

THE **e**LEARNING DEVELOPERS' JOURNAL™

Strategies and Techniques for Designers,
Developers, and Managers of eLearning

JOURNAL™

THIS WEEK — DEVELOPMENT TECHNIQUES

Guided Discovery Teaching Methods and Reusable Learning Objects

BY KIM E. RUYLE AND PEDER JACOBSEN

This is the first article in a two-part series that presents an e-Learning case study. In this article, the project is described with particular attention to two of the goals of the application: 1) to use effective guided discovery methods and 2) to achieve reusability with learning objects (LOs). The organization of the course and instructional strategies are explored in some detail. In the next issue of *The eLearning Developers' Journal*, part two in this series

will explore the technical underpinnings of the application, lessons learned, and thoughts about future applications of LOs.

The allure of guided discovery

Teaching methods can be classified along a continuum of the level of instructor-centeredness vs. learner-centeredness. At one end of the spectrum are instructor-centered expository methods such as the lecture. These expository methods are generally regarded as highly efficient means of delivering learning content, albeit with somewhat unreliable levels of quality; the effectiveness of a lecture, for instance, is highly dependent on the skill of the lecturer. At the other end of the spectrum

are learner-centered methods such as guided discovery and problem-based instruction. While these methods lose something in efficiency and neatness, they gain a lot in levels of learner engagement. And even a cursory search of the research literature shows that instruction is generally more effective when learners 1) feel accountable for their learning, and 2) are actively involved in the learning experience.

So here's the dilemma. Instructional designers, while enchanted by the simplicity and efficiency of linear expository methods, long to break free from doing a "content dump" to give learners real experiences — messy, nonlinear, less pre-

Continued on next page

In this first article of a two-part series, you will get an in-depth look at how Deere & Company designed and developed an e-Learning program that takes advantage of guided discovery teaching methods and leverages the power of reusable learning objects to solve a critical business issue. This excellent article adds to the growing body of case evidence that learning objects really can be reused! Read and learn how they did it...

dictable experiences that occur with guided discovery, experimentation, inquiry, problem- and case-based instruction, and even, (Dare we say it?) constructivism (see Constructivism sidebar on page 3). These methods can be difficult to design and deliver online, but the allure is powerful. Consider the following scenarios. Which is more engaging? Which is more interactive? Which is more likely to lead to the ability to synthesize or evaluate?

1) Learners complete a course by reading a few screens of information and then "interact" with the content by performing a drag-and-drop matching exercise or answer a multiple choice question as part of a "knowledge check." This is repeated ad nauseam until the course is completed.

2) Learners complete a course by solving complex problems that are presented in a meaningful context. The problems are neither trivial nor simply a replica of preceding content. Students must solve the problems by using their own devices and whatever knowledge they've accumulated to this point. Answers are far from obvious; solution paths are fuzzy and failure is allowed. Reflection is a natural reaction. Learners might not be "interacting" in any

What's meaningful for one population segment is nonsense to another. Reusable Learning Objects, the least granular of the objects [we] discussed, are most difficult to reuse because they, of necessity, contain contextual elements, practice, and assessment components that severely limit reusability.

observable way (by moving the mouse, for instance), but they must *really think*. Their brain is engaged because it has to be to reach their goal.

Learner-centered methods such as guided discovery imply true engagement, meaningful interaction, and reduced dropout rates. Learner-centered methods embrace learning by doing. Guided discovery e-Learning applications should meaningfully engage learners in the content, provide opportunity for reflection, and stress application. These applications shun meaningless activity in the guise of "interactivity."

The appeal of reusability

Content reusability accompanies guided discovery as one of the stepping-stones to e-Learning utopia. Reusability can be attained, it is hoped, by employing learning objects and standards, such as SCORM, to ensure interoperability. If reusability is achieved in organizations like ours (Deere & Company, a manufacturing firm located in the heart of the American mid-West), it will provide huge benefits. We have worked with companies in which dozens of people are employed creating content for

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SIDEBAR: On Constructivism

Constructivism is a teaching method that suggests learning best occurs when learners reflect on their own experiences and construct their own distinct meaning, rules, and mental models related to the content. Not too many instructional designers in the private sector are promoting constructivism, but some are employing a bastardized version. Outside of outdoor adventure learning camps or other forms of woo-woo training (a technical term) we can't really afford for learners to come up with their own meaning and answers — there is generally one correct way to do a job, and that's what we expect employees to learn. However, we embrace a constructivist viewpoint in terms of empowering learners and making training activities learner-centered. We believe that methods such as guided discovery, experimentation, and inquiry will lead to attainment of higher levels of learning in all learning domains.

paper documentation, such as product service manuals. Many other people in these same organizations are employed creating parallel content for web applications, such as for product service training. Although content overlaps, writers and editors do not currently have an easy way to determine where content is stored or if it even exists. There are multiple content repositories and content management systems. These issues, if resolved, present an enormous opportunity for increased productivity, reduced cost, and improved quality of information.

This article, the first in this two-part series, presents a case study that converges with the learner-centered and reusability themes. A comprehensive e-Learning application was designed to employ guided discovery teaching methods within an architecture based on learning objects.

Case overview

Before getting into the instructional strategies and reusability strategies we decided upon it is useful to understand why we were doing the project and what we were trying to achieve.

Situation and problem statement

Senior leaders in the organization, starting with the CEO, have embraced Shareholder Value Added (SVA) as a key strategic initiative of the enterprise. SVA is a financial indicator that shows how well an investment performs relative to an expected rate of return. Companies with high SVA values are viewed as better long-term investments than companies with low SVA values. Financial returns to investors are determined by free cash flow generated by

operations and by growth in share value. To drive improvements in these metrics, leadership has focused on increasing operating return on assets (ORoA), measured as follows:

$$\text{Operating Margin} \times \text{Asset Turns} = \text{ORoA}$$

This is a useful formula, but not readily understood by and meaningful to many employees. It is not enough to provide communication about the importance of SVA or ORoA. In fact, continuing to urge employees to increase SVA without increasing their comprehension and coaching them in specific desired behaviors is likely to lead to ambivalence or cynicism.

Problem: The business is unlikely to reach its ORoA and SVA targets unless a broad cross-section of employees understand these concepts well enough to apply them to their individual jobs.

A multi-level blended solution

To solve this problem, a blended learning solution and comprehensive communication strategy was developed. The instructional components of this strategy include:

A workshop. The *Building a Great Business Workshop* is one part of the series of messages and learning opportunities designed to engage all employees in efforts to create a business that serves employees, customers, and shareholders equally well. The workshop was designed to reinforce the chairman's message to all employees, and do it in a way that is interactive and fun. The workshop is delivered to small groups of 12 to 24 participants in a time frame of two hours or less. Things move quickly, especially because partici-

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As in any profession, there are many different perspectives about the best strategies, techniques and tools one can employ to accomplish a specific objective. This **Journal** will share these different perspectives and does not position any one as "the right way," but rather we position each article as "one of the right ways" for accomplishing a goal. We assume that readers will evaluate the merits of each article and use the ideas they contain in a manner appropriate for their specific situation. We encourage discussion and debate about articles and provide an Online Discussion board for each article.

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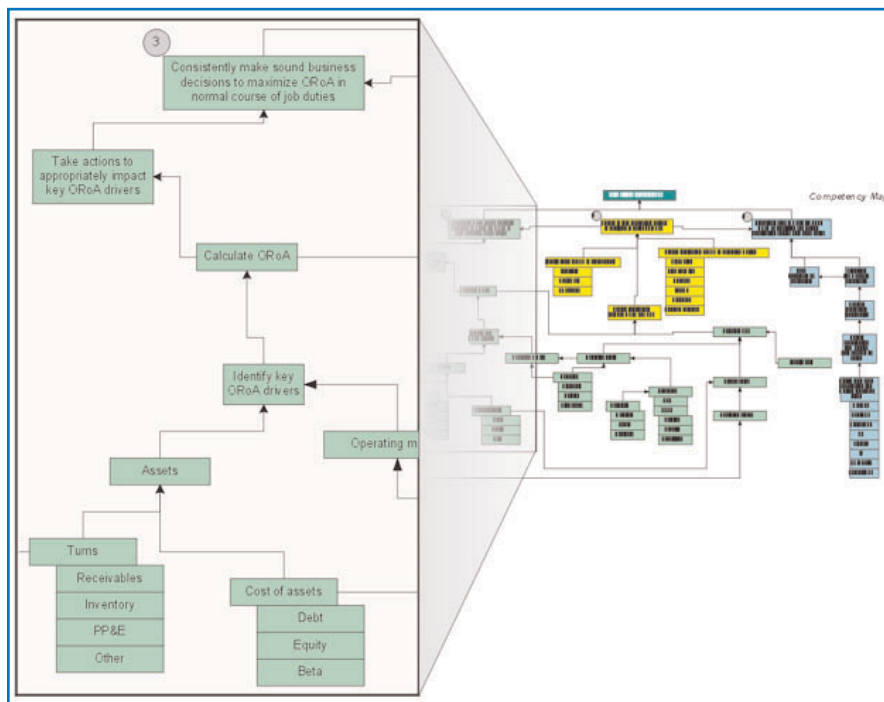


FIGURE 1 Competency map with a portion expanded.

pants are engaged in a variety of activities in which they all contribute to the shared learning. The workshop objectives have much more to do with influencing attitudes and introducing concepts than they do with skill building. After the workshop, participants are able to answer, at a basic level, these questions: What is a Great Business? How is a Great Business measured? How do we build a Great Business? What does our effort to become a Great Business mean for me?

An advanced e-Learning application. To supplement the workshop and address the skill requirements to solve the business problem described above, two e-Learning applications were also designed. Initially, a very comprehensive application was conceived, designed, and tested — we'll refer to this as the "advanced" course because it's advanced in terms of content. In the instructional design process described below, we'll see how the application employs guided discovery teaching methods in an LO-based architecture.

A basic e-Learning application. During usability testing of the advanced course, individuals in the organization's finance community suggested that a second application be developed to provide a more basic treatment of financial concepts. This second course, the "basic" course, uses instructional games as the primary teach-

ing method. This course was the first opportunity to attempt to reuse learning objects developed for the advanced course.

The remainder of this article addresses the design of the advanced course and how its content was reused and repurposed for the basic version.

Goals of advanced course

The business problem was identified as the likely failure of the business to reach its financial targets unless employees are making the right decisions and doing the right things. Specifically, employees must:

1) Consistently make sound business decisions on the job to improve operating return on assets.

2) Choose to take appropriate actions to positively impact SVA and ORoA.

3) Proactively seek to maximize SVA and ORoA by identifying and seizing opportunities outside normal job duties. This means zealously pursuing opportunities to improve financial performance in the enterprise and taking appropriate action to initiate and implement needed changes in business processes, e.g.,

- Bringing ORoA improvement opportunities to the attention of the appropriate process owner and finance staff.
- Lending assistance to ORoA improvement projects as appropriate.

These goals were analyzed to identify the knowledge, skill, and attitude components required and a competency map was developed to represent these components. Figure 1 illustrates a condensed version of the competency map. Each block is actually a terminal or enabling objective placed on the competency map to reflect its relationship to other objectives in a hierarchy of knowledge and skills. This map is helpful for chunking and sequencing instruction, identifying prerequisite knowledge and skills, and for developing instructional strategies.

Target population and prerequisites for advanced course

The target population was identified and analyzed, and two distinct groups were recognized and addressed with the application.

- The primary audience is a group composed of readers of English who fall into one (or both) of these groups:
 - a) mid-level managers and above;
 - b) all employees working in a professional accounting or finance role.
- The secondary audience is the group of all other employees who read English and have ready access to the company intranet.

Prerequisites were identified for levels of literacy and numeracy, and tests were administered during course design and development to ensure that the content accommodated learners meeting these prerequisites.

- For literacy — 8th-grade reading level as measured by Fry's Readability Index. (<http://school.discovery.com/schrockguide/fry/fry.html>)
- Level 4 (9th — 12th grade) numeracy level in each of the nine Mathematics Standards found in the McREL K-12 Standards. (<http://www.mcrel.org/compendium/Standard.asp?SubjectID=1>)

Instructional strategies

Instructional strategies, we believe, are best determined after a comprehensive analysis of the content, the performance goals, the target population, and the constraints of the delivery system. Here are just a few of the factors that entered into the decision process for this course:

- The content is technical and requires high levels of numeracy
- Concepts to be taught will be applied across a wide range of job activities
- The target population is very hetero-

geneous in terms of familiarity with content — some are near the level of a subject matter expert while others are complete novices

- Performance goals require initiative and independent thinking
- e-Learning capabilities are in place, and management would like to see e-Learning used in this situation
- There will be numerous opportunities to reuse and repurpose portions of the content for other audiences

Design objectives

Given the factors above (and many others), a set of design objectives were created to guide the remainder of the instructional design process. This Top Ten List functioned as a somewhat fluid list of specs for the instructional designers.

1) **Include guided discovery teaching methods.** A confident target population is a requisite for effective guided discovery. If the audience lacks confidence, designers must build in a high degree of coaching and cues to compensate. In this case, guided discovery was fitting for the significant portion of the target population who would be confident with the subject matter and the online learning environment. Guided discovery was also deemed appropriate for this course given the need for performers to show initiative and demonstrate independent thinking on the job. It made sense to reinforce those behaviors in the course itself.

2) **Include problem-based case teaching methods.** All instruction is simulation. When instruction closely mirrors performance on the job, it's considered high fidelity simulation. Most online instruction does not approximate what happens on the job, so it would be properly classified as low fidelity simulation. Since the objectives in this course, to a large extent, deal with analyzing and solving business problems, it made sense to base a lot of the instruction on solving problems, and those were embedded in case studies to provide more context, and so more fidelity.

3) **Include conventional, expository paths in the teaching methods.** The target population is highly heterogeneous in terms of familiarity with the content and fluency in navigating online learning (both are big confidence issues). Limiting the instruction to learner-directed methods, it was determined, would pose a threat to many learners. A more traditional, expository

and linear path was provided to supplement the problem-based, guided discovery portion of the course.

A note about the above methods: Our rationale for selecting multiple methods is not an attempt to meet various learning styles (e.g., auditory learner, kinesthetic learner, etc.). We believe that methods are

best determined by the content, the performance, and the target population's familiarity and confidence.

4) **Include an option for test-out.** Few things are more frustrating than to be forced to wade through a sea of content that you have already mastered, in order to reach the post-test. Learners in this course must be

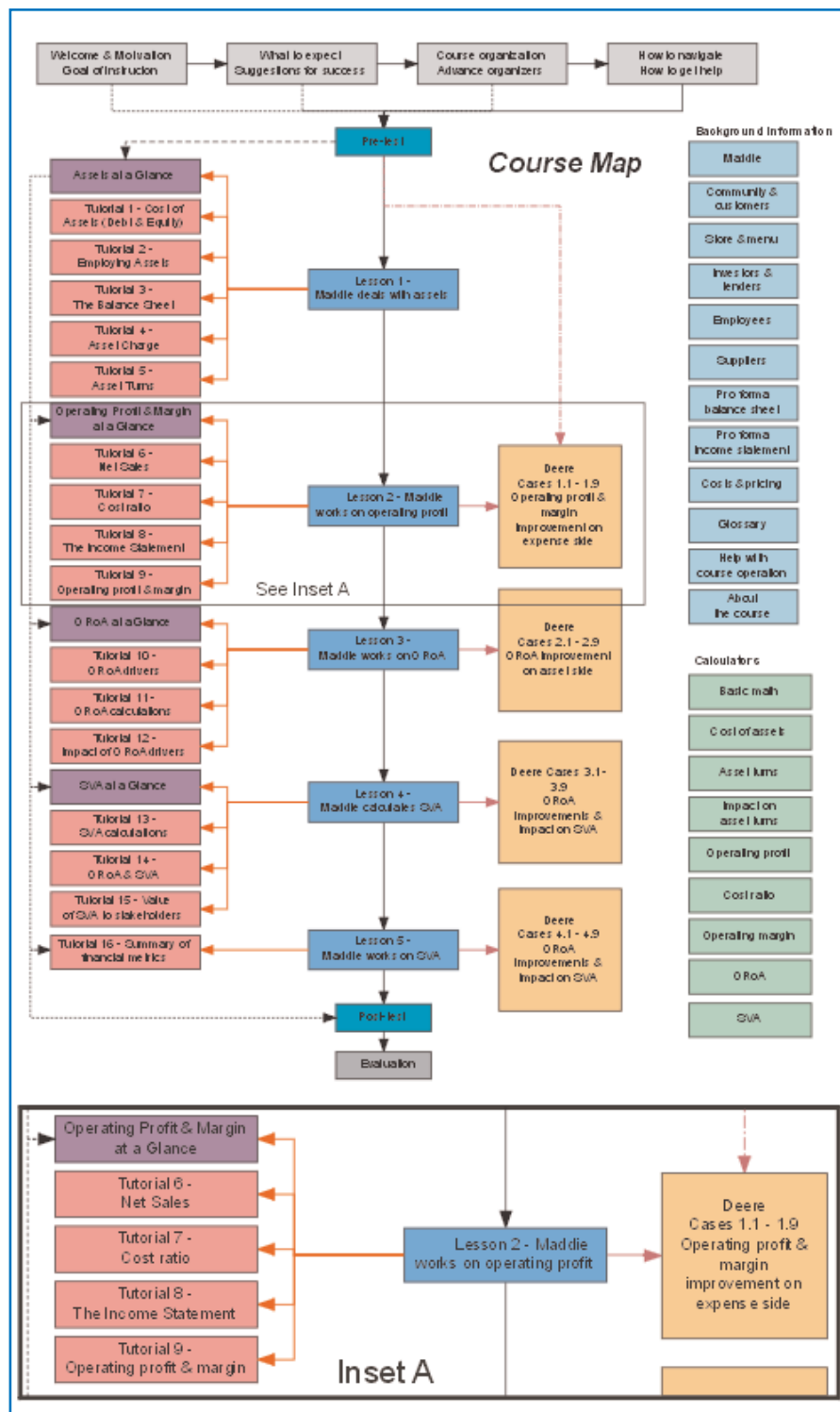


FIGURE 2 Course map.

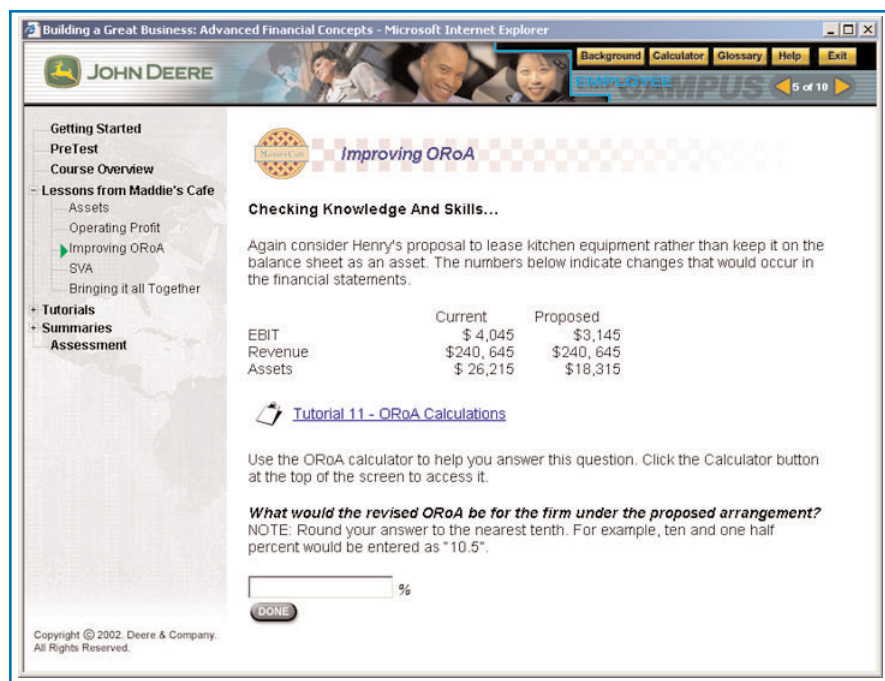


FIGURE 3 Screen shot of an ORoA improvement task.

given an opportunity to test out at any time.

5) **Use pre-testing to create a customized path through the content.** Due to the high degree of diversity in the audience with regard to subject matter knowledge, the ability to adapt content to individual needs would be a huge selling point. This was implemented by using a pre-test as a diagnostic and the capabilities of the learning content management system (LCMS) to serve up a customized course based on content mapped to the course objectives that need work.

6) **Provide alternate resources to serve as job aids after conclusion of the course.**

All the learning achieved in this course would be for naught if not applied on the job. Creating useful job aids and embedding them in the instruction would increase the fidelity of the training experience and also improve transfer to the job. Embedded job aids were seen as essential ingredients of the course.

7) **Select an appropriate "world context" to frame the general story line containing the cases.** We needed to create a context for the content that would be meaningful to all learners. A café was selected as a business that all learners could identify with and that would provide a meaningful way to present business problems that would transfer to learners' jobs.

8) **Provide role-specific job contexts in addition to a "world context."** The world context provided by the café was a good

place to start to introduce content and problems, but we knew the effectiveness of the instruction would be improved if we could reduce the amount of transfer learners would have to do to. We created a series of role-specific case studies that would increase the job context of the instruction provided in the café scenario. The pre-test used for diagnostics was designed to map the role of the learner to one of the following functional roles in the organization:

- Manufacturing
- Finance/accounting
- Marketing
- Engineering
- Human resources
- Supply management
- Information systems
- Product support

9) **Provide optional background information for those wanting greater richness in the world context.** This design goal was based more on intuition than analysis or research, but we felt we should provide optional contextual information for those learners who wanted greater richness in the café storyline.

10) **Base the course architecture on learning objects.** We authored the application using the capabilities of LogicBuilder, an LCMS product from LogicBay Corporation. The details and technical underpinnings of the architecture will be addressed in the follow-up article.

Course elements and organization

Figure 2 on page 5 provides a graphical representation of major course elements. Each block in the figure represents a series of screens of instructional content or supporting materials. In the next article in this series, we'll explain how these blocks function as objects and more about their particular attributes. For now, you can consider each block to be a series of screens that are randomly accessed from the navigation tree built into the interface.

Orientation information

The first series of blocks across the top of Figure 2 represents optional orientation information. It is likely that most or all of this information will be viewed the first time a learner enters the course, but not necessarily so. The introduction provides a message from the chairman of the company and information intended to motivate learners and answer initial questions.

Pre-test

Immediately below the introductory information is a block representing the pre-test. This test is optional but is useful for all levels of learners. For novice learners, it provides cues about pending instruction. Advanced learners especially benefit from the pre-test because it diagnoses mastery of learning objectives and then provides data to an engine that dynamically creates an optional path customized to address the individual learner's needs. The pre-test is composed of items drawn from a large pool, an aggregate of smaller pools that are each mapped to a learning objective. The result is that each test occurrence is a distinctive set of 50+ test items that cover all learning objectives.

Lessons in the main story line

You'll notice on the course map that there is a central line of objects extending like a spine down from the pre-test. This is the main story line, and it is composed of five lessons. The content is framed in problems presented in a story about a lady who starts a business, Maddie's Café. As the course opens, Maddie makes the decision to start her business. She gets capital and must make decisions about how to employ her capital based on its cost and her business needs. Learners are presented with the scenario and with the problems faced by Maddie as she runs her business. No explanatory content is provided prior to

presentation of the story but learners, as we'll see, do receive cues and links to a variety of resources.

Figure 3 is a screen shot of typical lesson content. In this screen, the learner is asked to investigate the feasibility of a business decision. This problem is not preceded by instruction on how to solve this problem — the learner must figure out how to solve it with resources provided. The learner who lacks confidence or tries unsuccessfully can opt to follow the link to Tutorial 1.1 for a bite-sized chunk of expository instruction on calculating ORoA.

The five lessons provide a path for self-directed learners to engage in guided discovery. The rest of the instructional and performance support components that are described below are all available from any screen in any lesson.

Expository tutorials

Referring again to Figure 2 on page 5, notice the column of objects along the left-hand side of the course map. These learning objects are short (five to 20 minutes) units of instruction. We called them tutorials, just to distinguish them from the lessons that make up the main storyline. There are major differences, though, between these objects. Whereas the lessons are problem-based story capsules that let learners wrestle with content and explore resources, the tutorials are typical (linear, rigid, expository) online instructional elements.

You can think of these tutorials as dishes arrayed along a large buffet table. Learners may select any item in any order — whatever is needed to enable them to master the objectives. These tutorial components are where course customization occurs. When a learner completes the pre-test, assuming some objectives are mastered, an alternate menu is available that shows only those tutorials that are germane to the individual. Of course, the menu containing the full list of tutorials can be selected as well, so even the expert learner can access basic lessons if desired.

Role-specific case studies

Notice that there are blocks connected to the right of four of the lessons in the course map to represent role-specific case studies. When a learner selects this option at the conclusion of a lesson, a short case study is presented to illustrate the teaching points of the related lesson. An engineer

will see the teaching points within an engineering context; the HR manager will see the same teaching points addressed in an HR case. These case studies increase the fidelity of the instruction; they are enormously useful for reducing the amount of transfer the learner must do to apply the knowledge and skills on the job.

Job aids

In the lower right corner of the course map there are a series of blocks representing calculator functions. In the final design, separate calculators for each key financial calculation were designed into one multifunction calculator depicted in Figure 4. The calculator has a general math calculator function as well as a built-in notepad. The job aid is designed to be accessible on the job and used for job functions in the same way it's used to solve problems in the course.

Background information

Blocks in the upper right corner of the course map represent background information. Some items serve as supporting course material that is essential to solve course problems (e.g., Maddie's Café balance sheet) and other items are purely to provide additional richness to the context of the Maddie's Café storyline (See Figure 5 showing Maddie's biographical information).

Background information includes:

- Biographical information on Maddie, the main character in the storyline
- Information on Maddie's community and customers
- Information about the Café setting and the menu
- Background of Maddie's investor and banker
- Biographical information on Maddie's two employees
- Information on suppliers to the café
- Balance sheet
- Income statement

FIGURE 4 Multi-function calculator showing the Cost of Assets calculator.

Background

Maddie

[Community & Customers](#)

[Store and Menu](#)

[Investors and Lenders](#)

[Employees](#)

[Suppliers](#)

[Balance Sheet](#)

[Income Statement](#)

[Costs and Pricing](#)

Maddie

Madeline (Maddie) James

Madeline James (affectionately known as Maddie by friends, her four children, and ten grandchildren) is a 60-year-old bundle of energy. She recently decided to set up a café—a place to showcase her great cooking. Maddie, who is widely known in the community, had worked for 27 years as the head cook in the cafeteria of the high school in the small city where she lives. Recently, in a budget-cutting move, the school board decided to privatize food services, and the cafeteria staff was all let go.

Maddie was able to keep her retirement benefits, but she wasn't really ready to retire. Instead, she saw this as a chance to realize a long-held dream by opening Maddie's Café. Her business is set up as a limited liability partnership and is equally owned by Maddie and Henry Babbitt, an old friend and local businessman. Both contributed an initial \$10,000 investment, and Maddie has an option to buy Henry out after three years. Maddie also took out a loan from the local bank for equipment. Her goal is to generate a 22% annual return on her investment.

Maddie has lots of ambition and, as long as her health is good, plans to work for five or six more years. Perhaps at that time she'll turn the operation of her café over to Margaret, a former co-worker and current employee. Then she'll have time to cruise the Caribbean and finally finish her novel, another of her life-long dreams.

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FIGURE 5 Biographical information on Maddie, the main character in the story line.

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Reusability strategies

We developed our reusability strategy at the outset of the instructional design process for the first course, the comprehensive course that is mapped in Figure 2 on page 5. Given the design goals presented earlier, we knew we faced a considerable challenge because we were planning on making the content rich in context. Context is the darling of instructional effectiveness but the bane of reusability. Remember this: regarding reusability, *all context is contamination*. We knew this and designed to mitigate the effects of context contamination — more about this later. What we didn't foresee is that certain content items and information objects would be needed when we had an opportunity for reuse.

Learning object overview

We use the term *learning object* as an umbrella label to refer to the elements described below. We'll provide detailed information on the technical aspects of LOs in the next article in this series. For now, here is an overview of learning objects as applied in our case study. (Author's aside: We credit Chuck Barritt of Cisco Systems and Wayne Hodgins of AutoDesk for shaping our thinking about learning objects. They bear no responsibility, however, for our attempts to interpret and apply their ideas.) *Content items* are the most granular of the learning objects. We define a content item as an independent information asset that adds value to instruction, a performance support application, or other communication. Examples of a content item include a block of text, an illustration, and a video clip. Content items, though self-contained objects, are generally not intended to stand alone for consumption by the end user; they are intended to be served up in combinations of two or more.

When content items are combined to create a stand-alone element of information ready to be served up to the end user, this is called a *reusable information object* (RIO). RIOs do not need to have an instructional intent (in fact, they generally do not). Consider Figures 4 and 5 on page 7. These are RIOs composed of content items, e.g., text, graphics, etc. They are

part of an instructional application, but when they stand alone do not serve an identifiable learning objective.

If you combine several RIOs with practice and assessment items to address a specific learning objective, you create a *reusable learning object* (RLO). In our case example, the combination of Figures 4 and 5 with Figure 3 (and the rest of the elements in that particular lesson) constitute an RLO. Also by way of example, each of the tutorials (left-hand side of the course map) is an RLO. They each address specific learning objectives and are composed of a variety of RIOs.

Reusability — it's all about granularity

Granularity is the paradox of reusability. The more granular the object, the more likely it is that the object is free from context and can find its way to be reused in alternate applications. However, as granularity increases, the problems of content management are compounded because there are simply more objects to tag, store, and later retrieve.

Think about your content repository as a sandbox. If all your LOs are individual grains of sand (simple content items), you have ultimate flexibility and reusability but the least efficiency. If, on the other hand, you have some pre-formed shapes (RIOs and RLOs), you can build your sand castles more rapidly and economically.

No, it's all about context

We'll learn in the next article in this series that there are LCMS capabilities that can simplify tagging and retrieval issues and thus mitigate some of the granularity concerns, but not all of them. As you assemble content items and RIOs to address learning objectives, you're almost obligated to incorporate context to make the content meaningful for your target population. What's meaningful for one population segment, though, is nonsense to another, and that's why we can say that all context is contamination when it comes to reusability. RLOs, the least granular of the objects we've discussed, are most difficult to reuse because they, of necessity, contain contextual elements, practice, and assessment components — all ingredients that severely limit reusability.

Our reusability strategy

Our strategy for achieving reusability consisted of creating two distinct paths, only

Context is the darling of instructional effectiveness but the bane of reusability. Remember this: regarding reusability, all context is contamination. What we didn't foresee is that certain content items and information objects would be needed when we had an opportunity for reuse.

one of which included RLOs that were intended for reuse:

1) **The guided discovery path.** This is the path down through the center of the course map and the five lessons about Maddie's Café. No reuse of the RLOs, the lessons, was anticipated. However, there are many supporting RIOs, e.g., the calculator and financial statements, that we anticipated would be reused. These RIOs were optional elements, the *discovered* elements of the content that added richness of context and enhanced the learning experience. None of these RIOs, however, addressed a specific learning objective. Characteristics of the guided discovery path include:

- There is richness in the world context (supporting information about Maddie's Café) and in the role-specific context (case studies for functional work roles).
- No expository methods are used. All instruction consists of problem-based cases with embedded cues to support resources. The expectation is that learners will explore and construct their own learning path in order to solve the problems.

2) **The expository path.** This is the path down through the 16 tutorials along the left-hand side of the course map. Each

tutorial is an RLO with content, practice, and assessment elements, and each addresses a specific learning objective(s). These objects were designed with reuse in mind. Characteristics of the expository path include:

- The instruction is generic, as void of context as is practical.
- The teaching method follows a linear, behavioral style — provide stimulus (content), elicit performance (knowledge check), provide feedback, and repeat.
- Graphical components, including animation, are used to provide visual interest.

In other words, the expository path is pretty much standard fare for online instruction — boring but efficient and, if the learner is motivated, effective to at least some extent.

What worked... and didn't

It's too early to report reliable and comprehensive results of the impact of the instruction, but we conducted extensive usability testing and can report some preliminary findings:

- The guided discovery path is engaging and holds learner interest.
- Nearly all learners perceive the role-specific context as valuable.
- Only a small percentage of learners spend much time exploring the optional background information about the café (the world context), but those who do express a lot of appreciation for the character development, etc.
- There are no predictable paths through the course map. Some learners jump out of the lessons (guided discovery path) at every opportunity to go through every tutorial. Some learners skip the guided discovery path altogether and focus on the tutorials, but most do spend extensive time in the guided discovery portion.

Now, about the reusability issue... We had created tutorial summaries to provide a simplified overview of the content of groups of the expository tutorials. For instance, the first five tutorials deal with assets and form a natural grouping, so we created a summary called Assets at a Glance. When asked to create a basic version of this entire course, it made sense to reuse those summaries — the content was what we wanted. However, we'd designed the summaries almost as an afterthought

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following creating of all the tutorials. As we created those objects, we failed to see the potential for reuse, and included wording that referred to portions of the extant course (dreaded context). Bottom line: we had to repurpose (rewrite) those tutorial summaries in order to use them in the basic course. If there's a lesson to be learned here, it's that opportunities for reuse spring from unexpected opportunities. Always consider the context issue as you create content items.

More to come

Our experiences have shaped our thinking about LOs, and we'll share more in the next installment. Our focus will be on the technical details of LOs, the operation of an LCMS, and our thoughts about the future structure and application of learning objects. *Editor's note: Part 2 of this series will appear next week. Peder Jacobsen will discuss the technical details of the project.* 

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