Successful e-Learning Interface

Making Learning Technology Polite, Effective, and Fun

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Learner Interface Design Guidelines Reference Guide

Published by Pfeiffer
An Imprint of Wiley
989 Market Street, San Francisco, CA 94103-1741
www.pfeiffer.com

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Library of Congress Cataloging-in-Publication Data

Allen, Michael W.
Michael Allen's e-learning library : successful e-learning interface : making learning technology polite, effective, and fun / Michael W. Allen.
p. cm.
Includes index.
ISBN 978-0-7879-8297-3 (pbk.); ISBN 978-1-118-03467-5 (ebk); ISBN 978-1-118-03684-6 (ebk); ISBN 978-1-118-03685-3 (ebk)
1. Instructional systems--Design. 2. Educational technology. 3. User interfaces (Computer systems) I. Title.
LB1028.38.A46 2011
371.3--dc22
2010048923

Printing 10 9 8 7 6 5 4 3 2 1

REFERENCE GUIDE

CONNECT

1. Viewing Relevance and Personalization Through CCAF

How then do we connect with learners? Analyzing the process of connecting with learners through the CCAF lens, we can use the following guidelines for creating relevance and personalizing the e-learning experience.

Context

C1. Demonstrate that you know your learners.

C1(a). Meeting of minds. Create a context that matches the probable mindset of the audience. Do you have learners who are comfortable with reading? Are they used to solving problems on their own or as members of a team? Do they expect to see tools, machines, or instruments?

C1(b). Hero for a day. Present a situation in which each learner can easily visualize himself or herself having and managing an important responsibility—a situation that can lead to a proud success.

C1(c). Please identify yourself. If you are teaching the same content to learners who have varying skills, are on different career paths, or are likely to have different definable interests in the content and skills to be learned, provide a choice or ask a couple of questions to select a context that can be meaningful to the individual.

Challenge

C2. Select meaningful and beneficial challenges.

C2(a). Why should they care? If the role you're asking the learner to play isn't the same as the role you're asking them to play for learning, explain why it's helpful to assume the responsibilities of this role now.

C2(b). Make challenges challenging. Challenges should be neither too simple nor too difficult. Most importantly, they should require each individual to think. If prior assessment is not available to calibrate the appropriate level of challenge, try a moderate challenge at first, provide extensive help for those who happen to need it, and set the next challenge either higher or lower depending on the amount of help that was required.

Activity

C3. Activities should relate to what learners do now and will do after skill development.

C3(a). Match performance modalities. Repair technicians probably like to fix things; they like puzzles and problem solving and are visual. Don't have them write essays. Creative people hope to find that multiple solutions exist, or at least that there are multiple valid paths for arriving at solutions. Make sure they can explore options.

C3(b). True tasks. The activity should involve tasks that learners could and would actually carry out in the real world. As learners near

proficiency, available support mechanisms should be reduced (or expanded) to represent those that will actually be available.

Feedback

C4. It's not just what you say, but how you say it.

C4(a). Stay in character. To personalize the experience, the feedback should be expressed in a form most meaningful and directly related to the learner. Rather than, for example, just showing that profits of the company dropped because of a lost sale, the company in the event story might announce layoffs as a result of poor business performance and the learner, most regrettably, is being let go. That's getting personal, huh?

2. Viewing Humanization and Dramatic Impact Through CCAF

Context

C5. Use theatrical devices.

C5(a). It was a dark and stormy night, but the project had to be finished on time. Janice was at her wit's end without hope until you showed up. Begin a story with someone or something at risk. Put the learner in a position to help. The risk might be the possibility of not achieving an important goal or losing an opportunity, job, or something of value. Use names and create characters of interest and energize emotion. Let a storyline provide a basis for sequencing learning activities.

C5(b). Use conflict. To personalize the experience, the feedback should be expressed in a form most meaningful for and directly related to the learner. Instead, for example, of just indicating that the learner correctly communicated to passengers aboard a rocky flight, present a short video of a passenger giving emotional praise for your comforting work.

C5(c). Be funny. Laughing releases endorphins that make us feel good and want more. Incorporating humor doesn't mean you aren't also serious about providing an effective use of learner time. Learners appreciate efforts to "entertrain" or "edutain" them and will respond with their attention and participation, especially if your efforts are truly entertaining as well as beneficial.

C5(d). Just (let them) do it. Avoid lengthy instruction about how to work the e-learning application. The user interface and the learner interface should be sufficiently intuitive that people can figure most of it out as they go. Tool tips and gradually revealed controls can help here. We want the context to be a content-related situation, and we do not want learners delayed getting to it. Nor do we want their focus constantly yanked away to deal with navigation or other mechanics outside the context of the experience.

Challenge

C6. Nest dramatic human consequences in the challenge.

C6(a). Solve our problem—everyone's depending on you. Challenge, activity, and feedback must all build on context to provide the best learning experience. Dramatic challenges are those with outcomes that matter. They're rarely single-step, isolated tasks. They're often provoking and complicated. Answering an academic question doesn't make the grade (sorry). But performing a procedure to meet a customer's expectations, using a software application to accomplish a task critical to a project's success, and taking proper precautions at a crime scene to protect people

nearby—these can be dramatic challenges that energize learning like nothing else can.

Activity

C7. Keep the story going.

C7(a). Think real, not academic. We often break complicated tasks down into tiny steps so that learners won't be overwhelmed with a challenge that's too great for them. This is a good thing to do, but it's often done such that learners lose the sense of the context and begin performing tasks that have only artificial, abstracted, or academic consequences. We want to keep everything as authentic as possible, so even if activities have to be simplified, try to keep them within the context of the story, process, or system. Instead of having learners perform tasks they aren't yet ready to do, have learners put preceding and/or following tasks in order and click to have them performed by others so that the excitement of actually performing part of a real task is achieved.

C7(b). Face up. Inclusion of photos of people humanizes the learning space. If part of a process is performed by someone, submitted to someone, or created for someone's benefit, let's interact with faces. Ask learners to move teams together, drag a photo of a person into position to perform a task, and otherwise work with "people" rather than just letting photos of people adorn the screen (which is better than not having photos at all).

Feedback

C8. The story continues.

C8(a). Prefer consequences to judgments. Consequences that build on each other have much more dramatic impact than isolated events. Judgment tends to terminate an escalating event or chop it into segments, so be reluctant to offer judgment. Rather, demonstrate the consequences of the learner's actions continuously as the learner works to meet challenges.

C8(b). Use media to make outcomes memorable. Video from a delighted or uncontrollably angry customer will be remembered. How about audio of a caller ranting about a recently serviced car having broken down in a very remote location? Late at night! In a storm! How about a scrapbook page of a peer-aged student winning first place in a science contest with smiling teachers and parents, a tall trophy, and an ecstatic kid?

3. Viewing Authenticity and Situational Fidelity Through CCAF

Context

C9. Context is almost everything. Choose wisely.

C9(a). It's OK to exaggerate some learning contexts for dramatic or humorous impact, but as people move closer to completing a course of learning, it's very important that the context be as authentic as possible. That is, the situations that fuel the challenges, activities, and feedback should become as similar as possible to what will really be encountered. CCAF components should be complete with their typical ambiguities, sporadic availability of resources, noise, interruptions, or whatever is typical.

C9(b). Vary contexts. When building general skills and knowledge to be transferred to many situations, it's important to provide a variety of contexts to demonstrate the wide applicability and utility of the skills being learned. Contexts should be interesting to the ages and lifestyles of the learners and also clearly show

the empowerment provided by what is being learned.

C9(c). Don't play generic games. *Jeopardy* and *Wheel of Fortune* are fun games, but the context is the game itself. Using them as a learning context, as so many do, provides an authentic context only if you're preparing to be a contestant on one of these games. It's important to use a context that matches the expected arena of performance.

Challenge

C10. Be reasonable, but don't be a softy.

C10(a). Ramp up challenges. Challenges should generally be those that will actually be encountered in the context presented. While it's typical to make initial challenges unrealistically simple, it's much better to search out and use actual situations that happen to present the simpler challenges. This helps maintain fidelity, which, in turn, helps learners understand the value of what they're learning. Challenges can and should become more difficult, of course, while maintaining authenticity throughout the sequence.

C11. Let challenges arise from learner mistakes.

C11(a). Apply the domino effect. With the increasing power of our software tools, it's finally become more reasonable to let learners traverse poorly chosen paths for long enough that they can experience the consequences of their mistakes rather than just receive an immediate judgment *Sorry, that's wrong. At this point you should choose. . . .* Going just a step further, if you can, allow new challenges to arise that not only reveal a previous mistake, but give learners an opportunity to make things better (if that's possible) by meeting subsequent challenges. Since we often have opportunities in life to correct mistakes and move on, such opportunities in e-learning may represent the ultimate authenticity and situational fidelity.

Activity

C12. Don't skip over practicalities.

C12(a). If you have to do it, you have to do it. Make it necessary to actually perform steps that would be necessary. If you'd have to go to the lab to obtain supplies, call the marketing department to procure product literature, get financial data to make a presentation, or stock specific foods for your restaurant, help learners visualize the location, the means of doing these things, and the time that will be required. Of course, we would rarely want to involve all the minute steps required nor take the actual amount of time required, but being aware of these necessities and the means of accomplishing them can be important to making the experience feel real and helping the student think about the application of their learning as they are learning.

C12(b). Show it. As much as possible, make activities visual. Instead of a button labeled "fire the greenware," let learners drag unfired pottery to a kiln. To teach safety, you might actually make them set the greenware down first before they can open the kiln. You get the "picture."

Feedback

C13. Consequences, judgments, explanations—of these, the greatest is consequences.

C13(a). Be consequential. The easiest feedback is to provide learners a judgment statement. *Yes, that's correct. No, you'll need to try again.* Actually, there's an even easier one that's worse yet. For all interactions, you can

give exactly the feedback regardless of response correctness: *The correct answer is _____. Click next to go on.*

The best feedback is to continually show the consequences of the learner's sequence of responses, augmented by explanation. When to give the explanation is a bit of an open question. If you give explanations at every step, you can condition learners not to think much about their choices. They'll select or input any convenient choice just to read the explanation. This short-circuits deeper thought and personal evaluation of performance, although it depends on how much and the type of explanation you give. In general, it's often better to wait until either success or irreversible failure has been achieved.

C13(b). Don't always make consequences obvious. Sometimes you have to seek feedback in real life to know what effect you're having. To make experiences authentic, you may want to require learners to take extra steps to gather data and evaluate their own performance, especially if that will be necessary in real life. Require them to click a photo of a manager and request feedback. Have them click the CFO's door to receive a financial report. Have them disassemble a product to be sure their crew assembled it properly.

C14. Consider how authentic you want to be.

C14(a). Let feedback be misleading! Yes, strange to say, but in the real world, feedback is often misleading. People want to be kind and will often tell us we're doing better than we are. Sometimes a bad decision works out well—talk about misleading feedback! Sometimes the best solution requires breaking a rule. Immediate feedback, in real life, might very well suggest we change course, but if we hang in there, we might be rewarded by superior success.

We have to cope with confusing feedback in real life and learn to cope with it effectively. If we want to be authentic and help learners cope, we'll sometimes want to introduce a similar lack of reliability in the feedback learners receive—at least the feedback that arrives in terms of consequences. If done well, by the way, true-to-life feedback can increase the level of intrigue considerably and create learning experiences that will drive water cooler discussions for months.

EMPOWER

4. Viewing Visual Clarity Through CCAF

Context

E1. Be visual.

E1(a) .Trim the text. People don't read on-screen text with accuracy. They comprehend less from on-screen text than they do from print. Use minimal amounts of text, keep the font large enough to read comfortably, and use it in support of graphics wherever possible. Better yet, skip the text and use audio to describe visuals.

E1(b). Don't fight. A red sweater stands out if the crowd isn't wearing a lot of red. But if everything is red, everything fights for attention but nothing stands out. Don't use busy backgrounds and don't put everything in busy frames; just let the primary visual objects take the honors and make everything else stand down.

E2. Maintain space and place.

E2(a). Don't erase the full screen unless you are jumping to a completely different context. Add and remove items as needed, drawing as much or little attention in the process as is

appropriate. When the screen erases, learners have to reset themselves too. They have to reexamine everything on the screen to determine whether it is a new thing or something that was there before. This is a disruption; so stay put as much as possible.

E2(b). Separate out-of-context items from in-context items. Buttons for accessing help, additional examples, progress information, menus, and so on are not part of the instructional context (the bank teller's counter, the call center, the new accounting software, the hospital room). They should be set apart, probably kept in standard places, and to maintain inertia, remain visible from event to event even when deactivated.

E2(c). Be consistent in the use of space. You increase focus, decrease distraction, and reduce effort for the learner when you establish permanent places for different types of things. However, (see next bullet)...

E2(d). Put related things together. Although keeping things in standard places helps learners know where to look for what they want, it's even more important to have related things in close proximity. Horizontal alignment is usually perceived as closer than vertical alignment (that is, put text and graphics side by side rather than one over the other).

E3. Make learning easier by eliminating distractions.

E3(a). Avoid extraneous text, graphics, animation, and audio. Learners must focus, focus, focus. A clear to-the-point screen is far better than a pretty screen that lacks focus. Don't get cute with things that don't add meaning. You may be amused, but learners will be distracted (and probably annoyed).

E3(b). Don't box text (or other things) unnecessarily. For some reason, we seem to be a natural instinct to put text in a box. In many cases, this is unnecessary clutter and can even make text harder to read. Boxes in general take up precious space. Eliminating them often makes displays more inviting and less form-like. If you don't have a strong justification for a box or another form of divider, don't use one.

E3(c). Choose speech or text, but don't use both simultaneously. It would seem that use of two media to present the same message would provide helpful redundancy. But learners almost can't prevent themselves from comparing the two as they are presented, rather than thinking about the content. This is a distraction to be avoided. Speech has the distinct advantage of taking up no display space, but may be too fast or slow for the individual. It is difficult to select and review distinct passages, although controls can be provided to help.

Challenge

E4. Present the challenge in context.

E4(a). Speak to the learner through the context. Challenges should build on an established context (which further strengthens the context). If you're teaching customer service, let the challenge be expressed by a customer. If you're teaching automotive repair, play the concerning sounds heard when the car is started. If teaching bank fraud, show fraudulent checks.

E4(b). Use images of people. They can be pictures, drawings, or even cartoons or sketches, but humanizing the challenge makes it more personally and psychologically engaging. A short video clip of a person reporting a

problem to be solved can express not only the nature of the problem but also its importance in a very clear and impressive way. In general, photographic realism has much greater impact than illustrated figures.

Activity

E5. Differentiate controls from displays.

E5(a). Allow direct manipulation of contextual objects. The screen can actually be cleaner and simpler if controls don't have to be added for moving objects. Allow repair technicians to turn knobs and flip switches directly rather than having to use a button to turn volume up, another to turn volume down, another to connect a speaker wire, and so on.

E5(b). Don't underline text unless it's a hyperlink. Not only does it look bad, but it's also a symbol for a hyperlink. Even if it is a link, you might use other means of differentiation to avoid the ghastly appearance of underscored text on the screen. Actually, how about never underlining text? Good idea.

E5(c). Give buttons and headings distinctive appearances that cannot be confused with each other. This shouldn't have to be pointed out, and yet the practice of making them look alike is perplexingly common.

E5(d). Invite action. When the mouse cursor rolls over objects that can be manipulated, visually invite action and indicate what kind of action can be taken (click, drag in one direction, etc.).

Feedback

E6. Use contextual elements to compose feedback.

E6(a). Display intrinsic feedback within context. The consequence of choices and actions is the feedback of situations and events. Learning is, in large part, becoming able to associate specific consequences with preceding situations and actions or inactions. So don't say, "Good, your mixture of hydrogen peroxide and phenyl oxalate ester will glow." Make it glow!

E7. If the feedback isn't intrinsic, create a unique visual identity for it.

E7(a). Provide mentorship in the form of an advisor. Betty Crocker, Mavis Beacon, and Aunt Jemima instilled trust in products from consumers for decades. These were fictitious personas—made-up names and images. Going as far as an avatar isn't necessary, but providing a named, pictured mentor can help learners accept and reflect on situations comfortably, while easily distinguishing between intrinsic feedback and explanatory information.

E7(b). Display judgmental feedback in a distinctive fashion, such as using an overlay with a drop shadow, a unique font and/or font color, or a unique border. The feedback should be displayed in close proximity to either the action taken, the consequences, or preferably both.

5. Viewing Input and Control Through CCAF

Context

E8. Build response opportunities into the context.

E8(a). Prefer direct control over remote control. For example, if a photo shows a task being performed, allow learners to click on things in the photo being done correctly (or incorrectly) rather than having to select from a remote device, such as a multiple-choice list of things in the photo.

E8(b). Make concepts, procedures, and situations tangible. Exposition of content through text facilitates text responses, whereas visuals make the content more real and can also provide objects that learners can manipulate for more interesting response gestures and interactions.

Challenge

E9. Integrate challenges and controls.

E9(a). Use context visuals to imply the challenge and controls. For example, the image of a disassembled device with pieces randomly scattered about expresses the challenge and the controls nonverbally. Users may be uncertain about whether they need to rotate pieces to make them fit and, if so, how it is done; but with proper invitations for action, such as changing cursor shapes, learners will experiment and learn faster than through reading instructions. And they'll enjoy figuring things out more than following a set of instructions that lay it all out for them.

E10. Make challenge identification part of an action-orientated task.

E10(a). Require learners to recognize problems. Without realizing it, many learning events fail to have learners practice handling real life scenarios because they define the problem for the learner. What may be the most critical part of successful performance is already finished and neatly served up. Present the high-level context and ask learners to probe around to determine the problem and then take steps to solve it.

Activity

E11. Empower learners with meaningful control.

E11(a). Avoid artificial restrictions. Your authoring tool or available programming skills may restrict you more than you wish, but strive not to restrict actions more than they will be restricted in real-world performance. People can typically do more than one thing at a time; so they should be also do that in their e-learning experiences.

E11(b). Allow users to back up. In the real world, we can often detect mistakes we've made and correct them before someone else has to point out our errors and request correction. By delaying judgment, we're half way there. The next task—not always an easy one to implement—is to allow learners to step back and make corrections. This rewards learners for continuously evaluating their work—an outcome we could prize.

E12. Make control comforting and convenient.

E12(a). Don't handicap learners. One of the really great things about books is that readers are in complete control. They can skip around, read sections out of order (I read magazines back to front), reread sections, highlight sections, earmark pages, and so on. Unless you have reasons to handicap learners and make their learning tasks more difficult, why not try to give learners at least the control they have over a book.

E12(b). Make controls intuitive. The thinking we want to incite should be about the content challenge. Requiring unnecessarily complicated gestures in order to respond diverts learners from productive thinking to thinking about the interface. As instructional challenges increase in difficulty, try not to make interface complexity also increase any more than necessary.

E13. Invite action.

E13(a). Signal possible actions clearly. It's important to let learners know what objects are interactive so they won't overlook input options and controls you've given them.

Feedback

E14. Make states clear.

E14(a). Communicate progress honestly. Checking off menu items or showing a progress bar is helpful to learners who need to schedule their time and meter their energy. Menus and progress bars work well if items are of similar difficulty and duration. If they're not, they can be quite inaccurate measures. Indicate relative proportions when variation is significant:

E14(b). Show the current state clearly. A design disaster found with bewildering frequency comes from confusing the display of a current state with the function of a button to change to another state.

ORCHESTRATE

6. Viewing Performance-Based Learning Objectives Through CCAF

Context

O1. Think theater. Think experience. Be dramatic.

O1(a). Create tension to communicate objectives. Objectives typically have a boring, sterile, academic tone to them. Instead of listing behavioral objectives that few learners read, let the context communicate the objectives by showing a problematic situation—a disaster, layoffs, lost sale, unhappy customers, etc.

O1(b). Don't give the outcome away. Who would want to go to a movie that began by saying, "Here's what's going to happen, watch for this, and expect this outcome"? This is what many learning designs do, and this is what kills the possibility of a great and authentic learning experience.

Challenge

O2. Think role playing.

O2(a). Put the learner in the story. The objective can be very clear when you are given an assignment to perform. It makes the experience much more direct than simply learning to list the principles of good performance.

O2(b). Switch rolls. By giving learners various roles to play, they can come to understand alternate perspectives and more deeply understand dynamics or processes. For example, if you're teaching customer service, let the learners play the role of an unhappy customer. They'll actually gain a deeper sense of why learning effective skills is important.

O2(c). Let the learner mentor. Sometimes learners can be more reflective and sometimes more exploratory when another character is performing a task, subject to guidance from the learner. If the character is failing to remember and/or perform certain steps, the learner as mentor can become acutely aware of how important specific learning and performance tasks are.

Activity

O3. Provide realistic distractions and confusion.

O3(a). Make objectives real. Even though words describing situations and conditions may be there in the objective (but often aren't), *at a typical airline ticket counter,* it's easy to set aside the real-life impact of a statement about the performance environment and concentrate simply on learning how to do things. Handling a noisy environment, with frequent interruptions and constantly changing priorities may actually prove to be the toughest aspect of the learning task. Activities the learner performs must therefore encounter

these same kinds of performance disruptions.

O3(b). Match activities to objectives. Although it makes sense to simplify activities for new learners so they can focus, avoid confusion, and not face overwhelming obstacles, it's easy for activity design to completely overturn critical aspects of objectives. Multiple-choice structures, for example, too often switch from an activity that should require recall or problem solving into much simpler and unrealistic recognition activity.

Feedback

O4. Compare performance to objectives.

O4(a). Chart progress against proficiency (not content). People want to know where they are within a module or course. They often think in terms of how many more pages, chapters, or hours they have yet to go. But those measures substitute the objective of "getting through this" for the intended objective of mastery, skill-building, and competence. So chart proficiency as a measure of progress to help learners keep focused on the real objectives.

O5. Stay in character.

O5(a). Again, stay visual and authentic. Show the outcome rather than describing it, whenever possible. Will feedback in actual performance situations come simply as someone's neat, tidy, and respectful verbal assessment, or will people get mad? They'll probably get mad. Will an assembly line shut down? Will the sales team lose a bonus? Will the patient have months of recovery instead of days?

7. Viewing Challenge and Help Through CCAF

Context

O6. Make a good first impression.

O6(a). Establish broad appeal. We may not know much about the individual yet, but learners begin sizing us up instantly. Am I going to get anything useful out of this? So, instead of starting with something bland, start with popular content in a context that has compelling components that are easy to relate to.

O6(b). Get into it quickly. Look for an initial context and challenge that are easy to grasp. There are so many ways to delay getting learners active, and all of them risk putting learners into a passive mode. So, especially at the outset, try for a context and challenge that don't require extensive explanation.

Challenge

O7. Pop the challenge.

O7(a). Ready, fire, aim. While it's not always a good strategy to "just do something," it's definitely not a good idea to delay putting the challenge on the table. Don't precede the challenge with lots of orientation, instructions, qualifiers, or other detail, even if you have to go back later to provide more details about the context upon which the challenge is based.

O8. Instill a sense of confidence.

O8(a). Not too easy or too hard. Too easy is better than too hard, but getting it about right is best. There is leeway, and by supplying proper help and feedback, you can move all learners comfortably through initial challenges until you can adjust the challenge level so that less exhaustive support is necessary.

O8(b). Provide a worked example. Worked examples have shown exceptional instructional

power, but unless learners have a problem of their own to work, reviewing worked examples can be yet another way of delaying activity and putting learners in a passive mode. So go ahead and present the challenge, but provide access to one or more similar reference challenges together with step-by-step explanations of their solutions.

O8(c). Be ready with graduated help. But don't help too much. This may be the trickiest part. You want to respond to the learner's request for help, but you don't want to provide a shortcut that makes thinking unnecessary. If it's true that the purpose of human life is to find the shortest path between any two points, it's true that learners will take the easiest path they can find. If it's to request help because help reveals answers easily, learners will request help without facing your challenges at all. One solution is to give only hints rather than answers. Going further, you can require learners to make effortful attempts to answer after receiving each hint before another will be offered, thus making it easier to actually attempt solutions rather than to repeatedly request help.

O8(d). Mix levels. Don't continually make challenges harder. Mix in some easier ones for practice and review, including some really easy ones just to remind learners how much progress they've made. Mixing challenge levels increases fun and interest.

O8(e). Power up. The strengths that learners acquire should empower them. At some point, reward progress by giving achievers extra capabilities, such as auto completion of simple or preparatory tasks that have been thoroughly mastered. Learners will appreciate being given partial solutions and find them very rewarding.

O8(f). Offer control. It's rewarding and motivating to be given the reins, to be allowed to steer. As learners progress, consider giving them more and more control. It's perhaps a form of "power up," but control can include such options as deciding for yourself whether to practice more now and push for progress later or try moving up right away and practice later.

Activity

O9. Give users options.

O9(a). Allow "studying up." Concurrent with giving learners challenges they may not be prepared to meet, it's important to provide effective and reassuring support. It's smart to avoid the tradition of explaining everything to learners first and asking them to understand and remember it all until they finally apply it. But that doesn't mean you should intentionally withhold information. Have good help, such as demonstrations, guides, worked examples, and full reference documentation, available for when learners ask for it. Allow learners to pause interactions without penalty in order to study.

O9(b). Allow "do-overs." We've observed that with many of our best-designed interactions, learners want the opportunity to do them over. Why? Because, quite commonly, in the first "do-over" learners want to confirm for themselves that they can do much better, if not perfectly. In the second "do-over" (yes, forget that simplistic and erroneous notion that learners want and will only accept 5-to-15-minute learning sessions; they may suffer poor designs for only a very short time, but with good ones, learners aren't always looking for a quick exit), learners will do something very, very smart: They will intentionally

experiment with wrong answers to see what happens. This exploration can yield many great learning moments.

O9(c). Allow previewing. Who doesn't skim through a book to get a sense of its contents, length, and style? Even online booksellers have found it important to allow buyers to browse through books before purchasing.

O10. Provide assistance.

O10(a). Be there. Although you can't physically be there for learner, your presence can be felt if you provide support and help. As learners work to meet challenges, sense when help is needed and offer it. Think about offering help after a string of poor responses, frequent use of links to reference materials without interleaved correct responses, long delays between responses, and so on.

O10(b). Don't penalize use of help. In many contexts, asking for help requires taking some risk. *Does it reveal that I'm not prepared or paying attention? Maybe I shouldn't admit I'm confused. It might go on my record.* Unless it's a certification or evaluation exercise, we want learners to ask for help. Don't penalize them for doing so. However, (see next point) . . . .Feedback

O11. Provide "power up" tips.

O11(a). Be a generous tipper. Because we don't want to expound content before learners become active and because we want intrinsic feedback to reveal results of learner activities, we have limited opportunities to provide tips and ancillary information. When learners ask for information or flounder, there's no problem. We can always provide additional information when requested. But if learners succeed without such help, don't forget to tip anyway: speak up at the point of transition from one event to another, providing learners the opportunity to replay the previous challenge and test out the advantages of your tips. Explanations can round out learners' knowledge and help them understand why certain behaviors produce results they want.

O11(b). Don't give away too much. Just as help can yield so much information that learners can figuratively or even literally cut and paste answers without thinking, feedback can do the same thing. In some designs, learners can enter any random response to receive feedback that eventually reveals the correct answer. So that's what learners do.

8. Viewing Performance-Relevant Input and Control Through CCAF

Context

O12. Create conditions—the "if"—gradually becoming more subtle from one exercise to the next.

O12(a). Elementary, my dear Watson. Scrutinizing the context for the critical "if" conditions is almost always the first step toward successful performance. Learners need to become skilled in recognizing the conditions—a learning and performance objective that's often overlooked. The context should set forth the conditions either statically, as is probably appropriate in initial learning events, or interactively, to provide practice on investigating conditions.

O12(b). Match media to real-world sources. If some information is available only in spreadsheets, in charts, in textual documents, through discussion or other forms of communication and resources, select media that most directly match the sources learners will need to use.

O12(c). Hide what's hidden. If real performance contexts have information that must be

sought out, extracted, or actually constructed, and learners will actually have to do this to perform well, we want them practicing these skills in their e-learning. So if critical information is often hidden, require them to take steps to uncover it, to ask necessary questions, or even fill out requisition forms.

O12(d). Facilitate multiple challenges. It takes time to become familiar with a context. If just one context can host multiple problems and performance conditions, just create a few rich contexts in which conditions change. Learners will be able to get more practice from a less costly e-learning application.

O12(e) Invite alternative actions. There's little to be learned from a context that puts forth only one condition the learner can respond to. Set up conditions that suggest multiple possible actions.

O12(f). Supply incorrect information. If it happens that information is sometimes incorrect and it's important to corroborate information before acting, provide incorrect information without being obvious about it. Give learners realistic means of validating information.

Challenge

O13. To set up challenges, familiarize learners with the conditions, actions, and consequences individually.

O13(a). Challenge learners to observe conditions. Before learners can associate specific conditions with appropriate actions, they need to know what to look for. Have them demonstrate and/or build their abilities to discern salient aspects of conditions—even guessing if they need to.

O13(b). Familiarize learners with actions to consider. Learners need to have an idea of actions that are possible. They may not be able to guess what's possible or, at the opposite extreme, you may not be able to list all the actions that should be considered. Providing examples and talking about whether there are either correct actions to memorize or a reference procedure to use will help prepare learners for their challenges.

O13(c). Don't give away consequences. Doing so can be like reading the last chapter of a mystery novel first. Don't take the experience out of the experience by foreshadowing consequences of alternative actions the learner can choose. You will want to state goals, such as "find the accounting error," "assign tasks to the best individuals to handle them," or "make sure the customer is satisfied before concluding the call." But don't indicate the consequences of either good or poor performance in any detail. That will reduce the impact of the subsequent consequences and feedback.

O14. Associate conditions and actions with consequences.

O14(a). Forward association. Although we don't want to spoil the power of intrinsic feedback, it can be a powerful exercise for learners to think ahead about possible consequences. Create challenges that require learners to predict what consequences would happen if they took various actions.

O14(b). Backward association. Create challenges that ask learners to explain what actions would have resulted in the current consequences.

Activity

O15. Prefer controls to inputs.

O15(a). Invite exploration. Because we're always trying to prepare learners to do valuable things, we want them busy doing things frequently in their e-learning experiences. Invite learners to be curious and adventurous. Let them become acquainted with their learning environment through exploration rather than through your painstakingly thorough explanation of everything.

O15(b). Match behavioral modalities. If the real-world activity would require moving something, have learners drag objects. If they would have to type a message, have them type one. If they'd have to tell a caller his credit application is being denied, have them record what they would say. If they'd circle a point on a map, have them circle a point on a map. Try not to make activities either more complicated or less complicated than actual performance will require, keeping in mind that you may want to start with simplified activities and build up to greater fidelity. (See 016-b on learner readiness below.)

O16. Match controls.

O16(a). Match controls to content. Consider the nature of the content when selecting activity modalities. Sometimes the content necessitates activity modalities that don't really represent actions learners will perform. To learn where to place seismographic equipment, for example, it's not necessary to simulate driving a truck from location to location to place seismographs. Moving icons on a map is a much better modality match.

O16(b). Match controls to learner readiness. For complex tasks, things may need to be simplified at first. Almost everything is a candidate for simplification. Conditions can be made much simpler than any that will really be found, the choice of actions can be both restricted and presented as a list of choices that would never actually be provided, and the controls and inputs can be simplified so that learners have fewer things to learn all at once. As learner capabilities develop, controls can become more complex and realistic to aid with transfer of learning to real-world performance.

Feedback

O17. Think consequences.

O17(a). Use intrinsic feedback. Consequences are intrinsic feedback, much more impactful than giving learners extrinsic feedback Yes, that's correct! is showing learners what has happened because of their actions. This helps cement the relationships among conditions, actions, and consequences.

O17(b). Delay judgment. It's not unusual that those consequences in life that reveal the quality of our action are delayed. Meaningful consequences often don't appear until we've completed a series of actions. It many cases, parroting this real-life experience makes e-learning experiences more effective. Delays not only teach learners that they won't always receive immediate feedback, but they also encourage learners to continuously evaluate their work and scurry around to make corrections if necessary while there may still be time.

O18. Provide mentorship.

O18-a). Check first steps. Did the learner not understand the conditions set forth in the context? In helping learners build the condition—action—consequence associations, it's important to make sure learners didn't misread the conditions and set off on the wrong path, take the wrong actions, and obtain baffling

consequences. If they did go off on a tangent because of misreading conditions, provide explanation and hold their hands as you step through the solution starting with context analysis.

O18(b). Prompt beginning learners. Provide observations and assistance, perhaps through representation of a coach. Do it without giving away answers, which can cause learners to lean heavily on the coach and avoid developing independent skills. Remind learners of things to consider—not just the things they haven't considered, but a mix of both those they appear to have remembered and not remembered.

O18(c). Promote exploration and initiative. Keeping experiences interesting and realistic requires some dependency on learner curiosity and willingness to explore. If learners haven't exercised controls that would be helpful, haven't tapped resources (hidden or in plain sight), or otherwise been effective in use of your learning affordances, some helpful prompts can make the experience much more effective. But avoid the temptation to "explain every cotton-pickin' thing" solution. It's very easy to get boring (and you know you'll want to do it). Don't.

MISCELLANEOUS GUIDELINES

M1. Differentiate Active and Inactive Elements

It seems obvious, manifest, inviolable. One should not (1) run over pedestrians, (2) put poisons on the spice rack, or (3) make active and inactive screen elements look alike.

M2. Stay Put

Good screen design is difficult. No doubt about it. Each screen layout presents unique challenges. You can move things around a bit to accommodate the specific contents of each page. Different background, border, or font colors might look better with different content elements. It's easy to make these changes with today's software. *But don't!* Stick with one or just a small number of basic screen layouts, carrying them forward from one interactive instance to another. The framework will become a recognized context that helps learners understand which rules of engagement are in effect without having to continually reassess the situation. It also helps learners notice exactly what has changed and thus should not be overlooked. If everything has changed in appearance, learners must assess everything to see what has changed in substance.

M3. Avoid Erasing the Screen

Positive screen inertia is pretty much destroyed when the screen is completely erased. Our confidence that we know what is and is not in the space becomes uncertain. Even if what appears after the erasure seems just like the screen on display a second ago, we instinctively and appropriately begin a search to see whether anything changed. If anything has changed, every future screen erasure is also a signal to learners that they should carefully review the entire layout before going on.

M4. Use Interface Conventions Consistently

This is yet another common practice that shouldn't have to be mentioned. Mixing conventions seems so obviously detrimental. But it occurs with alarming frequency.

M5. Don't Crowd the Screen

White space is important. When designers refer to white space, they actually mean the empty space used to separate items and to help draw attention to important elements. White space doesn't have to be white, although white and black are often good color choices for

open space. It can be any color—even a subtle gradient or pattern. The background should contrast strongly with other display elements and allow the eye to focus comfortably on display elements without distraction.

M6. Present Text Effectively

Remember always, people don't like reading text on the screen and, what they do read, they read with reduced comprehension. Learners generally want and expect action-based encounters when using a computer.

M7. Use a Small Color Palette Purposefully

There are lots of colors to choose from. Hundreds, thousands, millions. The more the better, right? No. Almost the reverse. Color has learning value only when it (1) systematically highlights, groups, or classifies selected objects (that is, the color has meaning), (2) creates helpful realism, or (3) enhances focus, clarity, and legibility. Displaying many colors at one time makes none of them valuable; they just fight with each other for attention with none winning. Too many colors: none of them have much impact. Inconsistent use of color: noisy, confused message. No meaningful use of color: missed opportunity.

M8. Use a Small Number of Fonts Purposefully

Oh, please! Don't use a plethora of fonts just because they're there, because you like each one of them, because it's possible, or for any other reason. We are not writing ransom notes or creating walls of graffiti. A jumble of fonts makes reading screen text even more difficult and unpleasant than it normally is. Severely restrict the number of fonts you use. Just as with the application of colors, change fonts only when there is a clear reason to do so. Define your rules for usage and stick with them.

M9. Go on an Eye Candy Diet

Yet another type of distraction that happens primarily, I suppose, because it has become possible, is extravagant visual adornment. Glitz. Eye candy. Pretty. Fun. But, like chocolate caramel ice cream sundaes, it's bad for you.

M10. Feature Learning Activities, Not Navigation

Navigation capabilities are important for most learning applications, but they are in many ways like a picture frame. They need to be supportive and not in competition for the viewer's attention. Some navigation systems are distracting simply because of the strength of their graphic design. It is often easy to justify the extra time and effort to embellish navigation components because they are used repeatedly throughout an application. But the resulting visual refinement of navigation elements can draw attention away from the sometimes plain appearance of content.

M11. Maintain Focus

Ever look at a screen and wonder which of all the things there you should be attending to? It happens when the visual space is unfamiliar or loaded with complexity. With all the interactive and informative elements we can provide simultaneously, it becomes all too easy to overwhelm learners. Valuable techniques that help learners focus on the right things include spatial placement, grouping, animation, and contrast.

M12. Keep Navigation in Its Place

Two seemingly opposite approaches help differentiate navigation from content, and keep focus on the content: fixed screen divisions and floating navigation panels.

Fixed divisions. Anchoring navigation into a space continuously reserved for it is often best. Once learners become accustomed to the navigation structures, they develop an ability to see past them and ignore them almost completely except when they need to select a feature. It's what psychologists call accommodation, and it occurs when a stimulus becomes so familiar that it no longer draws our attention. Animation and sound effects can override accommodation and bring special attention to navigation components when needed. Otherwise, the navigation sits quietly; it's helpful but transparent.

Floating panels. Sometimes the entire screen is needed for content components, such as when simulating a software application or operating system that normally commands the whole screen. In this situation, layering the screen can provide both screen division and the ability to see all areas. The navigation panel should be designed to contrast with but not upstage information displays. It should be easy to move, because the learner may have to take an active role in moving the panel out of the way if the software can't find a reliable basis for doing it automatically.

M13. Group Visual Elements

There is a tendency to put too much information on the screen at one time. Indeed, even with today's high-resolution color displays, it's a challenge to effectively present as much information as can be done well on a printed page. It is very easy to overload or dazzle the learner with too many displayed content items, interactivity options, and navigation controls. Still, context is important, and dispensing with it isn't a good solution to a clutter problem. It obviously wouldn't do to present a graphic on one screen followed by its description on the next and questions about it on the next. Interactivity designers are constantly grappling with the need to make the most effective use of the space.

M14. Animate for a Purpose

Just as unique or out-of-place things draw our attention, we are also predisposed to look at moving objects. Content can be animated in attention-getting ways that really help draw our attention.

M15. Use Contrasts to Communicate More Clearly

Contrast exists in size, position, texture, scale, animation, volume, timbre, saturation, transparency, and color. In general, our attention is drawn to things that are different—that contrast with others.

A good rule for contrast, whether it's color, text size, or any other parameter: If two items aren't the same, make sure learners can easily discern the difference. Subtle differences can be attractive, but they often confuse functionality. So make contrasts big and bold.

M16. Make Text Legible

Why wouldn't you? Don't know. But so often I see text that's very hard to read. Be alert for illegible text. Some examples:

- Red text on a blue background (or vice versa) doesn't work. Your eye can't focus well on these two colors simultaneously.
- Not all learners will have great vision, so keep text larger than necessary for people with average vision.
- Don't put small or lightweight text over photos or illustrations that have varied colors or textures. It can be impossible to read and looks bad.

M17. Sound Off

Sounds add a strong dimension to interactive applications. Just as with color and anima-

tion, however, sounds have as much ability to be distracting and annoying as they do to be helpful and pleasing.

M18. Invite Gestures—Static Invitations

You can simplify mouse-driven interactions by highlighting click and rollover-sensitive objects or distinguishing them in some other consistent manner (color or grouping, for example), thereby inviting learners to consider using these interactive objects and informing them of the gestures that will be recognized. We should use different indications for click, rollover, or drag activation or any other activating gesture. Invitations might take the form of a surrounding glow, a drop shadow, a bright color, underlining, 3D perspective, alignment in a banner, and so on, as long as the use is consistent. Using standards found frequently in other applications or the Internet reduces learning time and trial-and-error mistakes.

M19. Invite Gestures—Dynamic Invitations

The message that an object is active should be confirmed by a consistent augmentation of the highlighting that appears when the mouse cursor rolls over the object. Rollovers need only indicate that they have been activated with the cursor over them, whereas click, double-click, and drag gestures can be invited with a second-level invitation when the cursor is over the active object.

M20. Rollover and Play Alive

There is something pleasing about making something happen simply by moving the cursor over an object. Nearly effortless retrieval of helpful information can be an excellent aid for thinking and an outstanding capability of e-learning. But rollovers aren't universally applicable. Designers need to be careful with them.

M21. Double Your Clicks; Double Your Frustration

Clicking an object to select it becomes very natural for frequent computer users, but for some, clicking an object takes a bit of mental adjustment and fortitude, especially when a click sometimes initiates action and other times harmlessly selects an object for future action. It's extremely important for applications to respond consistently to every click. If one item opens with a single click, but other items open only with a double-click, significant confusion and anxiety can build. Truly, one little design slip and learners feel they can't trust your interface.

M22. Minimize Drag-and-Drop Woes

If double-clicking is an obstacle for learners, drag-and-drop gestures can be almost impossible for them. It's unfortunate, because there are times when this gesture seems very appropriate for the skill being taught.

M23. Consider Click-to-Place Instead of Drag-and-Drop

A simpler interface that can often substitute for drag-and-drop interactions is click-to-place. The learner first clicks an object to be placed. The object highlights. The learner then clicks a desired location and the object is animated into the clicked location. No dragging or complex highlighting is involved.

M24. Don't Start from Scratch

There are two layers of navigation and interface features that are almost always required in e-learning applications. The top layer includes features for topic selection, overview access, progress recall, quit and resume. Context- and content-specific features provide the second layer, including support for entering and editing responses, controlling simulations, and accessing related resource information

and help. Experienced designers know how to handle these structures and rarely start completely from scratch. It is quite effective and expeditious to adapt previous designs that have proven successful and flexible.

M25. Let Others Judge

There are, in fact, many learner interface design solutions known to experienced design teams, but even experts do some pretty horrendous things. Interface designers rarely have much trouble using their own interfaces, so they often conclude too easily that their designs are intuitive and user-friendly for everyone. Thankfully, it doesn't really take an expert to judge whether an interface is easy to use. It does, however, take some objective evaluation and some open-mindedness.

M26. Plan for More

Experienced designers know that more controls and interface features than initially expected will be desired and probably added. In their prototypes, they are careful to both reserve space and to delay refinement of global interface protocols until the desired learning experiences have taken clear shape.