

**CONVERTING e₃-LEARNING TO e³-LEARNING:
AN ALTERNATIVE INSTRUCTIONAL DESIGN METHOD**

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11.1. ABOUT THIS CHAPTER

How can instructional designers avoid *enervative, endless, or empty* e₃-learning (pronounced 3 sub-three learning) and replace it with *effective, efficient, and engaging* e³-learning (pronounced e to the third power learning)? This chapter explores how and illustrates those instructional principles that can help. It starts by describing e₃- and e³-learning. Next, it proposes how to achieve e³-learning through application of the first principles of instruction, including the *activation, demonstration, application, integration and task-centered*, principles. This chapter concludes with a brief description of the *Pebble-in-the-Pond* model, an alternative model for designing more effective, efficient and enabling e³ instruction.

Inside Box—Chapter 11—See Art Pack

11.2 INTRODUCTION

There is a trivial debate raging in the world of words: should the term *e-learning* be hyphenated? When the term *e-learning* starts a sentence should the *e* be capitalized? And what does the *e* stand for anyway? Is e-learning educational game learning? Is e-learning edutainment learning? Is e-learning e-mail or epistle learning?

For whatever else the *e* represents, it is apparent from even a superficial examination of instruction offered over the internet that way too many of the web sites that claim to be instructional are, in fact, not. Easy to use tools and inexpensive availability of server hosting makes it possible for anyone with even minimal computer skills to uncritically shovel information onto the internet and call it instruction. There are even well funded projects¹ that are assisting faculty to uncritically transfer their course materials, effective or not, to open-source sites on the internet so that they are readily available to anyone. Are such repositories of notes, syllabi, power-point presentations, and videos really instruction? Can we naïvely assume that college and university professors obviously know to organize effective learning materials?

This chapter considers this and similar questions. It opens by exploring the *energetic*, *endless*, or *empty* e₃-learning (pronounced 3 sub-three learning) that is so pervasive now. It then suggests that such learning be replaced with *effective*, *efficient*, and *engaging* e³-

¹ See the URL for the William and Flora Hewlett Foundation, www.hewlett.org. This foundation is sponsoring a number of projects designed to make open source educational materials available. At this writing these projects include: MIT Open Course Ware; Open Learning Initiative, Carnegie Mellon University; Open Learning Support, Utah State University; Sharing of Free Intellectual Assets (SOFIA), Foothill-DeAnza Community College District; SAKAI Educational Partners Program; and Harvard University Library Open Collections Program.

learning (pronounced e to the third power learning). It does so by exploring the first principles of instruction, including the *activation, demonstration, application, integration* and *task-centered* principles. This chapter concludes with a brief description of the *Pebble-in-the-Pond* model, an alternative method for designing more effective, efficient and enabling e³ instruction.

11.3 E₃-LEARNING: ENERVATIVE, ENDLESS, AND EMPTY.

For many of these so-called e-learning sites, the *e* must stand for *enervative, endless, or empty* learning. The adjective *enervative* means “to weaken or destroy the strength or vitality of” something². In this case, *enervative-learning*, rather than promoting skill acquisition, actually interferes with the learning that should occur.

The adjective *endless* means “tiresomely long, seeming without end,” or boring. *Endless-learning* is too repetitive leading to boredom. *Endless-learning* is too passive, devoid of interaction, allowing learners to disengage thereby failing to gain the desired skill acquisition.

The adjective *empty* means “without contents that could or should be present.” *Empty-learning* fails to implement those instructional strategies that have been found to be necessary for learning to occur. Too much so-called e-learning is merely information

² The definitions quoted here can be found at www.answers.com an on-line dictionary Houghton Mifflin Company.

transferred to the Internet without appropriate demonstration, practice, feedback, learner guidance or coaching. Information alone is not instruction.

Enervative, endless, or empty learning can be referred to as e₃-learning (pronounced e sub-three learning). The next three sections describe each of these characteristics.

11.3.1 Enervating-Learning

Figure 11-1 depicts³ the menu screen for an on-line course. In the original screen, a medieval scholar is leafing through an ancient manuscript. His hand is on a stack of scrolls. Clicking on the various medieval buildings in the foreground takes the learner to the different activities of the course. The original shows the name of the course in the small window at the lower center of the drawing.

What do you think that this course is about? (See footnote⁴ for the answer.)

³ The original screen is a very well executed colored drawing and is copyrighted. It is difficult to get permission to reproduce an original drawing to use as a bad example. This illustration is an original drawing that is merely a depiction showing the components and layout of the original sufficient for the purpose of our discussion.

⁴ Auto Damage Estimation

Is the medieval theme related to the topic of the course? Does this unrelated theme motivate the student? Or does this unrelated theme make learning more difficult? The designers of this course assume that a theme is motivating for the learners.

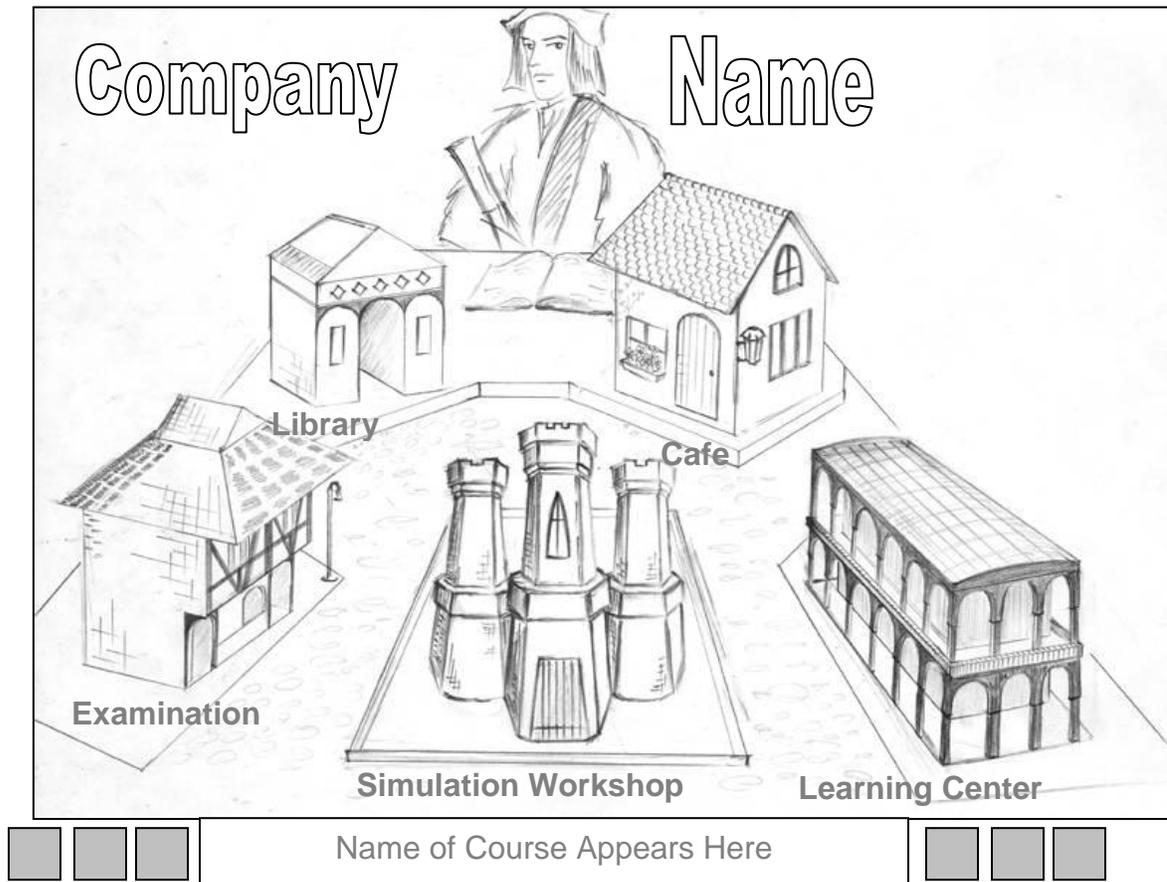


Figure 11- 1: Irrelevant Themes

This course also contains a game in which knights joust with each other. The knights advance when the learner determines the correct estimation for a damaged part of an automobile. This medieval theme is carried throughout the instruction in various learning activities.

What do you think of when you see a medieval monk with scrolls? What does a castle or other medieval building activate in your mind? Probably not automobile damage estimation. The medieval theme of this course activates a schema or mental model in the head of the learner. The schema activated by the medieval theme is unlikely to have anything to do with estimating damage to automobiles. Learners have limited capacity for mental processing. This course requires that learners simultaneously activate two different, unrelated schemas: medieval schema and automobile damage schema. Trying to work with two schemas simultaneously significantly increases cognitive load. The result is that any increase in motivation is more than offset by an increase in learning difficulty because of the increase in cognitive load. Unrelated themes make learning the intended content more difficult. Our medieval theme is an example of *enervative-learning*, an instructional practice that actually makes learning more difficult.

Consider the display shown in Figure 11-2. This is one display from an online course on workplace safety. When this display is presented, an audio message reads the text at the left to the learner. As the text is read the graphic at the right changes to correspond to the text. The second image is of the skeleton, the next image is a close-up of the vertebrae and disks.

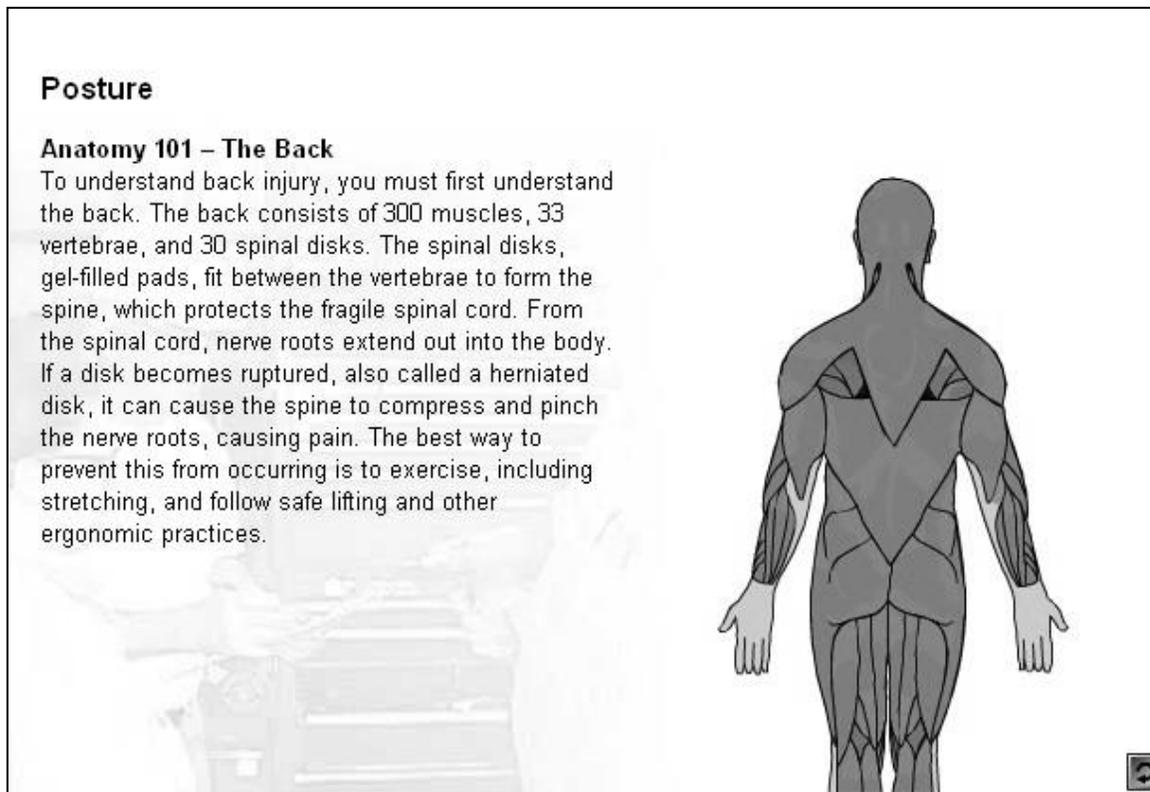


Figure 11-2: Inappropriate Uses of Multimedia Elements

When text is being read out loud, where does the learner look? Probably not at the image. Most learners follow the written text as it is being read. Humans are linear processors. We cannot look at two things at the same time. When our eyes are focused on the text we cannot simultaneously look at the graphic. If we glance at the graphic we lose our place in the text. Research (Clark & Mayer, 2003; Mayer, 2001) has shown that when a presentation contains three elements--graphic, text and audio reading—that there is a decrement in learning. It is better to have the graphic with audio and no text or the text and graphic with no audio than it is to have all three. Yet how often do e-learning courses read the text to learners even when there is a graphic on the screen. Violating known principles of multimedia instruction interferes with learning and results in enervative learning.

11.3.2 Endless-Learning

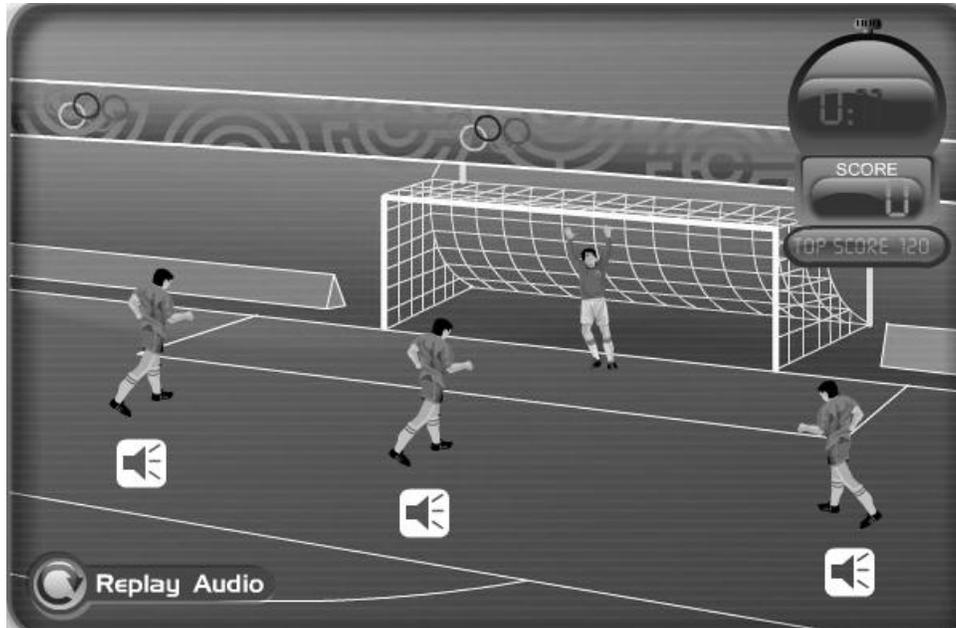


Figure 11-3: Edutainment

The soccer game depicted in Figure 11-3 is designed to teach English listening vocabulary to non-English speaking youth. An auditory message in their native language instructs learners to “Find the word *red*” by clicking on the speaker icon below each player and listening to the spoken word. The game can be used for any type of vocabulary matching; in this case the words are color words. When the learners hear the matching word, they are directed to click on the corresponding player. If they are correct, the player scores and the goalie pounds his fists on the ground. If they are incorrect, the player misses the net and the goalie jumps up and down in celebration. Each response is timed and a running score is kept for the student.

Obviously the purpose of this edutainment game is to find a way to motivate the student to learn the vocabulary words. Do you think that learners will find this game motivating? How many times is it entertaining to see the goalie pound the ground when the player scores? Repetitive feedback becomes boring. Is it more fun to see the goalie upset when there is a score or to see him celebrate when the ball misses the net? Too many so-called educational games violate the basic rules of effective games: provide a challenge, allow for increasing skill levels, and provide competition. The result is a boring exercise for which the learner quickly loses interest. Poorly designed games, far from motivating, actually create boredom and appear, even to young learners, to be irrelevant. Too often, ineffective activities that are thought to motivate result in endless boring learning.

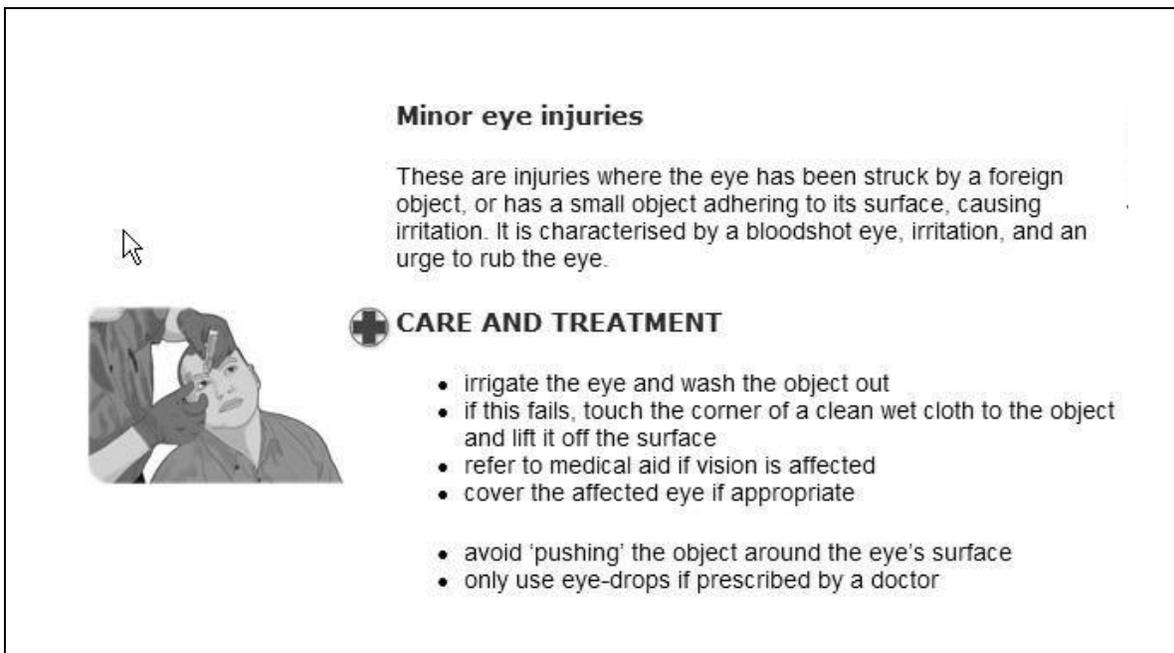


Figure 11-4: Online Book

One of the most prevalent forms of online instruction is providing a text book online.

Figure 11-4 shows a small quotation from an online first aid course that is comprised of a

frequently used digitized first-aid manual. Although having the information available online is convenient, it does not make for engaging instruction. Online electronic reference materials are not instruction.

11.3.3 Empty-Learning

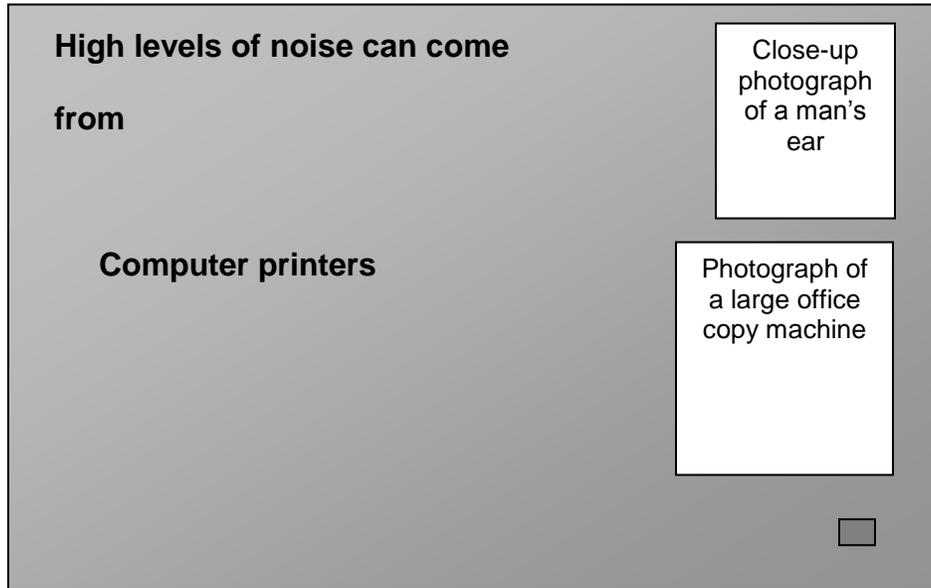


Figure 11-5: Tell-and-Ask Instruction

Select the appropriate answer for each question or enter the answer in the blank provided. When you are done, click the button to submit your answers, register your answers and find out your score.

1. Which methods below identify ways to reduce office equipment noise?
 - a. Relocating equipment to other rooms.
 - b. Using insulating dividers or pads.
 - c. Installing carpet and drapes.

Figure 11-6: Questions for Tell –and-Ask Instruction

Consider the image in Figure 11-5. It is a representation of a single display from a course on office safety. This course is an illustrated lecture on the Internet. In this lecture, the audio and text are used more effectively than the course represented in Figure 11-2. This instruction presents only bullet points from the audio rather than reading the entire text. Following each lesson in this course, students are asked to answer 5 multiple-choice or short-answer, remember-what-I-told-you questions. Figure 11-6 lists a couple of sample questions for one module in this course. Of course, there is a place for tell-and-ask instruction. However, tell-and-ask falls short of enabling learners to acquire the desired skills. Appropriate application exercises would better assess whether or not learners have acquired the skill of promoting office safety. Rather than merely asking learners to remember the rules, better application activities would require them to make adjustments in a real or simulated office. Such an application exercise would require learners to first

recognize a problem and then take corrective action. Rather than merely remembering the general rule, they would have to apply the rule in a specific situation. It should be obvious to the reader that applying the rules of office safety in several different situations would be an even more effective application. Adding appropriate application to this rather effective online lecture would convert it from empty learning to more effective learning.

Perhaps the most common approach to teaching computer applications is the use of *Simon Says* demonstrations. Do you know the game *Simon Says* or perhaps *Mother May I?* In *Simon Says*, instruction learners are directed to click on a particular menu or button, “click on the copy tool” as illustrated in Figure 11-7. If learners click some other place on the screen, they are told “No this is the not the copy tool” and then some prompt such as an arrow shows them where to click. Some programs call *Simon Says* demonstrations *simulation*. Although the instruction may simulate the actions of the computer program to a limited extent, this is certainly not simulating the kind of performance that will be required of learners later when they use the program to do real-world tasks. After you have completed a *Simon Says* demonstration of the commands for some computer application, do you feel like you can use the tool to create a spread sheet? Is *Simon Says* really an example of application?

Why is merely clicking on each of commands in a program an inefficient way to acquire the necessary skills? *Simon Says* can be an effective first demonstration of particular commands. At least it does get the student to actually click on the appropriate place on

the screen. But all computer applications involve more than merely knowing the individual commands. It is necessary to be able to select the appropriate command in a given specific situation. It is necessary to know a sequence of appropriate commands to accomplish some sub-task within an application. More appropriate application would require learners to actually perform a whole real-world task that requires a combination of the commands from a given program. Simon Says may be a first good step in effective instruction but by itself, it is still empty incomplete learning.

The screenshot shows the Microsoft Excel interface with a spreadsheet titled 'smallwld.xls'. The spreadsheet contains an inventory table with columns for categories (A-K) and rows for items (1-12). A black arrow points to the 'Copy' button in the Standard toolbar. Below the spreadsheet are two text boxes:

To copy the selected data, use the Copy tool on the Standard toolbar. When selected, the Copy tool copies the data to the Windows clipboard.

Navigation buttons and course progress indicated here.

Figure 11-7: Simon Says Instruction

11.4 E³-LEARNING IS EFFICIENT, EFFECTIVE, AND ENGAGING.

How can we avoid e₃ learning? What characterizes e³ learning (as mentioned earlier, pronounced e to the third power learning)? There are many instructional design models,

theories and procedures identified in the literature. I reviewed many of these theories and related research and found that most agree on five important instructional principles that promote effective, efficient and engaging e³ learning? (Merrill, 2002a, 2002b, 2007, in press). In this section, I first present the principles, and then describe a course that demonstrates their application.

11.4.1 Five Important Instructional Principles that Promote e³ Learning

These first principles of instruction are summarized as follows:

- The *activation principle*: learning is promoted when learners activate relevant cognitive structures by being directed to recall, describe or demonstrate relevant prior knowledge or experience.
- The *demonstration principle*: learning is promoted when learners observe a demonstration of the skills to be learned that is consistent with the type of content being taught. Demonstrations are enhanced when learners receive guidance that relates instances to generalities. Demonstrations are also enhanced when learners observe media that is relevant to the content.
- The *application principle*: learning is promoted when learners engage in application of their newly acquired knowledge or skill that is consistent with the type of content being taught. Application is effective only when learners receive intrinsic or corrective feedback. Application is enhanced when learners are coached and when this coaching is gradually withdrawn for each subsequent task.
- The *task-centered principle*: learning is promoted when learners are engaged in a task-centered instructional strategy that teaches task components in context and involves learners in a progression of whole tasks.
- The *integration principle*: learning is promoted when learners integrate their new knowledge into their everyday lives by reflecting on, discussing, and defending their new knowledge and skill. Integration is enhanced when learners publicly demonstrate their new knowledge or skill.

11.4.2 Australian First Aid: A Demonstration Course

Earlier in this chapter, I examined snippets from courses that illustrate e_3 -learning. So what characterizes an e^3 -learning course? Consider selections from the following course from St. John Ambulance Australia, the Australian First Aid (1996, Version 1.5, Commonwealth Bank). “The aims of this course are to provide you with the confidence and skills to treat the injured in a range of emergency situations.”

The course consists of:

- Four introductory Lessons: (1) Aims of First Aid, (2) Accident Prevention (3) First Aid Essentials and (4) The First Aid Kit
- Twenty-nine tutorials that provide instruction in specific first aid procedures
- Two guided case-studies demonstrating first-aid in real-world emergency situations
- Twenty practice case-studies that require learners to demonstrate first aid skills in real world emergency situations
- Ten test case-studies
- Four supplementary test case-studies.

Learners must complete each of the four lessons before they can begin the practice case-studies. The guided case-studies teach learners how to navigate the simulations in the case-studies. The tutorials cover the skills needed for the case-studies. Before each case-study, learners are given a list of the tutorials that they should complete before undertaking the case-study. Learners can complete the tutorials and practice case-studies in any order. Learners must complete all twenty of the practice case-studies before they can begin the test case-studies.

To illustrate those first principles of instruction that make this instruction more effective, efficient and engaging, a few selected segments of this course will be described: an opening simulation, the lesson on accident prevention, a guided case-study on first aid, a

tutorial on facial injuries, a case-study practice on bleeding noses, and other parts of the first aid course.

11.4.2.1 Opening Simulation

Learner Action	System Response	
Click on next button after registration.	<p>Audio: I'm a qualified first aider but I need your help. Could you find a phone box and call for an ambulance. This woman is unconscious but she is breathing. She needs medical help urgently.</p>	<p>Graphic: The learner sees a photograph of a street scene where someone has collapsed. An officer is kneeling beside the victim and pointing out of the screen toward the learner. There are a couple of bystanders standing behind the officer one with his hands on his hips and the other with his hand on his head looking as if they don't know what to do. There are numerous other pedestrians walking on the sidewalk behind the four figures in the foreground.</p>
Click the forward arrow	<p>Text (overlays photo): Will you need to place coins or a phone card in the public telephone?</p> <p>Buttons:</p> <p>YES</p>	<p>Graphic: Close-up photograph of a public phone in a phone booth.</p>

	NO	
Click NO	Audio: Call for help by clicking on the buttons on the telephone to call the correct number.	
Click any numbers other than 000	Text: Incorrect. You have dialed xxx. In Australia, you must dial 000 to get emergency service. Please dial 000.	
Click numbers on phone -- 000	Audio: Which emergency service to you require?	Buttons: Fire Brigade Ambulance Police
Click button -- Ambulance	Audio: Tone -- Ambulance service. Don't hang up until I tell you! What is your location with nearest cross street?	Graphic: Information card displayed near the telephone which includes the address, phone number and other information. Buttons: 3 choices for the address and cross street
Click button -- Martin Place near Elizabeth Street	Audio: How many casualties are involved?	Buttons: One Two Three
Click button -- One	Audio: What type of injuries?	Buttons: Possible heart attack, Collapsed in Street, Unconscious but breathing

Click button -- Unconscious but breathing	Audio: Are any other emergency services required?	Buttons: YES NO
Click button -- NO	Audio: What is the number of the phone you are calling from?	Buttons: 02 309 019P2 02 309 0192 02 309 091P2
Click button -- 02 309 019P2	Audio: An ambulance is on its way. You may hang up now. Siren sounds.	
<p>Narrator Audio:</p> <p>The importance of the part you have just played in this simulated first emergency should never be underestimated. But the reality is that there will always be more bystanders than effective first aiders. Completion of this exciting CDROM package accompanied by qualified trainers during a special one day practical course conducted by St. John's ambulance will equip you with skills and knowledge to provide life-saving first aid to the injured or acutely ill. First aid is one of the most important of all life skills. Acute illness or sudden injury have no respect for age or status, place or time, and many of us will be called upon to deal with emergencies among our family, friends or even total strangers.</p>		

Table 11-1: Design Plan for the Opening Simulation

After registration the course begins with a brief simulation, whose design is presented in Table 11-1. The table shows the learner's actions and the systems responses to it. What is the purpose of this opening simulation? Does it help learners recall emergency situations from their own experience where first aid was needed? Does it provide a reason why learners may want to take the course? Does it help motivate learners to

acquire the skills taught in the course? When considering the responses to these questions, consider, again, the Activation Principle.

Activation Principle: Learning is promoted when learners activate relevant cognitive structures by being directed to recall, describe or demonstrate relevant prior knowledge or experience.

11.4.2.2 Lesson 2 Accident Prevention

Table 11-2 presents the design of Lesson 2. The table shows the learner's actions and the systems responses to it. This lesson stresses the prevention of accidents by presenting a number of situations and asking learners to identify the potentially dangerous conditions that these situations present.

Learner Reaction	System Response	Graphic
Click on Lesson 2 on main menu.	Audio: Please click on items that represent a potential danger.	Graphic: Photograph of a typical kitchen. Various dangerous situations are included in the photograph including: knives close to the edge of a counter, cleaning supplies sitting out on the floor, dishes sitting on a dish cloth that drapes over the edge of the counter, a pan on the stove with the handle pointing into the room, etc.

Learner clicks on a potential danger in the photograph.	(Similar interaction for each of the potential dangers. If learners do not find them all a message reminds them that there are more dangers.)	Text: Sharp knives lying around loose are a temptation for children and a potential hazard for adults. Make sure that they are kept in a drawer or purpose made holder.
(Similar to above)	(Similar to above)	Graphic: Shop with dangerous items lying around.
(Similar to above)	(Similar to above)	Graphic: Pool area with dangerous situations present.

Table 11-1: Design Plan for Lesson 2 (Accident Prevention)

Is this lesson teaching about potential accidents or merely focusing learners' attention on dangers that may exist around them? Is this lesson helping learners recall situations from their own experience? Is this lesson helping students activate those mental models that provide context for the first skills to be taught? When considering the responses to these questions, consider the instructional principles that promote e³ learning

11.4.2.3 First Aid Guided Case-Study

The guided case-studies are designed as a type of simulation known as micro-worlds, which place learners in a real-world situation and ask them to make appropriate first aid decisions in response to the emergency presented. The format is a "Simon Says" type of demonstration. The system indicates the step that is next and directs learners to take that step. If learners perform some other action, the system indicates that the step was incorrect and again directs learners on which step to take.

Figure 11-8 illustrates the interface for the guided and practice case-studies. A menu on the right side of the screen represents the first-aid actions that learners can take. Clicking a button on this menu causes the system to display a pop-up list of specific actions learners can select. For example, clicking the button *Position Casualty* causes the system to display a pop-up with the following list of actions: *lie in stable side position, lie in alternate side position, lie flat on back, ..., sit down, sit (head between legs), ..., bend over the back of a chair*. In the guided case-study, only the button that is appropriate is active. Table 3 presents the design of the first guided case-study.

Text and Graphic appears .	Position
	Tell/Ask
	Tell/Ask
	Other
	Use first aid
	Use
	Story
	Picture of Guide
Navigation buttons here	

Figure 11-8: Design of the Interface for Case-study Simulations

Learner Action	System Response	Graphic
Select guided case study from the menu	<p>Audio: At the beginning of each case-study you will be given a list of the tutorials which cover the material you need to know to complete the case-study. It is a good idea to view the tutorials before beginning the case-study. You can view the tutorials at any time by clicking the tutor button at the bottom of the screen and then selecting the tutorial you want to view.</p>	<p>Text: This case-study deals with materials covered in the following tutorials:</p> <ul style="list-style-type: none"> • DRABC action plan • Side position • EAR • CPR
Click next	<p>Audio: You are working in your office when you hear one of your colleagues call out and then collapse. There is one other person around and you have a first aid kit and a telephone available.</p> <p>The first thing you must do is check to see if there is any danger to yourself, to anyone else near by, or to the casualty. Click on the Other Action button then select check for danger.</p>	<p>Graphic: shows an office worker laying face up on the floor with a colleague kneeling beside him. It is obvious that the victim is unconscious.</p>
Click button -- Other Action --	<p>Audio: When you think it is safe</p>	<p>Text (overlays graphic): You do</p>

<p>check for danger</p>	<p>to assist the casualty you must then check to see if the person is conscious. Click on either the Tell/Ask Casualty or Other Action button and select a way to check for a response.</p>	<p>not see anything that could be dangerous to yourself, to others, or to the casualty.</p> <p>Select the next step.</p>
<p>Click button -- Other Action -- gently shake casualty</p>	<p>Audio: The casualty did not respond so you must move him into the correct position for an unconscious person.</p> <p>Click on the Position Casualty button then select a position from the list.</p>	<p>Text (overlays graphic): You gently shake the casualty but he does not respond.</p> <p>Select the next step.</p>
<p>Click button -- Position Casualty -- stable side position</p>	<p>Audio: The next step of the DRABC action plan is to clear and open the casualty's airways. However, before doing this you should put on a pair of gloves from the first aid kit.</p> <p>Check on the Use First Aid Kit Item then select gloves from the list.</p>	<p>Graphic: Casualty is shown turned into the stable side position.</p> <p>Text (overlays graphic): Correct. You roll the casualty into a stable side position.</p> <p>Select the next step</p>
<p>The Guided Case-study continues by having learners engage in additional required first-aid actions each followed by text and an audio message. When appropriate, the graphic is changed to reflect the situation.</p> <p style="text-align: center;">* * *</p>		

<p>After the last step is completed:</p>	<p>Audio: You check the casualty's pulse and breathing after one minute then every two minutes.</p> <p>A siren is heard indicating the arrival of the ambulance.</p> <p>When the ambulance arrives the ambulance officers take over the resuscitation.</p> <p>At this point you should wash your hands thoroughly with soap and water.</p>	<p>Text: Summary</p> <p>[picture from case] Check for danger and response.</p> <p>[picture] Roll casualty into side position, and clear and open airway, and check for breathing.</p> <p>[picture] Roll casualty onto back, and give five full breaths in ten seconds.</p> <p>[picture] Check circulation, and have someone telephone for medical aid.</p> <p>[picture] Begin CPR, and continue until ambulance arrives.</p>
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Table 11-2: Design Plan for Interaction in the Guided Case-Study

This guided case-study demonstration shows two things. First, it shows the first aid actions to take when someone collapses (see the summary). Second, it shows how to use the navigation commands of the simulation interface. This demonstration teaches the principles of first aid by showing rather than by merely telling. Although the design plan shown in Table 11-3 do not show the actual photographs used in this instructional

sequence, the descriptions indicate that these photographs illustrated the first-aid procedures that were being taken. They were not superfluous pictures included to promote “motivation”. The photographs actually carry instructional information. For example, the illustration of the *stable side position* shows how the patient should appear when positioned in this way.

When general information is merely presented (that is, told) to learners, they have no option but to memorize the information and hope they can later recall it when needed. However, seeing the information demonstrated in specific situations enables learners to form a mental model of the skills being taught. Demonstration is one key to effective and efficient learning. Although information can be presented more quickly than is possible with demonstrations, the resulting learning is not efficient or effective because too much of the information is forgotten and cannot be used at a later time. So, although including appropriate demonstrations would seem, on the surface, to take more instructional time, this inclusion of appropriate demonstrations makes grasping what is being taught easier for learners. Thus, the instruction with the demonstrations is actually more efficient than instruction without it.

11.4.2.4 Tutorial Facial Injuries

The next place learners go in the course is to the example case studies. Once there, they might select a case for a bleeding nose from the main menu. When advised to complete tutorials first, learners go to the tutorial, whose design is presented in Table 11-4.

Learner Action	System Response
Select Bleeding Nose from the practice case-study menu.	<p>Text: You should complete the following tutorials before undertaking this case-study:</p> <p>DRABC Action Plan</p> <p>Facial Injuries</p>
The learner decides to complete the tutorials before completing the practice case-study.	
Click on DRABC Action Plan from tutorials menu.	<p>Text: DRABC Action Plan Tutorial</p> <p>This tutorial covers the following topic areas:</p> <ul style="list-style-type: none"> • Introduction to the principles of DRABC • The DRABC Procedure
Click next	<p>Text: From the time to time you may hear people say that they have done a First Aid course but are not sure if they remember what to do. This is not unusual, because some people don't get much opportunity to practice, and because first aid covers so many different situations and possibilities.</p> <p>There is however a simple plan of action which provides an easy to remember, five step, "must do" procedure known as the DRABC Action Plan.</p>
Click next	<p>Text: The initials DRABC stand for (items in list appear one by one) Danger, Response, Airway, Breathing, Circulation</p>
Click next	<p>Text: (The list moves to the left of the screen and each item is highlighted in turn). Place the cursor over the title highlighted in blue and click the mouse button.</p>
Click on Danger	<p>Text: (Color of the word danger changes to red). As soon as you become aware that a first aid situation exists and before you do anything, you must immediately look at the whole scene to see if there is any Danger: to yourself,</p>

	to any bystanders, to the casualty.	
Click next	<p>Text: Always check for danger ...</p> <p>To yourself – you can be of no help to anyone if you become a casualty yourself.</p> <p>To any bystanders – Your task will become much more difficult if the people watching become casualties as well.</p> <p>To the casualty – There is no point working on an injury if the casualty is still at risk from passing cars or falling rocks, etc.</p>	
Click next	<p>Graphic: Photograph of a person is lying on the floor of what looks like a shop. There is an electric drill laying next to them still plugged into an electrical outlet. On the workbench above the person is an object hanging partially off the workbench.</p>	<p>Text (next to the graphic): You hear someone cry out and then a thump, so you go to see what has happened. You see a person lying unmoving on the floor, and you can smell hot electrical wiring.</p> <p>Click on anything you think might be dangerous to yourself, to other people or to the casualty.</p>
Click on electric drill in photograph	<p>Graphic: same as previous.</p> <p>Text: Correct. The casualty may have suffered an electric shock from the power drill, so before approaching him you should make sure the switch is off, and the plug disconnected.</p>	
Click next	<p>Graphic: same as previous</p> <p>Text: You turn off the power, and move the drill away from the casualty. However, there is something else that could be dangerous, and which should be removed.</p>	
Click on object on the workbench.	<p>Graphic: same as previous</p> <p>Text: Well done. Very often people are so intent on what is happening on the</p>	

	ground that they miss the hazards above them. Remember, always look up.	
Click next	<p>Graphic: same as previous</p> <p>Text: you remove the overhead hazard. It will now be safe for you to approach the casualty and check for response.</p>	
<p>A similar presentation is used for the other four terms of the DRABC Action Plan: response, airway, breathing, circulation.</p> <p>After the learner has completed the DRABC tutorial he goes to the tutorial on facial injuries.</p>		
Click on Facial Injuries	<p>Text:</p> <p>Facial injuries are those involving the facial features listed below:</p> <p>The eye</p> <p>The ear</p> <p>The nose</p> <p>The jaw</p> <p>The Teeth</p> <p>Click on a facial feature.</p>	
Click on The nose from tutorials listed on the main menu.	<p>Text: Injuries to the Nose</p> <p>The three most common injuries to the nose are:</p> <p>Objects in the nose</p> <p>(explanation here omitted)</p> <p>Bleeding nose</p> <p>Some people, particularly children, have a tendency for their nose to bleed frequently and for no apparent reason. Others will receive bleeding noses from blows in fights or sports.</p> <p>Broken nose</p> <p>(explanation here omitted)</p>	
Click on Bleeding nose	Graphic: girl sitting in	Text (next to graphic):

	a chair holding her nose.	<p>Bleeding nose A bleeding nose is one of the most common first aid problems and yet is one most often incorrectly managed. The correct procedure is for the casualty to:</p> <ul style="list-style-type: none"> • Pinch the soft part of their nose and breathe through their mouth. • Tilt their head slightly forward.
Click next	<p>Graphic: girl sitting with head slightly forward and holding a cold wet towel to her forehead</p>	<p>Text (next to graphic): It also helps to apply cold, wet towels or an ice pack to the back of the casualty's neck and forehead in order to reduce circulation in surface blood vessels.</p>

Table 11-3: Design Plan for the Tutorial on Facial Injuries

As you review the design plan, consider how they apply some of the principles of e³ learning. First, consider the Demonstration Principle.

Demonstration Principle: Learning is promoted when learners observe a demonstration of the skills to be learned that is consistent with the type of content being taught. Demonstrations are enhanced when learners observe media that is relevant to the content.

Do the two tutorials described here implement the demonstration principle? Are learners shown what to do rather than merely being told the action to take? Do the demonstrations include relevant graphics that actually carry part of the instructional load?

Could this demonstration be improved to more adequately demonstrate the skill being taught? How?

Now consider the Application Principle:

Application Principle: Learning is promoted when learners engage in application of their newly acquired knowledge and skill that is consistent with the type of content being taught. Application is effective only when learners receive intrinsic or corrective feedback. Application is enhanced when learners are coached and when this coaching is gradually withdrawn for each subsequent task.

Consider these additional questions. Do the two tutorials described here implement the application principle? Are learners given the opportunity to apply the skill that they were just taught? Which tutorial lacks adequate application? What could be done to provide more adequate application for this tutorial? Do the tutorials provide intrinsic feedback? Intrinsic feedback allows learners to see the consequence of their actions. Could learners see the consequence of their actions in the application that is provided by these tutorials? Do the tutorials provide corrective feedback? Corrective feedback informs learners of the quality of their performance and shows them how they did or should have performed the procedure. Is there corrective feedback provided for these tutorials? How could more effective corrective feedback be employed? Is there any coaching available for the skills being taught? How could coaching be included in these tutorials?

Lack of relevant practice that is consistent with the real-world application of the skill is, perhaps, one of the most common problems in too much of the instruction that is

available. Many rely on multiple-choice questions. But merely answering multiple-choice questions that require learners to remember what they were told is not appropriate practice. Although remembering is a component of all application, more effective learning involves actually using the newly acquired knowledge and skill to complete a task.

11.4.2.5 Practice Case-Study for a Bleeding Nose

The practice case-study in the course consists of the presentation of a variety of specific emergency situations. There are 20 individual case-studies, including ones on scalded arms, sprained ankles, insect in the ears, drowning infants, and splinters in eye.

Each of these case-studies is a simulation that places learners in a real-world situation and asks them to respond to the emergency situations by making the appropriate decisions regarding first aid. The format of the cases is a semi-open simulation that present learners with several alternative actions on any given screen. As in the guided case-studies, a menu appears at the right of the screen presenting the actions to be taken. Each of the buttons causes the system to display a pop-up with a list of actions that learners can select. Unlike the guided case-studies, in the practice case-studies, all of the buttons are active and learners can take any of the actions listed. Feedback provided is appropriate for the action taken. Often this feedback includes advice about what learners should have done or may want to do next. Usually, the appropriate actions can be taken in any order. Table 11-5 shows the design plans for the interaction in the practice case study about handling an emergency with a bleeding nose.

Learner Action	System Response	
After completing the tutorials the learner goes back to the exercise case-study.		
Select Bleeding Nose from the course menu.	<p>Text: You should complete the following tutorials before undertaking this case-study:</p> <p>Facial Injuries</p> <p>Communicable Diseases</p>	
Click Next button	<p>Audio: You are walking near a high school when you see a teenage boy who looks as if he has been in a fight. There is no one else near by and no telephone but you have a small first aid kit with you. Select your first action.</p>	<p>Graphic: A young man about 10 or 11 years old has obviously been in a fight. His nose is bleeding and he looks frightened.</p>
The learner is unsure of how to start interacting with the tutorial so he clicks on the Expert Advice button.		
Click on Expert Advice	<p>Audio: The first thing you must do is check to see if there is any danger to yourself, to others nearby or to the casualty. Click the other action button and then click Check for Danger.</p>	
Click button -- Other Action - ...check for danger.	<p>Text: You do not see anything that could be dangerous to yourself, to others or to the casualty.</p> <p>Select your next step.</p>	
Click Position Casualty button ... sit with his head slightly forward.	<p>Text: Yes, the casualty should sit with his head slightly forward.</p>	<p>Graphic: Close up of young man's face showing the bloody nose and a black eye beginning to develop.</p>

<p>Click on Tell/Ask Casualty ... to apply pressure to his nose.</p>	<p>Text: He asks you what part of his nose he should hold.</p> <p>Click on the part of the casualty's nose to which he should apply pressure.</p>
<p>Click on the soft part of the boy's nose in the picture.</p>	<p>Text: Correct, the casualty should pinch the soft part of his nose.</p>
<p>Click button -- Tell/Ask Casualty ... not to blow his nose.</p>	<p>Text: Correct. You tell casualty that he should not blow his nose.</p> <p>Select your next step.</p>
<p>Click button -- Tell/Ask Casualty ... to breathe through his mouth.</p>	<p>Text: Correct. You tell casualty to breathe through his mouth rather than his nose.</p> <p>Select your next step.</p>
<p>Note that there are many different paths through the simulation many of which are alternate correct paths.</p>	
<p>Click button -- Other Action ... wait to see if the bleeding stops.</p>	<p>Text: You can do more to try and control the bleeding before waiting to see if it stops.</p> <p>Try again. Select your next step.</p>
<p>Click button ... other action ... Look closely at casualty's face</p>	<p>Text: The casualty's nose is bleeding, but it is not swollen or bruised. A bruise is forming around his eye, but the eye itself does not look as if it is damaged.</p> <p>Select your next step.</p>
<p>Click button -- Use Other Item ... water</p>	<p>Text: Question. What do you want to use water for?</p> <p>Wash blood off casualty</p> <p>Wash your hands</p> <p>Dampen towel</p> <p>Click on your answer</p>

<p>Click ... wash your hands</p>	<p>Text: Correct. When possible you should wash your hands before and after managing a casualty.</p> <p>Select your next step</p>	
<p>Click button -- Use other item ... towel</p>	<p>Text: Yes. You could place a cold wet towel on the back of the casualty's neck to try to control the bleeding nose.</p> <p>Select your next step.</p>	
<p>Click button -- Other action ... take casualty to doctor.</p>	<p>Text: Medical aid may not be necessary. It may be possible for you to control the bleeding nose simply by using first aid.</p> <p>Try again. Select your next step.</p>	
<p>Click button -- Other action ... wait to see if bleeding stops.</p>	<p>Text: Wait. You have not treated the bruised eye. What should you do to manage this injury?</p> <p>Select your next step.</p>	<p>Graphic: Photograph shows a wet towel on the back of the casualty's neck.</p>
<p>Click button -- Use First Aid Kit Item ... ice pack.</p>	<p>Text: Correct you get an ice pack and wrap it in a cloth. For example you could wrap it in a triangular bandage.</p> <p>Click and drag the ice pack to the area where you would use it.</p>	
<p>Click and drag ice pack to the black eye.</p>	<p>Text: Correct: The casualty must hold the ice pack against his forehead and over the bruise near his eye. It should stay for 29 minutes.</p> <p>Select your next step.</p>	<p>Graphic: Photograph close-up of casualty's face. Graphic of ice pack below picture.</p>

Click button -- Other action ... wait to see if bleeding stops.	Text: Question. After a minute the casualty tells you he thinks the bleeding has stopped. Should he release the pressure from his nose? YES NO Click your answer
Click NO	Audio: Tell casualty that if his nose starts bleeding again after he lets go to apply pressure for another 10 minutes. If it starts again he should see a doctor. He should also apply ice to the bruise for 20 minutes every 2 hours for 24 hours. Remember to wash your hands after you have completed your first aid.
Click next	Text : Summary Check for danger Have casualty sit with head slightly forward, applying pressure on the soft part of his nostrils. He should not blow his nose. Place a cold, wet towel, or ice pack wrapped in a cloth, on back of casualty's neck. Apply an ice pack (wrapped in cloth) to the bruised area around the casualty's eye.

Table 11-5: Design Plan for the Interaction in the Practice Case Study about Handling an Emergency with a Bleeding Nose

Does this case study require application? How does coaching occur? Is there corrective feedback showing or telling learners the action they should have taken? In the tutorials recommended for this case-study, learners should have learned how to treat a nose bleed and other facial injuries. The case-study allowed them to apply their knowledge in a somewhat real-world situation. The learner in this example did not perform perfectly but

the system provided intrinsic feedback when appropriate. The feedback shows learners what happens as a result of certain actions and corrective feedback by showing or having learners take the correct action. In this course, the level of coaching remains constant across the case-studies because learners are allowed to complete these case-studies in any order. Would a more effective coaching strategy be to decrease the amount of coaching with each subsequent case-study?

Topic-centered instructional strategies typically teach task components in a hierarchical fashion by teaching all the related skills of one type and then the related skills of another type, chapter by chapter, until all of the component skills have been taught. Learners are then given a task to which they can apply their skills as a final project in a course. A topic-centered approach is often characterized as the “you won’t understand this now, but later it will be very important to you” approach to skill development.

A contrast to the topic-centered approach is a task-centered one, which represents the Task-Centered Principle:

Task-centered Principle: Learning is promoted when learners are engaged in a task-centered instructional strategy. A task-centered instructional strategy is enhanced when learners undertake a progression of whole tasks.

Figure 11-9 shows the flow of a task-centered instructional strategy. In it:

- (1) Rather than teaching topics out of context, a task of the type learners are learning to do is demonstrated right up front.

- (2) Learners are then given instruction -- presentation, demonstration, application -- of the skills required to perform this task. This instruction does not teach all there is to know about a given topic or component skill, only what learners need to know to complete the task.
- (3) The whole task is revisited at this point and learners are shown how these component skills were applied to complete the task or solve the problem.
- (4) A new task is then given to the learners. Learners are asked to apply their newly acquired skills to this task. In addition, learners are taught additional skills or more detail for the initial skills that are required for this new and slightly more complex task. Again, learners are shown or asked to recognize how the previous and new skills are used to complete the task.

This cyclical procedure is repeated for each new task in the progression, with learners required to do more and more of the task as they acquire skills while the instructional system demonstrates it less and less. Eventually, learners are expected to complete the next task in the progression on their own. If the progression of tasks is carefully chosen and sequenced, then when learners satisfactorily complete one or more whole tasks without coaching or additional demonstration, then they have demonstrated that they acquired the desired skill intended by the goals of the instruction. A minimal task-centered strategy is a single worked task. However a truly effective task-centered instructional strategy involves a progression of increasingly complex tasks and a corresponding decreasing amount of providing guidance and coaching to learners.

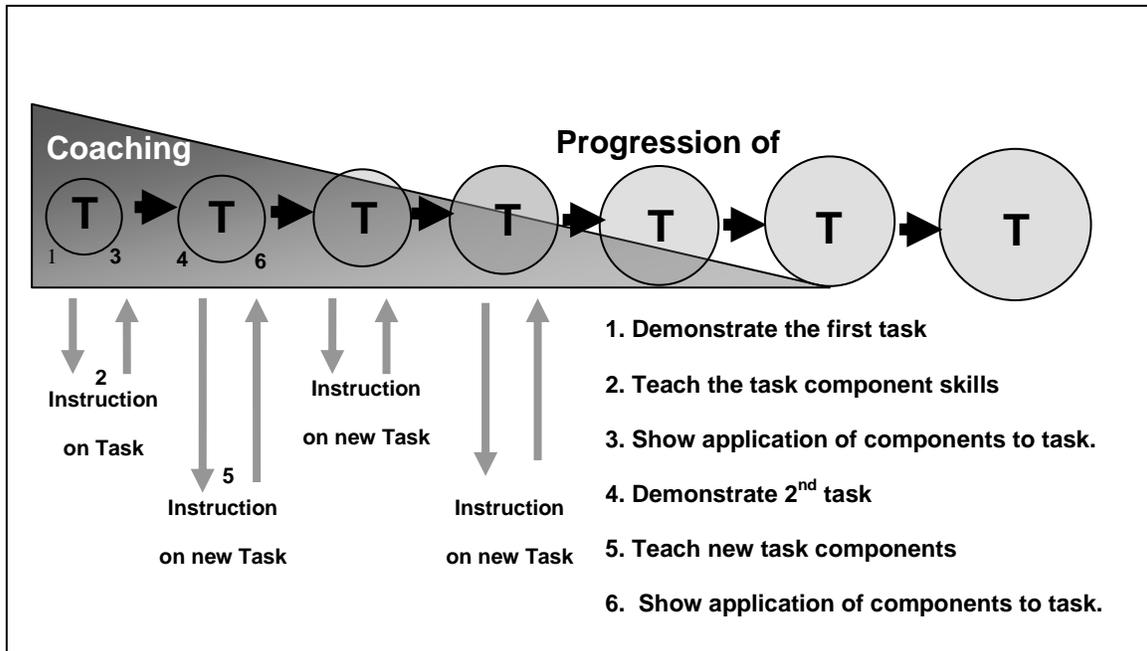


Figure 11-9: Task-centered Instructional Strategy

In the first aid course, the case-studies are equivalent to the tasks in Figure 11-9. The guided case studies are a demonstration of a whole task, applying first-aid in an emergency situation (look at item 1 in the figure). The tutorials are instruction on task components (look at items 2 and 5 in Figure 11-9). The exercise case-studies require that learners apply the component skills to a new situation (items 4 and 6 in the figure). This course deviates from an ideal task-centered instructional strategy in that the exercise case-studies are not sequenced according to complexity. In the first aid course, learners can take the exercise case-studies in any order. Acquiring component skills without knowing how these skills will be incorporated into real-world tasks often makes the learning seem irrelevant and, therefore, empty or boring and endless. However, when learners are engaged in real-world tasks right from the outset of the

instruction, they have a context for these component skills and can immediately see their relevance.

11.4.2.6 Other Parts of First Aid Course

During the course, learners' performance is recorded on a floppy disk to be sent to St. Johns, where learners are registered for the course. The CD-ROM course is followed up by a day of on-site practicum, during which learners have an opportunity to engage in a series of role-playing case-studies treating various types of injuries. Upon completion of both the CD-ROM course and the practicum experience, learners are certified in First Aid.

Knowing that at the end of their study they will have to demonstrate their skill in first aid through an all-day on-site experience adds significant motivation to learners to acquire the skills being taught. When learners know that they will be required to actually demonstrate their newly acquired skills, the instruction becomes more important to them. As a result, learners are more likely to be actively engaged in the learning. This practicum demonstrates the Integration Principle:

Integration Principle: Learning is promoted when learners integrate their new knowledge into their everyday world by publicly demonstrating their new knowledge or skill.

11.5 A PEBBLE-IN-THE-POND MODEL FOR DESIGNING E³-LEARNING.

How does designing e₃ instruction differ from more standard instructional design methods? In earlier work, I suggested a Pebble-in-the-Pond Model for instructional development (Merrill, 2002b). This approach differs from the accepted Analysis, Design, Development, Implementation, and Evaluation (ADDIE) Model of instructional design in a couple of significant ways.

Too often in the ADDIE Model, the content is only outlined during the analysis phase. The actual development of the content to be taught takes place during the development phase of the process. The Pebble Model suggests that the content should be specified up front and that this content is used for the remainder of the development process. This model also advocates a task-centered instructional strategy, like that previously described in this chapter. The usual model of instruction is to have individual modules or even whole courses focused on component skills required for completing some complex task. All of the knowledge or skill for one of these component areas is taught in the corresponding module. A task-centered strategy starts with a complex problem. The module for this problem provides all of the component knowledge and skill relevant to this problem. The component skills are taught in the context of the problem. Then another real-world complex problem is taught and all of the component skills are taught again, elaborating and expanding the skill as required for this second, more complex problem. This process is repeated with all of the component skills being visited for each subsequent problem in the progression of complex real-world problems. Such an approach represents a considerable departure from conventional curriculum design.

The Pebble Model also recognizes the importance of front-end analysis to determine whether or not instruction is needed. The description here assumes that an instructional designer had determined that instruction is an appropriate solution to the existing problem. The description here assumes that an instructional designer has determined that there are learners who lack the knowledge and skill necessary to accomplish some real-world tasks. Figure 11-10 illustrates the Pebble-in-the-Pond Model.

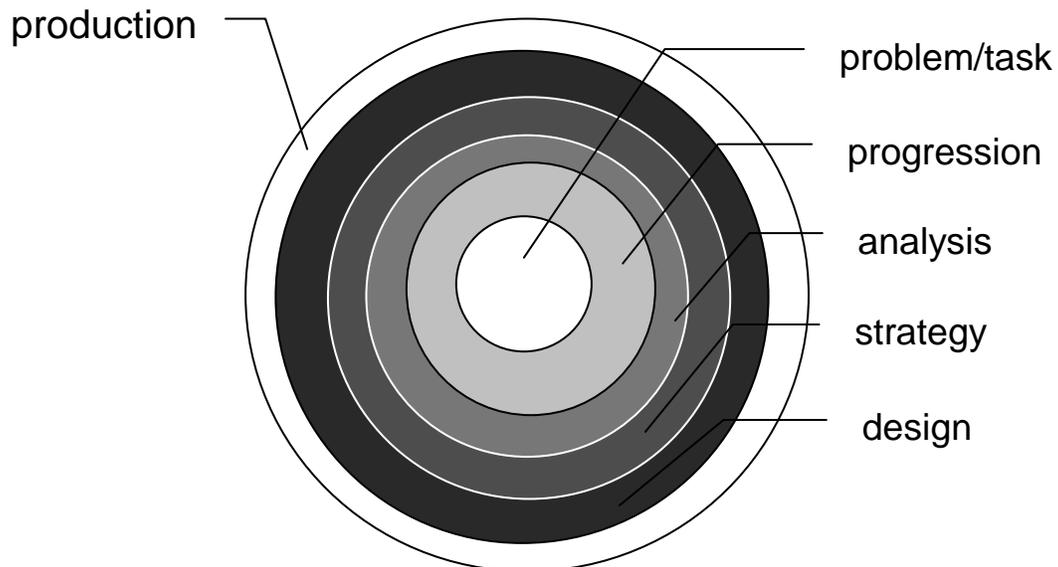


Figure 11-10: Pebble-in-the-Pond Model for Instructional Development

Here is how instructional design works under the Pebble Model. The first step, the initial splash, is to select a *specific complex real-world task*--the pebble to be cast into the development pond. This task should represent the type of task learners should be expected to perform after completing the instruction. To select this task, the instructional

designer should complete several intermediate steps: (1) Select the audience for the instruction. (2) Identify the task appropriate for this audience. (3) Then actually create the task, not merely a description of the task but the actual task itself. This involves gathering all the materials, data, and specific information required to complete the task. (4) Perform the task, complete it, and record in detail all of the activities necessary to do so. This task solution will be used later either to demonstrate the task to learners or as a template against which to assess the adequacy of learners' performance as they complete the task.

The second step, first ripple in the pond, is to identify a *progression* of specific complex real-world tasks from the same class of tasks as the initial task. Again, there are several sub-steps in selecting and preparing this progression. (1) Identify potential tasks for the progression. (2) Create and work each of these tasks as was done for the first task. (3) Sequence these tasks on the basis of complexity, difficulty or extent of component skill required. This progression is not a series of subtasks that are all parts of a more complex task. Instead, each of these tasks should be a complete complex task that belongs to the same class as the other tasks in the progression. (4) Check for content coverage. Be sure that, by the time learners have completed each of the tasks in the progression, they will have acquired the necessary component knowledge and skill to complete complex tasks to be encountered in the future. (5) Modify the tasks, rearrange the sequence and make adjustments that are necessary to insure the coverage of the subject matter content.

The third step, the next ripple in the development pond, is instructional *component analysis*. Several sub-steps in instructional component analysis exist. (1) For each task in the progression, carefully determine the instructional components (knowledge and skill) required to work through the task. (2) Determine which information, demonstration, guidance, application, feedback, and coaching is necessary for learners to acquire the knowledge or skill represented by the instructional component. (3) Carefully show how each component of knowledge or skill is used in completing the related whole task.

The fourth step is to (1) determine the overall instructional strategy that will be used. (2) Determine the instructional strategy that will be used to teach each of the components. (3) Integrate the instructional components with the tasks. (4) Provide the necessary wrap-around overview, summary, transitions, and navigation. Note that in the Pebble Model, the content has all been specified prior to the determination of the instructional strategy to be used. This is a deviation from more traditional Instructional Systems Design (ISD) models.

The fifth step is to design the instructional interface. Doing so involves several sub-steps. (1) Determine the delivery vehicle. Although the title of this chapter is e-learning, I have interpreted the e to mean effective, efficient and enabling. But these principles are relevant to many delivery systems, not just online learning. (2) Once a delivery system has been selected, it is necessary to determine the look and feel for the instruction. (3) Script and storyboard the content that has been previously specified, so that it can be programmed into whatever delivery system you have selected. (4) Develop the relevant

multimedia required for your instruction, such as graphics, video, audio, and text. (5) Determine the navigation through the course and prepare the necessary navigation buttons. (6) Determine how instructional management will occur, addressing issues such as record keeping, registration, cooperation, and learner control.

The final step in the Pebble Model is to produce the course. In the Pebble Model, all the content should be specified, placed into an effective strategy, and specified in appropriate storyboards and scripts. In the Pebble Model, all the instructional strategy should be specified prior to production. Instructional Designers who use the Pebble Model avoid problems in which graphic artists design instruction and programmers program instruction.

Most significantly, the Pebble-in-the-Pond Model is specifically intended to facilitate the implementation of first principles of instruction.

11.6 CONCLUDING THOUGHTS

We are frequently told that we live in the information age. The rise of the Internet is one of the wonders of the modern world. The click of a button will enable us to reach information on almost any subject. Often this information is labeled instruction. Many of these sources are called courses. However, merely labeling a website instruction does not make it so. Charging tuition, calling it a course, or even asking a few multiple-choice questions does not turn information into instruction.

Are you considering the acquisition or development of interactive, multimedia, or e-learning to meet your training needs? Beware! Too many courseware vendors are under-prepared in instructional design. It is not necessary to be certified to hang out a shingle and offer your services as a courseware developer. A clever name, an impressive title, experience in a subject matter, experience in computer graphics, or experience in computer programming cannot substitute for expertise in the development of consistent instructional strategies that teach. Too many of these vendors deliver enervative, endless, empty e₃ learning.

However, you can protect yourself. You can learn to look beneath sales hype to the underlying effectiveness of a given instructional product. You can acquire the skill necessary to look beneath the production quality of the product to the underlying instructional strategies and determine if the product is really effective, efficient, engaging e³-learning. You can learn to recognize and recommend instructional design methods that are more likely to produce e³-learning.

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11.8 CHART SUMMARIZING MAIN POINTS

Readers should take away the following main ideas from this chapter:

- Much current e-learning could be characterized as e₃-learning (pronounced 3 sub-three learning). These three are:
 - Enervative, which, rather than promoting skill acquisition, actually interferes with the learning that should occur.
 - Endless, which leads to boredom by being too passive, devoid of interaction, allowing learners to disengage thereby failing to gain the desired skill acquisition.
 - Empty, which fails to implement those instructional strategies that have been found to be necessary for learning to occur and may be, at its worst, information alone—transferred to the Internet without appropriate demonstration, practice, feedback, learner guidance or coaching. Information alone is not instruction.
- In contrast, e³ learning (pronounced e to the third power learning), is effective, efficient and engaging. It applies these five instructional principles:
 - The *activation principle*: learning is promoted when learners activate relevant

- cognitive structures by being directed to recall, describe or demonstrate relevant prior knowledge or experience.
- The *demonstration principle*: learning is promoted when learners observe a demonstration of the skills to be learned that is consistent with the type of content being taught. Demonstrations are enhanced when learners receive guidance that relates instances to generalities. Demonstrations are also enhanced when learners observe media that is relevant to the content.
 - The *application principle*: learning is promoted when learners engage in application of their newly acquired knowledge or skill that is consistent with the type of content being taught. Application is effective only when learners receive intrinsic or corrective feedback. Application is enhanced when learners are coached and when this coaching is gradually withdrawn for each subsequent task.
 - The *task-centered principle*: learning is promoted when learners are engaged in a task-centered instructional strategy that teaches task components in context and involves learners in a progression of whole tasks.
 - The *integration principle*: learning is promoted when learners integrate their new knowledge into their everyday lives by reflecting on, discussing, and defending their new knowledge and skill. Integration is enhanced when learners publicly demonstrate their new knowledge or skill.
 - One way of ensuring implementing e³ learning is through the Pebble-in-the-Pond Model for instructional development. This approach differs from the accepted ADDIE model by:
 - Specifying content up front and using this content for the remainder of the development process.
 - Advocating for a task-centered instructional strategy
 - Under the Pebble Model, instructional design works like this:
 - Select a *specific complex real-world task*--the pebble to be cast into the

<p>development pond.</p> <ul style="list-style-type: none"> ○ Identify a <i>progression</i> of specific complex real-world tasks from the same class of tasks as the initial task. ○ Perform an instructional <i>component analysis</i>. ○ Determine the overall instructional strategy that will be used, as well as the instructional strategy that will be used to teach each of the components. Integrate these with the task and provide the necessary wrap-around overview, summary, transitions, and navigation. ○ Design the instructional interface. ○ Produce the course.
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Summary Chart—Chapter 11—See Art Pack

11.9 GUIDING QUESTIONS FOR DISCUSSION

- Do you feel that the demonstration course described in this chapter is effective?
Efficient? Engaging?
- How does a course that you recently developed compare? Does it already represent e³ learning? If so, how? If not, what would be required to adapt your course to e³ learning?

11.10 LEARN MORE ABOUT IT

Links	<p>http://cito.byuh.edu/Merrill</p> <p>www.mdavidmerrill.com</p> <p>On-line task-centered course based on first-principles of instruction:</p>
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	<p>Mendenhall, A., Buhanan, C. W., Suhaka, M., Mills, G., Gibson, G. V., & Merrill, M. D. (2006). <i>Introduction to Entrepreneurship: How to start your own business</i>, http://cito.byuh.edu/entrepreneur/main.swf</p> <p>On-line lectures with power-point slides on first principles, pebble-in-the-pond and a task-centered instructional strategy (90 minutes)</p> <p>Merrill, M. D. (2006). <i>A Task-Centered Instructional Strategy part 1: First Principles</i>, from http://cito.byuh.edu/merrill/Merrill_1/Merrill-1.html</p> <p>Merrill, M. D. (2006). <i>A Task-centered Instructional Strategy part 2: Knowledge Analysis</i>, from http://cito.byuh.edu/merrill/Merrill_2/Merrill-2.html</p> <p>Merrill, M. D. (2006). <i>A Task-Centered Instructional Strategy Part 3: A Knowledge Object for a Whole Task</i>, from http://cito.byuh.edu/merrill/Merrill_3/Merrill-3.html</p>
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Learn More about It Chart—Chapter 11—See Art Pack