



# Writing questions for training programmes

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## Contents

What are questions used for? .....	4
Using formative questions.....	4
Give constructive feedback .....	4
Using remediation.....	5
Content or question first?.....	5
Neither right nor wrong .....	6
Allow several attempts.....	6
Writing summative questions .....	6
Scoring summative questions .....	7
General principles for writing good questions.....	7
Make questions cover a real objective .....	7
Check for understanding, not memorising.....	7
Get the reading level right .....	8
Avoid negative words.....	8
Avoid abbreviations.....	8
Keep questions all on one screen or page .....	8
Analysing the effectiveness of summative assessments .....	8
Multiple-choice questions .....	10
Ways of presenting a question.....	10
Using multiple correct questions.....	11
Guidelines for effective multiple choice questions.....	12
Finding distractors .....	16
Alternative response questions.....	17
Matching questions .....	18
Presenting matching questions .....	19
Guidelines for matching questions.....	19
Free format questions .....	20
Completion questions .....	20
Open ended questions.....	20
Essay response questions .....	21
Ways of evaluating essay responses .....	21
Making analytic marking work .....	21
Designing scoring rubrics.....	22
What the rubric is (and isn't) .....	23
Making holistic marking work .....	23
Reflection questions .....	24
Usability issues for on-screen tests and questions.....	25
What is right or wrong?.....	25

Pop-up windows for feedback ..... 25

## What are questions used for?

Questions are used in all forms of learning materials to:

- let the learner check their understanding of what they have studied (learning about learning, or metacognition), known as **formative** questions
- assess how well the learner has learnt the content (**summative** questions)
- stimulate a learner to think about a subject before exploring it in more detail
- allow a learner to see the consequences of different decisions, as when used in a simulation
- manage navigation, where the learner's response takes them to another part of the training.

## Using formative questions

Formative questions are questions designed to help someone test their understanding of a subject, much like a teacher would ask a class a question. The essential characteristics of such questions are that:

- scores for them are not formally recorded
- learners receive constructive feedback.

### Give constructive feedback

All formative questions must provide feedback. The feedback that you give should always be:

- positive, not criticising the person for having made a wrong decision
- corrective, explaining why the right answer is right
- immediate, as soon as the user has answered.

Learning is aided by providing **error-contingent feedback**. This is where the feedback you provide is different for each distractor, rather than "No, that is not correct." Look at this example, where option 3 is the correct answer.

Which of the following best describes a manager's role in dealing with information?

Options in question	Error-contingent feedback
1. Analysing information and protecting it	Protecting information is generally not good management. Effective managers look for information from within the organisation and elsewhere and then share it with people who need it.
2. Filtering and spreading information appropriately	Filtering information can be important but it has its dangers. Effective managers look for information from within the organisation and elsewhere and then share it with people who need it.
3. Looking for information and then sharing it	Effective managers look for information from within the organisation and elsewhere and then share it with people who need it.
4. Generating and controlling information	A manager may not have the necessary resources to generate information: effective managers look for information from within the organisation and elsewhere and then share it with people who need it.

## Using remediation

Error-contingent feedback can be developed to the extent of providing **remediation** exercises. This is where the answer given dictates the learner's subsequent route through the material, so that they may review the subject again before carrying on.

If you do provide remediation, represent and repackage the information that the learner has already seen.

You can do this by changing a graphic presentation to text or vice versa, changing the emphasis or even by suggesting that the learner talk to their manager or an expert.

### Content or question first?

One important question to resolve about every question that you include in an e-learning course is to decide whether it goes before or after the content that it questions:

- In content-question you present the content and then ask the learner a question about the content
- In question-content you ask the learner a question about the content and then give them the content in feedback or on following screens.

Each has its particular advantages and disadvantages, and deciding which approach to take is something you can do from screen to screen, as in some circumstances one will be more effective than the other. A combination of both approaches can help to create a more stimulating and interesting course.

### Content first, then question

Advantages:

- You can test the learner's understanding of the content they have read.
- You can test to see if the learner can apply knowledge in other situations.

Disadvantages:

- It can lead to the writing of potentially banal questions.

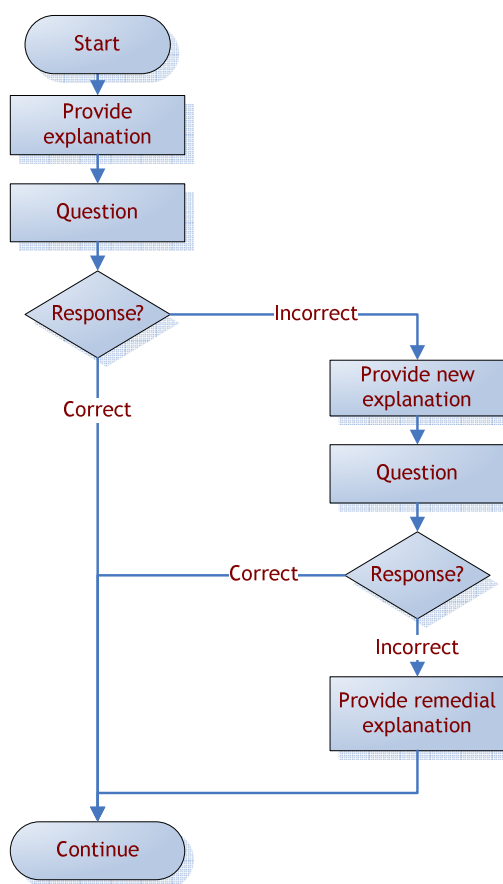
### Question first, then content

Advantages:

- It can present more of a challenge to the learner.
- It can give a learner practice in accessing external sources of information.
- It works well where people have some prior knowledge of the subject.

Disadvantages:

- It can be discouraging for a learner to have to answer questions where they do not know the subject matter.



### Neither right nor wrong

Remember that formative questions do not have to have right and wrong answers. Asking questions is a very good way to encourage someone to think about a subject and to explore different possibilities.

If you want to use a question in this way you will need to use error-contingent feedback.

### Allow several attempts

We use formative questions to help a learner see how much of the subject they have understood. It is therefore important to give them as much opportunity as possible to learn from the question by giving them several attempts to answer the question if they get it wrong first time.

You can:

- tell them that this is not the correct answer and ask them to try again
- provide some sort of hint which explains why this is wrong or helps them identify the correct answer
- point them towards a source of help.

Allow this at least once.

## Writing summative questions

Summative questions are used in assessment tests, where you want to check a learner's overall mastery of a subject. Note that you can offer summative tests before or after training – if the test is well-designed and comprehensive, someone who passes the test may not need to attend the training.

There are some important differences to consider between summative and formative questions.

Issue	Summative	Formative
<b>Scoring</b>	The answers are recorded in the management system, and a score for a correct, partially correct or incorrect answer is logged.	Scores are not logged in the management system, although they may be recorded temporarily if the learner is working through a series of questions and their performance needs to be monitored.
<b>Feedback</b>	The learner will not generally receive any feedback to tell them if their answer is correct or incorrect. However, they should be told that their answer has been recorded.	The learner should receive feedback that explains that their answer is correct and why it is correct, or that it is incorrect and why it is incorrect.
<b>Attempts</b>	The learner should only have one attempt during each pass through the assessment test. If they repeat the test they may be given the question another time.	The learner should have at least two possibilities to answer the question correctly.
<b>Right and wrong</b>	There should be a clear right and wrong answer, although there may be more than one correct answer.	It is not necessary to have a correct answer, but the feedback should provide useful information.

## Scoring summative questions

You always need to think carefully about how you will award scores for summative questions, especially when you use different question types or have some questions with more than one correct answer.

If all of your questions are single correct multiple choice questions, you just need to decide that you will award, say, one mark for the correct answer and zero for an incorrect answer.

However, if a question has two correct options, you need to decide if you are going to award a half mark for only selecting one of the correct options. You have to decide whether or not it is therefore appropriate to give someone a half mark for not answering the question completely correctly: this depends on the nature of the question and the subject matter.

If you do decide that someone needs to select all correct options before being given a mark, you should make this clear in the wording of the question.

## General principles for writing good questions

There are some general guidelines to follow.

### Make questions cover a real objective

Think about the purpose of training, which is to apply knowledge. This means that a good question should be testing an identified performance objective. Do not include a question just for the sake of it or because it is easy to write.

The most effective questions in learning materials are **performance-oriented**, i.e., they ask the learner to consider **how to apply knowledge**. This is, after all, what training is about – to make sure someone can apply knowledge in a real situation.

This contrasts with **content-oriented** questions, which ask about knowledge in isolation from its application.

Look at these examples.

Performance-oriented	Content-oriented
What do you do if you suspect you have a computer virus?	How does a computer virus work?
How much annual leave will a person have by the end of June?	How quickly does annual leave accrue?
Someone goes off sick on May 3 <sup>rd</sup> . After what date would they need to provide a doctor's certificate, if they stay off sick?	How many days can someone take off sick before they need a doctor's certificate?

### Check for understanding, not memorising

Avoid asking questions that merely repeat information the learner has just read. Questions whose answers are word for word copies of information presented are called **verbatim** questions and have no learning value.

Questions about facts often fall into this category. For example, consider these two questions:

- “Does the policy cover theft?”
- “Would a customer be covered if their phone was stolen from their jacket pocket?”

The first tests the recall of policy conditions while the second checks that they can understand and apply these conditions.

One good way to make questions test understanding is to make them performance-oriented – every new situation is a test of understanding and being able to use information.

If you do want to ask a content-oriented question, there are various ways in which you can present questions that test understanding rather than recall:

- Paraphrase, repeat the information presented but use alternative wording
- New application, make the learner apply the information presented to a new application
- Categorical, make the learner apply the information presented to a more general or specific example

### **Get the reading level right**

Make sure the wording of the question is appropriate to the reading level of the target group. Questions must always test knowledge of the subject rather than of reading ability. This is particularly important where the first language of some learners will not be the language of the test.

So write questions clearly and simply.

### **Avoid negative words**

Questions that ask the learner to identify which is **not the correct answer** are difficult to understand. They:

- avoid telling someone the right answer
- focus attention on the wrong thing to do
- test the learner's comprehension of English rather than of the subject, as they are linguistically harder to understand

Make questions ask the learner select correct things rather than incorrect things.

### **Avoid abbreviations**

Avoid using abbreviations in questions (unless of course you are checking an understanding of an abbreviation).

### **Keep questions all on one screen or page**

Make sure that the wording of questions and feedback fit on to one screen. If you find that you need to allow scrolling of the screen or turning to a new page, you must redesign the question.

If your e-learning software works by displaying feedback in a pop-up window (which, although popular, is not good practice) make sure that the content of the feedback stands alone, as the window may obscure question text.

## **Analysing the effectiveness of summative assessments**

Once a sufficient number of people have completed a summative assessment it is important to analyse how people are answering the questions, so that individual questions that are too difficult or too easy can be identified and amended.

There are several different statistical techniques that you can use to do this item analysis (as it is often called).

### **How many people answer a question correctly?**

The percentage of test-takers answering a single question correctly is called the facility factor. It is suggested that if more than 85% of people answer a question correctly the question is too easy, or less than 25% it is too difficult<sup>1</sup>.

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<sup>1</sup> <http://chemed.chem.purdue.edu/chemed/stats.html>



### How well does a question discriminate between good and poor test takers?

The difference in answering patterns between the top and lower quarters in a test is called the discrimination factor. This compares the ability of a question to distinguish between high and low performers by seeing how often low performers select the correct answer as compared to the high performers. The better the question, the closer the discrimination factor is to 1.

### How often do people select distractors?

The fewer times a distractor is selected the less effective it is in the question and the easier it is to guess the right answer.

The best way to see if a distractor is proving useful is to see how often weaker candidates select it: weaker candidates should select distractors more often than strong candidates. So we look at the results for the candidates who are in the bottom 25% for the whole assessment, and see how often they select the distractor for a question. If it is selected in less 7.5% of cases, it is too weak and should be replaced

stop  
Generally a distractor is regarded as ineffectual if it is selected less than 7.5% of the time<sup>2</sup>. In a good question there would be no such distractors.

### How reliable is the test overall?

If a test is reliable, there will be a certain relationship between the range of scores (between highest and lowest) and the range of scores that most people achieve.

The statistics for this are rather complex, but what is of interest is the ratio between the range and the standard deviation (which is easily calculated by a spreadsheet). The optimum value for this increases as the number of people taking the test increases, so for 25 it is 3.9, 50 it is 4.5, 100 it is 5.0 and so on.

### An example

Here is a question whose results were analysed.

Ms Smith may claim a dependency allowance for:

1. 5 children and her spouse
2. 6 children
3. 7 children
4. The spouse only

The correct answer is option 1.

The item analysis showed that 88.2% of test takers selected option 1, and nobody selected option 3. This tells us that:

- Option 1 is too obviously the correct answer.
- Option 3 seems a little unlikely.

We can therefore edit the question to make it more challenging.

The reasons why this is a very easy question to answer are explained later in these notes.

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<sup>2</sup> <http://www.grbps.com/Analysis.pdf>

## Multiple-choice questions

A multiple choice question is any question that asks the learner to select the correct answer(s) from a list of alternatives (or options). Some technical terms:

- the correct answer is sometimes known as the **key**
- the incorrect alternatives are the **distractors**

E-learning materials use a lot of multiple-choice questions as they are easy to program and easy for the computer to judge. This does not mean, however, that they are easy to design! It can be very difficult to design a set of multiple-choice questions that really test the material the learner is studying.

Graphics and audio allow for a lot of variety in the structure of a multiple-choice question. Although the principle of choosing a correct answer from a set of possibilities remains, there are various ways in which the possibilities can be presented and the choice made. For example, the learner can:

- select a graphic image
- click on the correct part of a graphic image
- drag a graphic image into an answer box
- select an audio item

## Ways of presenting a question

The most common and obvious style of multiple choice question is to ask a simple question and offer a number of possible answers. However, it can sometimes be difficult to think of suitable questions in this style, so it is useful to think about alternative styles.

### Premise and consequence

Present the learner with a situation and provide them with a choice of possible outcomes.

An organisation wants to estimate how much it will cost to offer existing services to a new group of clients. Which of the following would be useful activities to carry out?

1. Marginal cost analysis.
2. Strategy-context evaluation
3. Programme evaluation review
4. Value for money analysis

### Case study

Give the learner a scenario based on the source material. If your scenario is strong enough, you may be able to find several questions within it.

### Multiple true or false

Offer two statements A and B about the content. Then ask the learner if A is true and B false, A is false and B true, A and B are both true or A and B are both false. Four options from two statements.

Here is an example.

A voluntary organisation providing support to homeless people finds it hard to provide the required level of services during a time of economic recession. Two reasons put forward to explain this are:

- A. An increased number of people needed services
- B. it is harder to raise money at this time

What do you think about the validity of these two reasons?

1. Neither A nor B are relevant to voluntary organisations.
2. Only A relevant to voluntary organisations.
3. Only B is relevant to voluntary organisations.
4. Both A and B are relevant to voluntary organisations.

### **Missing item**

Give the learner an incomplete text or graphic-based list and ask them to identify what is missing from the list.

### **Option evaluation**

There are several ways to use this structure.

Give the learner a statement and ask them to evaluate it against specific, relevant criteria and then asked them to assess the statement. For example, you could give options of Unlikely, Possible, Probable, Very probable.

Give the learner a question and an answer, and then provide them with a list of possible ways of assessing the answer. For example, is the answer given Incorrect, Partially correct, Acceptable or Excellent. You will need to give the learner some criteria for categorising these descriptions.

Questions like this are very useful for testing people's understanding of subtle or complex issues where there may not be completely correct answers. If the question is summative, you may need to decide on awarding half marks for some answers.

## **Using multiple correct questions**

It is perfectly acceptable to give learners questions where there are two or more correct answers in a list. You should provide a correspondingly higher number of distractors.

### **Scoring multiple correct questions**

The main issue with using questions such as this in an assessment test is about awarding scores. You need to decide on a scoring scheme that rewards partially correct answers as well.

### **Providing feedback**

With multiple correct questions it is difficult to provide feedback that addresses the exact answering pattern if the question is only partially correctly answered. It is not fair to tell someone that their answer is 'incorrect' if they have correctly selected one or more of the correct answers.

The best thing to do is to start the incorrect feedback with something like "That is not completely correct..." This is potentially misleading if they failed to but is better than telling them that they are wrong. Of course, it may be possible to code the questions so that it detects responses that do not include any correct selections.

It can be difficult to provide error-contingent feedback with multiple correct questions that cover different combinations of responses. It is possible to do it but the question design time goes up considerably.

### **Explaining the question**

Take care when wording the instructions to multiple correct questions. You may need to tell the learner that:

- there are a specific number of answers to select, or
- there may be more than one correct answer.

Be careful about including multiple correct questions within a series of single correct questions. Learners do not always read the instructions and may assume that only one answer is correct!

For this reason a better way to present multiple correct multiple choice questions in an assessment test is to present them as a series of alternative response questions (true/false, for example). It is also thought that this is a more reliable way of asking such questions.

### **Questions where all the options are correct answers**

Think carefully about presenting questions where all the options are correct.

Avoid asking such questions where all the options are obviously correct. An example of this would be a question such as "Which of the following are desirable qualities in a house?", and where the options are all positive attributes. These can irritate learners and are not very meaningful learning opportunities.

There are occasions where using such a question can be effective in pointing out that the learner really must take into account all possibilities, but this should be done sparingly. Because the answers to such questions are often rather obvious, they are not good choices for summative assessment questions.

If you want to ask a question where all the options are reasonable answers, you could ask the learner to select what they think is a 'good' (rather than the best) answer. For example, you might want the learner to be able to explore the difference between different strategies, given a particular situation. In such questions you should provide error-contingent feedback for each option.

## **Guidelines for effective multiple choice questions**

### **Always number or letter the list**

Learners find it easier mentally to sort items that have easy references, such as numbers (1, 2, 3, etc.) or letters (a, b, c, etc.).

Do this even if the software you are using to present the questions does not need the number or letters.

### **Provide four or five possible answers**

A multiple choice question can offer, in theory, anything from two possible answers upwards. Of course, with only two answers the learner has a 50% chance of guessing the right answer, while with a large number of answers it is increasingly difficult to guess correctly, but the question becomes unwieldy both to design and read.

The best compromise is to offer no more than four or five alternatives.

### **Make all the choices believable**

The hardest part about writing multiple choice questions is thinking of the distractors, and it is sometimes hard to resist the temptation to put one in as a joke. Avoid this: it merely increases the user's chance of guessing the right answer from those left.

For example, is option 3 in this question plausible?

The United Nations Convention of 1951 defines UNHCR's responsibility towards:

1. Refugees
2. Internally displaced people
3. International civil servants
4. Stateless people

### **Make the meaning of the question clear to the user**

Do not ask questions that mean different things to different people. For example:

UNHCR's work is important because:

1. It helps refugees
2. It supports governments in helping refugees
3. Both refugees and internally displaced people are helped
4. Refugees are often powerless

Clearly everyone will have different thoughts about this.

However, note that questions asking the learner to choose the 'best' (or similar superlative) option are fine as long as the learner knows what the criteria are for making the decision. For a formative question it is particularly important in this case to provide error-contingent feedback.

You can also confuse the meaning of a question by adding unnecessary information in the options. Think about what the question is asking and confine content in the options to information that answers that question. For example, in the example below the text about debt consolidation is irrelevant and merely confuses.

What are the three repayment options available for a Personal Loan?

1. Deferred. Remember, this option can not be offered where 70% or more of the Personal Loan is for debt consolidation.
2. Standard.
3. Part payment.
4. Lump sum payment.
5. January holiday.

### **Keep the options as short as possible**

You keep the options short by putting as much text as possible in the stem of the question (the first part of the question). For example:

Christmas Day is on December:

1. 5
2. 17
3. 25
4. 31

This is preferable to writing December 5, December 17, etc. in the list of answers.

This is easier to do (and makes the question easier to understand) if the blank in the question is at the end. For example, write it as above rather than as something like "December X is Christmas Day. What is X?"

### **Make options parallel**

'Parallel' here means that the options should be grammatically similar.

So, for example, in the example above about UNHCR's work all of the options have a similar structure, and follow on grammatically from the stem.

### Keep options mutually exclusive

It is easy when trying to write distractors to create one that actually means more or less the same as the correct option, or is a special case of the correct option.

Here are two examples.

Does Ms. Smith require a full medical examination?

1. No – provided she has already had a full entry medical and it is within its expiry date
2. Yes – all APPC appointments require a full medical exam
3. No – but she must provide a certificate of good health
4. No – provided she has not used more than 3 sick leave days a month

Here options 1 and 2 are not mutually exclusive - option 2 is implied within option 1.

Notice also that the question is actually asking for a yes or no response, while the options contain justifications.

Another example:

Which of the following statements are correct? Click two or more options, then click confirm.

1. The writer provides enough detail to explain the current refugee problem
2. This could probably be simplified to aid readability
3. The writer makes good use of visuals (table of data)
4. The writer uses a prosaic, literary style which makes sentences and paragraphs rather long

Here, option 4 means the same as 2. If you had decided that option 2 were the correct answer, then 4 would also be correct.

On the other hand, a learner may see two options that are obviously the same and decide that they must be distractors.

Either way, the question ends up playing tricks on the learner and so is not functioning correctly.

### Avoid giving the learner clues

It is surprisingly easy to give a learner clues about right and wrong answers. We have already discussed implausible answers, but you must also look out for such things as:

- presenting opposites: an obvious distractor is the direct opposite of the key, so if a learner sees a pair in the list they will concentrate on those two
- making the correct answer the longest: you may find yourself doing this by adding information to make the correct answer unambiguously correct
- options written in a different style of language, especially one that sounds more 'official'
- 'a' and 'an': ending the stem with the word 'a' and including distractors beginning with vowels (or vice versa)
- repeating a key word in the stem and the correct option
- using jargon terms in just the correct option
- repetitive answer positions: repeatedly using the same number in the list for the correct answer (keep a die in your desk and roll it to decide the position of the key).

Here are some examples.

A staff member's TA is for 5 months. What is the requirement regarding medical clearance?

1. A certificate of good health valid for the first three months followed by a full medical OR ideally a full medical examination before starting employment
2. Provide a certificate of good health ONLY as it is valid for 5 months
3. Provide a certificate of good health upon extension of the TA beyond 6 months
4. She does not need to provide anything

Clues include:

- Option 1 is the longest and contains most plausible detail. It is also written in a formal style.
- Option 2 contains 'only' – such words alert people to them being incorrect.
- Option 2 says '5 months' – administrators never use odd numbers like this, so it is implausible
- Option 4 does not sound plausible.

#### **Avoid using 'not' in the stem**

Avoid asking learners to say which is not a correct answer. Such questions:

- become tests of mental dexterity rather than of an understanding of the subject
- make people think about the incorrect answer rather than the correct answer.

It is also better to avoid 'not' statements in the options, but if you do want to do this, make sure you highlight the 'not' appropriately.

#### **Avoid using 'none' or 'all' as an option**

Look at this question:

Which of the following groups does UNHCR work with?

1. Refugees
2. Internally displaced people
3. Stateless people
4. All of these

The weakness with this type of question is that if the learner knows that UNHCR does not work with stateless people, the 'all' option is not a possible correct answer. The question then becomes a simple alternative response type, with an increased chance of guessing the right answer.

With the way this question is worded, there is also an important error of logic. Technically all the options are correct, but the question writer really intended the learner to select option 4. It would be therefore easy to evaluate a selection of 'Refugees' as incorrect, when of course it is correct.

Similarly, avoid using specific determine words such as 'never', 'only', 'all' or 'always' in the stem or options of a question. Absolutes are always very hard to find, and if a learner can think of an exception, however obscure, they have a good reason to reject 'never' and 'always' options.

#### **Put answers in alphabetical or numerical order (where appropriate)**

When answers are numbers or single words it is good practice to put them in numerical or alphabetical order.

If there is any other logical sequence to the options, use this.

### **Finding distractors**

Following these guidelines will help you to design better multiple choice questions. Do not underestimate the time taken to write these questions: you could realistically spend an hour writing a well-designed multiple choice question.

Here are a few hints to help you find answers for multiple choice questions.

### **Collect possible answers**

Write your question down as an open-ended question and ask typical learners to give you answers to the question. You will find that you have right answers and wrong answers. The wrong answers make perfect distractors because they are clearly plausible to the target group!

### **Think of different questions**

Think of statements that would provide correct answers to different but similar questions.

### **Classify the answer**

Can you see what sort of 'general class' the correct answer is? Think of other items in that class and construct the distractors from that. For example, consider this question:

The Ansoff growth model proposes four strategies that an organisation can choose to follow. Three of them are market penetration, market development and diversification. What is the fourth strategy?

The correct answer is 'Product development'. This is in the class of 'doing things to products', so alternatives could be:

- Product enhancement
- Product distribution
- Product protection

All apparently meaningful, but quite wrong!



## Alternative response questions

Alternative response questions are a special form of multiple choice question, where the learner has to choose between just two items, such as true/false or yes/no.

There are also instances where they are valid, such as where there really are only two possibilities, such as in or out, or up or down. They are also useful as an alternative way of presenting a multiple correct multiple choice question.

A single alternative response question does give the learner a 50% chance of guessing the correct answer, and so their learning value as single questions is limited. Such questions can also be trivial and not test comprehension.

Here are some guidelines to follow.

### Present a set of statements

Give the learner a set of statements related to the same subject. This reduces the chance of them appearing to understand the subject by guessing all correctly.

Here is an example of one way to present an alternative response question:

Which of these people could have a case for being given refugee status?

	Yes	No
They have left their country to find a better job	<input type="checkbox"/>	<input type="checkbox"/>
They have moved to another part of their own country because of civil war	<input type="checkbox"/>	<input type="checkbox"/>
They have left their country and have no nationality	<input type="checkbox"/>	<input type="checkbox"/>
They have moved to another country because of religious persecution	<input type="checkbox"/>	<input type="checkbox"/>

### Distribute true and false statements

Make sure that your list contains an approximately equal number of true and false statements. Also make sure that they are spread randomly through the list.

### Avoid double negatives

Make statements positive. It is much harder for a learner to decide whether a statement which says that something is not the case is true or false. For example:

2004 was not a leap year. True or false?

This tests mental agility rather than knowledge of the subject.

### Use popular misconceptions

Try to identify what misunderstandings people have about the subject. Present them as 'true' statements.

### Enhance false statements

Word false statements so that they sound even truer and more plausible than the really true statements.

### Keep statements simple

Make sure that a true-false statement expresses a single idea. The more complex the statement the harder it is to make sure that it is definitely true or false.

### Make decisions clear

It is important to make sure that statements can be only true or false, and this is easier to do if your statements:

- use quantitative not qualitative language
- are comparative rather than absolute

For example:

A trader claiming Input Tax of £8000 on Inputs of £45,000 looks to be non-compliant

This uses figures to make the statement very clear.

Also, compare these statements:

1. Carrying out an audit of a sole trader will probably take less than one day
2. Carrying out an audit of a sole trader will always take less than one day

The second statement is absolute: people may well know of one case where such an audit did take more than one day. This makes it difficult to justify it as true.

## Matching questions

Matching questions are a refinement of multiple choice questions, effectively combining a number of multiple choice questions. For example:

Which are the correct capital cities? Match the city to the country.

Country	City
1. Romania	a. London
2. Hungary	b. Mexico City
3. Mexico	c. Bucharest
4. Nigeria	d. Budapest
	e. Abuja
	f. Barcelona

To define some terms used, in such questions each country is a **premise** and the cities are **responses**. As with multiple choice questions, the lists can be made up of text, graphics or audio items.

Use matching questions to:

- match images with associated words
- match words with associated words
- match images with associated images
- group or categorise related images or words
- label parts of an image
- complete a sentence
- fill in a form

There are various types of matching pairs questions.

### Ordering

Ask the learner to put responses in the correct order (the premises). The premises may be numbers with spaces or boxes in a flowchart or similar. You might ask the learner to

click on an up or down arrow next to the response to sort the list into the correct order.

### **Fill in the blank**

The premises are blanks in sentences. The learner decides which response goes in which space.

## **Presenting matching questions**

Matching questions can be really useful, as they can test a lot of understanding in a single question. However, they can be rather complex and need careful explanation to the learner. Word such explanations very carefully, and if possible, test the clarity of your wording out with other people.

Technically, you can:

- use drop down boxes, where the responses are listed as options in the drop down window
- use a drag and drop approach, where the learner drags what they think the correct response is over to the premise and lets it go.

## **Guidelines for matching questions**

Many of the guidelines about writing good multiple choice questions also apply to matching questions, but there are some additional guidelines to follow.

### **Keep items in each list homogeneous**

Design each list so that the items in it are of the same sort. For example, in the question above the first list contains countries and the second list cities.

### **Avoid clues**

In addition to the possible clues discussed above, a clue that is specific to matching questions is to provide items in the list that are obviously related. For example, in the question above Mexico and Mexico City are too obviously connected.

### **Offer more responses than premises**

If the list of responses is longer than the list of premises, the learner will always have to make a choice between alternatives even for the last premise.

Unfortunately many rapid e-learning tools are designed so that there have to be the same number of premises and responses. This comes from a lack of understanding amongst tool designers about the complexities of question design.

## Free format questions

The term 'free format' can cover both short, one word responses and essay length answers. In this section we will just look at the first possibility. Essay responses are covered in the following section.

Short answer, or constructed-response questions, require the learner to enter a response into a space. They are easy questions to design, and can be the most challenging to learners, as the correct answer is not visible.

Free-format questions work very well in paper-based materials, but are more problematic in e-learning courses for a number of reasons:

- If you want to check the response you must design thorough judging routines to take into account misspelling, etc.
- If you want to save the learner's response you must add some data storage capability.
- If the response is not judged, feedback is not related to the response. When learners realise this they may not bother with responding and simply read the feedback, making this a non-interactive interaction.

There are two main types, open-ended and completion.

### Completion questions

Completion questions are sometimes called 'cloze' (which comes from the word for *closure* used in Gestalt psychology) or 'fill in the blanks': in other words the learner has to provide a missing word.

For example:

Internally \_\_\_\_\_ are those who have had to leave their homes but have stayed in the country of their nationality.

When designing completion questions, make sure that you:

- have just one or two blanks, as any more can make the sense of the statement ambiguous and hard to answer correctly
- put the blanks at the end of the statement, as putting blanks at the beginning makes the statement more difficult to comprehend linguistically

So an improvement in this question would be:

People who have had to leave their homes but have stayed in the country of their nationality are known as Internally \_\_\_\_\_.

- allow for different spellings and capitalisation, as well as for variants (in this example we might accept 'People' as well as 'Persons').

### Open ended questions

This example would become open-ended if we asked:

What does the abbreviation 'IDP' means? \_\_\_\_\_

The points about allowing misspellings, etc., also apply here.

The best application for free format questions is where the answer is numerical. For example:

Approximately how many refugees are there in Chad?

But be careful. The answer scanning must also be able to pick up responses such as 'one thousand ', or the programming must bar the typing of letters.

## Essay response questions

These are questions where the learner must write a lengthier response to an open-ended question. If this is being done within an e-learning course, find a way for your learner to type and save a response, either using the LMS, specially designed notepad or an external method such as a word processor.

Terminology for this type of response varies, but some useful definitions are:

- brief response – takes less than 10 minutes to answer
- extended response – takes longer than 10 minutes, often what we loosely call an ‘essay’

Extended response questions make the learner discuss a relatively small area in great depth, which makes them effective for specialised topics but less good where we want people to have a good appreciation of a number of different topics. This is usually what we are looking for in occupational training courses.

Questions of this sort place a lot of demands on writing skills, and it can take some people a long time to express in writing what are relatively simple ideas. This may be a particular problem where people are having to write in a non-native language.

### Ways of evaluating essay responses

Evaluating responses is a big problem with this type of question. There are various challenges:

- It takes much longer to score such a response, and this can be expensive in terms of time and money.
- Scoring can be inconsistent – can you be confident that two different people will give the same score to the same piece of work? If not, the question is not valid as a test. There are so many variables here – clarity of expression, use of graphics, expectations about the individual – that it is almost impossible to develop a truly objective test.

There are broadly two approaches you can follow to marking brief or extended response questions:

- **Analytical** marking, where you use a scoring rubric to break down the desired components of a good answer.
- **Holistic** marking, where you give a mark based on the overall quality of the response.

Analytic marking is more consistent but is time-consuming to develop and works best where there are discrete elements to test. Holistic marking is good for extended responses, less clearly structured and opinion-oriented material but scores can vary widely between different assessors.

### Making analytic marking work

Here are some guidelines for making analytic marking work.

#### **Make sure the question measures a specific objective of the training**

Think carefully about the wording and structure of the question and make sure that it really does ask the learner to explain or discuss something that is directly relevant to their work.

#### **Make the question readable**

Think about the lowest reading abilities likely in your target group and phrase the question so these people can read and understand it. Test the wording with other people to see if they can understand what is needed before you publish it.

### Avoid questions that are matters of opinion

Ask questions to which there are right or wrong answers. Questions to which the answer is a matter of opinion cannot be analytically scored in any meaningful way as there is no definitive right or wrong. Consider this example:

How well is the distribution of non-food items carried out in your duty station?

A more meaningful question here might be something like:

Describe two aspects of the distribution of non-food items in your duty station that cause problems and for each suggest one way in which in this could be improved.

### Develop a tight scoring plan

Scoring plans (or 'rubrics') are essential to try and standardise how responses will be evaluated. They can also help to minimise the dependency on an expensive and unavailable expert resource. How to specify a rubric is described in more detail below.

### Give a word count

Tell the learner what the maximum number of words is that they should put in their answer. Make it clear that marks will be deducted if they exceed this, but in practice allow them to go over by 10%.

This makes everybody's life much easier, as it will limit the amount of writing they do and the reading you do!

You should write your own model answer when deciding the word count, so that you know how many words really are needed to include what you are looking for.

### Designing scoring rubrics

Rubrics are essential if you want to make the scoring consistent from one evaluator to another.

Here is an example of a scoring rubric for the question below. There are five steps, described below, to developing something like this.

Describe three factors you need to take into consideration when deciding whether a training solution requires a face-to-face event or if it can be delivered using on-line technology and what their impact might be.		
Elements	Assessment criteria	Points available
A. Three relevant factors are identified	Reference to factors such as (but not exclusively): <ul style="list-style-type: none"> <li>• budget available</li> <li>• level of inter-personal skills training involved</li> <li>• timescales for delivery</li> <li>• connectivity of participants</li> <li>• geographical distribution of participants.</li> </ul> Other relevant factors are proposed and clearly described.	3
B. Contribution of chosen elements to decision-making process is clearly explained.	Reference to how higher and lower level of each factor influences decision on choice of medium.	2 points for each factor (high - low)

### Write the first draft of the question

Think about the objectives of the training and then draft the question. For example:

Describe three factors you need to take into consideration when deciding whether a training solution requires a face-to-face event or if it can be delivered using on-line technology.

### **Decide how many points the question is worth**

This depends on the significance of the question within the overall assessment, and you will also need to think about how easy it is to apportion points within the question. In this example we shall assume that the question is worth 9 points.

### **Decide what elements you want to see in the model answer**

Think about what is important in a perfect answer. In this example we are looking for a list of factors and a simple analysis of what varying levels means.

### **Decide on the criteria for assessing the responses to each element**

Next provide guidance on how references to these factors must be judged.

If possible check your draft rubric with other subject experts to make sure that everyone is happy with the proposal.

### **Check the wording of the question to make sure the marking scheme is implicit**

Finally we look to see if a competent learner could work out what the scoring scheme is from the wording of the question. In this example, we might feel that the original wording does not express clearly that we want the answer to explain how high and low levels of the factors is important. We might therefore edit the question thus (new text in italics):

Describe three factors you need to take into consideration when deciding whether a training solution requires a face-to-face event or if it can be delivered using on-line technology, *and what their impact might be.*

### **What the rubric is (and isn't)**

It is:

- a way to make the assessment of answers as quantitative as is possible, reducing the subjectivity and variation amongst markers in marking
- a tool for simplifying and speeding up the marking process
- an audit trail we can use to defend a decision about scoring.

It isn't

- the right answer, but is a guideline to what *a* right answer should look like.

### **Making holistic marking work**

Holistic marking is quicker but less reliable than analytic marking. So to minimise the problems, follow these guidelines.

#### **Use several markers**

Have several different people mark the questions and find what the average is. The speed of holistic marking offsets the extra time needed.

#### **Develop a model answer**

A model answer will help assessors understand what the question is looking for and will identify responses that are clearly off target.

#### **Mark answers sequentially**

Mark all the Questions 1s, then the Question 2s, and so on, rather than Candidate A, then Candidate B. This will make it much easier to develop an idea of good and poor answers.

### Conceal names

The highly subjective nature of holistic marking makes it much easier for knowledge of the writer to subliminally influence your judgement. This also applies to analytic marking, but to a lesser extent.

### Give a word count

The comments above apply even more so in this type of response.

## Reflection questions

Questions do not always have to elicit a definite response that the computer will judge. People also learn by reflecting on what they have studied and thinking about how they will apply it, so it is a good idea to include questions that encourage the learner to do some external thinking or physical activity.

For example, you could use suggestions such as these:

- Imagine how you will use your new skills.
- How does what you have just learnt fit into the big picture of your work?
- How does what you have learnt compare to what happens in your workplace at the moment?
- If you put these new skills into practice, what effect will this have on working with your colleagues?
- Think about what you have just learnt. What implications might this have for how you go about your job?
- How does what you have just learnt fit into what you already know?
- Have a chat to your colleagues about what you have just learnt. See what ideas they have about the subject.
- Do you think you would be able to explain this to someone else? See if you can explain these principles to someone who has not gone through this training.
- You might find it useful to design yourself a simple aide memoir about this subject. Have a go at that before moving on.

As well as encouraging learning by reflection, such questions also help to reduce any:

- isolation felt by the e-learner
- discomfort felt by inconsistencies between what they already know or do and what they are being told to do in the e-learning.

Depending on the facilities offered by your e-learning systems, you might suggest that the learner makes a note of these things in an electronic notepad or in their e-mail client as a 'to do' item, for example.



## Usability issues for on-screen tests and questions

The software packages used to put questions on-screen often placed certain restrictions on how questions can work. This is particularly the case where the software is designed to be easy to use.

These restrictions can have certain implications for how you write or otherwise design a question.

### What is right or wrong?

The software will sometimes place a tick or a cross next to the set of options in a multiple choice or alternative response question to indicate that this is a correct or incorrect option.

However, this can sometimes be confusing as it can suggest that the learner's response is correct when it is incorrect, or vice versa.

### Pop-up windows for feedback

Feedback to questions is often given in a pop-up window that appears in the centre of the screen, covering up the question and options. This makes it difficult or impossible for a learner to relate the feedback to the question.

This is just a simple example of how software designers do not understand usability issues!

### Ensuring test reliability

On-line tests are an easy way to make testing available to large numbers of people in different geographical locations, but there are potential problems.

A major problem is ensuring that the person taking the test is who they say they are. If the test is significant in any way there can be an incentive for a candidate who feels weak to ask someone to sit the test for them. There are no real electronic ways to guarantee that the correct person is making the question selections, and if authenticity is essential, there has to be a completely trustworthy invigilator observing the test completion process.

### Setting randomised tests

Then, it is necessary to make sure that each person sits a different test. You can do this by providing a bank of questions from which the program selects a certain number at random. Each person will then sit a completely unique test.

### How many questions?

The number of questions to include in an assessment test depends on the nature of the subject and the level of mastery required. A practical guide is that a one hour e-learning course would have a test of about 10 questions which would be drawn from a bank of 20.

### Pass marks

Generally, the pass mark for a quantitative test (one containing multiple choice-type items) is set at about 70 to 80%. However, to make sure that this is valid it is important to do a thorough item analysis for the tests to make questions are set at the right level of difficulty.