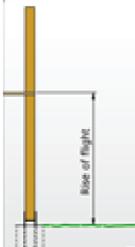
What is the **going of flight** of this stair?

The rise must be between 160 and 175mm.

The going is 240mm and the "rise of flight" is 1480mm.

The going of flight is mm.

Q5v4



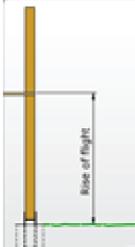
What is the **going of flight** of this stair?

The rise must be between 160 and 175mm.

The going is 250mm and the "rise of flight" is 1710mm.

The going of flight is mm.

Q5v5



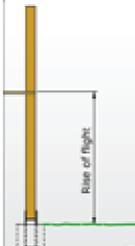
What is the **going of flight** of this stair?

The rise must be between 160 and 175mm.

The going is 270mm and the "rise of flight" is 1890mm.

The going of flight is mm.

Q5v6



What is the **going of flight** of this stair?

The rise must be between 160 and 175mm.

The going is 250mm and the "rise of flight" is 1020mm.

The going of flight is mm.



What is the **cost** of the **strings** for this stair?

The landing **MUST** be in the middle of the flight, ie. each flight should have the same number of risers and treads. Allow 300mm for fitting the strings.

The going is 250mm and the rise **MUST** be between 160 and 175mm.

The total rise is 3350mm.

The 250 x 50mm strings cost \$1260/m3.

The strings cost \$.

Q9v1



What is the **cost** of the **strings** for this stair?

The landing **MUST** be in the middle of the flight, ie. each flight should have the same number of risers and treads. Allow 300mm for fitting the strings.

The going is 250mm and the rise **MUST** be between 160 and 175mm.

The total rise is 4040mm.

The 250 x 50mm strings cost \$1260/m3.

The strings cost \$.

Q9v2



What is the **cost** of the **strings** for this stair?

The landing **MUST** be in the middle of the flight, ie. each flight should have the same number of risers and treads. Allow 300mm for fitting the strings.

The going is 250mm and the rise **MUST** be between 165 and 175mm.

The total rise is 4175mm.

The 250 x 50mm strings cost \$1260/m3.

The strings cost \$.

Q9v3



What is the **cost** of the **strings** for this stair?

The landing **MUST** be in the middle of the flight, ie. each flight should have the same number of risers and treads. Allow 300mm for fitting the strings.

The going is 250mm and the rise **MUST** be between 160 and 175mm.

The total rise is 4400mm.

The 250 x 50mm strings cost \$1260/m3.

The strings cost \$.

Q9v4



What is the **cost** of the **strings** for this stair?

The landing **MUST** be in the middle of the flight, ie. each flight should have the same number of risers and treads. Allow 300mm for fitting the strings.

The going is 250mm and the rise **MUST** be between 160 and 175mm.

The total rise is 4510mm.

The 250 x 50mm strings cost \$1260/m3.

The strings cost \$.

Q9v5



What is the **cost** of the **strings** for this stair?

The landing **MUST** be in the middle of the flight, ie. each flight should have the same number of risers and treads. Allow 300mm for fitting the strings.

The going is 250mm and the rise **MUST** be between 160 and 175mm.

The total rise is 3720mm.

The 250 x 50mm strings cost \$1260/m3.

The strings cost \$.

Q9v6

Questions 5 and 9 are further evidence of how one assessment, well presented and using valid methodologies, can be managed to ensure that the student has the required underpinning knowledge. As mentioned previously, if a student gets any question wrong at any stage, they are required to review the learning object or contact the trainer and then restart the online quiz. The student is then reassessed by being required to complete a different version of the previously answered questions.

9.6 Questions for assessors to ask about question banks

The following questions might be used by assessors in evaluating the quality of any question bank:

- How were the knowledge areas in the question bank identified?
- Do the knowledge areas cover the full knowledge requirements of the unit of competency?
- What are the online quiz assembly rules?
- Do the online quiz assembly rules require all knowledge areas to be assessed?
- Do the online quiz assembly rules ensure that all versions of the online quiz are comparable?
- How many questions are in the question bank? Why?
- Do the questions match the knowledge areas to be assessed? How is this evidenced?
- Do the questions address the dimensions of competency?
- Does the question bank include a variety of question types?
- Are the questions pitched at the appropriate AQF level?
- Does the question bank contain enough questions to address all the areas of knowledge to be assessed?
- Does the question bank contain enough questions to support the development of multiple versions of the online quiz?
- How were the questions validated?

9.7 Questions for AQTF auditors to ask about question banks

The following questions might be used by AQTF auditors in evaluating the quality of any question bank:

- Do the knowledge areas in the question bank cover the full knowledge requirements of the unit of competency? How can this be evidenced?
- What are the online quiz assembly rules?
- Do the online quiz assembly rules require all knowledge areas to be assessed? If not, what other assessment tools are used?
- Do the online quiz assembly rules ensure that all versions of the online quiz are comparable?
- Do the questions address the dimensions of competency?
- Are the questions pitched at the appropriate AQF level?
- How and why were the questions validated?

10 Security of online quizzes

There are two broad groups of security problems associated with online quizzes, and these are:

- authentication problems

- security and design problems.

10.1 Authentication problems

While the authentication of students is a risk, it is important to acknowledge that this problem is not restricted to online quizzes. Even in conventional supervised tests there is always a need to establish the identity of the student.

A range of approaches are available for authenticating students undertaking online quizzes. These include:

- individual student logins backed up by photographic and other forms of identification
- access codes and passwords
- webcam supervision
- test supervisors or invigilators
- biometrics
- declarations provided by the student
- external verification of the student
- backend systems to monitor time taken and make response comparisons.

Figure 3 sets out the key advantages and disadvantages of each of these approaches to student authentication.

Figure 3: Advantages and disadvantages of student authentication methods

Approach	Advantage	Disadvantage
Individual student logins backed up by photographic and other forms of identification	<ul style="list-style-type: none"> • Simple and easy to use • Low cost • Accessible technology 	<ul style="list-style-type: none"> • Chance of impersonation
Access codes and passwords	<ul style="list-style-type: none"> • Simple and easy to use • Low cost • Accessible technology 	<ul style="list-style-type: none"> • High chances of impersonation
Webcam supervision	<ul style="list-style-type: none"> • Provides continuous or randomly intermittent supervision • Monitoring that minimises interruption 	<ul style="list-style-type: none"> • Privacy considerations • May have to provide students with webcams
Test supervisors or invigilators	<ul style="list-style-type: none"> • Provide extra security in online test environments • Simple and easy to implement 	<ul style="list-style-type: none"> • Cost • Limits flexibility and capacity to offer 24/7 testing service
Biometrics	<ul style="list-style-type: none"> • Minimises impersonation threats • Enhances security 	<ul style="list-style-type: none"> • Cost • Privacy and personal information considerations • Identifies individuals but is unable to determine if other resources were used
Declaration by the student	<ul style="list-style-type: none"> • Element of trust conveyed to student • Simple and easy to use • Low cost • Legal document reduces 	<ul style="list-style-type: none"> • Chance of impersonation • Chance of student knowingly making a false declaration

	chances of student making false declaration	
External verification of the student	<ul style="list-style-type: none"> • Easy to do • Enhances security 	<ul style="list-style-type: none"> • Cost • Reduces flexibility and capacity to issue results promptly
Backend systems to monitor time taken and make response comparisons	<ul style="list-style-type: none"> • System highlights irregularities in results and/or the time taken to complete quizzes • Transparent processes that ensure RTO complies with defined 'risk management' processes 	<ul style="list-style-type: none"> • Expensive to implement • Requires highly skilled programmers to implement

Blue Dog uses a range of techniques for authenticating individuals undertaking online assessments. In high risk assessments such as the assessment for the White Card in the construction industry, which is based on *CPCCOHS1001A Work safely in the construction industry*, Blue Dog uses a range of authentication strategies. These include:

- having the students agree to abide by conditions for doing the course
- requiring students to have a unique login and password
- seeking approval from students to use webcam technology to verify identity and then take random images of them undertaking the course
- having systems in place to monitor students' progress through the course
- having systems in place to monitor the time taken to complete each part of the course
- having systems in place to select students for phone verifications
- obtaining a declaration from each student stating that they completed the course without assistance from anyone (other than from Blue Dog staff)
- obtaining a declaration from a witness (over 18 years old) who observed the student undertaking the course
- obtaining photographic evidence of identification from students
- ensuring that students know and agree that if they fail manual verification, they forfeit their enrolment fee.

Authentication is a major issue confronting RTOs that wish to use online assessment. This authentication issue was and still is an issue for any study that is delivered wholly by correspondence. These risks can be reduced by using a range of strategies to identify students, informing students of the consequences of failing authentication and carefully monitoring the assessment environment.

10.2 Security and design problems

There are a number of common security and design issues that assessors and auditors should be aware of when evaluating any online quiz or question bank.

The multimedia package that accompanies this guide provides worked examples of some of the most common, including:

- security issues – these include issues associated with the use of SCORM, XML sniffers and server side URL data
- design issues – these include issues to do with question bank design and the use of ‘click through’ and ‘redo’ questions.

The multimedia package also includes an example of what Blue Dog considers to be best practice in terms of question bank design.

Readers are advised to open the multimedia package, review examples of the security and design issues, and consider the features of the best practice model.

10.3 Questions for assessors to ask about the security of online tests

In evaluating online quizzes, assessors should consider the following questions:

- What are the procedures for student authentication? Are these adequate?
- Have alternative student authentication procedures been considered?
- Does the online quiz contain any of the following common security and design problems:
 - server side security
 - SCORM compatibility that allows manipulation of results or participation
 - quiz code delivered to the ‘client browser’ and able to be read via ‘View Source’
 - XML based quizzes delivered to the ‘client browser’ unencrypted and able to be read by ‘sniffers’ like Firebug
 - student determined scores
 - student feedback provides correct answer
 - click through
 - Using Control Find and Control Paste
 - back or redo option?

10.4 Questions for AQTF auditors to ask about the security of online quizzes

In evaluating online quizzes, AQTF auditors should consider the following questions:

- What are the procedures for student authentication? Are these adequate?
- Have alternative student authentication procedures been considered?
- Does the online quiz contain any of the following common design and security problems:
 - server side security
 - SCORM compatibility that allows manipulation of results or participation
 - quiz code delivered to the ‘client browser’ and able to be read via ‘View Source’
 - XML based quizzes delivered to the ‘client browser’ unencrypted and able to be read by ‘sniffers’ like Firebug
 - student determined scores

- student feedback provides correct answer
- click through
- back or redo option?

11 Continuous improvement of e-assessment

E-assessment, as with any other areas of an RTO's operations, must be underpinned by a systematic approach to continuous improvement. This helps to ensure the quality and consistency of assessment practices and outcomes and assists the RTO to meet the *AQTF Essential Conditions and Standards for Continuing Registration*.

Continuous improvement for e-assessment needs to be considered from the prospective of:

- content of the assessment
- design of the delivery system
- security
- validation.

Some commercially available software products allow RTOs to monitor and analyse improvements and changes to e-assessment and background IT systems. Issues are generated by feedback (from stakeholders including trainers, students and employers) and ongoing analysis and maintenance of the IT platforms used for delivery of online learning and assessment.

These products allow for:

- prioritisation of improvements and changes
- allocation of improvements and changes
- tracking of improvements and changes
- monitoring of improvements and changes.

For audit purposes, evidence needs to be gathered to prove consistent implementation of improvements. This evidence could include documentation showing that:

- communication throughout the organisation about management systems and decisions is effective
- staff are actively engaged in continuously improving the system
- key policies and processes are documented to an appropriate level and accessible to all relevant staff
- checks are made to ensure that key policies and procedures are being implemented appropriately
- regular and systematic reviews of key data are conducted by management.

Strategies to monitor the effectiveness of the management system could include:

- establishing key performance indicators and monitoring organisational performance against them

- eliciting and analysing stakeholders' feedback about the RTO's overall performance
- benchmarking management systems and organisational performance with other RTOs
- internal audit and organisational self-assessment against the *AQTF Essential Conditions and Standards for Continuing Registration* and other quality standards systems.

The Blue Dog approach to continuous improvement of e-assessment is to gather feedback from students, employers, industry, trainers and other stakeholders through formal and informal surveys. These results are then logged into an electronic tracking system that analyses, allocates and tracks all tasks through to completion. Improvements are then monitored and modified where necessary to ensure enhanced outcomes.

12 Glossary

e-assessment	An electronic assessment processes where ICT is used for presenting assessment activity and recording responses. This includes the end-to-end assessment process from the perspective of students, assessors, RTOs, industry regulators and the general public.
Learning management system	A generic term covering a variety of ICT systems that support online learning.
Login	The unique user name and password entered to access a computer system.
Question	This is the assessment object. At a minimum it contains the assessment question, the correct response and the feedback that may be presented to the student, including hints and solutions. Other information provided on the question may include: (1) author; (2) date written; (3) status, ie new, pilot, active, retired; (4) question type; (5) mapping information, ie relationship with the relevant unit of competency, qualification and training package; and (6) dimension of competency assessed.
Question bank	A repository or collection of test questions related to a unit or cluster of units of competency.
Quiz	An organised collection of test questions selected from a question bank.
Randomisation	The selection of individual questions from a predefined set. In online testing, randomisation is used to generate alternate test forms from an item bank. It can also be used to alter the sequence in which items are presented to different students.
Result	This is the report of the student's interaction with a quiz. It is usually expressed as a score.

13 Resources

- 1 Bicanich, E., Slivinski, T., Hardwicke, S. et al (1997). 'Internet-based testing: a vision or reality?' *T.H.E. Journal Online*, September.
- 2 Bernard, R.M., Abrami, P.C., Lou, Y., Borokhovski, E., Wade, A., Wozney, L., Walseth, P.A., Ficker, M., & Huan, B. (2004). 'How does distance education compare with classroom instruction? A meta-analysis of the empirical literature'. *Review of Educational Research*, 74, 379-439.