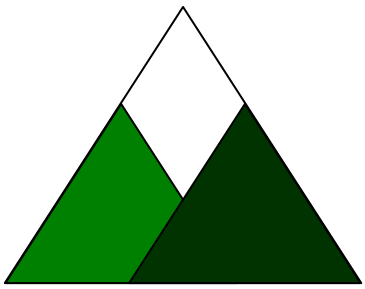

Instructional Objectives

A Work-Learning Research Instructional Research Report

Will Thalheimer, Ph.D.

A Work-Learning Research Instructional Research Report

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The Writer: Will Thalheimer is a research psychologist specializing in learning, cognition, memory, and performance. Dr. Thalheimer has worked in the corporate-training field, beginning in 1985, as an instructional designer, project manager, product leader, instructor, consultant, and researcher. Will has a Ph.D. from Columbia University and an MBA from Drexel University. This report will appear as a chapter in Dr. Thalheimer's forthcoming book, *The human learning system: A book for instructional designers, e-learning developers, trainers, performance consultants, and researchers.* Will founded Work-Learning Research in 1998 with the purpose of helping instructional designers, e-learning developers, trainers, and performance consultants utilize research-based knowledge to build effective learning-and-performance solutions.

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Acknowledgements

Given that this report is a research-based effort, I must first and foremost acknowledge the researchers whose work this document is based on. To view the names of those who authored the relevant studies, peruse the References section. Because every researcher builds on the work of numerous others, the authors cited represent only a small fraction of those who should be thanked for their contributions.

Although the responsibility for the research-based ideas in this manuscript can be attributed to the original researchers, the limitations and weaknesses of the current effort must rest firmly on my shoulders.

Special thanks are offered to Allison Stieber whose copyediting improved the text immeasurably. Thanks also to Samantha Cook for providing expert statistics help.

Will Thalheimer

How to Read This Report

The ultimate goal of all Work-Learning Research publications is to help you make research-based instructional-design decisions. We compile research on learning and performance from the world's best sources. Then we repackage it so that it's practical and accessible. We give you an in-depth understanding of the human learning system so that you can make informed choices in your instructional designs.

It is our belief that the learning-and-performance field will serve learners better when researchers and practitioners begin to work hand in hand. The first step in this process is for each to understand the language and issues faced by the other. Our Instructional Research Reports are written to facilitate mutual understanding between these two groups.

By the end of this report on instructional objectives, you can expect to have a clear picture of how learning objectives can be used to guide the behavior of learners and how performance objectives can be used to guide the behavior of instructional designers and developers. You will also understand more fully how the human learning system works.

Work-Learning Research Instructional Research Reports present concepts that will be new to many readers, using a language and perspective that may be unfamiliar and provocative. The reports are designed to help you gain comfort with this new set of concepts, but some perseverance may be required on your part. Don't feel that you must memorize every term or understand every concept. Information will be repeated and reinforced throughout the report.

Each major learning point is introduced with a practical question about how instruction should be designed. You will learn more if you carefully answer each question before reading further. Don't peek at the answers! After you answer a question, we will provide you with information on "Why it works this way," which will describe how the human learning system creates the effect being discussed. You will be asked a series of questions—and given feedback—after which you will be offered a summary of "Practical Recommendations." After these recommendations, we will provide several sections that outline the "Research Background" for the major learning points. Some readers may prefer to skip these research-intensive sections. Others may want to more fully understand how the research supports the practical recommendations. Finally, we offer realistic practice questions to help you retain and refine the knowledge you've gained.

The research sections in this report include research citations, typically enclosed in parentheses like the following (Thalheimer, 2002). The parentheses will include the researcher(s) name(s) along with the date of publication. Unless you want to find the original article, you can ignore this information. On the other hand, it's often fun to look at the date to see when the research was done. The references are included to provide research-based support for the claims in the paper and to give the researchers their due.

Enjoy!!

Realistic Questions With Explanations

A small-appliance-repair class utilizes 5 overarching instructional objectives that describe the behavior participants should be able to perform at the end of the class. Each of these overarching objectives is supported by 15 specific instructional objectives. For example, one overarching instructional objective reads, "Given realistic cases, the participant will be able to diagnose and repair all 10 of the most typical causes for power failures." One of the specific objectives reads, "When confronted with soiled conductor interfaces that reduce electrical flow, participants will appropriately clean both conductor surfaces to improve the electrical flow." Who will perform better at the end of the class?

A. Learners who are presented the 5 overarching instructional objectives at the beginning of the course.
B. Learners who are presented the 15 specific instructional objectives at the start of each section of the course.
C. Learners who are presented with both types of objectives: 5 overarching objectives at the beginning of the course and the 15 specific instructional objectives at the start of each section of the course.
D. Choices A and C will produce equally superior performance. Specific instructional objectives add little to learning.
E. Choices B and C will produce equally superior performance. Overarching instructional objectives add little to learning.

Correct Answer: Fourth Letter: ADBECDA

The learners who are presented with specific instructional objectives will be guided to pay attention to relevant material and will have a better chance to integrate the new information into memory. Overarching instructional objectives are ineffective in this regard, although they can be useful to guide the development of instruction.

Why It Works This Way:

Instructional objectives can serve two separate functions. They can be used to guide the development of instruction or to facilitate the learning process. Objectives guide behavior. When we present people with an objective, we want to shape their behavior in a particular direction. Strangely, over the last four decades, we've been inclined to use one type of instructional objective to guide the behavior of both learners and instructional designers. We don't want these two groups to do the same things, yet we insist on one correct method for writing instructional objectives. Despite our evangelical convictions, the guidelines we have used for instructional objectives may have done more harm than good.

Because we have two separate audiences, we ought to have two types of instructional objectives, each with its own special function. I offer the following terminology to clarify the issues:

> *Objectives to guide learners will be called Learning Objectives.*
> *Objectives to guide instructional developers will be called Performance Objectives.*
>
> *So, the terminology I used previously will change as follows:*
> *Specific Instructional Objectives will become Learning Objectives.*
> *Overarching Instructional Objectives will become Performance Objectives.*

Although such clarifying terminology can be useful even when the labels used are arbitrary, I use "learning objectives" because the primary goal of the learner when presented with a learning objective is "learning." Similarly, I use "performance objective" because the primary goal of instructional designers and developers is the "performance" of the learners.

Performance objectives should be used by instructional designers to guide the process of development. In this capacity they are used as a project management tool. Not only are they useful to help developers create learning events that focus on performance, they can also provide clear benchmarks that enable the assessment of learning results.

Learning objectives should be used to guide and improve the cognitive processing done by the learner. In this capacity, instructional objectives help learners to focus their attention on the most relevant instructional information and also to integrate the new information into memory.

In the question above, the overarching instructional objectives (now called performance objectives) produce no effect on the learners because they are not specific enough to guide the learners' mental focus during learning. The specific instructional objectives (now called learning objectives) are effective because the learners get sufficient information to know what aspects of the learning material to pay closer attention to.

To summarize this section, an instructional objective should be used to guide the behavior of instructional designers or learners, but not both. When they are used to guide instructional designers, I'm going to call them "performance objectives." When instructional objectives are used to guide the behavior of learners, I will refer to them simply as "learning objectives." The next question involves performance objectives.

Which type of performance objective (as exemplified in the examples below), when used by instructional developers to design a course, will generate the best participant performance overall?

A. When confronted by unwanted persuasive messages, learners will resist being persuaded by those messages at least 75 percent of the time.
B. When confronted by unwanted persuasive messages in their role as managers, learners will resist being persuaded by those messages at least 75 percent of the time.
C. When confronted by unwanted persuasive messages in their role as managers, learners will utilize appropriate persuasive techniques to resist being persuaded, including reviewing counter-argumentation, recognizing the persuasive intent of the message, and delaying action on the issue.
D. Learners will understand that targets of persuasive messages can be inoculated against those messages by being introduced to counter-arguments before being exposed to the persuasive message.

Correct Answer: Fifth Letter: BABDCDA

Performance objectives that most clearly specify the desired learner behavior will produce the best instructional design.

Why It Works This Way:

Performance objectives are really a project-management tool. Because of this, performance objectives are most effective when they describe the behaviors that learners should perform when they get back to their jobs. I use the term "performance objective"[1] to create a focus on the performance of the learner. Although this term is already used in the training field, it is unfortunately used sometimes outside of the project-management rationale. Again, this lack of clarity creates confusion that performance objectives, by being dangled in front of learners before learning begins, can also improve learning—which they can't, as I'll soon describe in greater detail.

Performance objectives are effective project-management tools because, like all goals, they focus attention and behavior. Human cognitive and behavioral activity is characterized by short, task-directed efforts that are interrupted at regular intervals. Even when I sit alone at my laptop to write this section, I am interrupted by the

[1] Note that I could have used the term behavioral objective. I chose not to because of some of the baggage associated with the term and, more importantly, because I want to emphasize that there are two separate situations that instructional designers must keep in mind: the learning situation and the performance situation. Using the terms "learning objective" and "performance objective" facilitates this critically important distinction.

phone, by email messages, and by noises outside the building. In addition, I may be interrupted by daydreams, tangential thoughts, sexual fantasies, feelings of hunger, and sudden realizations that I have other tasks to accomplish. Having a personal goal to finish this section by the end of the week helps me to overcome these distractions by redirecting my thoughts to the work at hand.

Performance objectives have the same effect. They focus instructional designers and developers to stay on task. They set out clear expectations of what should be accomplished. Moreover, they help instructional designers remember what they want to accomplish so they don't have to waste time remembering their intentions over the weeks or months it takes them to design or develop the instruction. Performance objectives also have another critical benefit. They enable different people to have a common understanding of what will be accomplished. In today's media-rich world, most instructional-design efforts involve a multitude of people, including instructional designers, writers, graphic artists, subject-matter experts, instructors, computer programmers, and multimedia specialists. If instructional-development teams have fuzzy ideas about what they are trying to accomplish, the individuals often go off in distinctly different directions. Such fuzziness has been the cause of frustrated and angry development teams, unhappy clients, and learners who are receiving sub-optimal instruction.

To reiterate, performance objectives produce their effects because they focus, redirect, and reenergize the behavior of instructional designers and developers. In order to be effective, goals must clearly outline the expectations involved. In the example above, the best performance objective is the one that most clearly specifies the desired outcome.

Practical Recommendations (Performance Objectives)

Performance objectives should follow project-management best practices. They should be written primarily to guide the behavior of the instructional designers, not the learners. To guide the development of the instruction, instructional designers need to (1) have a sense of the work context in which the learners perform, (2) know the behaviors that learners need to exhibit on the job, (3) understand the contingencies under which those behaviors should be exhibited, and (4) evaluate the effectiveness of the instruction they develop so that they (the instructional designers) can learn from their efforts and hold themselves accountable.

Performance objectives should be written at two levels of specificity. It's important to write them at a general level to create a clear sense of the big picture and to enable instructional designers to be creative in designing instructional interventions. Performance objectives should also be written at a more specific level to provide a clear sense of what needs to be learned and to ensure that the performance of learners can be measured. Such measurement enables instructional developers to hold themselves accountable and to work toward continuous improvement.

Performance objectives should be written first as broad descriptions of performance. In the question above, Choice C provides a good example:

> *Overarching Performance Objective*
> *When confronted by unwanted persuasive messages in their role as managers, learners will utilize appropriate persuasive techniques to resist being persuaded, including reviewing counter-argumentation, recognizing the persuasive intent of the message, and delaying action on the issue.*

Item C is the best overarching performance objective because it describes the context of the job (i.e., management), the appropriate context in which the behaviors should be used (i.e., when confronted by unwanted persuasive messages), and a general sense of the type of behaviors that are expected.

This type of performance objective sets broad parameters for instructional designers, enabling them to have a clear sense of what should be taught, but not being so restrictive as to encourage the development of instruction that focuses on meaningless trivia. General performance objectives encourage the use of simulations, experiential exercises, and on-the-job learning, whereas specific objectives sometimes prompt instructional designers to develop boring didactic lectures or yawn-inducing page-turning multimedia.

After these general performance objectives have been established, several specific performance objectives should be developed for each general objective to ensure that the designers deeply understand the topic area to be taught and the situations in which learners will actually apply the learning. For example:

Specific Performance Objective
Managers will recognize when they and their teams are about to be confronted by persuasive messages. Upon recognizing that an unwanted persuasive message is coming, a manager will prepare himself and his team by (1) letting team members know that someone will be trying to persuade them, (2) delaying the delivery of the persuasive message so that the team has time to prepare themselves, (3) investigating and anticipating the arguments that may be made against their positions, (4) developing counter-arguments against those positions, (5) developing counter-arguments against their own positions, and (6) discussing the weaknesses in those counter-arguments.

Finally, for each objective, instructional designers should develop a performance benchmark to determine whether the learners are actually performing as expected. The performance benchmark should include methods that analyze how well the participants are performing in terms of both overarching and specific performance objectives. However, some instruction is better evaluated with emphasis on the overarching objectives (interpersonal skills training) whereas other instruction is more appropriately evaluated with emphasis on specific objectives (technical training). The following example represents a balanced approach:

Performance Benchmark
To determine if our managers are able to resist unwanted persuasive messages as stated in the Overarching Performance Objective, we will observe their performance in a behavioral simulation six months after training. During the simulation, we will give the managers warning that another team in the simulation will try to talk them into a path of action that may hurt their simulated company's business prospects. We will evaluate managers on their overall success in convincing their teammates to reject the persuasive message. We will also analyze how well managers use each of the techniques described above in the Specific Performance Objective. We will consider our training successful if 90% of our managers convince at least 60% of their teammates to reject the persuasive message during the behavioral simulation. We will consider our managers successful if they convince at least 60% of their teammates and if they utilize at least two of the six techniques described above in the Specific Performance Objective.

Note that the prescriptions for writing performance objectives included here are quite similar to the prescriptions put forth by Mager (1962, 1997) in his seminal work on instructional objectives, with only a few minor differences. Mager suggests that each instructional objective should include the performance desired, the conditions under which that performance is expected, and some criterion for successful performance. He also suggests that objectives should NOT include the

instructional procedure or the target audience of learners. On this last point, I disagree with Mager. It is critical for instructional developers to understand their audience and to focus their design to meet the needs of that audience. For example, in the performance benchmark preceding this paragraph, the focus is on resisting unwanted persuasive messages. I've included the target audience, managers, because the type of persuasive messages they'll have to resist—and the type of contexts in which they'll have to resist them—will be completely different than for an audience of accountants, negotiators, etc.

On the other points, I am in agreement with Mager, except for some differences in emphasis. For instance, I have separated the performance objectives into "overarching" and "specific," and I have removed from the objectives the elements in the "performance benchmark" (Mager's "criterion"). Too often, instructional designers who try to meet all of Mager's recommendations in one instructional objective prompt themselves to create instruction that is focused on very small information units. By separating objectives into three parts as recommended here, instructional designers are freed to be creative, while still maintaining focus and holding themselves accountable.

Let me summarize this section on practical implications for performance objectives. When designing and developing instruction, use performance objectives to specify the performance you want the learners to exhibit when they get back to their jobs. Use overarching performance objectives, specific performance objectives, and performance benchmarks. You should use the objectives to guide your design and development, and the performance benchmarks to hold yourself accountable and to improve your design and delivery for next time.

We turn now to learning objectives.

Realistic Questions With Explanations (Learning Objectives)

Which type of learning objective (as exemplified in the examples below), when presented to participants at the beginning of a lesson, will generate the best performance?

A. "When confronted by unwanted persuasive messages, learners will resist being persuaded by those messages at least 75 percent of the time."
B. "When confronted by unwanted persuasive messages in their role as managers, learners will resist being persuaded by those messages at least 75 percent of the time."
C. "When confronted by unwanted persuasive messages in their role as managers, learners will utilize appropriate persuasive techniques to resist being persuaded, including reviewing counter-argumentation, recognizing the persuasive intent of the message, and delaying action on the issue."
D. "Learners will understand that they can resist unwanted persuasive messages by thinking of counter-arguments to their own position before being exposed to the persuasive message."
E. Choices B and C will both produce the best performance.

Correct Answer: Sixth Letter: DABECDB

Learning objectives are most effective in facilitating learning when they are specific and include information that is directly related to the point to be learned.

Why It Works This Way:

Learning objectives can be used to facilitate learning when they are presented to learners before the learners encounter the instructional material. Learning objectives facilitate learning by (1) helping learners focus their attention on the most relevant instructional material and (2) facilitating memory integration of the new material when it is encountered and processed during learning.

It is not normal for human cognition to stay completely focused. In fact, it is dangerous for us to maintain focus too intensely for too long. Evolution has prepared us better than that. Imagine one of our ancestors living on a savanna in Africa. He kneels down to examine a zebra footprint and gets lost in thought. A hungry tiger approaches. The man remains focused on the alluring curve of the hoofprint. The tiger pounces, breaking the man's neck, ending his focus forever. Fortunately, our thoughts don't usually go that deep. Instead, we choose what to process deeply and we maintain an awareness of our surroundings so that we can switch our attention when something else becomes more interesting or imperative.

As we process learning material, our attention wavers and flits back and forth from the intended instructional message to other less relevant stimuli. Learning objectives are useful because they guide our attention to the most relevant material. They can also encourage us to stay focused on that material. The caveat is that learning objectives have to be written in a particular manner in order to have this effect. I will describe how to write them effectively a little bit later.

Learning objectives can also affect how information is stored in long-term memory. Information can be stored in ways that make it more retrievable or less retrievable. If a person learns something well enough to use that information on his or her job, we can describe that information as retrievable. If the information disappears forever into the black hole between our ears, we might as well conclude that the information was not retrievable enough.

Psychologists use the term "long-term memory" to describe where information is stored for long-term use. They use the term working memory to describe the current contents of thought. For example, my knowledge of "the psychology of learning" is stored in my long-term memory. As I think about how to write about "long-term memory," all the thoughts and perceptions that are running through my mind are included in my working memory. Whereas long-term memory provides almost unlimited storage space, working memory is transient, unstable, and limited. I can't think about much else as I write. When I move from sentence to sentence, the contents of my working memory change. When I hear the woman in the apartment downstairs gag noisily, my thoughts turn to her health and safety and away from my writing. When daydreams flow into my working memory, thoughts of my writing move to some parallel universe out of my grasp, until I can shoo away my fantasies and reconstruct my thoughts about how to write this paragraph.

The ability to retrieve any particular piece of information from long-term memory and have it move into working memory depends on three things: (1) the accessibility (explained soon) of that piece of stored information, (2) the similarity between the stored information and the stimuli that are in the current external environment, and (3) the similarity between the stored information and the stimuli that are in the current working memory.

"Accessibility" refers to the ease of moving the particular information from long-term memory to working memory. Imagine long-term memory as a gigantic storage room with boxes piled from the floor to the ceiling throughout a mammoth space. Imagine working memory as a small workbench[2] at the front of the room—the only place available to open up the boxes and access what's inside. The boxes at the front of the room would be more accessible than the boxes at the back of the room. Someone searching for boxes at the front of the room would simply be able to read

[2] I've borrowed the workbench metaphor from Roberta Klatzky (1975), and her book, *Human memory: Structure and processes* (pages 66-67). San Francisco: Freeman. The metaphor was so powerful for me that I recalled it almost 20 years after encountering it.

the box labels, select the appropriate box to open, move it quickly to the working-memory workbench, and search the files in the box. Boxes at the back would be much more difficult to locate and access.

Information stored in memory is more accessible under the following circumstances: (1) when the information is thought about often, (2) when it has been recently thought about, (3) when it is emotionally important, and/or (4) when it is linked in memory to other information that is itself highly accessible.

The inventory expert controlling our long-term memory storage room puts the recently used boxes at the front of the room when done with them. Our inventory expert is also smart enough to keep boxes that are regularly accessed at the front as well. I bet you feel better knowing you have an expert inside your head. Who would want an idiot in there rearranging the boxes? In addition, our expert is careful to keep boxes that contain information of great emotional import in clear sight at all times. Finally, because information is filed in the boxes near other similar information, it doesn't have to be accessed itself regularly or recently to be at the front of the room—it just needs to be similar to other information that is regularly retrieved. It's as if the boxes are made up of files that each contain related information.

Let me provide several examples of how retrieval works. If you were asked, "What is the largest river in the United States," the environment stimulus "largest river in United States" would likely prompt you to retrieve the concept "Mississippi." In other words, the stimulus prompts the information to move from long-term memory into your working memory. If you hear a particular love song, that stimulus may remind you of your first romantic entanglement, moving thoughts of your first love into your working memory. If you see envelopes by the door, they may remind you to put your letters in your local mailbox, moving the idea of that task into your working memory.

Now pay attention a moment. I'm about to explain how all this relates to learning objectives and their effect on learning. Learning objectives have a learning effect because (1) they guide a person's attention to the instructional material related to the objectives, and/or (2) they help to integrate the new to-be-learned material into memory in a way that makes it more retrievable. I'll describe each process in turn.

When learners read learning objectives at the beginning of a course, the information contained in those learning objectives moves into working memory and then into long-term memory. There they sit in long-term memory in boxes at the front of the room. They are highly accessible during the learning situation because they were read just before the learning situation began. As learners subsequently encounter instructional material, the learning objectives are accessed when a stimulus in the learning material is similar to those learning objectives.

So, for example, if you read the learning objective, “Fish navigate by using the sun,” the concepts of “fish,” “navigation,” and “sun” are all likely to be highly accessible in memory. Their boxes will be at the front of the long-term-memory storage room. When you read subsequently, any mention of these concepts is likely to remind you that you should pay more attention. Note that related words, for example “salmon,” will be less likely than the learning-objective word “fish” to remind you to pay attention, but will be more likely to provide a reminder than unrelated words like “tree.” The closer the similarity between the learning objective and the instructional material, the more likely learners will retrieve the learning objective (and use it to pay closer attention) when they encounter related instructional material. Also, the more deeply and recently the learning objective was processed, the more likely it will be retrieved from memory when related information is encountered. In other words, learning objectives read a week before a class are less likely to produce effects than learning objectives read 5 minutes before the class begins. Also, learning objectives briefly covered are less likely to produce results than learning objectives that are memorized or reviewed carefully.

Learning objectives can also help learners to integrate the new information in memory. As mentioned above, when a person reads a learning objective, the learning-objective concepts move from working memory into long-term memory. In long-term memory, they can act as placeholders for the new information to be integrated. For example, suppose you present the learning objective, “You will understand the mechanism by which fresh-water perch navigate” to learners before you begin your lecture. As learners read this statement, they will create a long-term memory store that incorporates the notion that fresh-water perch navigate using some mechanism. They may not have thought about how perch navigate before. As they think about this, several boxes from long-term-memory are opened and explored, and then placed at the front of the long-term-memory storage room. These memory stores now provide a place in memory for new information to be integrated when it is learned. So, when one of your students hears you say that perch navigate by using the sun, it is noted in many of the boxes and files that were recently explored while that student contemplated the learning objective. Later when she sits down to take an exam, she will be more likely to recall that perch navigate by using the sun because it has been noted in so many memory-storage files. The information is more likely to be found in that gargantuan storage area we call your brain if it’s in more of your brain’s boxes.

The following learning objective prompts learners to think about the terms “persuasive messages, inoculated, counter-arguments,” making these concepts more easily retrievable. Furthermore, the learning objective below also prompts learners to think about the targeted concept (introducing people to counter-arguments helps to inoculate them against persuasive messages), making the whole concept more retrievable later.

> *Participants will understand that targets of persuasive messages can be inoculated against those messages by being introduced to counter-arguments before being exposed to the persuasive message.*

Learning objectives can only facilitate learning if they are written properly. In short, learning objectives should be very specific and should include only relevant information. The learning objective above is facilitative because it helps learners gather and store important instructional material. Specifically it helps learners focus on information related to "counter-arguments" and "inoculation," and it creates memory locations where related new information can be stored.

Performance objectives, especially those that are broad general statements, do not constrain learners' thoughts enough to guide their attention or create appropriate memory storage. For example, the instructional objective, "Learners will be able to use 10 methods to persuade others," lets learners know that the topic is persuasion, but such a global understanding does not create useable memory stores. This instructional objective is simply not specific enough, nor does it provide any useful information. The key concept in this objective is persuasion. This concept will not help people in guiding their attention to relevant aspects of the instructional material, nor will it create memory storage. In other words, knowing that there are 10 persuasive techniques will not help people remember the 10 techniques. Presumably this information will have to be described by the instructional material anyway, so the instructional objective does not add much value.

In the question above, the learning objective, "When confronted by unwanted persuasive messages, learners will resist being persuaded by those messages at least 75 percent of the time," tells the learners that they should resist being persuaded by persuasive messages, which, though useful, is not as useful as the other learning objectives offered. For example, both C and D offer more useful information.

> Choice C
> *"When confronted by unwanted persuasive messages in their role as managers, learners will utilize appropriate persuasive techniques to resist being persuaded, including reviewing counter-argumentation, recognizing the persuasive intent of the message, and delaying action on the issue."*
>
> Choice D
> *"Learners will understand that they can resist unwanted persuasive messages by thinking of counter-arguments to their own position before being exposed to the persuasive message."*

Choice C tells the learners that they should try to overcome unwanted persuasive messages, that they can overcome them, and that there are some specific techniques they can use. Choice D is better because it focuses more specifically on one of the techniques and provides the learners with very specific information that they can

hold in memory and pay attention to as the instructional information is revealed to them.

Note that Choice D—the one I've selected as the best answer—includes the word "understand," a word that many of us instructional designers have been warned never to use. In fact, judging from other instructional designers' reactions, I have to surmise that the instructional-design code of conduct suggests that the use of the word "understand" in a learning objective is a crime punishable by jail time and physical mutilation. In fact, the word "understand" is perfectly useable in a learning objective if it is combined with sufficient and appropriate specifics. Where it is NOT useable is in performance objectives, because it does not create a goal that is measurable.

Which of the following, when presented to learners before instruction begins, will generate the best learner performance on a later test for the meaning of the word "occlude"?

A. The statement, "Learners will learn the synonym for the word occlude."
B. The question, "What is the synonym for the word occlude?"
C. Both will produce equal results.

Correct Answer: Third Letter: ABCBABC

Questions can generate searches of memory that guide learning behaviors and provide a place in memory for learned information to be integrated.

Why It Works This Way:

When worded appropriately, questions can produce effects similar to learning objectives. In this example, the question, "What is the synonym for the word occlude?" can help learners focus their attention on relevant learning material when they encounter it in the learning situation. The word "occlude" becomes a word to search out.

The question above also builds a memory store for the word "occlude" that provides a place in memory for the newly learned information to be integrated. It's almost as if the question creates an empty slot in memory for the synonym of "occlude," so that when learners encounter the phrase "occlude means to block or obstruct" during the learning situation, this information has a prepared place for incorporation.

Of course, providing the full information as in the learning objective, "The learner will be able to recall that the synonym for occlude is block," will produce even better results than the learning objectives in the question above. It does this obviously by providing even more relevant information.

Then again, the question, "What is the synonym for occlude?" followed shortly by the answer, "The synonym for occlude is block," is at least as effective as presenting the full-information learning objective, and it may even be slightly more effective because it creates a more thorough initial search of memory by asking the question. In this way it may create a richer memory trace to integrate the newly learned information.

A performance consultant is designing a course for new crane operators and is developing learning objectives to facilitate proficient crane operations. Which of the following learning objectives will aid the performance of the learners?

A. "Learners will be able to use their feet to control the foot pedals so that the momentum of the crane arm will move the wrecking ball to the target at the appropriate velocity."
B. "Learners will understand that the momentum of the wrecking ball will carry it beyond the swing of the crane arm."
C. "Learners will understand the importance of momentum in controlling the swing of the wrecking ball."
D. Choices B and C will produce equally superior results.
E. Choice B will produce some positive benefits over the other two choices, but is likely to have only a small impact on performance.

Correct Answer: Third Letter: BCEABDA

Learning objectives create cognitive effects that learners may have difficulty utilizing as they learn physiological movement skills.

Why It Works This Way:

Learning objectives produce clear cognitive benefits for material that is primarily verbalizable—the kind of information that can be vocalized or written down. For movement skills, learning objectives can be effective for this same sort of information, but they may be less effective for information that is too difficult or too rich in content to communicate in that manner. For example, a ski instructor could use the learning objective, "You will learn to keep the weight of your shins pressing into the front of your ski boots as you ski down the mountain." This is a highly useful point and one that is clearly verbalizable and understandable. On the other hand, some aspects of skiing are not so easily stated, such as the delicate realignment of joints as the skier moves from side to side. For this type of information, learning objectives are less likely to be useful.

Learning objectives are also unlikely to be useful for movement skills when verbalizable information is being used in a highly constrained timeframe—a very common occurrence for movement skills. For example, people could never swing

dance if they had to process step-by-step instructions about how to put their left foot down, how to have their weight distributed between their feet, how to grab their partner's hand, how to move from one position to the next, or how to communicate with their partner through body contact. There's too much information to process if one wants to keep in time with the music. In this type of situation, learning objectives may prompt learners to perform tasks algorithmically instead of in one big-picture gestalt. It is probably better to avoid learning objectives when learners have to process so much kinesthetic information. Adept instructors should have a list of these points ready to interject during the lesson, but presenting them before the lesson may befuddle learners and put them into the wrong mindset. Alternatively, instructors could introduce one (or at most two) learning objectives in these types of situations, an amount that is unlikely to drive learners into inappropriate algorithmic processing.

The HydroCar, Inc., Training and Performance Department is designing a four-week intensive training course on hydrogen engines. The company's instructional designers have learned to write good learning objectives, but although everyone agrees on the objectives, a debate ensues about when to present them to the training participants. Thanks to the wise leadership of the department, they decide to randomly assign trainees to four groups and see who performs better after the training. Which of the following methods will produce the best performance?

A. Sending out the learning objectives to learners two weeks in advance of the program.
B. Providing the learning objectives for each week to the learners at the beginning of the week.
C. Providing the learning objectives for each day to the learners at the beginning of the day.
D. Providing the learning objectives for each half-day topic to the learners at the beginning of the topic.
E. Both B and C will produce equally superior results.

Correct Answer: Sixth Letter: BCEABDA

Learning objectives create memory traces that are accessible. Because accessibility depends upon recent activation, learning objectives should be presented to learners close to the time of the learning.

Why It Works This Way:

Learning objectives guide learners to pay attention to information related to the learning objectives and create memory stores that enable future integration of new information. Both of these effects depend on the learning objective's own memory store. If the learning objective's memory store is highly accessible, there is a greater

chance that it will be utilized than if it is less accessible. Imagine that learners are given 50 learning objectives regarding rare words like “immure.” If immediately after being given this list the learners are presented with reading assignments that include the rare words, they are likely to remember the learning objectives and pay special attention to parts of the reading material related to those words. They may not be able to recall all 50 of the learning objectives, but seeing “immure” again as they read the text will remind them that they had received a learning objective for that word and will prompt them to attend more closely to the word and the surrounding text. On the other hand, if learners are given this same set of learning objectives weeks before they are asked to read the material, the word “immure” is much less likely to be remembered or accessible in any way. In this case, the learning objectives would have lost their power to prompt additional processing. Moreover, because the memory store for that word is not very accessible, it is unlikely to help integrate the new learning.

The Wheat-From-Chaff Milling Company has developed a training course for its machine operators, complete with well-written learning objectives. The course contains two topic areas that are taught together, “Threshing” and “Grinding.” The instructional designers wanted to have these taught in tandem because both processes are inherently related to the final output and the company wants to keep the workers focused on pleasing their customers. If only the learning objectives for Threshing are presented to the learners before the course, what is the most likely outcome?

A. After the course the information on Threshing will be better recalled than if no learning objectives had been provided.
B. After the course the information on Grinding will be better recalled than if no learning objectives on Threshing had been provided.
C. After the course the information on both Threshing and Grinding will be better recalled than if no learning objectives had been provided.
D. After the course the information on Threshing will be better recalled than if no learning objectives had been provided, and the information on Grinding will be recalled at the same level of proficiency as if no learning objectives had been provided.
E. After the course the information on Threshing will be better recalled than if no learning objectives had been provided, and the information on Grinding will be recalled worse than if no learning objectives had been provided.

Correct Answer: Fifth Letter: EBACEDB

Learning objectives guide attention toward some aspects of the learning material and away from the other aspects.

Why It Works This Way:

As learners are presented with the instructional message, their attention wavers, strengthening sometimes and weakening at other times. Learning objectives serve to guide learners to some of the instructional material. Subsequently, learners are likely to have their attention waver when they are processing learning material that is not related to learning objectives.

The Learning Organization Group (LOG) provides consulting to help organizations capture knowledge and facilitate informal workplace learning. One of their more creative junior associates suggests that they use the learning-objective concept to help produce workplace learning. The senior partners are skeptical but decide to allow a pilot test. Which of the following work groups is likely to perform most proficiently a month after the pilot test?

A. The group that continues working as usual.
B. The group that reminds itself during weekly meetings of the importance of working together and performing proficiently.
C. The group that meets once a week to create a list of things they'd like to know but that they don't know currently.
D. The groups in Choices B and C will achieve equally superior levels of performance.
E. All groups will have equal levels of performance.

Correct Answer: Fifth Letter: CEBACDE

By creating a list of items that are unknown, workers can essentially create learning objectives for themselves and their work groups that enable them to attend more selectively to stimuli in their workplace environment that are relevant to the concerns they've outlined.

Why It Works This Way:

Just as learners in a course attend more closely to some aspects of the learning material than others, workers are more likely to pay attention and gather data about information that they've recently labeled as relevant to themselves or their work groups. By reflecting on things they'd like to know, people are essentially creating memory stores or are making existing memory stores more accessible—the same process that transpires when people read learning objectives. There is an additional benefit to doing this with a group because everyone in the group can act as a separate memory store and information-gathering device. Everyone in the group can help each other gather information. I saw this work very clearly in graduate school when my fellow students and I would share citations related to each other's research. Jeff's research was related to source memory. Cynthia's research was

related to moral understanding. My research was related to information-acquisition goals. When Jeff or Cynthia came across articles related to information-acquisition goals, they would make me a copy or give me the citation for the article. When I stumbled over research on source memory, I'd let Jeff know. When I found articles on moral understanding, I'd tell Cynthia.

Managers can create a similar effect in their work teams by educating their direct reports about the business imperatives, goals, and issues. By doing this, the most relevant information in the environment is paid more attention, data gathering is more focused, and more creative solutions are enabled because the information that is processed is more relevant to the main organizational concerns.

Which of the following types of instruction is most likely to be facilitated by well-written learning objectives?

A. Learning that is self-paced by the learners.
B. Learning that is not self-paced.
C. Both will be facilitated equally by learning objectives.

Correct Answer: Second Letter: CABCBAB

Learning objectives affect the attention of learners. If the learning material is self-paced, this gives learners more opportunity to selectively attend to parts of it.

Why It Works This Way:

Learning objectives affect the attention of learners. Some learning environments enable learners to spend extra time attending to different aspects of the learning material, while other learning environments do not. Self-paced environments, because they allow learners to focus their attention and dwell on certain information, are probably more likely to be affected by learning objectives.

This does not imply that learning objectives have no effect for non-self-paced learning environments. For example, in the classroom, learners may choose to dwell on information as the instructor moves forward to the next thought. Obviously, this type of situation is not as conducive to focusing one's attention as a self-paced reading assignment would be, for example.

Learners are assigned an article that contains this sentence: "Leaders are most successful when they include their direct reports in decision-making." Which of the learning objectives below is most likely to get the learners to pay attention to this part of the article when they read it?

A. "Learners will understand that as managers they should work to enable their subordinates to have input into decisions."
B. "Learners will understand that as leaders they should include their direct reports in the decision-making process."
C. "Learners will include their workers in the decision process."
D. All of the above choices will produce similar results.

Correct Answer: Sixth Letter: BACDCBA

The more similar the learning objective is to the targeted information in the learning material, the more likely the learning objective will be accessed in memory and utilized to prompt additional attention to the relevant learning material.

Why It Works This Way:

Learning objectives are stored in memory after they are read or heard. When learners encounter similar information in the reading material, the learning objective's memory store may or may not be accessed. It depends on the general accessibility of the memory store and on the correspondence between the memory store and the stimulus in the learning material. In the question above, the learning objective included key words such as "leader," "include," "direct reports," and "decision-making." When learners read the learning objective, these words (and other information as well) are stored in memory. Later, when learners encounter these words during reading, the related memory store is likely to be accessed. In turn, learners are likely to remember that they were presented with a relevant learning objective and thus are likely to pay special attention to this portion of the text. Words with slightly different surface characteristics (for example, "manager" instead of "leader") are less likely to access the learning objective's memory store and thus are less likely to prompt additional attention and learning.

Practical Recommendations (Learning Objectives)

In instructional situations, provide learners with specific learning objectives or questions before they begin a topic section. Make sure that the learning objectives cover meaningful material. Remember that your learning objectives will guide learners toward some aspects of your learning material and away from other aspects. Because of this focusing power, you will need to prioritize what information you want your learners to be able to retrieve on-the-job and then develop learning objectives for those points. To create the greatest effect, present learning objectives to learners as near as possible to the time they will be encountering the learning material. Ensure that the surface characteristics of the learning objectives and the learning materials are similar. This will increase the likelihood that the learning objective's memory store is accessed during the learning event. Remember that learning objectives are powerful to the degree that they are accessible—and they are accessible to the degree that they are deeply processed before learning. For this reason, develop some mechanism that encourages learners to deeply process the learning objectives. For example, put the learning objectives in the form of questions and present them to learners as a tool to diagnose their current learning. Because of the question format, the learners will want to do well, so they'll think deeply about the learning-objective questions.

Learning objectives are likely to be less powerful in non-self-paced learning environments, such as lectures, videos, audiotapes, and unstoppable multimedia presentations. When designing for these learning environments, you may want to use learning objectives while providing for additional levels of learner control. Also, you may want to use learning objectives for only the most important points. This will enable your learners to occasionally spend time reflecting as the learning material moves forward. With only a few learning objectives per section of material, learners will worry less about missing something important. Alternatively, you could design your instruction-paced learning environments to provide non-informative interludes after presenting key material, to enable learners to reflect on the critical information. National Public Radio (NPR) is known for separating its news stories with short snippets of music. These snippets enable NPR listeners to process the previous story before their cognitive systems are sent into another information swarm and their working memories are held captive by newly arriving information.

Based on the information in this section, you might think that we should have learners go through a whole set of specific learning objectives before sending them into the actual instruction. Unfortunately, for a one-day course, this might force us to have participants read 50 to 100 specific learning objectives, something they may not be willing to do. Putting these objectives in the form of questions may make this process more palatable, but it still may leave learners wanting less. Moreover, there is evidence to suggest that having too many objectives decreases the likelihood that any one objective will be utilized to improve learning (Rothkopf & Kaplan, 1972). Of course, one way to get around this is to show the learning objectives before

smaller sections of the course so that there are fewer learning objectives to read at one time.

To improve the power of learning objectives to have an effect in classroom and other non-self-paced learning situations, give learners ample opportunities to ask questions, discuss implications, and reflect individually on the material. For example, by encouraging learners to ask questions during a lecture, the situation becomes more like a self-paced learning situation, enabling learners to make sure they understand the key points as targeted by the learning objectives.

I'm a big believer in the use of prequestions before topic discussions. In my experience as a trainer and instructional designer, these seem to energize the learners by making them realize that they do NOT yet know the material. They also are likely to improve memory integration as they get people to build long-term-memory storage for the concepts to be learned.

One potential downside of learning objectives is that they can be used to focus learners on trivial information. This doesn't have to happen, but the need to write learning objectives focused on specific information may encourage some of us instructional designers to worry about facts instead of meaningful learning. Don't do it. Make sure your learning objectives are meaningful.

Although learning objectives may be effective in focusing learner attention on the most relevant information, they may not be the only method of doing so. For example, trainers may be able to skip learning objectives and instead use their tone of voice to highlight the most important information. Instructional designers may be able to use pacing, formatting, or other devices to create the same effect. Of course, these strategies will take the place of learning objectives in guiding attention, but they are unlikely to replace learning objectives as a mechanism to improve the memory integration of new information. Even if memory integration is enabled during the learning situation, it may not have the same power as presenting learning objectives to learners prior to learning because such a device has the advantage of spacing learning over time.

Research Background

Performance Objectives as Project-Management Tools

Research on goal-setting has consistently found facilitative effects (Locke & Latham, 1990; Latham & Locke, 1991). Moreover, specific goals have been shown to have a much greater effect than general goals, which appear to produce little or no positive outcomes (for reviews see Latham & Yukl, 1975; Locke, 1968; Locke & Henne, 1986). The reason for this appears to be that general goals, because they are unclear about what constitutes effective performance, allow people to judge themselves more positively (Kernan & Lorde, 1989). Specific goals, on the other hand, encourage accountability by enabling people to clarify for themselves whether they have been effective or not.

Learning Objectives as Facilitators of Learning

Since the 1970's experimental psychologists have known that learning objectives must be specific and directly related to instructional material to facilitate learning. Rothkopf guided much of the definitive work in this area. Rothkopf and Kaplan (1972) found that specific learning objectives improved learning for that portion of the instructional material related to the objective by about 40% over general learning objectives. Kaplan and Rothkopf (1974), in two experiments, found that specific objectives improved learning by 19% and 26% over general objectives.

It should be noted that in these experiments, "general" objectives were still somewhat specific, mentioning clearly some of the relevant content in the reading material. For example, one of the general learning objectives was written: "Learn about the physical appearance of the three kinds of typefaces discussed." One of the specific learning objectives was written: "Learn about the physical appearance of Gothic type" (Rothkopf & Kaplan, 1972). These "general" objectives still produced positive results (Kaplan & Rothkopf, 1974, Experiment 1), improving learning (for the material related to the learning objectives) for people who saw them by 63% over people who didn't see any learning objectives. But note that specific objectives improved learning by 95%!

Using a different research methodology, Pichert and Anderson (1977) had people read a passage about a house. When the readers were given the general goal—to read the passage from the perspective of a burglar—they were later more able to recall information about the house relevant to robbing the house (where the jewelry was, escape paths, etc.). Readers who were given the general goal—to read the passage from the perspective of a homebuyer—remembered information relevant to home buying (number of bedrooms, layout of kitchen, etc.). Wyer, Srull, Gordon, and Hartwick (1982) replicated and improved on the Pichert and Anderson study by showing that general goals guided the attention of the readers and thus enabled subsequent recall. Both studies demonstrate that general goals may produce

learning effects if and only if they guide learner attention to relevant portions of the learning material.

When learning objectives get diluted much beyond Rothkopf's "general" level of specificity, they usually lose their effect. As Rothkopf (1982, p. 123) has suggested, the more similar the words used in the learning objective to the words used in the learning material, the more learning facilitation will occur. Rothkopf and Billington (1975) demonstrated this by finding that learning objectives that were directly related to the learning material created posttest performance that was 31% and 29% better than learning objectives that were similar but not directly related to the learning material; and these similar learning objectives created performance that was 43% and 25% better than learning objectives that were unrelated to the learning material. Frase and Kreitzberg (1975) found that precise one-to-one correspondence between learning objectives and learning material produced effects whereas less precise referents did not. Thus, learners in a course on conflict resolution are not likely to improve their learning if given the general learning objective, "By the end of the class participants will be able to create a conflict-positive environment." It is just not specific enough to guide their attention or memory processes. The topic "conflict-positive environment" subsumes so many separate learning points that its use in a learning objective does not help guide the learners to pay attention to those points, nor does it create memory stores to facilitate memory integration of those points.

Mager's (1962) very specific behavioral objectives produced little positive effects in a number of studies (Hamilton, 1985). As Hamilton wrote, "[a learning] objective that generally identifies the information to be learned in the text will produce robust effects. Including other information (per Mager's, 1962, definition) will not significantly help and it may hinder the effects of the objectives" (p. 78). To reiterate what has already been said, learning objectives have their effects because they focus attention and help us integrate new information in memory. Both processes can be guided only by information relevant to the content of the ideas. Abstractions and general statements don't help because they don't help the learner differentiate between different instructional content. Specific information that isn't relevant to the content of the ideas doesn't help either.

It should be noted that when learning objectives are used, they increase the learning for the material in the text related to the learning objectives, and they often decrease the learning for the material not related to the learning objectives! For example, in two experiments using specific objectives, Rothkopf and Billington (1979) found that when learning objectives were provided to learners, performance on material related to the objectives improved by 49% and 47% over situations when learning objectives were not used. However, the material not related to the learning objectives was learned 39% and 33% WORSE than it would have been if no learning objectives were used! These results bring up the question of whether learning objectives should be used at all. It may seem that learning objectives are a zero-sum game. Targeted information is better remembered and non-targeted

information is less well remembered. Two points argue against this position. First, generally the benefits are bigger than the losses. Second, and more importantly, learning objectives can be written so that they focus learners on the most important aspects of the text. Thus, learning objectives can create more learning on the important information and less learning on the less important information.

It should be clear from the information just presented that learning objectives help learners determine the information to which they should pay attention. In fact, in their third experiment, Rothkopf & Billington (1979) tracked how people's eyes moved across the text and found that learners used about twice as many eye fixations on sentences that included material related to the learning objectives than on sentences that had no related information. This experiment clearly demonstrated that learning objectives direct the attention of the learner to material related to the learning objectives and away from material unrelated to the learning objectives. Further supporting the idea that learning objectives generate additional cognitive processing on relevant portions of the learning materials, Muth, Glynn, Britton, and Graves (1988) found that learning objectives increased the amount of time readers spent rehearsing (thinking about) those aspects of the text that were targeted by learning objectives.

In research that I undertook during my dissertation years (Thalheimer, 1996), I found that questions could also facilitate learning through the process of memory integration. The research of Yaniv, Meyer, and Davidson (1995) produced results that have the same implications, using a slightly different methodology. Recall that the research cited above found that learning objectives (and questions) given before reading (1) prompt people to spend more time reading the material relevant to the learning objectives and (2) create more learning for this material. The implication is that the extra attention causes the extra learning. But what if we found a case where the objectives or questions could create more learning with the same amount of reading time? Then we'd have pretty good evidence that the objectives created learning through a memory process other than attention. Well, that's just what my research found. It showed that prequestions created more learning while prompting about the same amount of reading time.

So if attention didn't create learning, what did? Further analyses showed that prequestions actually created more highly accessible memory stores for the to-be-learned information. For example, when I asked people to pick one of six words as synonyms for the word "occlude," the word "occlude" became highly accessible in memory. In other words, its information got moved to the very front of the long-term-memory storage room. Amazingly, prequestions created greater accessibility for the word "occlude" than telling people that "block" and "occlude" were synonyms. This suggests that because prequestions create strong memory stores, new information learned during reading is integrated into these relatively stronger memory locations and thus the whole package of information becomes more retrievable after the learning situation. In common language, we would say that prequestions improve learning.

This conjecture is further strengthened by the research of Pressley, Tanenbaum, McDaniel, and Wood (1990) who found that prequestions that were answered produced greater learning gains than prequestions that were only read by the learners. Even when the prequestions were answered incorrectly they created 8% better performance on the final test than when they were only read (marginally significant, with a small effect size of .16 and a p-value falling between .01 and .05). This finding bolsters the notion that reading and answering prequestions produces a memory effect because of the mental processing of the prequestions.

It is as if the prequestions force our long-term-memory inventory expert to bring several related boxes to the workbench to search for the meaning of "occlude." Prodded by the pre-question, the inventory expert searches several boxes and many different files in each of those boxes. When the word isn't found, all of those boxes are put at the front of the long-term-memory storage room. Later, when we learn that "occlude" means "block," we note this information in many of those boxes and in many of the files that we previously searched. Much later, when we encounter "occlude" as we wander through our world, we will have an increased likelihood of remembering what it means because with all of those notes in all those files we're more likely to find its meaning when our boxes and files are searched.

Kaplan (1974) found that giving learners all the learning objectives at once before learning began was not as effective as interspersing the learning objectives between presentations of the learning material. This result has two implications. It suggests that it is best to present learning objectives shortly before instruction begins. It also demonstrates that presenting large numbers of learning objectives all at once may dampen the ability of learners to utilize any one of those objectives, even while more overall information may be learned.

In similar work, Rothkopf and Billington (1975) found that increasing the number of learning objectives from 5 to 10 decreased the amount learned by 17% but increasing the number from 10 to 30 didn't further decrease the amount learned. To strengthen their findings, Rothkopf and Billington added irrelevant learning objectives (objectives not directly associated with the information in the learning material). So, for example, they compared learners who got 5 learning objectives (all of which were directly related to information in the learning material) and learners who got 10 learning objectives (the 5 relevant objectives described above plus 5 objectives not directly related to the learning material). They found that those getting these 10 objectives performed worse by 14 percent than those just getting the 5 relevant objectives. Thus, they showed that it was the length of the learning-objective list, as opposed to the amount of information to be learned, that caused the decrement when learners got 10 instead of 5 objectives. To put this in perspective, the people who got 10 learning objectives outperformed those who got no learning objectives by 50 percent, again putting an exclamation point on the power of learning objectives.

Questions can be just as powerful as learning objectives. Rothkopf (1966) found that providing people with learning objectives produced the same posttest performance as providing questions and answers, both of which outperformed a control group (that got no learning objectives) by 169%. Even just asking people questions without providing answers improved performance over the control group by 129%. Frase (1967) replicated Rothkopf's result. Thalheimer (1996) found that asking people questions and providing them with answers produced about the same posttest performance as simply providing them with the same information in a learning objective.

Strength of Research Findings:

Performance Objectives as Project-Management Tools

Moderate.
Studies have NOT been done to test whether performance objectives help instructional designers, but loads of research has been done to show how goals improve and focus other workplace activities. Learning objectives are goals, of course. If written appropriately, they provide learners with a goal of what to learn. The facilitative effects of goals have been outlined in several reviews of the research (Locke & Latham, 1990; Srull & Wyer, 1986; Frese & Sabini, 1985). And as Latham and Locke (1991) have pointed out, the superiority of specific goals in energizing and focusing behavior has been reviewed and found conclusive by many researchers (Latham & Yukl, 1975; Locke, 1968; Locke & Henne, 1986; Locke, Shaw, Saari, & Latham, 1981), and meta-analyses have corroborated these findings (e.g., Mento, Steel, & Karren, 1987; Tubbs, 1986).

Learning Objectives as Facilitators of Learning

Strong.
The research on the effects of specific learning objectives is very strong, as evidenced by a number of reviews of the literature (Hamilton, 1985; Klauer, 1984; Rothkopf, 1982). In addition, the effects of prequestions provided before instruction create a mechanism similar to learning objectives (Hamaker, 1986; Anderson & Biddle, 1975), and these results have been similarly impressive.

This research has generally been interpreted as showing that objectives and prequestions focus attention, and that this attention produces more learning (Anderson, 1982; Reynolds, Trathen, Sawyer, & Shepard, 1993). This interpretation cannot easily be denied, especially given the work of Rothkopf and Billington (1979) using eye-movement data. The notion that objectives and prequestions can also help to integrate new information into memory (Thalheimer, 1996; Yaniv, Meyer, & Davidson (1995) is newer, and thus should be viewed with more skepticism.

The more specific the learning objectives and the more closely their surface characteristics mirror those of the learning material, the stronger the evidence for learning objective facilitation (Rothkopf, 1982; Rothkopf & Kaplan, 1972; Kaplan & Rothkopf, 1974; Frase & Kreitzberg, 1975; Rothkopf & Billington, 1975).

Percentage Improvements:

Performance Objectives as Project-Management Tools

Undetermined.
Because there are no studies that specifically examine the effects of performance objectives on learning performance, it might be misleading to report the size of effect from studies that utilize general types of goals.

Learning Objectives as Facilitators of Learning

Learning Objectives versus No Learning Objectives
Representative Range (improvements on related learning material) 5% to 45%.
Rothkopf and Billington (1979) found that learning objectives produced 51%, 47%, and 42% better performance on information relevant to the learning objectives than a condition that used no learning objectives. For the information in the learning material not related to the learning objectives, performance with learning objectives was 39%, 33%, and 57% worse than when learners got no learning objectives. Rothkopf (1966) found that full-information learning objectives and prequestions with answers both produced 169% improvements over a control group that received no learning objectives. Even prequestions without answers presented before relevant paragraphs produced a 129% improvement over the control group. Reynolds, Trathen, Sawyer, and Shepard (1993) found that for information in the learning material relevant to the learning objectives, the addition of learning objectives produced 7% better performance than having no learning objectives, whereas for information not related to learning objectives, the learning objectives produced 38% worse performance[3]. Pressey, Tanenbaum, McDaniel, and Wood (1990) found that prequestions that were answered produced 14% better performance on a short-answer test than prequestions that were evaluated only for their comprehensibility, and these prequestions in turn created 16% better

[3] Interestingly, Reynolds, Trathen, Sawyer, and Shepard (1993) found that learning objectives made more of a difference for skilled sixth-grade readers, but had little effect for unskilled sixth-grade readers. In fact, the skilled readers used learning objectives to improve their scores by 21%, while the unskilled readers actually performed 10% worse with learning objectives than without. This result lends further credence to the idea that learning objectives prompt learners to pay more attention. Those that don't yet know how to do that don't get the advantages of the learning objectives. Although most adults have learned how to pay more attention, we should probably assume that some are more able to do this than others.

performance than having no prequestions at all. Thalheimer (1996) found that prequestions produced a 13% improvement over no prequestions in Experiment 1 and a 30%, 16%, or a negligible 2% improvement, depending on the type of prequestion manipulation, in Experiment 2.

Specific versus General
Representative Range 20% to 40%, but based on very little data.
Rothkopf and Kaplan (1972) found that specific learning objectives improved learning for that portion of the instructional material related to the objective by about 40% over general learning objectives. Kaplan and Rothkopf (1974), in two experiments, found that specific objectives improved learning by 19% and 26% over general objectives. In related work, Rothkopf and Billington (1975) demonstrated that learning objectives that were directly related to the learning material (used the same words) created posttest performance that was 31% and 29% better than learning objectives that were similar but not directly related to the learning material (used some of the same words), and these similar learning objectives created performance that was 44% and 25% better than learning objectives that were unrelated to the learning material.

Effect-Size Improvements:

Performance Objectives as Project Management Tools

Undetermined.
Because there are no studies that specifically examine the effects of performance objectives on learning performance, it might be misleading to report the size of effect from studies that utilize general types of goals.

Learning Objectives as Facilitators of Learning

Learning Objectives versus No Learning Objectives
Representative Range (Cohen's d effect size) .30 to .70.
Rothkopf & Billington (1979, Experiment 3) found a small effect size of .33, indicating that learning objectives produced better performance on information relevant to the learning objectives than a condition that used no learning objectives. For the information in the learning material not related to the learning objectives, there was a medium effect size of .66, indicating that the learning material not targeted by the learning objectives was recalled more poorly than if no learning objectives had been used. Reynolds, Trathen, Sawyer, and Shepard (1993) found that for information in the learning material relevant to the learning objectives, the addition of learning objectives produced better performance than having no learning objectives by an effect size of .19, whereas for the information not related to learning objectives, the learning objectives produced worse performance by a large effect size of 1.05. Pressey, Tanenbaum, McDaniel, and Wood (1990) found that prequestions that were answered produced better performance on a short-answer

test than prequestions that were evaluated only for their comprehensibility, by a small effect size of .29, and these prequestions in turn created better performance than having no prequestions at all, by a similar effect size of .31. Thalheimer (1996) found that prequestions produced a small effect-size improvement of .36 over no prequestions in Experiment 1 and a medium .70, a small .30, and a negligible .08 effect-size improvement, depending on the type of prequestion manipulation, in Experiment 2. In a review of 20 studies that used prequestions as learning objectives, Hamaker (1986) found an average effect size of .15 for questions that were given as learning objectives and then repeated on the test, including an effect size of .19 for short-answer questions and .06 for multiple-choice questions. In a meta-analysis of 21 studies on learning objectives and questions, Klauer (1984) found an effect size of .40 when learners intentionally tried to remember the learning material.

Specific versus General
Representative Range (Cohen's d effect size) .50 to .80, but insufficient data.
Rothkopf and Billington (1975) demonstrated that learning objectives that were directly related to the learning material (used the same words) created better posttest performance than learning objectives that were similar (used only some of the same words) but not directly related to the learning material, by effect sizes of .81 and .63; these similar learning objectives created performance that was better than learning objectives that were unrelated to the learning material, by effect sizes of .75 and .61.

Generalizability of Research Findings:

Performance Objectives as Project-Management Tools

Wide.
As Locke and Latham (1990) have indicated, goal-setting research has included 239 laboratory studies and 156 studies in real-world environments, combining to use over 40,000 experimental participants. This research has included a wide range of experimental participants across many cultures. For those of you unfamiliar with research methodology, the notion of generalizability may not seem important, yet it is crucial. In this research, the large number of consistent findings across such a diverse set of situations and experimental subjects provides overwhelming evidence that goal-setting has fairly universal effects. In other words, it's likely that goal-setting works as we've described for most people in most situations.

In sum, it would be nice (especially because folks have been advocating this at least since the 1960's!) if someone would do a series of studies evaluating how well the development of performance objectives affects the learning and performance of learners. However, until that data is available, the other relevant research is so strong that we should continue to follow the kind of recommendations made by Mager (1997; 1962) and Dick and Carey (1996) to create performance objectives

that are specific and measurable. The recommendations made here (to create overarching performance objectives, specific performance objectives, and performance benchmarks) may also be useful, as they may free instructional designers to be able to focus more clearly on the performance situation.

Learning Objectives as Facilitators of Learning

Medium.

These studies were done largely using reading as the instructional method. Thus, it is reasonable to wonder how widely we should generalize these findings. Reading provides a good analog for many training situations. In most learning environments where people are intentionally trying to learn, learners move through instructional material in a continuing flow just like readers reading text. Like all learners, readers pay more attention to some parts of the instructional message than to other parts, and learning objectives can control this attention to some extent.

On the other hand, reading is self-paced, whereas instruction such as classroom learning is not. We might therefore question whether learning objectives would have similar effects for non-self-paced learning. In fact, Rothkopf and Billington's (1979) classic study on eye movements during reading found that sentences relevant to a learning objective were partially reread, whereas other sentences were not reread. In non-self-paced situations, learners cannot go back and think deeply about previous information without missing the new information that is coming at them. Of course, they may choose to linger on some idea and miss the new information, but this is probably a difficult task given the compelling nature of new information. This analysis is contradicted potentially by Hamaker's (1986, p. 230) meta-analysis finding that, in studies when the learning time was fixed, prequestions had a greater effect than in studies in which learners could pace themselves. Hamaker's findings should be judged with skepticism because of the meta-analytic technique of comparing across studies and also because the t-statistic was only 1.95, for a p-value of $< .10$, a statistically dubious difference.

Another difference between reading and classroom learning is that the words in the reading material can be made to be very similar to the words used in the learning objectives. As we've already discussed, the closer the similarity between the learning objectives and the learning material, the more the learning. Classroom lectures do not guarantee that the learning-objective words will be used, as instructors have a tendency to ad lib, so this may diminish the effects of the learning objectives as well.

Learning objectives may also have less influence in classroom learning situations because they provide information that is redundant to that given by good instructors. Good instructors highlight the most important information in the lecture, causing learners to pay close attention to that information. Learning objectives don't add anything in the way of focusing attention in this type of situation.

Because learning objectives facilitate learning by helping to integrate information into memory as well as by guiding attention, they may still have an impact in non-self-paced learning situations. The learning objectives may create learning in lectures because the information related to the objectives may be more robustly integrated into memory.

Speculation is one thing, and a fun thing, but the cold, steely truth of empirical research is better. Unfortunately, there are relatively few studies of learning objectives in classroom learning and other non-self-paced learning situations. And the research that has been done in non-self-paced situations is not always done with specific objectives (ones that have a chance of working) or with methodological rigor. Moreover, there are no definitive review articles to guide us in making an assessment. More importantly, the few studies that are available seem to conflict with each other. Experimental psychologists have focused their energies on doing learning-objective research in reading situations because reading is more controllable than classroom instruction, making it easier to do experiments and see results.

In the appendix of my dissertation I included a study that asked college students questions about their campus to find out if these learning-objective-like questions produced effects similar to learning objectives. For example, I asked Columbia University students, “What object sits on the lap of the statue Alma Mater?” When I surprised the students with a follow-up test a week after asking them the initial questions, I found that they had actually learned 16% more about the campus stuff that they had been asked about the previous week than the campus stuff they hadn’t been asked about. What’s remarkable about this result is that the students weren’t even trying to learn the information. It was just there in their environment to learn about, and the questions prompted them to pay attention to (and learn) what they’d been asked about (Thalheimer, 1996).

The use of high-school and college students in many of these experiments should not be used to dismiss the findings. When psychologists do experiments on basic learning processes like attention and memory, the results can be generalized widely. Of course, if psychologists were studying sexual behavior or drug use, the results of experiments on college students would not be reasonably generalized to 50-year-old accountants. But learning objectives create changes in attention and memory, processes that are likely to be similar, if not exactly the same, regardless of age, level of education, and other personal facts.

Priorities for Further Research:

Performance Objectives as Project-Management Tools

As mentioned above, research is needed to confirm the common-sense notion that performance objectives help instructional designers to facilitate better learning designs that subsequently improve the learning and performance of learners. It is true that a wide range of research has been done on the effects of similar goal constructs, but to my knowledge no research has been done specifically on the effects of performance objectives.

In addition, researchers should investigate how different forms of performance objectives affect learning and workplace performance, the meaningfulness of the developed instruction, and the probability that the learning methodology will be evaluated and improved.

Learning Objectives as Facilitators of Learning

Although an enormous amount of research has been conducted on learning objectives, almost all of the rigorous research was done using reading as the instructional milieu. Because of the over-reliance on this one research methodology, future research needs to investigate the power of instructional objectives in non-self-paced learning situations, such as the classroom, videos, and online learning. Moreover, some attention should be focused on the ability of learning objectives to produce effects when learning material is made more and less learner-controlled, and when non-instructional pauses are added to the learning material to give learners time to attend to the information targeted by the learning objectives.

The conjecture about learning objectives having less impact on physical movement skills needs to be tested. At present, there have been no studies to determine whether learning objectives work in this area. Research is needed so that training developers have definitive guidelines.

Research could also be directed at the problem of how to present enough learning objectives to facilitate learning a large number of learning points. In addition, the proposal regarding the timing of learning objectives should be explored further. Is it always best to present learning objectives immediately before the learning event? What delays are acceptable between the presentation of the learning objectives and that of the learning material? Do learning objectives have a comparative advantage over other methods that focus learner attention partly by creating a spacing effect?

Learning objectives and prequestions have usually been found to be effective only in situations where the learning material is very specific. When broader concepts are targeted, learning objectives generally produce weaker effects. This result should be examined in more depth to determine if learning objectives can be made more viable for broader, more conceptual learning points.

Practice Questions

The following set of questions will help you solidify your knowledge of the topic. Ideally, you should wait a day or so after finishing the previous sections before you attempt these questions. Don't just skim the questions, but instead, answer them with high levels of attention and intention. Don't look ahead to the answers—such a process will short-circuit your learning efforts. If you really want to supercharge your learning, apply the key learning point of each question to real-world issues. And don't forget to have fun! These aren't test questions. They're practice questions.

A human performance technologist is designing a training program on how to build a website using Microsoft FrontPage. Which of the following instructional objectives will be most beneficial in helping people learn FrontPage?

A. "In this lesson, you will learn how to insert pictures."
B. "In this lesson, you will learn that you can insert pictures by going to the Insert menu, pointing to the Picture menu item, and then clicking on the From File command."
C. "After successfully completing this lesson, you will understand that a picture can be inserted by going to the Insert menu, pointing to the Picture menu item, and then clicking on the From File command."
D. Choices B and C will produce equally superior results.
E. None of these choices is likely to provide a significant benefit.

Correct Answer: Sixth Letter: BCEABDA

Learning objectives create effects when they provide specific information that learners can place in memory. Choices B and C both provide information about how to insert pictures, whereas Choice A only tells learners that they will be able to insert pictures.

An educational specialist is designing a program to teach people how to dance the tango. Which of the following instructional objectives, after being presented to learners before a tango lesson, will be most beneficial in helping the learners successfully lead the tango? (Note that in this type of dancing there is a leader and a follower.)

A. "After successfully completing this lesson, you will be able to lead the follower's steps to create a comfortable, smooth walk."
B. "After successfully completing this lesson, you will be able to lead the follower's steps to create a comfortable, smooth walk at least 95 percent of the time."
C. "After successfully completing this lesson, you will be able to lead the follower's steps gently but firmly to create a comfortable, smooth walk."
D. None of the first three choices is likely to produce significantly better performance than having no learning objectives at all.
E. None of the first three choices is likely to be significantly better than any other the others.

Correct Answer: Second Letter: BEDABDA

Learning objectives create cognitive effects that learners may have difficulty utilizing as they learn physiological movement skills. Choices D and E are equally viable. One could argue that Choice D is correct because the learners may not find the learning objectives useful in helping them translate the cognitive notion into physical action. On the other hand, Choice E is plausible as well because all of the choices are likely to be similar in their ability to get learners to remember that the goal of the lesson is to create in followers a comfortable, smooth walk. Note that in this case, the learning objective is more likely to have an effect if it is presented to learners alone instead of with a dozen or so other learning objectives. If there are too many such learning objectives for movement skills, learners are likely to think in a very algorithmic, step-by-step manner, instead of in a manner that is comfortable and smooth. For those who might still be arguing for the additional benefits of Choice C, the extra "gently but firmly" is not really descriptive enough, nor does it really encapsulate all of the actions necessary to successfully lead someone. For example, learners also need to (1) have footwork that keeps the beat, (2) have their feet move from parallel to crossed and back appropriately, (3) look in the direction where they are going, and (4) move forward, stay in place, turn right, and turn left, all while keeping the follower walking smoothly.

A class on computer programming is developed with instructional objectives. Two different variants of objectives are tested for their effectiveness. In which class will the learners learn more and be able to perform better?

A. 1. When programmers need to branch their programs based on a particular decision criteria, they will use If-Then-Else statements. When they do this, they will work toward writing programming code that (a) doesn't create error messages, (b) is visually comprehensible by other programmers, and (c) is clearly documented.
2. Learners will be able to choose between several methods of branching, including If-Then statements, If-Then-Else statements, and If-Then-Else-If statements. Learners will indent Then and Else statements. Learners will document If-Then-Else statements by stating why they are using them, describing the If evaluation that is being done, and explaining where the Then and Else branches are going (or what they're doing).
3. To evaluate how proficient our learners are in using If-Then-Else statements, we will have an independent review of one day of their programming work, chosen at random within 2 and 4 weeks after the end of the course. We will consider each learner to have succeeded if his or her code produces no error messages, and if both independent judges evaluate the code with a score of at least an 8 out of 10 on a scale that measures the visual comprehensibility of the code, and a 7 out of 10 on a scale that measures how well the code is documented to enable others to understand the code.

B. 1. Learners will be able to use If-Then-Else statements to branch their programs, and they'll be able to determine when If-Then-Else statements are more-or-less appropriate than If-Then statements and If-Then-Else-If statements.
2. Learners will indent the Then statement and the Else statement to enable other programmers and themselves to easily comprehend the code based on a quick visual inspection.
3. When learners use an If-Then-Else statement, they will document why they are using it, describe the If evaluation that is being done, and explain where the Then and Else branches are going (or what they're doing).

C. Using instructional objectives from both A and B is likely to produce the most learning and the best performance.

Correct Answer: Fifth Letter: BCABCAB

In developing a training course, it is best to use performance objectives to guide the behavior of the developers and learning objectives to guide the learning and performance of the learners. Choice A represents a set of performance objectives, including an overarching performance objective, a specific performance objective, and a performance benchmark. When developers have clear and effective goals, they work better together and produce better training courses. Choice B represents a set of learning objectives that are specific enough to aid student learning. When learners are presented with learning objectives before they learn, they remember the material better and thus their performance is improved.

A training class on how to manage a diverse group of people uses 3 overarching performance objectives, 9 specific performance objectives, and 12 learning objectives. Who will be a better manager at the end of the class?

A. Learners who are presented with the 3 overarching performance objectives, the 9 specific performance objectives, and the 12 learning objectives at the beginning of the day.
B. Learners who are presented with the 3 overarching performance objectives and the 9 specific performance objectives at the beginning of the day.
C. Learners who are presented with the 3 overarching performance objectives at the beginning of the day.
D. Learners who are presented with the 12 learning objectives at the beginning of the day.
E. Given the subject matter, all learners will perform about the same.

Correct Answer: Sixth Letter: BCAECDA

The learners who are presented with learning objectives will be guided to pay attention to relevant material and will have a better chance to integrate the new information into memory. Performance objectives are generally ineffective in this regard. Moreover, the more objectives presented to learners, the less likely each objective is to produce an effect.

Which type of performance objective (as exemplified in the examples below), when used by trainers to design a course, will produce the best on-the-job performance by the learners?

A. "Learners will be able to produce a newsletter using the Adobe Publishing Collection. Learners will produce a department newsletter within the first two weeks of returning to the workplace. Learners will meet this objective when they perform successfully to a 90 percent criteria."
B. "Learners will be able to produce a three-page newsletter using the Adobe Publishing Collection when provided with five pages of material. Learners will use graphics, text, and white space to create a visually appealing document that is well written, both grammatically and stylistically. The course instructor will judge the learner's final project."
C. "When creating a newsletter, learners will use an average of at least 25 percent white space on each page to create a visually appealing product.
D. All of the above choices will produce equally superior results.
E. Choices B and C are likely to produce equally superior results.

Correct Answer: Fourth Letter: BABECDA

Performance objectives can be used either to set out a broad goal or to outline a very specific goal. Both are necessary. Overarching performance objectives enable developers to have a clear sense of the big picture and encourage them to be creative in reaching this goal. Specific performance objectives clarify the details that will be learned and enable instructional developers to communicate clearly with each other and hold themselves accountable. In this case, Choice B does a nice job as an overarching performance objective and Choice C does a nice job as a specific performance objective.

Which type of learning objective (as exemplified in the examples below), when presented to participants at the beginning of a lesson, will generate the best performance?

A. Providing the following learning objective ten minutes before the lesson begins: "When you have successfully completed the lesson, you will be able to lead a brainstorming session that promotes creativity."
B. Providing the following learning objective two hours before the lesson begins: "When you have successfully completed the lesson, you will be able to lead a brainstorming session that promotes creativity by maintaining an enjoyable and non-evaluative environment."
C. Providing the following learning objective one day before the lesson begins: "When you have successfully completed the lesson, you will be able to lead a brainstorming session that promotes creativity by maintaining an enjoyable and non-evaluative environment, encouraging people to offer provocative ideas, and making sure that everyone is contributing."
D. All three choices are likely to produce similar results.

Correct Answer: Sixth Letter: DABACBD

This question involves two critical factors, the specificity of the learning objective and the time between the presentation of the learning objective and the learner's encounter with the related learning material. Learning objectives are most beneficial when they are specific and meaningful. Choice C offers the most useful information, while Choice A offers the least. Learning objectives are most powerful when the delay between the objectives and the learning is shortest. Choice A offers the shortest delay and Choice C offers the greatest delay. In this case, Choice C's one-day delay is likely to be too long to create learning effects. Choice A simply doesn't provide much useful information at all. Choice B is arguably the best choice. It provides some useful information, and its two-hour delay is unlikely to create too much loss of the learning objectives' effects. Because two factors are being varied and because we don't yet know the relative strengths of these two factors or how they might interact, Choice D may also be a worthy choice.

Nurse practitioners attend a seminar on nutrition. Which of the following, when presented at the beginning of class, will generate the best performance when the practitioners see patients with menstrual discomfort?

A. The statement, “Vitamin B6 has been shown to reduce menstrual discomfort.”
B. The question, “What vitamin has been shown to reduce menstrual discomfort?
C. Both will produce equal results.

Correct Answer: Fifth Letter: ABCBABC

Questions can generate searches of memory that guide learning behaviors and provide a place in memory for learned information to be integrated. However, in this case, the learning objective in Choice A provides more information than the unanswered question of Choice B. If Choice B’s question would have been answered, “The vitamin that has been shown to reduce menstrual discomfort is B6,” then it would have produced similar results to the learning objective in Choice A.

The Lieutenant Electric Company offers a course to its electricians on how to analyze electrical circuit faults. The course consists of the use of oscilloscopes and voltmeters. Which of the following designs will cause the information on voltmeters to be more poorly recalled than if no instructional objectives are presented?

A. Overarching performance objectives are presented to the learners that focus on both oscilloscopes and voltmeters.
B. Overarching performance objectives are presented to the learners that focus on oscilloscopes only.
C. Learning objectives are presented to the learners that focus on both oscilloscopes and voltmeters.
D. Learning objectives are presented to the learners that focus on oscilloscopes only.
E. Choices B and D will produce equally poor results.
F. Choices B, D, and A will produce equally poor results.

Correct Answer: Sixth Letter: EFACEDB

Overarching performance objectives are generally written at such a high level of abstraction that they have no effect when presented to learners. Thus, in this question, Choices A and B are not likely to create worse performance. Learning objectives, if written appropriately, can have very powerful learning effects. However, because they guide attention toward some aspects of the learning material and away from the other aspects, they can actually hurt learning on some material. In this question, Choice D is likely to guide learner attention toward the information on oscilloscopes and away from information on voltmeters.

At the Big Dollar Financial Group, employees are regularly sent on month-long work assignments outside their normal work area. The company calls these "Cross Trainings" because they believe that they are excellent opportunities for people to learn about different aspects of the business and to increase interdepartmental communication. One manager goes so far as to give his employees a list of "things to learn" before they go off to their Cross-Training. The manager sends this list to employees in an email twice a week while employees are doing their Cross-Training. What is likely to happen to this manager's employees?

A. They will learn the same information as employees not given such a list.
B. They will learn more than employees not given such a list.
C. They will learn more of the information on the manager's list than employees not given such a list.

Correct Answer: Fifth Letter: CABACBA

By creating these information-acquisition goals, the manager is likely to direct his employees' attention to specific aspects of the information environment. Although this type of effect is not as strong as learning objectives, it utilizes a similar mechanism, focusing learner attention and enabling information integration into memory. Choice C is very likely to occur, and Choice B is a strong possibility as well. Employees given such a list are more likely to learn information on the manager's list. They also may learn more information than people who don't have such a list because they'll have better memory for items on the list. Of course, there is the danger that the list may focus learner attention away from important information as well. Obviously, the key to the success of the manager's list is the relevance of the items on the list.

The Commerce Department plans to train census workers on how to approach people to gather information from them. A set of well-written learning objectives is developed. Because of the large numbers of people from all over the country who have to be trained, several different methodologies are used to train the workers. Which of the following methodologies will produce the best learning on the material relevant to the learning objectives?

A. Learning objectives are presented to learners before they begin a computer-based training program.
B. Learning objectives are presented to learners before they begin a multimedia training program.
C. Learning objectives are presented to learners before they begin an instructor-led class.
D. All three choices will produce equal results.
E. Choices A and B are likely to produce equally superior results.

Correct Answer: Second Letter: CEBACDE

Learning objectives affect the attention of learners. If the learning material is self-paced, this gives learners more opportunity to selectively attend to different parts of the learning material. Research shows that different instructional media produce similar results. Thus, Choices A and B are likely to produce more learning on the information related to the learning objectives because both are self-paced.

A multimedia program is developed that trains people to paddle a kayak. During the program the narrator says, "To use your paddle as a rudder, keep the full paddle blade in the water behind you." Which of the learning objectives below is most likely to get the learners to pay attention to this part of the article when they read it?

A. "Learners will be able to use their paddle to steer the kayak."
B. "Learners will be able to use their paddle as a rudder to steer the kayak."
C. "Learners will be able to use their paddle blade as a rudder to steer the kayak."
D. Both B and C will produce equally superior results.

Correct Answer: Fourth Letter: BACDCBE

The more similar the learning objective is to the targeted information in the learning material, the more likely the learning objective will be accessed in memory and utilized to prompt additional attention to the relevant learning material. Learning objectives rely on their surface characteristics to produce their effects. To reiterate, the words used in the learning objective can make all the difference; it's not just the underlying meaning that counts. Of course, minor variations in wording are not likely to make much of a difference especially if the critical words do not differ. Choices B and C both include the key words "paddle" and "rudder" and "steer" so that the addition of the word "blade" in Choice C is not likely to produce additional benefits.

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Review Questions

The questions below are the original questions presented in the report. You may find it valuable to answer these questions one to two weeks or more after you finish reading the report. Such a process will help you solidify your knowledge of the topic. Don't just skim the questions, but answer them with high levels of attention and intention. Don't look ahead to the answers—such a process will short-circuit your learning efforts. If you really want to supercharge your learning, apply the key learning point of each question to your on-the-job instructional-design issues.

1.
A small-appliance-repair class utilizes 5 overarching instructional objectives that describe the behavior participants should be able to perform at the end of the class. Each of these overarching objectives is supported by 15 specific instructional objectives. For example, one overarching instructional objective reads, "Given realistic cases, the participant will be able to diagnose and repair all 10 of the most typical causes for power failures." One of the specific objectives reads, "When confronted with soiled conductor interfaces that reduce electrical flow, participants will appropriately clean both conductor surfaces to improve the electrical flow." Who will perform better at the end of the class?

A. Learners who are presented the 5 overarching instructional objectives at the beginning of the course.
B. Learners who are presented the 15 specific instructional objectives at the start of each section of the course.
C. Learners who are presented with both types of objectives: 5 overarching objectives at the beginning of the course and the 15 specific instructional objectives at the start of each section of the course.
D. Choices A and C will produce equally superior performance. Specific instructional objectives add little to learning.
E. Choices B and C will produce equally superior performance. Overarching instructional objectives add little to learning.

Correct Answer: Fourth Letter: ADBECDA

The learners who are presented with specific instructional objectives will be guided to pay attention to relevant material and will have a better chance to integrate the new information into memory. Overarching instructional objectives are ineffective in this regard, although they can be useful to guide the development of instruction.

2.

Which type of performance objective (as exemplified in the examples below), when used by instructional developers to design a course, will generate the best participant performance overall?

A. When confronted by unwanted persuasive messages, learners will resist being persuaded by those messages at least 75 percent of the time.
B. When confronted by unwanted persuasive messages in their role as managers, learners will resist being persuaded by those messages at least 75 percent of the time.
C. When confronted by unwanted persuasive messages in their role as managers, learners will utilize appropriate persuasive techniques to resist being persuaded, including reviewing counter-argumentation, recognizing the persuasive intent of the message, and delaying action on the issue.
D. Learners will understand that targets of persuasive messages can be inoculated against those messages by being introduced to counter-arguments before being exposed to the persuasive message.

Correct Answer: Fifth Letter: BABDCDA

Performance objectives that most clearly specify the desired learner behavior will produce the best instructional design.

3.

Which type of learning objective (as exemplified in the examples below), when presented to participants at the beginning of a lesson, will generate the best performance?

A. "When confronted by unwanted persuasive messages, learners will resist being persuaded by those messages at least 75 percent of the time."
B. "When confronted by unwanted persuasive messages in their role as managers, learners will resist being persuaded by those messages at least 75 percent of the time."
C. "When confronted by unwanted persuasive messages in their role as managers, learners will utilize appropriate persuasive techniques to resist being persuaded, including reviewing counter-argumentation, recognizing the persuasive intent of the message, and delaying action on the issue."
D. "Learners will understand that they can resist unwanted persuasive messages by thinking of counter-arguments to their own position before being exposed to the persuasive message."
E. Choices B and C will both produce the best performance.

Correct Answer: Sixth Letter: DABECDB

Learning objectives are most effective in facilitating learning when they are specific and include information that is directly related to the point to be learned.

4.

Which of the following, when presented to learners before instruction begins, will generate the best learner performance on a later test for the meaning of the word "occlude"?

A. The statement, "Learners will learn the synonym for the word occlude."
B. The question, "What is the synonym for the word occlude?"
C. Both will produce equal results.

Correct Answer: Third Letter: ABCBABC

Questions can generate searches of memory that guide learning behaviors and provide a place in memory for learned information to be integrated.

5.

A performance consultant is designing a course for new crane operators and is developing learning objectives to facilitate proficient crane operations. Which of the following learning objectives will aid the performance of the learners?

A. "Learners will be able to use their feet to control the foot pedals so that the momentum of the crane arm will move the wrecking ball to the target at the appropriate velocity."
B. "Learners will understand that the momentum of the wrecking ball will carry it beyond the swing of the crane arm."
C. "Learners will understand the importance of momentum in controlling the swing of the wrecking ball."
D. Choices B and C will produce equally superior results.
E. Choice B will produce some positive benefits over the other two choices, but is likely to have only a small impact on performance.

Correct Answer: Third Letter: BCEABDA

Learning objectives create cognitive effects that learners may have difficulty utilizing as they learn physiological movement skills.

6.

The HydroCar, Inc., Training and Performance Department is designing a four-week intensive training course on hydrogen engines. The company's instructional designers have learned to write good learning objectives, but although everyone agrees on the objectives, a debate ensues about when to present them to the training participants. Thanks to the wise leadership of the department, they decide to randomly assign trainees to four groups and see who performs better after the training. Which of the following methods will produce the best performance?

A. Sending out the learning objectives to learners two weeks in advance of the program.
B. Providing the learning objectives for each week to the learners at the beginning of the week.
C. Providing the learning objectives for each day to the learners at the beginning of the day.
D. Providing the learning objectives for each half-day topic to the learners at the beginning of the topic.
E. Both B and C will produce equally superior results.

Correct Answer: Sixth Letter: BCEABDA

Learning objectives create memory traces that are accessible. Because accessibility depends upon recent activation, learning objectives should be presented to learners close to the time of the learning.

7.

The Wheat-From-Chaff Milling Company has developed a training course for its machine operators, complete with well-written learning objectives. The course contains two topic areas that are taught together, "Threshing" and "Grinding." The instructional designers wanted to have these taught in tandem because both processes are inherently related to the final output and the company wants to keep the workers focused on pleasing their customers. If only the learning objectives for Threshing are presented to the learners before the course, what is the most likely outcome?

A. After the course the information on Threshing will be better recalled than if no learning objectives had been provided.
B. After the course the information on Grinding will be better recalled than if no learning objectives on Threshing had been provided.
C. After the course the information on both Threshing and Grinding will be better recalled than if no learning objectives had been provided.
D. After the course the information on Threshing will be better recalled than if no learning objectives had been provided, and the information on Grinding will be recalled at the same level of proficiency as if no learning objectives had been provided.
E. After the course the information on Threshing will be better recalled than if no learning objectives had been provided, and the information on Grinding will be recalled worse than if no learning objectives had been provided.

Correct Answer: Fifth Letter: EBACEDB

Learning objectives guide attention toward some aspects of the learning material and away from the other aspects.

8.

The Learning Organization Group (LOG) provides consulting to help organizations capture knowledge and facilitate informal workplace learning. One of their more creative junior associates suggests that they use the learning-objective concept to help produce workplace learning. The senior partners are skeptical but decide to allow a pilot test. Which of the following work groups is likely to perform most proficiently a month after the pilot test?

A. The group that continues working as usual.
B. The group that reminds itself during weekly meetings of the importance of working together and performing proficiently.
C. The group that meets once a week to create a list of things they'd like to know but that they don't know currently.
D. The groups in Choices B and C will achieve equally superior levels of performance.
E. All groups will have equal levels of performance.

Correct Answer: Fifth Letter: CEBACDE

By creating a list of items that are unknown, workers can essentially create learning objectives for themselves and their work groups that enable them to attend more selectively to stimuli in their workplace environment that are relevant to the concerns they've outlined.

9.

Which of the following types of instruction is most likely to be facilitated by well-written learning objectives?

A. Learning that is self-paced by the learners.
B. Learning that is not self-paced.
C. Both will be facilitated equally by learning objectives.

Correct Answer: Second Letter: CABCBAB

Learning objectives affect the attention of learners. If the learning material is self-paced, this gives learners more opportunity to selectively attend to parts of it.

10.
Learners are assigned an article that contains this sentence: "Leaders are most successful when they include their direct reports in decision-making." Which of the learning objectives below is most likely to get the learners to pay attention to this part of the article when they read it?

A. "Learners will understand that as managers they should work to enable their subordinates to have input into decisions."
B. "Learners will understand that as leaders they should include their direct reports in the decision-making process."
C. "Learners will include their workers in the decision process."
D. All of the above choices will produce similar results.

Correct Answer: Sixth Letter: BACDCBA

The more similar the learning objective is to the targeted information in the learning material, the more likely the learning objective will be accessed in memory and utilized to prompt additional attention to the relevant learning material.