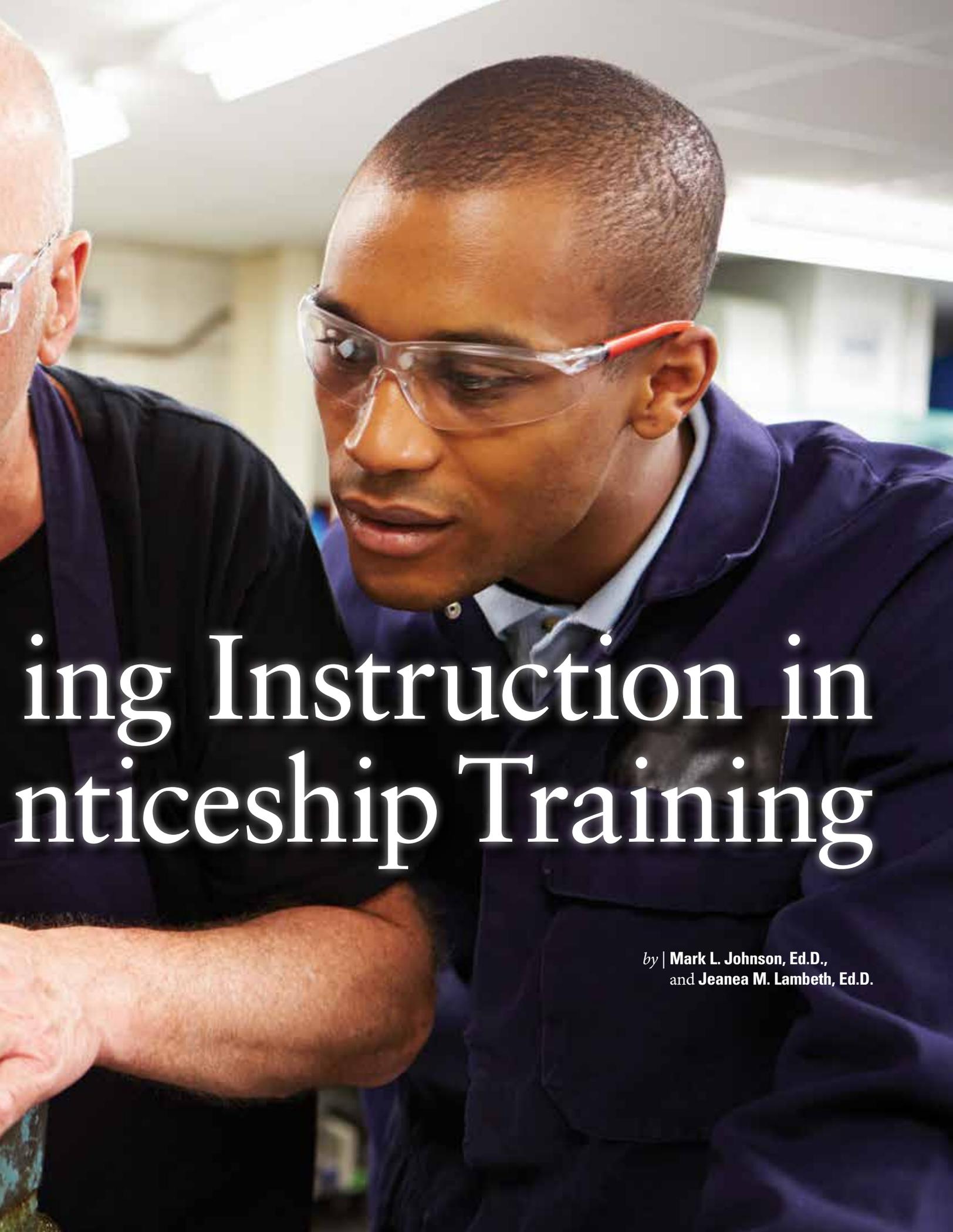


A close-up photograph of a man with glasses and a black t-shirt operating a drill press in a workshop. He is looking down at a metal workpiece being drilled. The background is slightly blurred, showing other workshop equipment.

The authors believe a relatively small adjustment in how instructors teach technical skills to apprentices might help apprentices reach proficiency more quickly and efficiently.

# Redefin Appre

A photograph of two men in a workshop setting. The man in the foreground is a Black man with short hair, wearing clear safety glasses with orange temples and a dark blue polo shirt. He is looking intently at something out of frame to the left. To his left, the side of another man's head and shoulder is visible; he is wearing glasses and a dark blue shirt. The background is a brightly lit industrial or workshop environment with various pieces of equipment and a ceiling with recessed lights.

# ing Instruction in nticeship Training

*by* | Mark L. Johnson, Ed.D.,  
and Jeanea M. Lambeth, Ed.D.

**A**pprenticeship training for years has accepted the instructional method of instructor demonstration, student demonstration and then feedback. That method seems logical and has been somewhat effective. However, researchers have discovered that model may have a flaw involving the delay between when students receive instruction and are expected to successfully perform a task—a problem that can be overcome by adjusting the instructional process.

A time-tested curriculum design, recently modified and used in the Train the Trainer program at the International Alliance of Theatrical Stage Employees (IATSE) Training Trust Fund, may have wider implications in career and technical workforce development and apprenticeship training.

IATSE uses a modified version of the ADDIE (analysis, design, development, implementation and evaluation) model, which addresses development of competence as it relates to workforce development and behavior change. Research has shown that a person develops competence through thoughtful interaction with the learning environment.<sup>1</sup> A person's behavior and motivation to become competent increase as he or she successfully completes training activities and gains confidence.

A person's motivation or intention to perform proficiently is directly tied to the individual's attitude, the social aspects of a situation and the perception of the task or skill.<sup>2</sup> Studies have shown that when an individual is given clear and structured examples of expected behavior, he or she is more mo-

tivated and will perform at the expected capacity. By providing immediate feedback, a trainer sets the groundwork for behavior change and fostering competence at expected tasks.

### The ADDIE Model

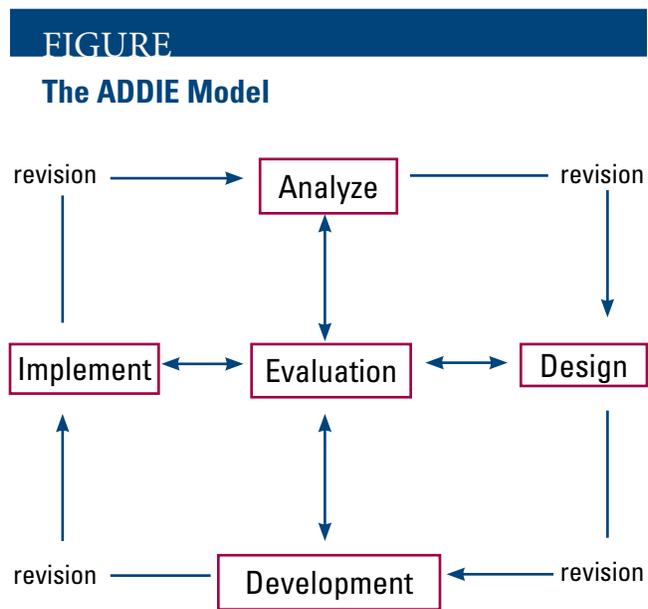
Professional competence in the workplace has always been a factor in the efficiency of industry and in the military. In fact, the ADDIE model was first used by the U.S. armed forces in the 1970s at Florida State University.

The separate parts of the model are:

- **Analysis:** In the first phase, the challenge of the course is detailed and objectives or learning targets are established. The learner skill level is identified.
- **Design:** The second phase addresses the issues of learning objectives/learning targets, content, assessment instruments, student exercises, subject matter analysis, lesson planning and media selection so that the training reaches an optimal outcome. The training will follow an orderly, logical process toward completion of the course or curriculum.
- **Development:** The content and any of the media needed are created for instruction. All student learning activities and practice exercises are developed.
- **Implementation:** The course or training is implemented according to the curriculum that has been designed. Teachers and trainers are challenged to implement the activities and introduce the content necessary for a student to gain the skill at a level of proficiency that has been predetermined by the industry or the accrediting body.
- **Evaluation:** Throughout the ADDIE model, evaluation takes place after each phase of the process and through a final evaluation.

Later, all U.S. armed forces branches adapted and used the ADDIE model, and it frequently has been used and modified as a best practice for curriculum development and instruction in the private sector. The biggest attraction to this model is its flexibility for use in both individual and traditional group instruction.

This article focuses on the implementation phase of the ADDIE model. The authors believe that a change or shift in how technical skills are taught can shorten or eliminate an effect described as *educational latency*. They have studied how the model has been modified in training provided by the IATSE Training Trust Fund for its Train the Trainer program.



When an instructor is teaching a new task or skill, he or she should see a change in how well the student performs skills and tasks. A change in behavior seems to be the most important aspect of this shift in instruction. Therefore, in the context of preparing employees to be considered proficient and competent in the performance of their jobs, the *way* instruction happens is paramount.

### The Four-Step Teaching Method

The accepted method for teaching technical skills involves four steps identified by Wilbur R. Miller in 1961.<sup>3</sup> The learner:

1. Must know the steps of a procedure to be followed and the physical motions necessary to perform
2. Should understand the purpose of each step and the relationship between steps that determines the sequence
3. Should be guided through an initial performance correctly and successfully
4. Must practice the physical and mental steps until the process becomes automatic.

In 2009, Miller identified the four key elements to demonstrating a skill for students:<sup>4</sup>

1. Preparation—emphasizing the relevance of the lesson and motivating the student to learn the skill
2. Presentation—demonstrating the steps necessary to complete the task
3. Application—providing an opportunity for the student to apply the new concept
4. Evaluation—assessing student performance of the task.

While it is clear that the four-step method is the standard for teaching technical skills to students, one factor that has not been included in the conversation is educational latency. Simply defined, *latency* is the difference in the time that a concept is taught and when the student applies the concept.

In 1932, Edward Tolman<sup>5</sup> indicated that latent learning occurs when an individual acquires knowledge of something but does not show it until motivated to do so. He suggested that the key to learning and reinforcement was motivation, or getting the person to *want* to do the behavior. He also indicated that people learn not only by repetition of elements of a task or skill, but also through making mistakes. Tolman contends that through making mistakes and being given immediate proper feedback, the learner will retain the skill or task with precision that is expected for exhibiting proficiency and competence in the task or skill.

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In most learning environments, a majority of students will demonstrate a skill successfully after observing an instructor; however, several will not. Until now, this has simply been understood as a normal part of the teaching process. The authors challenge this notion by asking the question, “Is there a way we can teach a skill so that all the students get it right the first time?”

### A Shift in the Way Instruction Happens

As has been discussed, the accepted standard for teaching includes the teacher demonstrating the skill while the students observe. Then students demonstrate the skill while the teacher observes them. The teacher then provides feedback and revisions as needed. The expectation is that the students will successfully perform the skill after the demonstration. The amount of time that may have passed before students demonstrate the skill could be minutes, hours, days or even weeks after receiving instruction. This period of time is when educational latency occurs.

The challenge here is for the students to remember what was demonstrated, in perfect detail, and perform it proficiently. This is the normal expectation by instructors, who become frustrated when students cannot perform the task or skill or when instructors need to reteach the skill because several of the students didn’t seem to “get it” the first time it was demonstrated.

The authors propose a twist on the demonstration process within instruction of technical skills—to change *when* students are expected to perform the task. Rather than teaching an entire skill all at once, an instructor would teach a single step of the task being taught. The students would then demonstrate that same step while the instructor checks for understanding

**TABLE**

**Results From Las Vegas IATSE Pretest/ Posttest Experiment 2015-2016**

Test Site 1			
Student	Pretest	Posttest	Change
1	73	100	27
2	73	100	27
3	55	91	36
4	73	100	27
5	73	100	27
6	46	91	45
7	28	91	63
8	19	100	81
9	55	100	45
10	73	100	27
11	82	100	18
12	73	91	27

Test Site 2			
Student	Pretest	Posttest	Change
1	73	100	27
2	64	100	36
3	19	100	81
4	46	100	54
5	28	100	72
6	100	100	0
7	82	100	18
8	91	100	9
9	73	100	27
10	55	100	45
11	64	100	36
12	73	100	27
13	37	100	63

and corrects mistakes as needed. Once each student has completed the step successfully, the instructor would teach the next step of the task and repeat the process for each step. The authors understand that this concept poses several challenges for instructors and requires a total shift in how teaching happens.

An example of this would be a carpenter teaching students to cut a 2x4 to a specific length. Instead of showing the students the whole process and then having the students do it, the instructor would first show them how to measure the board. Then each student would measure a board. After the instructor saw that each had measured correctly and provided the necessary feedback, he or she would show students how to mark the board, then have them mark it and so on until they have successfully completed all of the steps needed to cut the board accurately.

Evidence from a recent study conducted at an IATSE training center in Las Vegas, Nevada demonstrates this concept and the shift in “how” instruction happens.

The data in the table show a comparison of two different methods for teaching an introductory electrical class on skills such as wiring a basic circuit. In both cases, the content and the instructor were the same, as were the pre- and posttests for each site. In Test Site 1, the instructor used the traditional four-step technical training method:

1. He introduced the skill to students.
2. He demonstrated the skill for students.
3. The students then demonstrated the skill for the instructor.
4. The instructor assessed their performance. As the results shown in the table indicate, while all 12 students improved their scores, only seven of the 12 got a 100% on the posttest.

In Test Site 2, the instructor made an adjustment in teaching by combining steps 2 and 3. In this scenario, the teacher taught a single step and had the students perform that step while he modeled the performance. He immediately checked their performance and provided feedback when a correction needed to be made. Once everyone was on the same page, the instructor moved to the next step and continued until the entire skill was completed. When the students of this group took the posttest, all 14 students got 100%.

**Conclusions, Implications and Recommendations**

Apprenticeship trainers will be more efficient and effective by shifting their teaching methods to the modified version of

**takeaways**

- In preparing employees to be considered proficient and competent in the performance of their jobs, the way instruction happens is paramount.
- The traditional way of teaching technical skills to apprentices may result in some students having to be retrained in a skill because by the end of instruction they aren't able to perform it proficiently.
- The ADDIE model—analysis, design, development, implementation and evaluation—is flexible enough to be used in both individual and traditional group instruction.
- Studies show that by giving students immediate feedback after they perform each step of a skill being taught, a trainer fosters competence at expected tasks.

the instructional process. This also will provide the best opportunity for students to learn the skills necessary to be successful in their trade in the most efficient manner possible.

The implications of educational latency in training and instruction for the IATSE Training Trust Fund's Train the Trainer Program could be important when thinking about how much time has been spent in reteach mode during instruction. Rather than spending time reteaching the lesson, instructors could be teaching advanced skills much sooner.

This research could also have important considerations for the concept of perfect practice. By following the proposed instructional shift in teaching technical skills, instructors can guarantee that all students have practiced the skill successfully the first time they attempted to demonstrate the task or skill. All further practice would be based on what they performed correctly the first time. For the apprentice, this means mastering skills faster, which will help them be more productive and move forward in the certification process for their trade. For the instructor, it means shifting the timing of student demonstration and providing feedback to correct mistakes sooner rather than having the students wait to perform the task until the instructor has completed the entire process, possibly saving materials and equipment, as well as—most importantly—time. 🗨️

### Endnotes

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### bios



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