

Success Factors in Technology Training

Logical Operations®

Harvey D. Feldstein and Terry Boothman

Transcribed (with permission) from Transferring Training to the Workplace, ASTD, 1997

.....
Experienced trainers with Logical operations®, a pioneering computer training firm, conducted a three-Phase research project over several years to identify reasons for significant differences in levels of transfer among their participants. First, they identified eight factors that distinguished participants with high levels of transfer from those with low levels. They then confirmed these findings among colleagues in the computer training community. Finally, they studied a pilot transfer support intervention with a group of trainees and their managers and found dramatic increases in transfer levels over those expected based on earlier research.
.....

The Productivity Paradox

In 1982 a few forward-thinking professors from Rochester Institute of Technology formed a small company called Logical Operations® with the idea of training laypeople to use personal computers. Initially, handfuls of highly motivated early adopters to the technology showed up, eager, even desperate, for knowledge.

By the mid-1980s, the handfuls of devotees had turned into hordes of computer illiterates, who weren't in attendance by choice. Many said things like, "I don't quite know why I'm here; 'They' sent me here for a computer course." Some students were not even sure which course they were to attend and at a midmorning break would sheepishly tell the instructor, "I think I'm in the wrong course. We don't do Lotus at our place."

This case was prepared to serve as a basis for discussion rather than to illustrate either effective or ineffective administrative and management practices.

At the same time, disturbing research began to surface about these wonderful productivity tools littering our desks and our conversations. An article in *PC Week* quoted Steven S. Roach, a senior economist at Morgan Stanley, as saying "There are only scattered examples where a strategy of technology acquisition can be associated with improved productivity performance. In the broad scheme of things, ...success stories turn out to be the exceptions rather than the rule" (Karon, 1987).

Roach and others pointed out that over the previous 10 years, U.S. businesses had spent up to a trillion dollars on personal-computer (PC) hardware, software, peripherals, and support services and had little to show for the investment. In 1980, prior to the introduction of the PC, productivity was growing annually at a rate of 3.3 percent. At this rate, productivity would double in about 20 years. By 1990, after spending upwards of a trillion dollars on technology-based productivity tools, productivity growth had dropped to 1 percent. At this rate, it would take 80 years to double productivity. And to make matters worse, the bulk of that trillion dollars was spent in the service sector where productivity growth declined even faster. Nobel laureate Robert Solow, former Xerox chief information officer Paul Strassman, and others confirmed the gloomy research.

This was grim news for the authors, who had been dedicating their lives to PC training. Clearly, if nothing good was happening, their efforts must have been less than wildly successful. Was it possible that the skills they so carefully taught were not being applied back on the job? Was it possible that all those great skills were rotting in the great abyss of extinction?

They began regular informal surveys of Logical Operations® key clients. The questions were simple: What has changed since your people acquired these PC skills? Have processes been improved? Are people more productive? Are there any bottom-line effects, such as a need for less staff, increased output, or decreased support needs? Some clients reported dramatic results. More typical, however, were reports that although they felt the training quality was

excellent, they had noticed no particular changes or improvements since the training. In fact, many clients reported that they were not aware of any particular changes since the PCs were installed. More than a few managers reported that in spite of training and good intentions, a large percentage of the people who had PCs didn't use them at all or significantly underused them.

In addition, the bad press continued to pour in. *Business Week* ran a cover story called "The Productivity Paradox: Why the Payoff from Automation Is Still So Elusive" (Pennar, 1988). *Info World* published a survey titled "CEOs Question Value of Investments in Information Systems" (LaPlante, 1988). And on the training front, Timothy Baldwin and Kevin Ford published the results of a study that concluded that "while American industries annually spend up to \$100 billion on training and development, not more than 10 percent of these expenditures actually result in transfer to the job" (Baldwin and Ford, 1988). Their conclusion seemed to be that not only is it doubtful that organizations will get any value out of massive technology investments, but also that they can't count on training to remedy the situation. Chances are that both will fail to make a significant change in the organization.

In spite of all the doom and gloom, people continued to buy PCs and (thankfully for us) to come in droves to Logical Operations® PC training classes. And significantly, regular surveys of students and their managers started revealing an interesting pattern. Although many students were not applying much of their training when they got back to work, some students were charging back to work eager to build new spreadsheets, create newsletters, automate databases, and streamline word-processing tasks. The big questions were obvious and compelling: What made some learners so successful at transfer, while others seemed to languish? What could be learned from these high-transfer learners? Could it be taught to others?

Research Project 1: Critical Success Factors

The authors' first research project, begun formally in 1989, was designed to answer one critical question about PC training and productivity: What kinds of events, attitudes, and behaviors before and after technology training seem to have the most impact on long-term retention, application, and satisfaction? It was significant that although many clients had reported that not much seemed to happen after training, some reported dramatic change and tremendous satisfaction with the results. The key question became: What was different about these high-performance PC users? They went to the same training and used the same hardware and software as the average user, but both they and their managers reported significantly more productivity change. Would it be possible to identify pre- and post-training factors that were unique to this group?

The first task was to identify what percentage of students effectively applied the skills they learned in class on the job. How many could report that productivity had changed and that a process had been improved? Once this high-performing group was identified, the authors, as researchers, needed to discover what, if anything was different about them. What happened to them that did not happen to the average learner?

Methodology

The research methodology began with two focus groups, totalling 18 people, who were involved in management and delivery of training. From information gained in the focus groups and a review of the literature, the researchers created a 24-item survey instrument. The instrument was designed to elicit information about the following four distinct areas:

- demographics-such as job title, prior PC and software experience, and type of experience
- pre-training events and behaviors-what kinds of things happened before coming to PC training (for example, did the trainee have a computer and program in hand, did the trainee have set expectations?) post training events and behaviors - what kinds of things happened after attending PC training (for example, did management take note of the training and arrange for the trainee to practice the new skills?)
- change measures, or performance improvement measures.

The research design was simple: to identify learners who reported significant change after training (high-performance learners) and to find demographics and pre- and post training events and behaviors that correlate with so-called high performance. The researchers reasoned that if they could find one or more factors with significantly high correlation to high performance after training, they might then be able to advise organizations on appropriate measures to take to ensure maximum value.

The researchers surveyed 355 learners who had taken an introductory Lotus 1-2-3 class, using Logical Operations® training materials, at least three months but not more than six months prior to survey distribution. They chose Lotus 1-2-3 because the course had large volumes of trainees with diverse demographics and because the software has extensive possible uses. Survey recipients had not taken advanced Lotus 1-2-3 training. The sample included only learners from large organizations: Fortune 500 companies, utilities, and major banks. The researchers received 212 completed usable surveys, for a respectable response rate of 60 percent.

To identify high-performance users, the questionnaire asked participants to rate each of five survey questions related to performance on a five-point scale. The subject matter of the questions suggested by the focus groups included the following:

- Are you now performing old tasks better or faster than before training?
- Are you performing new tasks that you had not attempted before?
- Have you found new and valuable uses for the course information?
- Are you more productive than you were before training?
- Are you satisfied with your ability to use the software?

Survey recipients scored these items as "1" (no/low) through "5" (yes/high). The total possible score was 25. High-performance users were defined as those who scored at least 20 points (four or above on all items). Approximately 15 percent of the sample (32 of 212) fell into this group. Low-performance users were defined as the 15 percent (32 respondents) with the lowest number of points on the five change-indicator items.

Results of Research Project 1:

The typical Logical Operations student in the sample could be described as follows:

- had one year of PC experience .had full-time use of a PC
- worked closely with others using Lotus 1-2-3 .requested the training
- wished he or she had been trained sooner
- felt that the training was valuable. ...

In terms of Job titles, the sample had the following diversity:

- technical, 30 percent
- secretarial, 24 percent
- managerial, 13 percent
- professional, 13 percent.
- production, 13 percent
- financial, 7 percent.

Several factors had no significant correlation to high performance. How the learners felt about the training, whether they requested the training or were sent by supervisors, how they felt prior to training, and even how they reacted to the classes had little effect on their application of skills. Researchers also found that length of PC use, job title, and supervisors knowledge of the software had no influence on the learners' performance.

To determine which pre- and post-training behaviors, attitudes, and events correlated most significantly with high performance, researchers correlated all 24 items from the survey against

all other items. They also cross-tabulated the items based on the change factors for high and low performance described above. In addition, all items were assessed for significance by using both chi-square and t-tests. Eight interrelated factors showed high positive correlations. Figure 1 shows the first four items that describe learner attitudes and behaviors prior to and following training.

Figure 1. Learner attitudes and behaviors.

	<u>High-performance learners</u>	<u>Low-performance learners</u>
Reported exploration or use of software prior to training.	72 percent had experience with the software prior to training.	5 percent had experience with the software prior to training.
Before training, had a clear idea of how to apply the skills taught in the class.	100 percent had at least some idea.	53 percent had no idea,
After training, had 3 or more practice sessions per week following training.	62 percent practiced three or more times per week following	10 percent practiced three or more times per week training.
After training, were aware of many ways to apply the new skills they had learned on the job.	93 percent saw many places to apply new skills.	26 percent saw many places to apply new skills.

The next four items (figure 2) describe the learners' perceptions of the attitudes and behavior of their supervisors or managers.

Figure 2. Learner perceptions of manager and supervisor attitudes and behaviors.

	<u>High-performance learners</u>	<u>Low-performance learners</u>
Learners' managers or supervisors had reasonable expectations for performance change after training.	75 percent reported reasonable supervisor expectations	75 percent reported no supervisor expectations
Learners' supervisors or managers had adequate knowledge understanding of how the learners would use the software.	83 percent reported manager or supervisor had adequate knowledge and understanding	0 percent reported manager or supervisor had adequate knowledge and understanding and
Learners felt supported by management in their learning and growth using the software.	80 percent felt well supported	40 percent felt well supported
Management had noticed and communicated about productivity and process changes since the training.	62 percent reported that supervisor had noticed and communicated about change	0 percent reported that supervisor had noticed or communicated about change

The Manager Factor

The eight factors described above all correlated significantly with reported productivity improvements. In addition, the eight factors clustered tightly; each was a strong predictor for the other. The more factors that a respondent answered positively, the more likely it was that the respondent fell into the high-performance learner group. The eight factors can be viewed as two interconnected sets of principles in which one is related to learner behavior, the other to managerial behavior. Based on these survey data, it is clear that the behaviors of the learner and the manager or supervisor are predictive of learner success in applying skills on the job and improving productivity or processes, or both.

For the purpose of simplicity and ease of use, the eight factors can be consolidated into the following six critical steps - three for managers and three for learners - to ensure learning success:

THREE STEPS FOR LEARNERS: These guidelines can be adapted easily to non-technical training courses as well.

1. Explore the software (subject matter) before attending the class. Look at the documentation or go through the tutorial. Talk to other users to get an idea of what the software does and how it can be applied. Explore the menu options and function keys. Take a "guided tour" with an expert in the organization. A variety of approaches can raise a prospective student's awareness of the content. Pre-class reading, practice, and awareness exercises are simple and effective.
2. Before training, develop clear ideas about how to apply the skills learned in class. Talk to other users in the organization to see how they are using the software productively. Schedule meetings with managers or supervisors to discuss how the software might contribute to increasing your productivity. Look at the various work processes you engage in on a regular basis, and ask how the software might be applied to improve one or more of those processes. After class, make a list of the possible ways the software could be used to improve a process or product.
3. All training is perishable, so practice the skills learned in class. Practice should begin the day following training, if at all possible, and should take place at least one hour per day, three times per week, in the weeks following training. Practice can be self-directed or guided by a trainer, manager, or colleague. If the class falls at a time when practice will be impossible, then consider rescheduling the class to another time.

THREE STEPS FOR MANAGERS AND SUPERVISORS OF LEARNERS: These steps can also apply to non-technical training courses.

1. Make sure that the preceding three steps for learners are communicated and understood. Follow up to make sure that steps 1 and 2 are completed before class. If these steps are not completed, then it is unlikely that the skills learned will be applied in any systematic way.
2. Develop and communicate clear and reasonable performance expectations. Learning is a critical part of any change model. For training to be effective, however, the learner must clearly know what needs to change. It is very likely that this vision of change is the most powerful determinant of successful training. A collaborative effort of a learner and a manager is most likely to be successful in developing that vision into reality. The manager or supervisor must have (or acquire) sufficient knowledge of the software's potential and the learner's intended or assigned uses of the software to engage in this development process.
3. Develop and communicate measures of success. Reward success. Success measures need not be complex or statistical. In Logical Operations® research, high-performance learners reported that managers noticed change and supported it. The level of complexity or sophistication of the measurement may not be nearly as important as having some measure that makes sense to both the manager and the learner, and offering follow up and support.

Research Project 2: Colleagues' Agreement

The six steps passed all the authors' statistical tests of significance, plus one more crucial, non-statistical test-the test of reasonableness. It seemed that it all made great sense. Three

questions then emerged:

- Would technical training colleagues agree that these six factors are important determinants of training success (transfer)?
- Are these training colleagues performing systematic interventions to make sure that these six steps are practiced by learners and managers?
- Do technical training colleagues feel empowered to create such interventions?

Methodology and Results

In 1991 the authors mailed a survey to over 5,000 technical trainers listed with the Association for Computer Training and Support. Approximately 2,000 usable surveys (40 percent) were returned.

Results were dramatic. Close to 80 percent of these technical trainers agreed that the six factors were important determinants for and predictors of successful transfer. However, only 22 percent reported that their companies had a systematic intervention for ensuring that learners and managers engaged actively in the steps. Perhaps most distressing, only 14 percent of the trainers reported that they felt empowered to design and install such an intervention. In other words, technical trainers reported that they knew what to do, that their companies didn't do it, and that it would be pretty well useless to try to change the situation!

Research Project 3: A Training Transfer Intervention

The first research project confirmed that high levels of transfer weren't accidental. High performance correlated strongly with a set of fairly predictable pre- and post-training behaviors. The second project confirmed that the first research results were no surprise to training colleagues. Just about everyone seemed to know how to get high levels of transfer, but few training organizations acted on this knowledge. A third research question emerged: Is it possible to cause high performance? Can interventions move people into the high-performance group?

Phase 1 of the third research project (carried out in 1992-1993) was sample selection. As a training vendor, Logical Operations® had an active telephone registration line, which it used to select the sample from first-course Excel students. The researchers chose this course because of the number of students registered and the timing of the offering in respect to the research project. Excel registrants were asked if they would be willing to engage in a research project designed to help them get full value from the training they had just selected. They were told that the project would involve several hours of work before and after class, that they would be asked to complete a survey three months after the class, and that the intervention required few trainees turned down the offer, and most were enthusiastic about it. The researchers contacted the managers and were again surprised that most readily agreed to participate. Twelve learners and their managers were identified for this part of the research project.

Based on the previous research, it could be assumed that 15 percent of these learners, approximately two, would be high-performance learners with no intervention on our part. The question for the researchers was: Could they create an intervention for learners and managers that would significantly increase the number of reported high-performance learners?

Methodology

At least one month before training, all participants and their managers received a brief written explanation of the prior research and a set of guidelines describing the critical steps to training success. We reduced the six factors to five because the first factor-making sure that learners explored material in advance, knew how they would apply new skills, and had practice opportunities after training was implicit in this research. A copy of these guidelines is included as figure 3.

Figure 3. Planning for successful training guidelines for supervisor and trainee.

1. Exploring the software.

There is much evidence that some kinds of learning before going to class can help build better job skills. Preclass learning can make you more familiar with the material and eliminate the confusion that sometimes occurs in a classroom.

What you can do:

Get a feeling for the way the software works. Look at the menu or command structure, the basic features of the product, and so forth. Software manufacturers often provide guided tours, demonstrations, or tutorials that may be just right for this purpose. You also could get someone who knows the software to show you a few samples of what they do. !

Get a feeling for basic vocabulary or main ideas. Examples: in Lotus 1-2-3 you need to learn the nature of the "electronic worksheet," the idea of a "formula," the notion of "automatic recalculation," and so on. In your word processor, you may need to get a sense for basic file management, entering text, editing, and navigating a document.

You may find other ways to work with the product before you go to class. Although these activities seem to add unnecessary steps to the learning process, we can assure you they will reduce the time you'll need to make a change in the way you work.

2. Learning exactly how you'll use your training on your job.

Research tells us that when you know the specific ways that training will be applied to your job, the training is far more helpful.

Can you think of one or more ways to apply your new skills to a job-related task?

3. Scheduling practice time.

To get the biggest job benefit out of your new skills, you'll need time to practice applying them. This should be at least a day or two per week, to occur soon after training. During this time you can continue to explore the software and practice what you see fit. If possible, apply your new skills to your job. We strongly recommend that, even before you attend training, you schedule a block of protected practice time to occur soon after the training event(s).

4. Thinking of a way to measure how you'll do your job differently.

You should find a way to measure the new way you do your job after training. Although it isn't always easy to find ways to do this, your measurement will help convince your supervisor, the trainers (and you) that the training was really useful. For these reasons, measuring your new job performance is very important.

In this project, you might count things like: number of new reports created per week, or hours saved per PC-related task. Another approach is to log the number of hours of "productive" computer time per week. (You'll have to define "productive.") Can you find any other ways of knowing that time has been saved, value has been added, or quality has been improved?

5. Thinking of one or more ways for you to get rewarded for doing a better job after your training.

You should get some recognition for the changes you make after training. Although you may feel good about your new performance, it's a good idea to be sure that others are aware of the positive changes. Different people have different feelings about recognition. Here are some ideas that you may try, but you might want to come up with something that works for you:

- a skills file where your supervisor puts letters identifying new skills that you display .
- a letter of commendation put in your permanent personnel records
- the opportunity to take advanced training in the software in which you show new skills .
- choice of a new assignment or task using your new skills
- being appointed "local expert" in the software, being allowed to help other workers.

You may come up with ideas that work more effectively for you.

Figure 4. Action Plan Summary for learners and their supervisors.

Action Plan
Summary
Training Impact Program

Date: _____

Supervisor's Name: _____

Learner's Name: _____

Date you completed this summary: _____

Both supervisor and learner should participate in completing this summary during your meeting together. Please return the form in the enclosed envelope.

- 1) **Exploring the software.**
What is your plan for allowing the learner to explore the software? How much time is being devoted to this activity?
- 2) **Using your training on the job.**
Can you describe the tasks or products to which the training will be applied?
- 3) **Scheduling practice time.**
How much off-the-job practice time has been scheduled? How has this time been "protected" from job-related interruptions?
- 4) **Measuring the success of training on the job.**
How will you know whether the training is making a difference in the learner's job? What would you use to show someone else this difference?
- 5) **Getting recognition for doing a better job after training.**
How will the learner be recognized or rewarded for successfully applying new skills on the job?

Each team of learners and managers met in the manager's office with one of the researchers for a one-hour session about the importance of pre- and posttraining work. Most of the hour was used coaching the learner and manager on the five critical factors and helping them create an action plan for each of the factors. The action plans took the form of contracts that the learner and manager agree to. A sample action plan contract form is included as figure 4.

The interviews concluded with a reminder that a researcher would be in touch in three months to see how they did.

Results

Three months after the training event, learner and manager were surveyed, using a slightly reworked form of the survey used in the first research project. Again, the results were dramatic.

First, all of the groups significantly increased the amount of attention placed on pre- and post-training activities. Using the baseline data gathered in the first research project, one could expect that approximately 20 percent of the sample would engage in anyone of the particular pre- or post-training

behaviors. Less than 20 percent would actively engage in multiple pre- and posttraining behaviors.

In this experimental sample, everyone worked on at least two of the five factors, and more than half the groups attempted some work on all five!

And equally important, three quarters of the learners entered the high-performance learner category, based on responses from both learners and managers.

Both learners and managers also reported high levels of transfer. Nine managers (75 percent of the sample) reported that the learner was now "substantially more productive" than before attending the class. In a time when the business value of training is being questioned, these data can provide a powerful statement about training and what is required to make it truly beneficial.

Conclusion

Transfer is not accidental. It can be predicted, and it can be engineered. Training professionals can create and support systems that, with cooperation from learners and their managers, virtually guarantee high levels of transfer. It is clear, however, that the training professional's role and mission must be expanded. Skills acquisition and concept formation are not sufficient to help organizations make substantive change. Professional trainers must begin to take an active role in the change-management process. Training and support are a part of the process, but they are only a part.

The research and suggestions outlined above can be adapted to create the beginnings of a change-management process that is built around training and technology. Training organizations must step up to the challenge and take the lead in this area. Logical Operations® has had great success using the five guidelines for learners and managers and the Action Plan

Summary

It is more than clear that the traditional "spray-and-pray" model of training doesn't work. It's up to knowledgeable training professionals to propose and support the use of transfer strategies with their clients and customers. Educating all stakeholders about the barriers to transfer and helping them develop tailored support strategies will make a significant difference (Broad and Newstrom, 1992). Two major benefits occur: The organization or the individual learner, or both, achieve important performance improvement goals, and the training consultant gains credibility as a strong professional resource. Together, these constitute real success.

Discussion Questions

1. Which of the six factors identified in Research Project 1 do you believe is the most significant? What leads you to that conclusion?
2. What prevents most training organizations from installing systems that would ensure that the six steps from Research Project 1 are practiced before and after training?
3. Why do trainers feel so disempowered?
4. Although the third project was successful as research, what are the major problems with wide-scale application of its methodologies? What suggestions could you make to overcome these obstacles?

The Authors

Harvey D. Feldstein is an internationally recognized author, speaker, and consultant in the areas of training, learning, and performance. For the past 20 years he has been consulting with organizations and designing systems to help facilitate learning, transfer, and the accomplishment of worthy business goals. Harvey currently serves as and Director and Principal Consultant for The Centre for Learning Innovation, a consultancy focused on design and implementation of innovative training and

performance solutions. Formerly he was director and principal consultant at Appcon in Sydney, Australia, and Vice-President of Ziff-Davis Education in Rochester, NY (now Element-K)

The author and subject of numerous journal articles, his most recent publication is Making Training Work: Innovative Methods that Achieve Measurable Results, published by Ziff-Davis Education. He also conceived, researched, and authored two exhaustive study of e-learning in Australia (Appcon, 2001 and 2003). In addition, Harvey has been a presenter, facilitator, and keynote speaker at numerous conferences, seminars, and workshops in Australia, Asia, the US, and Canada.

Harvey's has consulted with numerous corporate and government organizations over the past 15 years. He has designed and implemented programs in leadership, customer service, sales training, sexual harassment, work life balance, as well as numerous computer skills training courses.

Currently Harvey's interests and areas of practice include leadership, virtual classrooms, mobile learning, re-shaping mental models, action learning, the development and use of imagination in organisational settings, and the creation of sustainable environments for human and organizational development. Harvey can be reached at harvey@learning.au.com.

Terry Boothman, Novation learning Systems, is an author, researcher, consultant, and speaker with nearly 25 years experience in the fields of education, training, and adult learning. His expertise ranges from applied behavior analysis to performance technology and instructional design. In the past 10 years, he has traveled throughout North America presenting seminars on a variety of topics including training design and evaluation and training effectiveness. Terry has published dozens of articles and professional papers in his field. He independently developed and, in 1996, released a multimedia training product for the general market. He can be reached through his Web site at <http://novalearn.com> and through e-mail at writer@frontiernet.net.

References

Baldwin, Timothy T., and Kevin J. Ford. "Transfer of Training: A Review and Directions for Future Research." *Personnel Psychology*, 41, 1988, 63-105.

Broad, Mary L., and John W. Newstrom. *Transfer of Training: Action-Packed Strategies to Ensure High Payoff from Training Investments*. Reading, MA: Addison-Wesley, 1992.

Feldstein, Harvey and Terry Boothman, *Making Training Work*. Rochester, NY: Ziff-Davis Education, 1998

Karon, Paul. "America's Computer Gamble: Has It Paid Off" *PC Week*, December 8, 1987.

LaPlante, Alice. "CEO's Question the Value of Investments in Information Systems." *Info World*, March 7, 1988.

Pennar, Karen. "The Productivity Paradox." *Business Week*, January 26, 1988.

