E-learning content must be accurately prepared and presented in order to be effective. Instructional techniques should be used creatively to develop an engaging and motivating learning experience.

While e-learning content can consist of different elements, ranging from simple learning resources (e.g. documents and PPT presentations) to interactive content, simulations and job aids, this section will focus mainly on the development of interactive e-lessons. Interactive e-lessons are the most common method for delivering e-learning content. They offer a medium level of interactivity and allow designers to use a variety of instructional techniques and media.

This section will illustrate the process of developing e-lessons, including preparing the content, applying instructional techniques and media and creating the final interactive product using appropriate software and authoring tools.
5. PREPARING CONTENT

This chapter provides suggestions to SMEs on how to prepare and write content for e-learning. It will introduce the following topics:

> How SMEs can provide the required information and knowledge; and
> How to write content for e-learning.

5.1 HOW SUBJECT MATTER EXPERTS CONTRIBUTE TO E-LEARNING DEVELOPMENT

In traditional training, SMEs assemble material for learners and teach them directly, while in e-learning, SMEs provide IDs with the information and knowledge they need to prepare e-learning materials and activities. For courses where domain-specific knowledge and skills must be developed (e.g. for an e-learning course on food security analysis), SMEs must provide IDs with high-quality content. However, the extent of an SME’s contribution can vary, depending on the amount and quality of existing material.

In fact, it is very likely that a set of materials for a specific subject is already available. These can consist of:

> user manuals and technical documentation;
> classroom course handouts and lecture notes;
> presentations, such as PowerPoint slide shows;

It’s time to take action!

The e-learning course will include a set of self-paced e-learning lessons to illustrate basic concepts.

Jin, the SME, is in charge of preparing all the required knowledge and information—the “heart” of the course.

So, I am responsible for developing the course content. How should I proceed?
> documented case studies;
> photographs, images, graphs, tables and other illustrative materials;
> training materials, such as self-study guides, web guides and other distance learning materials; and
> reference materials, such as specialized thesauri and glossaries.

**CAN EXISTING MATERIALS BE USED WITHOUT MAKING ANY CHANGES?**

Unfortunately, existing training materials and documents cannot be automatically transformed into e-learning materials by just making them available from a Web site.

E-learning differs from face-to-face training and requires specific formats. For self-paced e-learning in particular, material must be carefully designed and must embed adequate instructional support to allow learners to function independently throughout the course.

For example:
> a PowerPoint presentation developed for face-to-face training sessions is not e-learning content, because it does not include all the explanations and examples which are supplied by the presenter in a traditional classroom; or
> a 20-page article made available online is not e-learning content because the way it is designed doesn’t match specific learning objectives and because scrolling text pages is not the best way of reading online.

Although preparing materials is less demanding in instructor-led synchronous learning, it is still necessary to adapt existing materials to the new learning environment.

Two main situations can occur:

<table>
<thead>
<tr>
<th>IF...</th>
<th>...THE SME MAY BE REQUIRED TO PROVIDE:</th>
<th>...THE ID WILL:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Existing materials provide high-quality content sufficient to cover each outlined e-lesson</td>
<td>&gt; linkages between existing source materials and outlined e-lessons (for example, Chapter 1 of a manual on vulnerability analysis can cover the content for lesson 2.3 of an e-learning course on food security analysis).&lt;br&gt; &gt; practice exercises (i.e. questions and feedback) and additional examples where required by the ID.&lt;br&gt; &gt; glossary terms and relevant descriptions.&lt;br&gt; &gt; recommended reading and resource pointers for the lesson(s).</td>
<td>&gt; develop lesson storyboards which integrate content taken from different source materials, with practice exercises and examples provided by the SME.</td>
</tr>
<tr>
<td>2) Existing materials do not adequately cover the content of outlined lessons</td>
<td>&gt; core content for the lesson which ensures that the learning objectives of the lesson are adequately covered.&lt;br&gt; &gt; practice exercises (i.e. questions and feedback) and additional examples where required by the ID.&lt;br&gt; &gt; glossary terms and relevant descriptions.&lt;br&gt; &gt; recommended reading and resource pointers for the lesson(s).</td>
<td>&gt; develop lesson storyboards which integrate lesson content, practice exercises and examples prepared “ad hoc” by the SME.</td>
</tr>
</tbody>
</table>
In either case, the SMEs also must review the storyboard to verify that the ID has correctly interpreted the content.

5.2 Tips for Content Development and Language Style

When SMEs are in charge of developing content for e-learning lessons, they should refer to the course outline (or course plan) to be informed about the topics to cover and the approach to take in illustrating those topics (e.g. the level of detail, the language to use, the preference for illustrating concepts through examples or case studies). With those instructions, SMEs can begin to write the content.

The following are some tips for SMEs on authoring lesson content.

**TIPS FOR CONTENT DEVELOPMENT**

- Before developing the content for the assigned lessons, review the proposed learning objectives.
- Make sure that the content and knowledge assessment tests and exercises “match” the lesson objectives at every step in the work flow process.
- Provide all the knowledge needed to meet the learning objectives, including information that may seem obvious to you but may be unknown to learners.
- Use examples that are likely to be familiar to most, if not all, learners. People taking the course may have different backgrounds, so use a variety of examples. This will help learners understand and remember concepts.
- Classify topics for each lesson as follows:
  - Must know: a core part of the content; the learner needs to understand these concepts.
  - Nice to know: the learner could get by without this information, but it could help develop a better understanding of the subject, or add interest for the learner.

How much content should an e-lesson include?

A single e-lesson should not take more than 30 minutes of learning time.

How many pages of content should the SME submit to create a single e-lesson?

There are no precise rules on this; it depends on the level of complexity and on the number of questions and interactions in the lesson. For a 30-minute e-lesson that included 30 screens (using an estimate of 1 minute per screen of, for example, a text/image or a feedback window), approximately 10-15 pages of content would be required.
Authoring content for e-lessons is not the same as writing books or scientific articles. The following tips on language style could be useful to SMEs when authoring content for e-lessons.

### TIPS ON LANGUAGE STYLE

> Write directly, simply and clearly. To accomplish this, keep sentences short. One rule of thumb is that a sentence should not be longer than 25 words. It is important to not give the reader more ideas or information than can be handled at one time.

> Avoid jargon.

> If you are addressing a multicultural audience, avoid culture-specific slang, colloquialisms and examples.

> Be sensitive to the fact that many learners are not native English speakers. Write as you talk. Informal language and contractions (e.g. don’t, we’re) can be used.

> Minimize the use of compound sentences. When you see a colon or semi-colon, examine the sentence to see if it could be made simpler and clearer by breaking it into shorter sentences.

> Use personal pronouns (e.g. "you") to refer to learners. This personalizes instruction and involves your reader.

> Use bulleted lists when appropriate.

> Use gender-inclusive, non-sexist language (e.g. sexist: “Over the years, men have continued to use non-renewable resources at increasing rates;” gender-inclusive: “Over the years, people have continued to use non-renewable resources at increasing rates.”)

> Use the active voice. In a passive construction, the agent of the action often disappears from the scene. Use the passive voice only when the active voice is unduly awkward.

> Spell out acronyms in full the first time they are used. Consider adding them to the glossary if appropriate.

### 5.3 IN SUMMARY

### KEY POINTS FOR THIS CHAPTER

> There are two main ways in which SMEs can provide the knowledge required for an e-learning course:
  > they can provide IDs with references to source documents and materials; and
  > they can actually write the content for an e-lesson.

> In either case, they must check the storyboards and provide additional information where needed (for example, they might provide feedback on exercises or complete examples and scenarios created by the ID).

> Content development is based on the course (or curriculum) plan, which describes learning objectives and topics to be covered.

> In authoring the content, SMEs should provide all the knowledge needed to meet the learning objectives and avoid unnecessary information.

> The language should be direct, informal, easily understood by diverse people and culture- and gender-sensitive.
6. CREATING STORYBOARDS

This chapter provides concrete guidelines on how to develop storyboards for e-learning interactive lessons by applying different instructional techniques and media elements. It will illustrate the following topics:

> How to structure a lesson storyboard;
> How to use instructional techniques to present lesson content;
> How to add examples;
> How to use media elements (e.g. text, graphics, audio, video, animations); and
> How to develop practice and assessment tests.

### 6.1 WHAT IS A STORYBOARD?

The ID works on the content provided by the SME to design each e-learning lesson. The lesson’s storyboard (also called the script), is the design document resulting from this activity.

**What is a storyboard?**

The term “storyboard” is taken from movie production where it indicates a visual representation of the various scenes of a film. In e-learning, the storyboard describes screen by screen what will happen in the final e-lesson. The storyboard is not a final product. It is an intermediate product which is then used by Web developers to create the final interactive e-lesson.
More specifically, for each lesson, the ID:

> reviews the content provided by the author;
> selects the instructional technique which is more appropriate to present that type of content (e.g. storytelling, scenario-based approach, etc.);
> determines the lesson’s content sequence;
> creates a storyboard which specifies which elements will appear in each screen of the e-lesson. These elements include: text, images and other media, interactive questions, “more information” windows and annexes.

The following is an example of a storyboard created with PowerPoint. However, storyboards also can be created using a word processing program.

The main PowerPoint slide presents the visual elements (text and graphics) that will appear in the screen of the final lesson. It also shows the screen number and the titles of the unit, lesson and learning step.

In the notes section of the page, the ID writes information for developers about interactions, animations and audio associated with that screen.

The next sections provide some guidance on how to use instructional techniques and integrate media elements and interactive questions to create a lesson storyboard.
6.2 STRUCTURE OF AN INTERACTIVE E-LESSON

In creating the storyboard for an interactive e-lesson, the ID reorganizes the content provided by the SME into a sequence of slides, which will correspond to the screens of the final interactive lesson.

For example, the following is a typical e-lesson structure:

| LEARNING OBJECTIVES (1 Screen) | INTRODUCTION (1 to 3 Screens) | CONTENT (4 to 25 Screens) | SUMMARY (1 Screen) |

Let’s see a lesson’s components in more detail:

<table>
<thead>
<tr>
<th>LESSON COMPONENT</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Learning objectives</td>
<td>[Image of a slide with learning objectives]</td>
</tr>
</tbody>
</table>

At the end of this lesson you will be able to:
- identify the different reasons for doing an impact assessment;
- understand the basic concepts of impact assessment.

21 The standard structure of an e-learning lesson reflects Gagné’s nine events of instruction: 1) Gain attention; 2) Inform learner of objective; 3) Stimulate recall of prior knowledge; 4) Present the material; 5) Provide guidance for learning; 6) Elicit performance; 7) Provide feedback; 8) Assess performance; and 9) Enhance retention and transfer (See Gagné 1985).
### Lesson Component Example

#### 2) Introduction

One or more introductory screens describing how the knowledge gained from the course will be used and the benefits of having that knowledge.

The purpose of the introduction is to motivate learners to proceed with the lesson.

---

#### 3) Content (core of the lesson)

A set of screens (from 4 to 25) which make up the core of the lesson. These combine:

- text;
- media elements;
- examples; and
- practice questions.

Their purpose is to facilitate learning of knowledge and skills.

A range of instructional techniques can be used to present the content. These techniques, as well as guidelines on how to use media elements, examples and exercises, are presented later in this chapter.
6.3  TECHNIQUES FOR PRESENTING CONTENT

When creating storyboards for e-lessons, IDs may choose among diverse techniques for presenting content, according to the type of content and the desired instructional approach.

This section presents an overview of the following techniques, including descriptions and guidance on when and how to use each one:

> storytelling;
> scenario-based approach;
> toolkit approach; and
> demonstration-practise method.

Storytelling

> What is storytelling?

Storytelling provides information through a story narrative which places content in a realistic context and illustrates actions and decisions of one or more characters. It can use illustrations, pictures or video sequences.
The following is an example of an e-lesson using storytelling:

**Example: An E-Lesson Using Storytelling**

This lesson is part of a course entitled “Communicating for Food Security”.

The lesson follows the story of two communication specialists, Nur and Samir, and Paulo, an NGO communication officer, who is helping them to promote a new technology to raise yields.

Paulo will guide his colleagues through the process of organizing a communication campaign. The story provides learners with guidelines and relevant conceptual knowledge for organizing such a campaign.

> **When should storytelling be used?**

The storytelling technique can be useful when you need to:

> provide job-specific knowledge;

> describe complex processes, where different actors perform different actions. The story can clarify who does what and helps learners follow the flow of events;

> add a human aspect to the lesson, since learners can follow the stories of real people; and

> highlight the usefulness of the knowledge, because through storytelling you can show how this knowledge can be integrated into a real situation.
Scenario-based approach

What is a scenario-based approach?

Lessons using this approach are built around a scenario. Typically, the scenario is a challenging situation in which learners are required to make decisions by choosing among different options. Feedback is provided to the learners for each option to explain why their choices are correct or incorrect. The feedback can also show the consequences of their decisions.

Example: An e-lesson using the scenario-based approach

Let’s consider a lesson on the steps involved in creating a digital library collection for a given scenario.

The lesson deals with creating a digital library collection of student dissertations in an engineering college.

At the beginning, the case is presented and the problem is introduced.
The learner is asked to help Paula, the college librarian, make a number of decisions. These decisions should be made according to presented information as well as colleagues’ reactions. Conceptual information is provided through feedback in a very succinct manner.

> When should a scenario-based approach be used?

This approach allows learners to learn strategic principles by applying them to a concrete situation and observing the consequences of their decisions.

The scenario-based approach can be useful when you need to:

> develop problem-solving or interpersonal skills;
> teach strategic principles rather than conceptual and factual knowledge; or
> develop an interactive exercise at the end of a conceptual unit, i.e. as a practice lesson following a set of lessons which provide underlying concepts and principles.

This type of approach requires strong collaboration between the ID and the SME, as the ID needs to have enough information to design a realistic situation, provide learners with the information for the decisions they have to take and provide appropriate feedback on their choices.

**TIPS FOR USING A SCENARIO-BASED APPROACH**

> Create a scenario. Think about how learners will use the information in the lesson, and build the scenario around it. Involve an SME to ensure that the scenario is relevant and credible.
> Work with the SME to understand which decisions a person would make in that scenario. SMEs can share different experiences and possible outcomes.
> Provide learners only with the information required to make decisions. This can be given as part of the scenario description; as part of the feedback to learners’ responses; or as part of information available on demand (e.g. through a “more information” link to additional information).
> Define possible choice options for each critical decision. Choices should not be obvious.
> Each choice generates a consequence; provide detailed feedback for each option by showing its consequences.
What is a toolkit lesson?

An e-lesson can take the form of a toolkit which allows learners to select from among a set of independent topics, rather than follow a sequential approach. Learners are invited to choose the topics that interest them the most.

Example of a toolkit lesson

This lesson illustrates the main characteristics of several collaboration tools. Learners can access tool descriptions from the menu screen. Each tool is presented in a systematic way by providing main features, potential applications, limitations and examples.

When should a toolkit lesson be used?

Toolkit lessons are a good option when you have to present short pieces of content which belong to the same category, but are quite independent from each other. The content pieces can be descriptions of tools, steps of a procedure, stages of a process or frequently asked questions on a given topic.

Learners are invited to navigate the toolkit in a non-linear fashion, since a logical order is not necessary and learners might be interested only in some of the tools.

Tips for developing a toolkit lesson

> Provide an introduction before the menu page with an overview of the various tools to orient learners in selecting the menu options.

> Present each tool in a systematic way, such as by providing the same categories of information (e.g. description; purpose; example; strengths; weaknesses) for each tool.
**Demonstration-practise method**

> What is the demonstration-practise method?

The demonstration-practise method is used to teach a procedure. You first demonstrate the procedure, and then you ask the learner to practise the procedure by interacting with the system.

**EXAMPLE: E-LESSON USING THE DEMONSTRATION-PRACTISE METHOD**

The lesson teaches how to import documents into a digital collection using the digital library software, Greenstone.

First, the task is shown both verbally and through an animation...

...then the learner is asked to perform the task by interacting with the system.

The system provides specific feedback on incorrect choices or final positive feedback if the learner makes no mistakes.
When should the demonstration-practise method be used?

This method can be used to teach procedures, typically software procedures.

### TIPS FOR DEVELOPING A DEMONSTRATION–PRACTISE LESSON

- You can use an animation (e.g. a flash animation) to demonstrate the procedure. This should be accompanied by a detailed verbal explanation, in the form of written text or audio comment.
- Allow the learner to control the animation by providing play, pause, stop and reload buttons.
- Develop an operational simulation to have learners practise the procedure.
- The operational simulation allows the learner to perform a number of actions (e.g. selecting options or typing text). If the learner does a wrong action, the system provides an error message, and if the learner does the right action, the system allows the learner to go to the next step until the end of the procedure.

### 6.4 ADDING EXAMPLES

Adding examples is key to ensuring that learners can make sense of the illustrated concepts. Examples can be used in deductive and inductive ways:

- To illustrate a concept or show the steps of a procedure which has been previously introduced (deductive);
- To stimulate thinking and reflection before providing definitions and principles (inductive).

### DEDUCTIVE AND INDUCTIVE SEQUENCES

<table>
<thead>
<tr>
<th>Deductive sequence</th>
<th>Inductive sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition (theory)</td>
<td>Example or case</td>
</tr>
<tr>
<td>Example or case</td>
<td>Definition (theory)</td>
</tr>
</tbody>
</table>

Deductive sequences reflect a behavioural approach, which emphasizes response strengthening, while inductive sequences reflect a constructive approach, where emphasis is on the active processes learners use to build new knowledge.

Examples can help bridge the gap between theory and practice. You can give learners an example of how to accomplish a task together with an explanation of the underlying procedure or principle; afterwards, you can ask them to answer questions about the examples to stimulate their reflection and prepare them for actual performance.
Let's consider a lesson that provides guidance on how to select livelihood indicators in specific contexts.

Example: Selecting Livelihood Indicators

First, a sample situation is provided. Learners can open the PDF and read the situation of the Nias mountain people. Learners also are provided with a list of indicators that an expert analyst has selected for that situation.

Then, the underlying principles used by the expert to select those indicators are presented.

SELECTING LIVELIHOOD INDICATORS

Let's now have a look at how indicators have been selected in a specific context.

Example: Nias mountain people

Description of the situation

Click on the icon above to read the example

The following indicators have been selected for this livelihood group:

- Terms of trade between rubber and pig income and essential food and non-food purchases
- Access/income from rice cultivation/share cropping
- Access/income from labour in Nias town or Sumatra
- Disease outbreaks amongst pigs/other livestock
- Levels of stunting and anaemia amongst children

Why have these indicators been selected?

SELECTING LIVELIHOOD INDICATORS

The livelihood indicators for the Nias mountain people have been selected for a number of reasons:

- The mix of indicators covers most aspects of livelihoods, i.e. vulnerability, livelihood strategies, processes and outcomes.
- They provide the maximum amount of information on livelihood status. Most income comes from pig and rubber sales, rice cultivation and labour in Nias and Sumatra. Thus, assessing terms of trade between rubber and pig sales and essential food and non-food purchases, as well as access and income from rice cultivation/share cropping and labour provide a comprehensive overview of livelihood status and current vulnerability.
- The indicators are generally easy to measure. Price and wage information are fairly easy to collect while outcome information on stunting and anaemia (although costly) are easily obtainable. Swine disease outbreak information is also easily monitored.
- The indicators can easily be incorporated into a framework to assess livelihood and food security status.
Now, three new examples are provided, together with the list of indicators selected in each situation and an explanation of the reasons for that selection.

Finally, using a new example, learners are asked to answer a set of questions regarding the selection of indicators in that specific situation.

**TIPS FOR DEVELOPING EXAMPLES**

- Integrate different media to present the example (e.g. a picture and text or audio narration).
- If the example is long or complex, break it up into smaller components.
- Try to also use non-examples, e.g. examples of incorrect application of principles.
- Use a realistic job context for your example; this will support transfer of the knowledge to the job.
- For strategic skills, use at least two examples which illustrate the same underlying principle in different contexts. Then, ask learners to compare them and identify the common principles.
6.5 INTEGRATING MEDIA ELEMENTS

There are a number of different kinds of media elements that can be combined to create compelling e-lessons. Pay careful attention when integrating media elements into your storyboard to avoid overloading learners’ working memory, as this can be detrimental to the learning process.\(^{22}\)

**Media elements: Text**

Written text is an important “media” for communicating course content. Great attention should be given to its graphic display and integration with images.

The following principles apply when displaying text on a lesson screen:

---

### TIPS FOR USING TEXT

- Display on-screen text to provide the best readability and clarity.
- If possible, use diagrams, graphs and flow charts to help the learners understand the content.
- Use graphic conventions consistently; for example, italic style must always be used for the same purpose.
- Use lists or tables to help learners organize the information.
- Use list points or blank spaces to separate items in a list or focus the attention on them.
- Consider word and row spacing to improve text readability.

---

**Media elements: Graphics**

Graphics include illustrations, pictures, diagrams and icons. They can range from photographic realistic images to schematic representations or even tables.

Graphics can serve different communication functions, including the following:\(^{23}\)

- **decorative**: to add aesthetic appeal or humor;
- **representational**: to depict an object in a realistic fashion;
- **mnemonic**: to provide retrieval cues for factual information;
- **organizational**: to show qualitative relationships among content;
- **relational**: to show quantitative relationships among two or more variables (e.g. pie charts, line charts);
- **transformational**: to show changes in objects over time or space (normally realized through animations and video); and
- **interpretive**: to illustrate a theory, principle or cause-and-effect relationships.

Graphics can play a crucial role in promoting learning. They should not only be used to add visual interest to a screen. In e-learning, relevant graphics can facilitate learning by:

- drawing attention to a specific content element;
- suggesting analogies between new content and familiar knowledge;
- supporting the understanding of concepts;
- simulating the work environment and real situations; and
- motivating learners by making materials more interesting.

---

\(^{22}\)Guidelines presented in this chapter take into account the cognitive load theory. Cognitive load theorists assert that since working memory is limited, cognitive overload will result if the complexity of instructional materials is not properly managed, and this will interfere with the learning process.

The following examples of graphics serve some of the communication functions listed above.

**EXAMPLE: GRAPHICS WITH REPRESENTATIONAL FUNCTION**

These realistic pictures illustrate plant components for a course on plant genetics.

The illustration on the right describes a realistic situation in a work environment.
EXAMPLE: GRAPHICS WITH MnEMONIC FUNCTION

This visual list is provided at the beginning and at the end of each lesson to have learners recall the various steps of the process.

EXAMPLE: GRAPHICS WITH ORGANIZATIONAL FUNCTION

This simple diagram clarifies the relationships between the concepts of malnutrition and food insecurity.
This diagram illustrates cause-effect relationships among food security elements at national, household and individual levels.

This flow chart illustrates a set of guidelines for deciding which type of data should be used for food security analysis depending on the context.
Media elements: Animations

An animated illustration can show a series of procedural steps or transformations.

TIPS FOR USING GRAPHICS

➤ Try to avoid graphics that have no real function in complementing the information in your text. Purely decorative graphics do not help learners understand the text and should be minimized. Adding extraneous pictures can interfere with the process of understanding presented materials, thus jeopardizing the learning process.

➤ If you use printed words to comment upon the graphics, place them near the parts of the graphics to which they refer, so that learners’ attention is not divided.

➤ If you use spoken words (narration), present corresponding graphics and spoken words at the same time so that learners’ attention is not divided.

➤ Use digitized photographs when creating a realistic context and suggesting analogies to real-life situations.

➤ An animated illustration can be used to show a series of procedural steps or the stages of a process.

➤ A matrix, a conceptual map or a tree diagram can show relationships among content.

➤ Line charts can demonstrate trends and allow learners to make comparisons between two or more variables.

➤ Bar graphs are useful for comparing quantities and dimensions.

➤ Pie charts show relationships between the parts and the whole, and are particularly useful for showing proportions and ratios.

➤ Flow charts are recommended to describe complex procedures.

➤ Diagrams can provide organization and meaning and are therefore recommended when you are trying to help the learner store and retrieve verbal information.

➤ When developing a text table, ensure that sequential relationships are accurately reflected, and arrange sequences so that they are represented from left to right and from top to bottom on the page. Working contrary to that “natural” flow can create confusion. When using text tables, provide instructions on how to interpret and use the table.

➤ Ensure that diagrams, graphics and screenshots correspond to their descriptions.

TIPS FOR USING ANIMATIONS

➤ Allow learners to focus on only one object at a time.

➤ Use arrows to steer attention to selected details or motion direction.

➤ Segment long or complex animations and allow learners to access each chunk at their own pace rather than playing all the steps continuously (e.g. by adding Play and Pause buttons).

➤ Limit the use of animation effects on text because they do not have any instructional function and can irritate learners.
Media elements: Audio

Effective use of audio greatly increases the effectiveness of a course. Audio can be used in combination with on-screen text to summarize or expand key points or to accompany video sequences.

Audio narration is more effective than printed text when providing comments on animations, video sequences or a series of static frames showing a transformation. Indeed, learners’ visual channel can become overloaded if they have to process graphics and the printed words that refer to them.

TIPS FOR USING AUDIO

› Keep the audio short.
› Use audio to complement the visual elements of the screen. For example, during a procedural demonstration, audio can be used to explain animated steps.
› If you use audio to comment on graphics and animations, present corresponding graphics and spoken words at the same time so as to not split the learner’s attention.
› Avoid redundant audio. Do not use it to “read” the text on the screen; instead, combine audio narration with textual summary.
› Use written text for key messages which need to remain on the screen as long as desired so that learners can refer to that information over time.
› Avoid adding “extraneous” audio, such as background music and sounds, to a narrated animation. If learners pay attention to sounds and music, they will pay less attention to the narration.

Media elements: Video

Video is the only media that makes it possible to reproduce behaviour, processes or procedures the way they appear in real life. It can be used to present a case study and is especially effective in role plays to illustrate interpersonal communication situations.

Video requires a lot of bandwidth. In many cases, graphics or animation can be an effective substitute for video.

TIPS FOR USING VIDEO

› Video sequences should always be accompanied by comments in either written text or audio narration.
› In situations with limited bandwidth connections, a video sequence can be replaced by a sequence of pictures.
› Avoid using video only to show a teacher speaking.
This United Nations Development Programme course entitled "Prevention of Harassment, Sexual Harassment and Abuse of Authority in the Workplace" allows learners to display a role play scenario as a video or as a sequence of images.

Learners who select the "Images" version will see the scenario as a sequence of pictures with dialogue balloons.
Practice and assessment questions should be designed to reinforce the achievement of learning objectives. Questions play an important role in involving learners and keeping their attention, so you should try to use them as much as you can in your storyboard.

In a job-oriented course, the questions should be placed in a job-realistic context to build knowledge and skills that can be transferred to the job.

**Developing practice and assessment tests for different types of knowledge**

Different types of practice and tests are required for different types of content. The table below offers some tips for promoting and assessing:

- **memorization of facts:**
  - Have learners recall features or specifications
  - Have learners identify pictures or objects

- **understanding of concepts and processes:**
  - Have learners discriminate between examples and non-examples

- **application of procedures and strategic principles:**
  - Have learners practise through operational simulation
  - Have learners actually perform the procedure
  - Ask questions about the principles underlying a worked example
  - Have learners apply guidelines to solve a job-contextualized problem or case study

<table>
<thead>
<tr>
<th>Type of content</th>
<th>Tips</th>
</tr>
</thead>
</table>
| Fact            | > Have learners recall features or specifications  
|                 | > Have learners identify pictures or objects |
| Concept         | > Have learners discriminate between examples and non-examples |
| Procedure       | > Have learners practise through operational simulation  
|                 | > Have learners actually perform the procedure |
| Principle       | > Ask questions about the principles underlying a worked example  
|                 | > Have learners apply guidelines to solve a job-contextualized problem or case study |

**Example of practice: Application of a communication principle**

The lesson provides guidance on how to communicate with policy-makers to sensitize them about your initiative.

The screen on the right provides some guidelines on listening to a negotiation...
Questions formats

In self-paced e-learning, practice and tests mainly consist of questions associated with response options and feedback. They generally have the following structure:

> a question or statement;
> an operational message that indicates to the learner how to perform the required operations (e.g. click, drag, press a key);
> a series of options;
> the correct answer; and
> feedback for the correct and incorrect answers.

The most frequently used question formats include:

> multiple choice;
> multiple responses;
> matching;
> ordering;
> fill-in-the-blank; and
> short answer/essay.
The table below provides a short description and an example for each one of these formats.

<table>
<thead>
<tr>
<th>TYPE OF QUESTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>True or False</strong></td>
<td>A statement with two options (true/false or yes/no), where only one is correct.</td>
</tr>
<tr>
<td></td>
<td><strong>WHAT IS NEW ABOUT THE RIGHT TO ADEQUATE FOOD?</strong></td>
</tr>
<tr>
<td></td>
<td>What is the added value of the right to adequate food to human development, food security and poverty reduction programmes? The definition of and the conditions for achieving food security bear close resemblance to the definition of the right to adequate food explained above.</td>
</tr>
<tr>
<td></td>
<td><strong>See the definition of Food Security</strong></td>
</tr>
<tr>
<td></td>
<td>How would you answer the question asked by this Food Security project manager?</td>
</tr>
<tr>
<td></td>
<td>I work in sustainable development. Our project focuses on food security, by taking into account the cross-cutting conditions of multiple sectors such as agriculture, nutrition, markets, etc. Am I doing everything necessary in order to realize the right to adequate food?</td>
</tr>
<tr>
<td></td>
<td>Correct: Even if the conditions required to achieve Food Security goals are also required by the Right to Adequate Food, a Right to Food approach complements the Food Security concept and programmes with the principles of human dignity, accountability, empowerment, non discrimination and participation.</td>
</tr>
<tr>
<td><strong>Multiple choice</strong></td>
<td>A statement that provides different options; only one is correct.</td>
</tr>
<tr>
<td></td>
<td>This type of interaction allows for providing different feedback for each selected option.</td>
</tr>
<tr>
<td></td>
<td><strong>PARTICIPATORY APPROACH</strong></td>
</tr>
<tr>
<td></td>
<td>Another approach consists in ensuring different degrees of local stakeholder participation in impact assessment.</td>
</tr>
<tr>
<td></td>
<td>A participatory approach is aimed to enhance the participation of local people, agencies, and decision makers in the impact assessment process.</td>
</tr>
<tr>
<td></td>
<td>In your opinion, when is an impact assessment fully participatory?</td>
</tr>
<tr>
<td></td>
<td>〇 When the programme participants are asked to answer some questions from their own perspective.</td>
</tr>
<tr>
<td></td>
<td>〇 When all stakeholders make decisions about how the impact assessment will be conducted and what information needs will be covered.</td>
</tr>
<tr>
<td></td>
<td>✗ When the assessment is based on application of qualitative data gathering techniques.</td>
</tr>
<tr>
<td></td>
<td>Using qualitative methods does not necessarily mean that the impact assessment is participatory; also a participatory approach can be applied to use of mixed methods where the stakeholder input and ownership also shapes the content of the quantitative assessment.</td>
</tr>
<tr>
<td>TYPE OF QUESTION</td>
<td>EXAMPLE</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Multiple responses</strong></td>
<td>The correct answer consists of more than one option, all of which must be selected.</td>
</tr>
<tr>
<td></td>
<td><img src="Image" alt="Multiple responses example" /></td>
</tr>
<tr>
<td></td>
<td><strong>WHO ARE POLICYMENERS?</strong></td>
</tr>
<tr>
<td></td>
<td>Help Samir and his colleague Nur identify which policymakers they should focus on:</td>
</tr>
<tr>
<td></td>
<td>- Members of national food security coordination body</td>
</tr>
<tr>
<td></td>
<td>- Staff of United Nations bodies</td>
</tr>
<tr>
<td></td>
<td>- Traditional chiefs</td>
</tr>
<tr>
<td></td>
<td>- Provincial commissioner</td>
</tr>
<tr>
<td></td>
<td>- Heads of district agencies for food and agriculture</td>
</tr>
<tr>
<td></td>
<td>- Presidential adviser on food security</td>
</tr>
<tr>
<td></td>
<td><img src="Image" alt="Multiple responses example" /></td>
</tr>
<tr>
<td></td>
<td>**Very good. Note that actors at one level may influence policy at other levels. <strong>For example, a local member of parliament may be an important influence on provincial and district policies as well as having a say in policies at the national level.</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Matching</strong></td>
<td>This type of interaction presents two series of elements. The learner must associate each element of the first series with an element of the second.</td>
</tr>
<tr>
<td></td>
<td>The example shows a drag-and-drop exercise.</td>
</tr>
<tr>
<td></td>
<td><img src="Image" alt="Matching example" /></td>
</tr>
<tr>
<td></td>
<td><strong>WHAT MAKES AN IMPACT ASSESSMENT RIGOROUS?</strong></td>
</tr>
<tr>
<td></td>
<td>To summarise: what kind of questions the two criteria explained in the previous screens allow to answer?</td>
</tr>
<tr>
<td></td>
<td><img src="Image" alt="Matching example" /></td>
</tr>
<tr>
<td></td>
<td><strong>Click each option, drag it and drop it in the corresponding box.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>When you have finished, click on &quot;Check Answer&quot;.&quot;</strong></td>
</tr>
</tbody>
</table>
**Ordering**

The learner has to order several elements in a sequence, e.g. the logical sequence of several phases, steps or operations to be performed.

**PROGRAMME LOGIC**

In this sequence representing a programme logic, can you put the examples below in the right place?

<table>
<thead>
<tr>
<th>Programme’s planned work</th>
<th>Programme’s intended results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmers increase their income and food security through diversified production</td>
<td>Farmers adopt new techniques and diversify their production</td>
</tr>
<tr>
<td>Farmers adopt new techniques and diversify their production</td>
<td>Demonstrations carried out for farmers on vegetable production</td>
</tr>
<tr>
<td>Demonstrations carried out for farmers on vegetable production</td>
<td>Farmers’ capacities and knowledge about vegetable production improved</td>
</tr>
<tr>
<td>Farmers’ capacities and knowledge about vegetable production improved</td>
<td>Available staff, funds and materials to carry out the activities</td>
</tr>
</tbody>
</table>

Click each option, drag it and drop it in the corresponding box. When you have finished, click on “Check Answer”.

**Fill-in the blanks**

This can be an incomplete statement to be completed by learners; or a sentence with one or more missing words or numbers. The learner must fill in the blank spaces with the appropriate terms.

The response is checked by the system which provides relevant feedback.

**COVERAGE, EXCLUSION AND INCLUSION - HOW MANY PEOPLE?**

Can you calculate the coverage, exclusion and inclusion rates in this case?

Use the table below.

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Beneficiaries</th>
<th>Non-beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td>20</td>
<td>80</td>
</tr>
<tr>
<td>Target group</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coverage = 19%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exclusion error = 11% (or under-coverage)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-target group</td>
<td>70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inclusion error = 1%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Please insert the correct values. Then, click “Check Answer”.
The learner is free to choose his/her own words to formulate the response to the question. This makes it more difficult to check the learner’s output as it is impossible to foresee all the possible answers. However, an answer developed by an expert can be proposed for comparison (see the example) or the essay can be saved and submitted to an online tutor.

The following table summarizes the main characteristics of each type of question:

<table>
<thead>
<tr>
<th>TYPE OF QUESTION</th>
<th>EXAMPLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short answer/short essay</td>
<td>The answer is created by the learner</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
</table>
| True or False                     | Easy to create
Can differentiate feedback for each option | Learners have a 50 percent chance of selecting the right option
The answer is not created by the learner |
| Multiple choice                   | Very flexible (can be used for several purposes)
Can differentiate feedback for each option | Difficult to create (you have to develop credible wrong options and write different feedback for each of them)
The answer is not created by the learner |
| Multiple responses                | Very flexible (can be used for several purposes)                                                                                               | Quite difficult to create (you have to develop credible wrong options)
The answer is not created by the learner |
| Matching                          | Quite easy to create                                                                                                                           | Risk of being too easy for learners
The answer is not created by the learner |
| Ordering                          | Quite easy to create                                                                                                                           | The answer is not created by the learner |
| Fill-in the blanks                | Easy to create                                                                                                                              | Rarely appropriate
Difficult to measure |
| Short answer/short essay          | The answer is created by the learner                                                                                                          | Very difficult to measure |
Developing questions

The following guidelines are valid for every type of interactive question:

**TIPS FOR DEVELOPING QUESTIONS**

- Practice questions should be created for all critical topics or tasks.
- The text of the question must be as clear and unambiguous as possible.
- Incorrect options should be plausible. An obviously wrong option does not play any useful role and decreases the learner’s interest.
- Incorrect options should aim not to distract learners, but to anticipate common errors so that useful information can be provided in the feedback.
- Provide textual responses for each option of about the same length. If one of the responses is much longer than the others, the learner will think that is the correct one.
- Provide explanatory feedback: after the learner responds to a question, provide feedback saying whether the answer is correct or incorrect with a succinct explanation.

**6.7 ADDITIONAL RESOURCES**

Additional instructional support can be designed as part of the lesson or the course. These resources may include, for example:

- printable versions of the lesson content;
- “getting started” tutorials, providing an overview of navigation features for new learners;
- downloadable job aids (e.g. checklists, if/then tables);
- glossary providing key terms and related explanations;
- bibliography and/or links to Web resources, for learners to find out more about the topic; and
- pop-ups or “mouse-overs” which provide additional information on specific topics without interrupting the flow of the lesson.
By clicking on the “i” icon, learners get more information through a pop-up window.

6.8 IN SUMMARY

KEY POINTS FOR THIS CHAPTER

> The typical structure of a storyboard for an e-lesson includes the following elements: learning objectives; introduction; content and practice (the core of the lesson); summary.
> The core of the lesson is composed of a combination of text, media elements, examples and exercises.
> A range of instructional techniques can be used to present the content, such as storytelling, scenario-based approaches, toolkits and the demonstration-practise method.
> Adding examples is crucial to facilitate understanding of concepts and application of strategic principles.
> Different media can be used to illustrate the content. It is very important to use them appropriately to avoid overloading the working memory of learners.
> Practice and assessment tests facilitate the achievement of learning objectives. In self-paced e-learning, practice exercises and tests mainly consist of questions associated with response options and feedback. Questions should be created for critical topics or tasks and should use explanatory feedback to reinforce learning.
This chapter provides information on the last step of the development stage, which is the creation of the final interactive courseware. The chapter will illustrate the following topics:

> Authoring tools for producing e-learning courseware; and
> How to select the right authoring tool.

Clara is evaluating whether to use one of the existing authoring tools to make the course interactive and publish it online.

The development team will use this tool to create the final interactive e-lessons and embed them in a nice graphic interface which allows learners to access the course content.
7.1 WHAT DOES COURSEWARE DEVELOPMENT IMPLY?

Once the storyboards are ready, the development team creates the final interactive e-lessons. Alpha and beta versions are prepared for testing and review before distributing the course online and/or through CD-Rom.

Courseware development may require the work of a group of professionals. Specifically:

> a course integrator to assemble all the course components and set up the course interface; this person may also be responsible for quality assurance testing;

> graphics developers to create graphics and animations, including navigation buttons and icons;

> multimedia developers for audio and video editing;

> HTML/XML coders if there is a need to develop tailored templates; and

> programmers to develop complex interactions.

Not all these roles are required in every case. It depends on the mix of media and on the required level of interactivity. For example, only a course integrator and graphics developers would be needed for courses composed of only text and images, with a medium level of interactivity and created using an authoring tool.

7.2 AUTHORING TOOLS

Various tools can be used to produce e-learning content, depending on the file formats you are going to use and the final product you aim to deliver.

In a very broad sense and at the simplest level, slide-based tools, like Microsoft PowerPoint or even word processors, are regarded as e-learning tools. While those tools are not appropriate to present interactivity, testing and scoring, they can be sufficient to create simple learning resources.

To develop interactive content, various elements are assembled (e.g. text, illustrations, animations, audio, video, interactivity). There are two main ways to do that:

> use programming tools which have been created to develop web content (not only for e-learning) and customize them to specific e-learning needs; or

> use special tools – known as authoring tools or authorware – which have been created specifically to develop e-learning courses.

Generally, programming tools (particularly those that are sophisticated and complex) require professional expertise and considerable development time, while authoring tools can be used by people without programming skills. The main advantage of authoring tools is that they are easier and faster to use, and they therefore shorten development time.
Other characteristics and differences between the two approaches are summarized in the table below.

<table>
<thead>
<tr>
<th>Programming Tools</th>
<th>Authoring Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Skills required</strong></td>
<td>Not user-friendly; requires advanced programming skills</td>
</tr>
<tr>
<td><strong>Users</strong></td>
<td>Used by developers/programmers</td>
</tr>
<tr>
<td><strong>Ease of use</strong></td>
<td>Difficult to use</td>
</tr>
<tr>
<td><strong>Learning curve</strong>&lt;sup&gt;24&lt;/sup&gt;</td>
<td>High</td>
</tr>
<tr>
<td><strong>Development time</strong></td>
<td>Require a lot of development time</td>
</tr>
<tr>
<td><strong>Development cost</strong></td>
<td>Inexpensive</td>
</tr>
<tr>
<td><strong>Instruction set architecture</strong></td>
<td>Low-level program; needs to be compiled</td>
</tr>
<tr>
<td><strong>Run time</strong></td>
<td>Program runs quickly</td>
</tr>
<tr>
<td><strong>Purpose of use</strong></td>
<td>Can be used for open-ended, multi-purpose tools (such as Web sites)</td>
</tr>
<tr>
<td><strong>Control over e-learning environment</strong></td>
<td>Complete control; source files are available for customization</td>
</tr>
</tbody>
</table>

There are many categories of authoring tools which differ by their features, level of complexity, installation site (i.e. desktop or web-based) or visual graphic interface. These tools range from very simple Microsoft PowerPoint converters to powerful toolboxes for rapid e-learning. These more complex authoring tools, referred to as self-contained toolboxes, do not rely on other tools; the entire e-learning course is created within just one integrated toolset.

All authoring tools must have some key capabilities, including:

> interactivity and navigation – menu-driven content and ability to move throughout the content;
> editing – content publisher for easier changes/updates;
> visual programming – use of buttons, icons, drag-drop graphic;
> preview/playback – ability to see or test an ongoing project;
> cross-platform interoperability – able to run on all platforms;
> cross-browser interoperability – able to run on different browsers;
> integration – with leading e-learning applications and compliance models, such as Sharable Content Object Reference Model (SCORM) and Aviation Industry CBT (Computer-Based Training) Committee (AICC), for LMS delivery; and
> delivery of learning content in multiple formats – able to use SCORM for LMS, Web, CD-ROM and Microsoft Word.

---

<sup>24</sup> Learning curve represents the period of time necessary to learn how to use the tool.
In their early phases, many authoring tools were simple PowerPoint “add-ons”, able to convert a set of slides directly from PowerPoint. For example, iSprint Presenter\textsuperscript{25} or Articulate\textsuperscript{26} transform standard PowerPoint presentations into Flash.

In their early phases, many authoring tools were simple PowerPoint “add-ons”, able to convert a set of slides directly from PowerPoint. For example, iSprint Presenter\textsuperscript{25} or Articulate\textsuperscript{26} transform standard PowerPoint presentations into Flash.

\textbf{Navigation options}

People may use different approaches to study: some may prefer to have a quick and overall look at the content and then go back to a specific unit, while others may want to follow a predefined order. Allowing learner’s control over the process is particularly relevant in adult learning.

Course interfaces usually allow the following navigation techniques:

> course and lessons menus, which allow learners to select specific lessons and topics within the course; and
> previous, next and reload buttons to permit control of pacing within a lesson.

\textbf{The SCORM model}

In order to be appropriately uploaded and made accessible from an LMS, e-learning lessons and courses must conform to a set of technical and instructional standards.

For example, the SCORM (Sharable Content Object Reference Model) model encompasses the following standards:

> packaging standards that allow courses to run under different LMSes;
> runtime specifications on how LMSs can launch courses and how they can report results back to the system; and
> metadata standards to create and publish metadata records about courses, lessons and topics.

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\textbf{EXAMPLE: ARTICULATE PRESENTER}

The articulate tool is nested inside PowerPoint.

![Articulate Presenter](http://www.ispringsolutions.com/products/ispring_presenter.html)

Pressing on Preview > Preview slides or Publish, a PPT presentation is automatically converted into Flash.
As authoring tools evolved, they integrated many other useful features and new easy-to-use templates to accommodate rich media interactions, quiz makers, video converter, etc. for more engaging and complete learning experiences.

Authoring tools generally allow choice among different outputs depending on the required product format. Several outputs can be produced by authoring tools: Web, CD-ROM or SCORM-compliant format for LMS (SCORM 1.2, SCORM 2004) delivery, and MS Word for hardcopy reference materials.

Moreover, some online user-friendly hosted services, like those set up by the Articulate or Course Lab communities, allow content to be published, delivered and tracked online. In this case hosted services act as LMS and allow users to set course parameters, course structure and eventually invite other users to view published courses.

**Example: Articulate Engage Publishing Options**

Articulate publishing options in Articulate Engage include: Web, hosted online service, LMS, CD or MS Word.

**Example: CourseLab Publishing Options**

Apart from CD/SCORM outputs, CourseLab offers a hosting service on My CourseLab.com server for course testing and learning.
Articulate offers the opportunity to change the look and feel (e.g. colours, test, layout, navigation) of the player.

Another tool, Adobe Captivate\(^{27}\) (now part of the complete toolbox for developing professional e-learning content) was born as a simulation and demonstration software, but thanks to object styles and rich interactive elements, it has become a multipurpose development tool.

Some tools are directly incorporated into LCMSs, such as eFront\(^{28}\) or aTutor.\(^{29}\) They include authoring components and are able to create or add content and build online tests.

### 7.3 TYPES OF AUTHORING TOOLS

Authoring tools can be grouped under three main categories according to the architecture they use for authoring:

- template-based tools;
- timeline-based tools; and
- object-based tools.

Many recent tools combine some of these. CourseLab\(^{30}\), for instance, provides both template and object elements. Rapid Intake\(^{31}\) is a template-driven tool, but it also provides timeline-driven template source files (Flash FLA files), which enables developers to customize templates.

---

\(^{27}\)http://www.adobe.com/products/captivate/

\(^{28}\)http://www.efrontlearning.net/

\(^{29}\)http://atutor.ca/

\(^{30}\)http://www.courselab.com/

\(^{31}\)http://www.rapidintake.com/
Template-based tools

The idea behind the template-driven system is to offer a gallery of pre-built, default templates for different types of screens, both static and interactive (e.g. tests and question screens). In template-based authoring systems, authoring/editing starts by selecting the right template which later will be filled with content using the visual content editor.

Interface, formatting and layout of the final product (player) are fairly easy to control by using customizable skins. Templates provide visual and cognitive consistency - all screens in one course will not be identical, but they will have very similar features, color schemes, themes, layout, etc. The template based system is beneficial for both course designers and learners. Using templates and skins dramatically reduces production time and simplifies workflow. For designers this ensures that course elements are consistently and appropriately added in each screen, while learners become familiar with course elements and structure, thus avoiding unnecessary efforts while navigating from one screen to another.

Despite the variety of templates, template-based systems may present certain limits to creativity and design. First of all, template layout may be rigid and inflexible with fixed dimensions and positioning of screen elements. More serious problems occur when a pre-made template collection does not meet some instructional needs.

Recent editions of software packages (e.g. Rapid Intake32 and CourseLab) manage to overcome this problem by embedding customization capabilities that can generate new, custom templates.

In addition, there are services which offer high-quality, interactive template solutions for e-learning professionals. E-Learning Templates is a template market place that provides fully customizable Flash templates which are compatible with most authoring tools (e.g. Articulate, Captivate, Rapid Intake, Adobe Presenter).

**Timeline-based tools**

Timeline-based tools, such as Adobe Flash, are widely used to create animations and robust interactive applications with their own scripting languages and timeline that organizes and controls content over time.

---

**Example: Adobe Flash used for an animated splash screen in Imark Courses development**

In the Flash screenshot below, content is organized into layers (see the column on the left side). Layers are positioned one after another, each containing a piece of content, images, text, etc. The central part represents an action divided into frames, each containing only a part of action. The playhead is an indicator of the frame currently visualized in the preview, where it moves from left to right along the timeline.

---

**Object-based tools**

Object-based tools build content using a set of ready to use objects that can be easily modified by changing their properties. Object library covers all screen elements, such as: forms, simulations, buttons, titles, textboxes, scenarios, etc.

Object-based tools, such as SmartBuilder or Course Lab, offer creative and flexible approaches to course design because they eliminate constraints imposed by templates. The authoring phase starts with empty on-screen real estate that is then populated by easily created, moved, resized or reused objects. However, object-based tools require more development time than template-based tools.

---

33http://e-learningtemplates.com/
34http://www.adobe.com/products/flash.html
35http://www.suddenlysmart.com/
EXAMPLE: CREATION OF A POPUP WITH THE COURSELAB OBJECT LIBRARY

This example illustrates how to build a standard popup with the use of a popup object from the object library (Course Lab). A popup object is selected and dragged onto the screen. You can modify the objects appearance and behaviour by opening the object’s property window.

7.4 SELECTING AN AUTHORIZING TOOL

There is no right or wrong authoring tool – the best choice is the one that meets your needs and best supports your instructional approach.

The best way to select an authoring tool would be to create a requirement sheet, grouping all prerequisites and functions that are required to support all instructional patterns.

If you opt for your own code-based authoring tool, this list may serve as the software requirements specifications. If you need to choose one or more off-the-shelf solutions, you can compare your requirements with the products’ features. Almost all vendors give detailed descriptions of their product’s main characteristics and components, organize demonstrations and offer trial versions.
The following are some important factors to consider when evaluating authoring tools:36

> **Editing/updating capabilities** – These can allow rapid editing through a content publisher. Fast editing and easier updating is time efficient.

> **Development or product costs** – Your budget needs to cover proprietary license costs, hardware, infrastructure and deployment costs, or development costs, in the case of self-developed product. If the budget is tight, open-source authoring tools could also be considered.

> **Delivery outputs** – Determine how an e-learning course is going to be delivered to end users. Authoring tools use one or more of the following outputs:

  > LMS, if deployed on a learning management system. This output requires courseware to comply with SCORM technical standards;
  > CD-ROM for stand-alone deployment;
  > Web browser (interoperability should be considered);
  > podcast;
  > mobile devices; and
  > MS Word – produces a printable version of reference materials.

> **Learning curve** – This represents the amount of time needed to learn how to use the tool. Each tool requires time to understand how it works, its main characteristics, the actions it is able to perform, etc. While authoring tools reduce the time required to programme systems, they perform very complex tasks and therefore take some time to learn.

> **Training opportunities** – You can learn about the tool through online guides, webinars, online support and forums. Also, many vendors deliver Web-based or on-site training sessions. With an internally developed authoring solution, prepare a well-documented training manual to allow other people to work with the tool.

> **Integration** – This specifies whether a tool integrates well with leading LMS or/and other software, such as PowerPoint, or other media programs and tools.

> **Creative freedom** – This is the ability to express and accommodate interactions, navigation elements, quizzes and other features into course design. Some tools without customization capabilities can impose constraints on your creativity.

> **Team in charge of courseware production** – The number of team members, their expertise and their ability to handle different tasks are crucial factors in any selection process.

> **Industry and community support** – Having available support is essential for troubleshooting, problem solving and getting useful tips. The more widely used tools are better supported by online forums and user groups, which provide free technical support to users, publish manuals and guidelines and organize Web seminars and online classes. Some examples of product communities or forums are: Articulate Community,37 CourseLab Community,38 and Rapid Intake.39

Specialized reviews and e-learning research institutes perform exhaustive studies of all currently available authoring tools. They establish criteria to guide you through the selection process and provide profiles and information on each tool’s authoring process and rapid development features. Some examples include:

> The eLearning guide;40

> Centre for Learning and Performance Technologies;41 and

> Brandon Hall Research.42

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36The list is not complete, as there may be other decisive elements to examine (e.g. localization abilities for multilingual content or mobile device output). Items are not ranked according to their importance.

37http://www.articulate.com/community/

38http://www.courselab.com/db/cle/forum.html


40http://www.elearningguild.com/

41http://c4lpt.co.uk/Directory/Tools/instructional.html

7.5 IN SUMMARY

KEY POINTS FOR THIS CHAPTER

- Interactive e-lessons are created by the development team and assembled in courseware.
- A number of authoring tools exist for producing courseware. Authoring tools are specifically designed for producing e-learning content without needing programming skills. However, media editors are usually needed to develop graphics and other media elements.
- There are three main kinds of authoring tools: template-based, timeline-based and object-based. Compared with template-based tools, object-based tools offer more flexibility for content developers but require more development time.
- When selecting your authoring tools, consider important factors such as team expertise, development costs, desired output, creative freedom and community or vendor support.