

ENGINEERING . . . what a strange term to associate with learning. Yet most fitting when you consider what it takes to help people acquire the skills and knowledge that permit them to achieve workplace success. This Toolkit is your resource for attaining learning results that you, your learners, your organization, and all stakeholders in the outcomes value.

Engineering means to design or produce by methods that derive from the science by which the properties of matter and sources of energy are made useful to humans. This utility can come from structure, machines, and products. When you create effective learning systems, this is exactly what you do. You gather the resources and then design, invent, and contrive using every means at your disposal to establish a learning system. *The Engineering Effective Learning Toolkit* is your key resource for accomplishing this mission.

The EEL Toolkit: What, Why, and How

The *EEL Toolkit* has been created to meet your learning program development needs. Its overall objective is for you, with the help and guidance that the Toolkit provides, to be able to design and develop a unit, module, course, or even curriculum that meets a clearly defined objective and to verify the effectiveness of the learning that results from it. In the ensuing pages, you will often see the term “learning program” used to cover the range of learning options you might choose to develop.

What Exactly Is a Toolkit?

This Toolkit contains a considerable amount of instructional design technology, organized in a user-friendly manner. Think of this Toolkit as an accessible coach at your side as you embark and work through a learning design and development project. The material has been created based on extensive interviews with instructional designers, instructors, and managers who have been faced with the challenge of developing effective learning systems with few usable resources to guide them. It is also based on a vast amount of research in instructional systems design. In essence, this Toolkit has been born of two parents: (1) a need for structured, understandable, easy-to-use tools and guidelines for developing solid, learner-centered, performance-based instruction and (2) a field of study and practice whose focus has always been effective learning systems.

Why an EEL Toolkit?

The natural tendency of a knowledgeable person—a subject-matter authority of some sort—when asked to create a lesson or course is to gather a lot of content and build a strong “informational” system. Information, however, is not instruction. And information transmission does little to transform learner skills. When you accept the task to create a learning program, you become the learner’s advocate. Your job is to transform the logic of the content into the logic of learning. You have to shed the expert role and view the material to be mastered through the learner’s eyes.

The *EEL Toolkit* helps you do this. It provides you with steps, procedures, activities, and job aids that guide you through the development process. It truly is a “toolkit.”

The *EEL Toolkit* is based on a fourteen-step model, which is a road map that you will follow. It helps you see where you are going and lays out the milestones of your journey. What is wonderful about this model or itinerary is that you will be able to apply it again and again with each new instructional challenge you are given. Remarkably, it will guide you to success every time.

This Is Your Toolkit

The *EEL Toolkit* is based on an analysis of *your* needs—an individual or team tasked with creating an effective learning program (unit, module, course, curriculum) and seeking guidance and resources to accomplish this mission. We have cut out and/or condensed many of the usual instructional design steps without harming the integrity of the system. However, we ask one favor of you, and that is to be patient as you proceed through the steps. The initial analysis steps and later verification ones may appear to slow you down. However, in the long run, you will produce a sounder learning result with

less rework than if you plunge headlong into the content in a desire for rapid closure. Overall, following all the steps in the model will save you time.

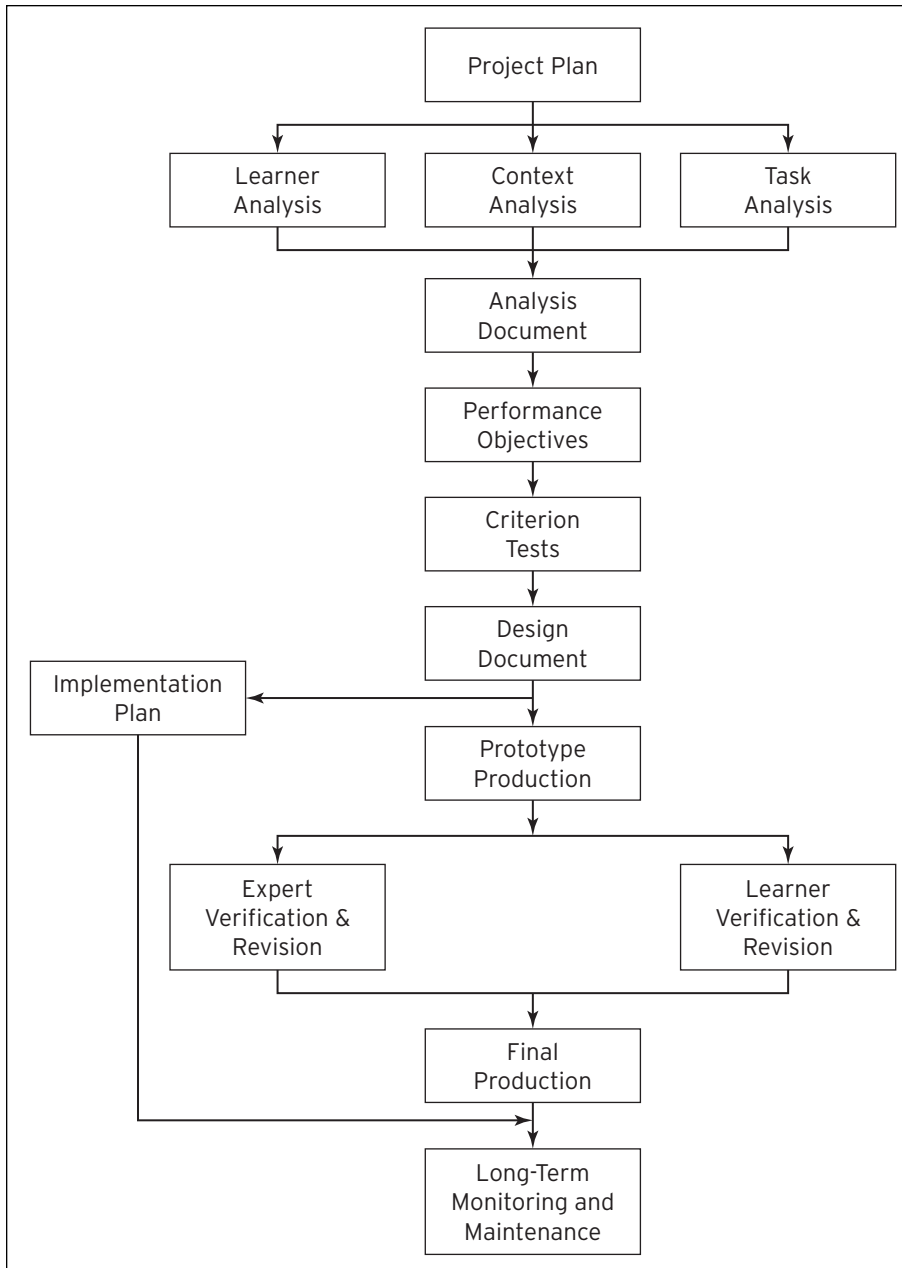
Enough talk. Let's get you started! What follows in the remainder of this introduction is an overview of the EEL model, a quick performance aid that helps you determine how much of the model you should use for a particular project, and an explanation of how this Toolkit is organized.

The EEL Toolkit Model

Here (Figure I.1), in overview, is the instructional design and development model that guides your activities and provides the basic structure for the Toolkit. Notice that it has fourteen steps. Basically, you follow each step and apply the tools. Take a moment to study the model. Notice how the steps link together in a flow. A note of caution, however. Too often, we make the decision that “training” is required when there is a gap between current and desired performance. Over the years, many organizations have discovered that the reason for the gap may not be related to lack of skills or knowledge, the only reason for developing and delivering training. In fact, what the research on human performance, particularly in the workplace, tells us is that, 70 to 80 percent of the time, there are other causes for insufficient performance. These include lack of clearly defined expectations; lack of timely and specific feedback on performance; inadequate or insufficient resources and time; poor incentives or consequences to encourage and support desired performance; improper selection of people to perform required tasks; lack of motivation to perform well, often due to the low value performers attribute to the task; and lack of confidence about being able to meet expectations. There are many more. The key point is that, before you invest considerable time, energy, and resources to develop a learning program, you had better determine first whether or not it is appropriate, and if it is, whether it will be sufficient to provide desired results. To do this requires that you conduct a front-end analysis, the object of another toolkit in this series. In this *EEL Toolkit*, we open with an assumption that you have undertaken some form of systematic front-end analysis and have discovered that a learning program is necessary. This is our point of entry for the model that follows.

Before developing a new learning program—a unit, module, course, curriculum, instructional package, or any learning event—or before making major adaptations to an existing one, localizing, updating . . . even translating it, your management must first make the decision to allocate resources and time to the project. Usually management creates a business case to justify expenditure on course development/adaptation. The result of the business case is the starting point for the EEL model. If one has not been done, then you need to do it—or at least conduct a front-end analysis, as we mentioned above, to identify the nature of the gap between what is expected and where things

 **Figure I.1. The Fourteen-Step EEL Model**



are currently and to determine in clear, unambiguous terms what the business need is. The front-end analysis process also includes identifying what interventions are required to close the gap, what role the learning program will play, and what the “worth” of the learning and other interventions are for achieving success. If there has been no business case made or if a front-end analysis has not been conducted, you may want to consider starting there. You can refer to our *Front-End Analysis and Return on Investment Toolkit* for guidance and assistance in doing this necessary first step.

Assuming you possess adequate information on why the learning program design project you have undertaken should proceed, here is an overview of your itinerary. As you read through the overview, refer to Figure I.1.

Step 1. Project Plan. This first step draws from the decision and business case or from a front-end analysis to create/adapt a learning program and specifies what the final product will contain. It states in unambiguous terms the scope of the module/course or curriculum to be developed/adapted, the target audiences for whom it is intended, specific characteristics, and major components. During the development process, this Project Plan serves as the target to be attained. New information during development may cause modification to the Project Plan.

Step 2. Learner Analysis. This analysis allows you to identify those characteristics of the targeted learners that must be considered for the learning program to be effective. It generally includes observations of and interviews with prospective learners. Existing data on the learner group(s), such as previous performance in courses, job descriptions, background information from client organizations, the business case, and/or the front-end analysis, can make an important contribution to the Learner Analysis. The end result is a portrait of the targeted learners (primary, secondary) that summarizes their aptitudes with respect to what they must master during the learning, their attitudes toward the content or specific methodologies, their learning and language style preferences, and antipathies as well as relevant tool skills (for example, keyboard skills, programming capability, equipment use, software navigational skills).

Step 3. Context Analysis. Here, you identify the circumstances in which learning will occur. Context Analysis specifies classroom and laboratory configurations and constraints, hardware and software resources/limitations, instructional equipment availability, communication requirements/limitations, tracking/enrollment procedures, incentives/certificates, course prerequisites, administrative/financial requirements, and constraints. The output of the Context Analysis is a clear description of the conditions under which learning must take place.

Step 4. Task Analysis. This analysis produces the structure upon which the learning system is built. Your job here is to draw out from subject-matter experts (including yourself, if appropriate), master performers, documentation, management, and all relevant sources the information that allows you to lay out in graphic and linear form all the tasks and subtasks the learners must master to move from current to desired levels of performance. You always express tasks and subtasks in terms of learner accomplishments.

Step 5. Analysis Document. Once all analyses are completed, you assemble these together with the Project Plan and submit the Analysis Document for review. This step has three purposes:

1. To allow management and other knowledgeable individuals to review the analysis, verify accuracy, completeness, and assumptions, and provide early corrective feedback.
2. To ensure availability of resources and support to complete the course as specified in the Project Plan and laid out in the analyses.
3. To establish an audit trail that documents the development process.

Step 6. Performance Objectives. This important step expresses what the learners will be able to do in verifiable terms as a result of engaging with the learning you develop. Performance objectives form the *contract*, so to speak, and flow directly from the Task Analysis.

Step 7. Criterion Tests. Once the Performance Objectives are specified, you create test items (means for verifying objectives attainment). Regardless of training methods and media, the learners must demonstrate performance competency as measured by these items. Criterion Test items may take the form of written tests, performance tests with checklists, simulation exercises, and so on. All training is focused toward leading the learners to perform satisfactorily on these test items that perfectly match the objectives.

Step 8. Design Document. In this step, a blueprint of the learning emerges. It contains all the objectives, instructional events, evaluation methods, and media/resources arranged in sequence with allotted times. In essence, it details what the instruction will look like. Critical to this step is the selection of learning methods, which define the instructional events. The Design Document offers a major opportunity for management, instructional design, and subject-matter expert review. It is an important document for the learning program audit trail.

Step 9. Implementation Plan. Implementation of a learning program is at least as important, if not more so, as the design of the instruction itself. While you should be thinking about implementation right from the start, this step becomes more formalized once the Design Document has been produced. In this step you detail all the actions that must be taken for successful implementation of the learning program and prepare lists of resources, equipment, and supplies that will be required.

Step 10. Prototype Production. Once the learning design has been approved, you move on to produce the actual learning materials, which are initially in rough form. The instructor guide, participant materials, examples, projection materials, simulations, and so forth must all go through iterative loops of refinement.

Step 11. Expert Verification and Revision. As the course materials take shape in rough form, you continually have them verified by knowledgeable persons to ensure that all content, examples, and explanations are accurate, culturally acceptable, and in keeping with organizational standards. An experienced instructional developer should also review your materials for instructional soundness. Feedback on even small portions of what you have produced in the initial phases of development can save you enormous rework later.

Step 12. Learner Verification and Revision. This is one of the most critical steps in the EEL process. Here, you try out even first approximations with actual or simulated learners to verify that they do indeed learn from what you have developed. Based on learner tryout information, you make revisions to the prototype components and retest, if necessary. The earlier you do this, the easier and less costly it is to make corrections. Most of the inadequacies of a module, course, or curriculum can be identified and corrected in the early prototype stages.

Step 13. Final Production. Once the learning system components have been approved by experts as accurate and acceptable and have demonstrated that learners meet Performance Objectives, you produce materials in “final” form. Further rounds of tryout testing and revision may still occur here.

Step 14. Long-Term Monitoring and Maintenance. It is important to monitor and maintain learning system components until they are no longer required. Maintenance includes both content updating and instructional revision.

Now that you have had an overview of the *EEL Toolkit* model, you are ready for details.

You Don't Always Have to Do It All

The EEL Fourteen-Step Model represents a complete learning development system. However, you do not have to apply all the steps if you are only translating, localizing, or updating a learning program. The decision matrix in Exhibit I.1 below suggests the most appropriate steps for each type of adaptation or development project.

Exhibit I.1. Decision Matrix for Course Adaptation and Development

If	Then
Translation (language and/or culture)	Translate/adapt prototype components Conduct local expert and learner verification and revision Produce final translated/adapted course
Localization (specific local requirements/ restrictions/additions)	Revise learner and task analyses, performance objectives, and criterion tests Revise/produce prototype components Conduct local expert and learner verification and revision Produce final localized course
Technical updates—minor (changes to existing software, hardware, and/or O/S)	Revise task analysis, performance objectives, and criterion tests Produce new prototype components Conduct expert and learner verification and revision Produce final updated course
Technical updates—major (new software, hardware, and/or O/S)	Apply complete model (borrowing from existing course as appropriate)
New course	Apply complete model

Using the EEL Toolkit System

This Toolkit includes six major components:

1. Fourteen *information charts* that present all the key information you require to complete each step of the process. Information charts contain the following:

Step:	What the step is called. Beside each step is the graphic illustration highlighting where the step is located in the model flow diagram.
Purpose:	The reason for performing the activities of the step.
Result:	What the output of the step is.
Activities:	What must be performed to obtain satisfactory results from the step.
Time Required:	Approximate amount of time needed to complete the step.
Resources:	Material and human resources generally required to complete the step.
Caveats:	Things to be aware of and to watch out for during the step.
Tips:	Helpful hints to facilitate performance of the step activities.

2. *Job aids* that are referred to in each information chart. These guide you to perform all the required activities of each step in the EEL development process. Job aids may be in the form of a worksheet, flowchart, decision table, checklist, recipe, algorithm, or reference list.
3. A *running example* that documents how the EEL process was applied to a project. All the job aids for each step are filled in. This example should help you perform the same tasks for your own project. The running example used in the *EEL Toolkit* (Mail Tool) was specifically selected as simple content that everyone should be able to relate to without difficulty. This frees you to focus on the *process* versus the *content*.
4. *Samples* and *templates* along the way to clarify or help guide your efforts.
5. Five *technique charts*, found at the back of the Toolkit, that help you organize data-gathering sessions for analysis or evaluation.
6. A brief *glossary*, found at the back of the Toolkit, of important or novel terms. In addition, terms are generally defined as they are introduced throughout the text. A resource list of useful publications, software, or information sources to help you expand your learning design capability that can be found at the back of the Toolkit. An *index* to assist you to locate EEL model steps.

Accompanying each information chart is a small graphic illustration of the EEL flow diagram. The step that the information chart deals with is darkened on the graphic as in the following example:

Step:	Context Analysis	
Purpose:	The reason for the step.	
Result:	What the output is.	
Activities:	What must be performed.	
Time Required:	Approximate time. This is very approximate and highly dependent on the nature of the learning program, the degree of novelty or complexity of the content, the experience level of the design team, and the length of the program. Some steps in the process take the same amount of time regardless of program length (for example, context analysis, learner analysis). Others are highly dependent on the size and length of the learning program (for example, task analysis, performance objectives, design document, prototype production). Also, the more varied the learner populations, the greater the amount of time required for many of the steps.	
Resources:	Material and human resources.	
Caveats:	Things to watch out for.	
Tips:	Helpful hints.	

Also included are points to note, cautions, and reminders. These are clearly identified by the following icons:



Note



Caution



Reminder

As you will find, there is a lot packed into the *EEL Toolkit*. It is all there to make your job easier. It is there to support you as you create effective learning programs.

Preparing for EEL Toolkit Application

You have your project. You are ready to begin. Check “yes” or “no” for each item in the Preparation Checklist (Exhibit I.2). If an item is not relevant, ignore it. If you check “no” for a relevant item, resolve it before you proceed too far into the project.

You should also set up a project timeline to keep you on track. A rule of thumb is to add *at least 20 percent* more to the time you estimate for completion of each step. Snags always occur. The Sample Project Timeline (Exhibit I.3) is a simple timeline planning method. Use it as a model. (Page 13 has an example of a complete project timeline). Over time, your estimates will improve.

Another important planning step is to ensure that you have a list of all the project participants and their roles. A RASCI chart (Exhibit I.4) is a simple method of planning for this. RASCI stands for

R = Responsible (the person who must complete the work)

A = Approval (the person/s who must sign off on the step)

S = Support (the person/s who can help you with this step)

C = Consult (persons you can turn to for expert information: technical, administrative, legal, marketing, instructional)

I = Inform (persons or groups you should let know about what is happening)

Exhibit I.2. Preparation Checklist

	Yes	No
1. You are officially assigned to develop the learning.*	<input type="checkbox"/>	<input type="checkbox"/>
2. Your supervisor or client has approved the project.	<input type="checkbox"/>	<input type="checkbox"/>
3. You have negotiated adequate time to complete the assignment.	<input type="checkbox"/>	<input type="checkbox"/>
4. You have all the required business case or front-end analysis information for the project.	<input type="checkbox"/>	<input type="checkbox"/>
5. You have access to appropriate resources (for example, content information, experts, equipment, software, instructional design support, materials).	<input type="checkbox"/>	<input type="checkbox"/>
6. You will be able to test your prototype with “live” tryout subjects.	<input type="checkbox"/>	<input type="checkbox"/>

*“Develop the learning” means adapt, localize, update, translate, or create either a module, a course, part of a course, a boot camp, an instructional package, a Web-delivered seminar, or an entire curriculum of courses.

Exhibit I.3. Sample Project Timeline

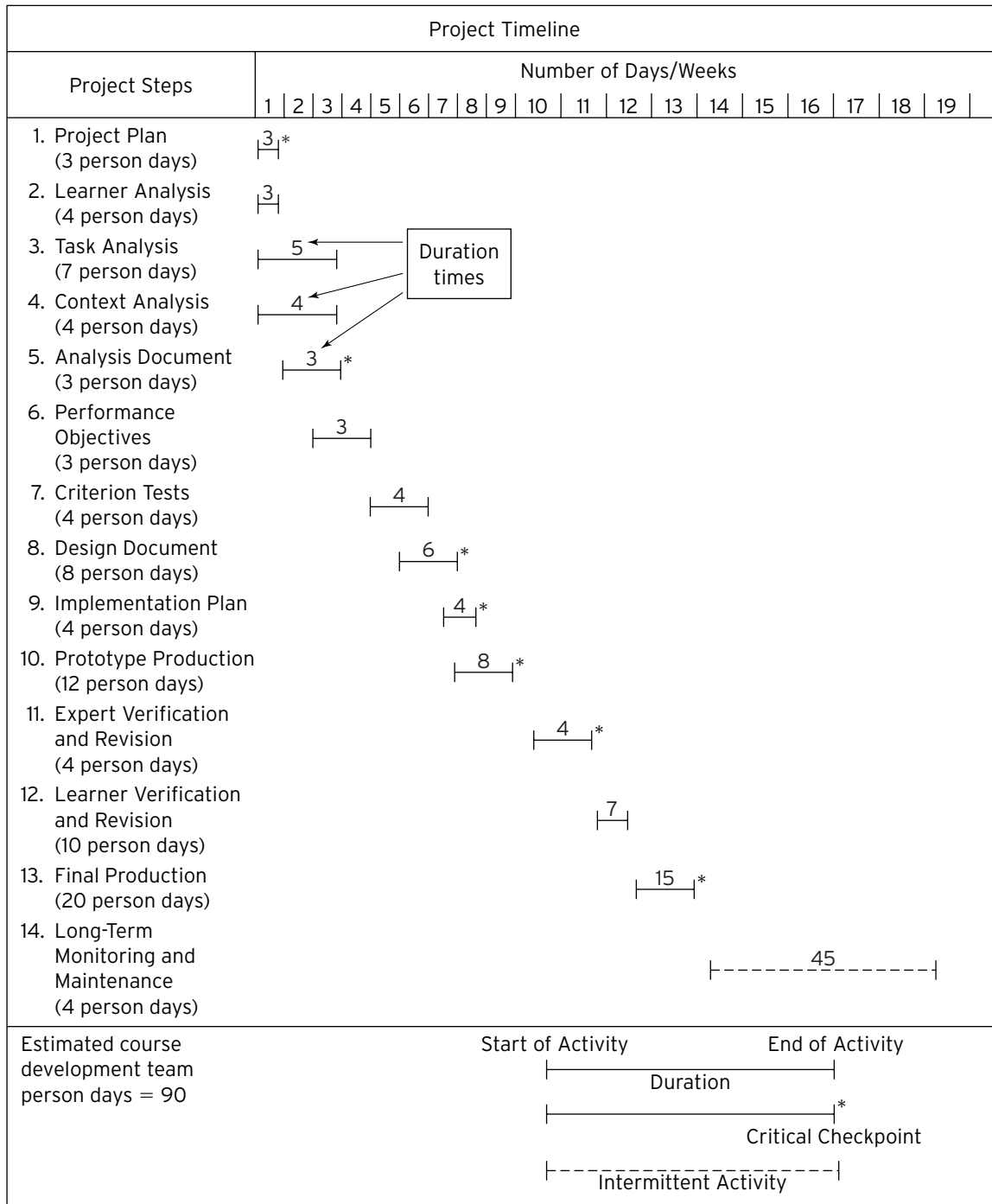


Exhibit I.4. Project RASCI Chart (Time Specified in Person Hours)

Steps	Project Participants			
	Manager/ Supervisor	Instructional Developer*	Curriculum Team	Others
1. Project Plan	A <input type="text" value="1"/>	R <input type="text" value="24"/>	C <input type="text" value="2"/>	
2. Learner Analysis	A <input type="text" value="1"/>	A <input type="text" value="24"/>	S <input type="text" value="1"/>	
3. Task Analysis	C <input type="text" value="1"/>	R <input type="text" value="32"/>	A <input type="text" value="24"/>	
4. Context Analysis	<input type="text"/>	R <input type="text" value="32"/>	C <input type="text" value="2"/>	
5. Analysis Document	A <input type="text" value="3"/>	R <input type="text" value="24"/>	<input type="text"/>	
6. Performance Objectives	<input type="text"/>	R <input type="text" value="24"/>	<input type="text"/>	
7. Criterion Tests	<input type="text"/>	R <input type="text" value="32"/>	<input type="text"/>	
8. Design Document	A <input type="text" value="3"/>	R <input type="text" value="40"/>	C <input type="text" value="6"/>	
9. Implementation Plan	A <input type="text" value="3"/>	R <input type="text" value="26"/>	<input type="text"/>	
10. Prototype Production	S <input type="text" value="4"/>	R <input type="text" value="48"/>	A <input type="text" value="20"/>	
11. Expert Verification and Revision	<input type="text"/>	R <input type="text" value="32"/>	C <input type="text" value="20"/>	
12. Learner Verification and Revision	<input type="text"/>	R <input type="text" value="56"/>	<input type="text"/>	
13. Final Production	<input type="text"/>	R <input type="text" value="80"/>	A <input type="text" value="8"/>	
14. Long-Term Monitoring and Maintenance	R <input type="text" value="4"/>	S <input type="text" value="4"/>	S <input type="text" value="24"/>	

* This is **you**.

Every step requires an R. Many steps require an A, S, or C. I is only noted if someone requires information on the project but plays no active role (for example, a manager or a union). Within each step, estimate the number of hours (or days) it will take each participant to perform her or his part. Enter the estimate in the lower right box for each step/participant. To see an example of a RASCI chart filled in, see page 14.

EEL Toolkit Steps and Resources

You have checked “yes” on all the relevant preparation items. You have estimated your timelines. You have created a project RASCI chart. You are now ready to attack each step of the EEL process.

What follows are all the materials for the steps of the EEL Fourteen-Step Process Model. Please note that:

1. Each step begins with a brief introduction/explanation/description.
2. Following this introductory piece is the *information chart*—a sort of very brief how-to recipe. The information chart provides the name of the step, purpose, result, activities, time required (as a guideline or estimate only), resources, caveats, and tips. Under the “activities,” in the left-hand margin, you will find, in parentheses, references to job aids. These refer to the job aids you should use for each specified activity.
3. The *job aids* are the worksheets and tools you actually apply to complete an activity. Many of the job aids are preceded by instructions for use. Others are self-explanatory.
4. Some of the activities require data collection. To help in the data-gathering process, we have created “Technique Charts.” Each one of these technique charts is designed just like the information charts. They are located immediately following this section on the EEL fourteen steps. The information charts refer to technique charts at appropriate points.
5. To help you fill in the job aids, we have included a *running example* on a learning program called “Mail Tool.” This fictitious, but realistic case uses all the job aids. These should provide models for how you might apply or complete the job aids for your project.



The *EEL Toolkit* is not a reading book. We created it to help you develop learning programs. For the *EEL Toolkit* to make any sense, please refer to it as you work on an actual project.

