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New Directions in Census Training

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Abstract: The United States decennial census of population and housing poses unique challenges for the training of enumerators. In 1990, approximately 449 district offices and 400,000 temporary workers will be required to complete all phases of the census. Because of the complexity of the census and diversity of the work force, a major concern is the delivery of standardized training across the United States. This paper describes approaches for training a dispersed work force that have been under development during the past 10 years at the United States Census Bureau. The rationale for different approaches, results of evaluations, and plans for the future are also discussed.

Key words: Training; job aids; simulations.

1. Introduction

The purpose of this paper is to describe training approaches used by the United States Census Bureau as part of its Decennial Census of Population and Housing. This paper will briefly review past approaches to training, discuss constraints that affect the delivery of training, and then describe new training approaches either in use or being considered for use.

This paper focuses on training designed for enumerators (interviewers), rather than office or clerical workers simply because enumerators comprise the largest group of census workers and pose the most serious problems for delivering standardized training across the United States.

Enumerators perform a variety of functions in the census. Since the decennial census is conducted primarily using the mail and self-enumeration forms, some of the major activities of enumerators are to prepare and update lists of mailing addresses, assign geographic codes to addresses, correct and update maps, telephone households for missing or inconsistent information, locate addresses and complete a census questionnaire for those households that failed to return one, and participate in evaluation and coverage studies.

2. Past and Current Approaches for Delivering Training

As recently as 1950, the U.S. Census Bureau relied on experts or "master trainers" who traveled across the United States to train field staff. Specifically, these master trainers trained supervisors who then, in turn, trained their staffs. Although successful at the time, this approach had its disadvantages. Most notably, the master trainers complained of "burn out" from their exten-

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sive duties and travel. In addition, informal feedback indicated that the quality of the training degenerated when trainers, other than the master trainer, delivered subsequent training.

As the decennial census increased in complexity and size, the master trainer approach became unworkable. Instead, in censuses since 1950, the primary approach for delivering training has been a highly structured training guide which is designed to be read verbatim to a group of trainees. Verbatim training guides are developed at headquarters and then sent to the census offices where supervisors use them to train their staffs. This approach enables training to cascade to the lowest levels and for the Census Bureau to accomplish several goals:

1. Conduct training concurrently across the United States
2. Deliver standardized training content
3. Enable supervisors to train their own staffs

This last objective is considered especially important because of the value of group spirit and team work in completing the difficult field work of a census. Training in small groups led by the supervisor creates the opportunity for enumerators to get to know their supervisor and to develop ties with their fellow workers.

3. What Constraints Affect the Delivery of Census Training?

There are several. They include the population of census workers, the size and logistical complexity of the census itself, and the decision to allow supervisors to train their staffs.

3.1. Population of census workers

Up until the 1960 census, the U.S. Census Bureau could rely on a large, well-educated pool of potential census workers – the American housewife who, for the most part, was out of the work force and was willing to work temporarily in the census. However, since 1960, there has been a dramatic change in the participation of women in the work force.

As recently as 1960, 46% of American women were housewives (Russell (1985)). By 1984, that figure was only 20%. Less than 11% of women today are the stereotypical housewife – a married woman, not in the labor force, with children at home. Therefore, the pool of workers we once relied upon to conduct the census is shrinking dramatically, and we expect this trend to continue.

Also, unlike other countries, the U.S. census does not have ready access to government workers, school teachers, the military, or the like for conducting the census. Instead, we recruit in the local labor market to fill jobs that typically last two to six weeks. Moreover, applicants must pass a selection test which establishes minimum requirements for literacy and mathematical skills. Although the requirements are minimal, many applicants fail the test. As a result of these factors, the U.S. Census Bureau is faced with an enormous task to recruit the approximately 400,000 temporary workers it will require to staff 449 district offices in the 1990 census.

Based on our experiences in 1980, the staff we recruit in 1990 will be characterized by diversity, and many will come to training with little knowledge of the objectives and value of the census. Recruiting, motivating, and retaining enough staff will be an ongoing problem. For example, in some inner-city areas of New York City in 1980, staffing never exceeded 65% of the desired levels due to recruiting problems and turnover.

3.2. The census's size and complexity introduce constraints

The commitment to deliver standardized, concurrent training across the United States means that there may be as many as 18,000 separate training sites for our largest census operation. To control costs we attempt to obtain free training space whenever possible. Although we do prescribe minimum requirements that the space should satisfy (e.g., lighting, space, etc.), in reality, the quality of space obtained varies widely.

Finally, the decision to allow supervisors to train their immediate staff means that most of our trainers will be inexperienced and many will lack good training skills.

4. Disadvantages and Advantages Associated with Structured Training Guides Read Verbatim

The most glaring problem associated with a training guide read verbatim to a class becomes apparent after only a few minutes. Many trainers lack good platform skills and deliver a non-conversational, monotonic, unenthusiastic reading of the material. As a result, trainees may have trouble paying attention and concentrating on the important topics.

Other problems with such training guides include an over reliance on lecture for communicating ideas, lack of instructional variety, lack of individualized practice, poor choice of language for different types of trainees (the training is not tailored to different types of groups), and training sessions that typically last an entire day. This latter problem means that fatigue, information overload, and wandering attention become serious problems for census trainees. As a result, learning suffers.

A more subtle drawback to the approach involves the process used to prepare materials. Almost all census field training is developed with the assumption that a reference manual or handbook will be needed to perform the job properly. For the 1980 census, reference manuals and training guides were prepared by different staffs of writers. For example, a reference manual or field handbook would be prepared by one writer and then given to another writer who would prepare the training.

Unfortunately, this separation of responsibilities impeded communication and sometimes resulted in a manual which was difficult to use in the training or on the job. This problem will be discussed in more detail later.

Given these drawbacks, a legitimate question is "Why persist with this training approach?" The reason is that structured training guides do have advantages which, in most situations, outweigh the disadvantages.

As advantages, structured training guides are relatively easy to prepare, revise, and distribute. Skilled writers are necessary, but they only need to know instructional design and have good writing skills.

The importance of "ease of revision" cannot be underestimated. Census procedures change frequently to adapt to operational and, occasionally, changing political pressures. Accordingly, there are always last-minute changes that have widespread ramifications in training packages. These can be accommodated relatively easily in paper-and-pencil approaches to training. But just as importantly, they can be reviewed relatively quickly by subject-matter experts.

Also, as noted previously, census training cascades to the field worker. Consequently, there simply are not enough skilled trainers available to cover the thousands of dispersed training sites. A structured training guide is a compromise to sending out a

"master" trainer. Our reasoning is: if you cannot send out the master, then send out what the master would have said.

Finally, structured training guides are one of the least expensive alternatives available for training census workers, which raises the questions: Why deliver such structured training at all? Why not use a self-study or semi-structured briefing delivered by the supervisor? Wouldn't that be adequate for the relatively simple jobs involved in a census?

Although appealing because it would be a simple solution, research conducted by the U.S. Census Bureau (Hansen, Hurwitz, and Bershad (1961)) has clearly demonstrated the effect of enumerators on the variability of census statistics. In fact, this effect is so pronounced that it was one of the major reasons cited for going to a mail census to help eliminate some of the bias attributed to enumerators.

More recent research conducted by Billiet and Loosveldt (1988) also reveals the importance of training. In this study, training was varied for two groups of interviewers. One group received only elementary instructions, whereas the other group received extensive training. Billiet and Loosveldt found that the better trained interviewers obtained higher response rates and more information for selected types of questions. Specifically, the effects appeared to be greatest on question types that required the most activity from the interviewer. This research confirms the U.S. Census Bureau's belief that comprehensive, standardized training helps reduce bias and variability.

5. Strategies for Simplifying Training

There are two basic approaches to simplifying training: either the job can be simplified or the training materials and approaches can be simplified. To adapt to a shrinking pool of highly qualified census workers, the U.S. Census Bureau has been pursuing both approaches.

Our most important goal with respect to job simplification is to design jobs suited to the people we are able to recruit. However, we also realize that training does not occur in a vacuum and that the success of training depends to a large extent on the adequacy of follow-up supervision. With this consideration in mind, the U.S. Census Bureau has implemented management approaches unique to a census environment. These include approaches such as required daily contact between a supervisor and enumerator, daily payrolls, small spans of control for field staff, and the use of automated reporting systems. Since these approaches are not of immediate concern in this paper, the interested reader is referred to Mockovak, Ellis, Hill, and Marshall (1987) for a more detailed discussion.

The simplification of training has been attempted through a variety of approaches which will be discussed next.

5.1. Use of job aids

A review of manuals prepared in 1978 for the 1980 census revealed two general problems: information was difficult to find in the table of contents, and when it was found, it was difficult to read and understand. The cause of these problems was poorly designed manuals written for the wrong audience.

In an attempt to improve access to technical information and enhance the comprehensibility of that information, an instructional technology known as job aids (Lineberry and Bullock (1980)) has been used extensively in preparing 1990 census training materials.

The theoretical rationale behind job aids is that these specially designed formats serve

as storehouses of information that do not need to be covered extensively in training. Trainees can refer to the job aids for guidance during training or while working, instead of relying solely on memory. Accordingly, training is simplified and job performance is enhanced.

Evaluations of the use of job aids have shown that inexperienced maintenance workers using job aids were able to outperform more experienced workers using traditional reference materials (Foley (1973)) and that training designed around the use of job aids received higher ratings than traditional training on a variety of attitudinal measures and led to increased use of a census manual on the job (Mockovak (1981)).

A simple definition of a job aid is that it is anything that helps a person perform a job – or perform it better. In the U.S. Census Bureau, it has taken on a more precise meaning: the presentation of clear, concise, and accessible technical information through the use of plain English and special formats, such as checklists, decision tables, and flowcharts. The formats selected have been shown to lead to more effective learning (Lineberry and Bullock (1980)). Job aids present information that typically would be presented using paragraphs of printed text. For example, such as those that appear in this paper.

Figure 1 presents a simple checklist. Such checklists are in common everyday use. Although this one uses only words, checklists can be enhanced by using graphics or illustrations. Checklists typically are the most common type of job aid format used in census reference manuals.

Another type of job aid, which also has proven useful, is the decision table. Decision tables identify different conditions, situations, or problems that a worker may encounter and which lead to different actions. Typically, a middle column is also used in the table which adds additional information or qualifying information. The table shown in Fig. 2 was developed as a troubleshooting aid for interviewers using computers in their work. The actual decision table was much larger.

Fig. 1. Illustration of a simple checklist (From Lineberry and Bullock (1980))

1. Preheat oven to 425 degrees.
2. Fold back the foil covering the dessert.
3. Place the frozen dinner in the oven on a middle rack.
4. Remove the dinner after 35–40 minutes.
5. Remove the foil and serve.

The third type of job aid in common use is the flowchart, as shown in Fig. 3. Flowcharts graphically identify decision points and lead the user to subsequent actions. The symbols used to identify decision points in a flowchart are arbitrary. The job aid shown in Fig. 3 is just an example; it does not represent an actual procedure from the U.S. census.

In general, many enumerators initially find decision tables and flowcharts harder to use than a checklist. Therefore, our training is designed to introduce simple examples of the formats and then explain how to use them. In addition, any combination or variation of the three basic job-aid formats can be used depending on the need.

Although this discussion has focussed on the appearance and format of job aids, an equally important consideration is the process used to develop them.

The U.S. Census Bureau is presently using an approach for developing census training which either requires the same person to prepare both the manual (job

Fig. 2. Illustration of a simple decision table

Problem	Possible Cause	Solution
Message "The escape key was pressed, Cancel, Ignore, or Suspend?" appears	Pressed Esc key	1. Type "I." 2. Press return.
Computer on, nothing shows on screen	Screen controls	Adjust contrast & backlight
Computer on, message "disk boot failure" appears	Diskette not inserted right	Reinsert the diskette
Computer on, message "non-system disk or disk error" appears	Defective diskette	Use spare (yellow) diskette
Computer requests the date & time	Defective diskette	Use spare (yellow) diskette

aids) and the training guide or, if done by different people, to develop the manual and classroom training concurrently. The intent is to have the writers communicate freely and to design job aids that can be used in both the training and on the job.

The most important advantages of this approach are that writers and subject-matter experts work closely together to identify critical job tasks and information, clarify ambiguities in procedures, and design job aids that simplify learning and job performance. A study which evaluated this training approach in the context of the 1980 census (Mockovak (1982)) found that more effective classroom training resulted, and that job-aid manuals were better accepted and used more frequently on the job. This study has led directly to the increased use of job aids in materials being prepared for the 1990 census.

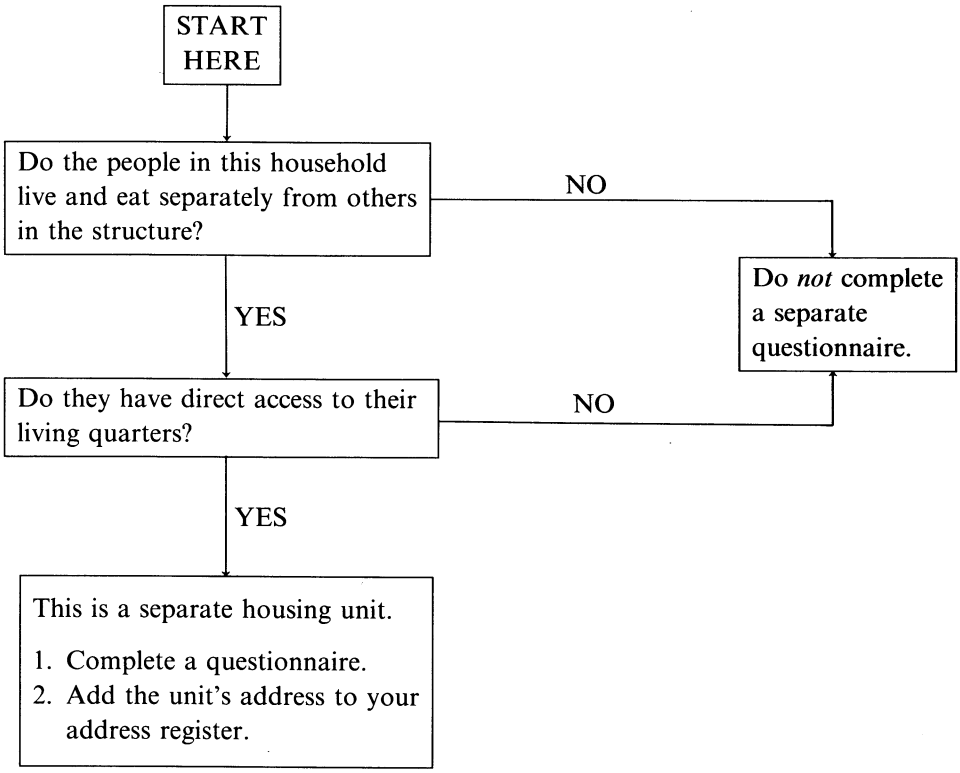
5.2. *Improved training designs*

The disadvantages of verbatim census training were summarized briefly in a previous section of this paper. Job aids were cited as one strategy for improving training and subsequent job performance because of the enhanced presentation of procedural information, but also because job aids help change the nature of a training session.

Because of the simplicity of job aids, they can be used in individual and group learning activities. Consequently, not only is less lecture required, the resulting training tends to be more active because trainees can learn the job through simulated activities that replace passive listening.

Another phenomenon observed in census training has been called "information overload." This condition results when a trainee can no longer learn new information

Fig. 3. Illustration of a simple flowchart



because of the amount or complexity of information learned previously. This phenomenon most often occurs when training lasts uninterrupted for an entire day and is especially pronounced in the afternoons when fatigue begins to play an important role.

To address the problem of fatigue and information overload, several principles are followed when designing census training. Although these may seem obvious on first reading, our past experience indicated that they often were violated in many training packages. These include the following:

1. Starting with the most basic, simple concepts and procedures and progressing to the most complex or least frequently occurring
2. Increasing trainee participation during training. Implement "learning by doing" or increase "time on task" whenever possible
3. Limiting training sessions, if possible, to a half day
4. Including actual job experience in the training
5. Distributing the training over a period of days

The first principle is a generally accepted guideline in designing any type of training program.

The second principle is based on research (Jernstedt (1982)) which clearly reveals that approaches which increase "time on task" are the most important correlates of training effectiveness. In the context of

census training, you would increase "time on task" by increasing the amount of time spent practice interviewing, completing actual census forms, reading and correcting maps that would be used on the job, and so on.

To combat the fatigue resulting from all-day training sessions, training for certain jobs has been redesigned so that a classroom training session, which once lasted all day, now lasts no more than three to four hours. In addition, as noted, the resulting classroom training is highly participative and relies on techniques for involving the learner (e.g., practice interviews, workbook exercises, discussion groups).

In addition to shorter training days, we have integrated actual job experience into the training design. In a typical training design, a trainee might learn some census procedures in the morning and then go out to work either alone or with another worker (team interviewing) in the afternoon to apply what was learned. Besides less fatigue, this design has other advantages. It shortens the amount of time between learning the material in class and applying the knowledge on the job. Therefore, feedback obtained while working is more meaningful. In addition, "team" interviewing during training provides critical psychological support for a new enumerator and helps ease him or her into a job that can be very stressful and demanding.

The fifth principle stems from a body of psychological research which demonstrates that learning is enhanced and less subject to forgetting when it is distributed over time. For example, a census training session might extend over three days, with training sessions in the mornings followed by actual work in the afternoons.

As noted, this training design leads trainees from simple to more complex procedures and returns them to the classroom where confusion about procedures or concepts can be resolved before training is completed. An advantage of progressing from simple to complex concepts is that the trainee is able to build self-confidence which should lead to less turnover and better performance. Finally, because the trainee returns to class each day, knowledge about local conditions can be discussed and the training can be tailored to a certain extent by discussing local problems and how they should be handled. For example, some training designs block out a specified period of time at the start of each day to discuss problems that occurred the previous day. This helps clear up problems and ambiguities immediately, not after a week or so into the field operation.

Again, this approach should be contrasted with past training approaches in which people were trained in a classroom over a two or three-day period and then sent out to work. On the job training was available after classroom training, as it is in the new design, but it would take days for an overworked supervisor to reach all people and by then bad habits would often be ingrained.

6. Strategies for Enhancing Trainee Participation

Some commonly used methods for increasing participation during training have already been mentioned. A partial list includes: directed questioning by the trainer, the use of practice interviews or simulated job activities, group discussions, role playing, and workbook exercises. In addition to these activities, the U.S. Census Bureau also has been experimenting with the use of self-studies, videobased training, and special simulations for teaching map-reading

skills. These topics will be discussed in turn.

6.1. *Self-studies*

Self-studies have long been a successful training approach. However, their advantages for training census field workers were first demonstrated by the Canadians (Hartney, Huska, Laroche, and Van Baaren (1982)). They found that training presented via self-studies was effective and could lead to cost savings.

Whereas the Canadians have considered replacing relatively large portions of their training with self-studies, the U.S. Census Bureau has taken a less ambitious approach to their use, primarily because of the concern that large numbers of trainees may not complete self-studies prior to classroom training sessions. Accordingly, our self-studies are not designed to present detailed information. Instead their primary function is to set the stage for classroom training by covering very general, but important, background information. As noted, we are not convinced that we will be able to use self-studies successfully in large census operations. Again, our primary concern is that large numbers of trainees will not complete them prior to the classroom training sessions. Future evaluations will determine whether we continue to use self-studies as a home-study approach or if we employ some variation, for example, such as having trainees complete them in class.

One innovation we have attempted with self-studies is the use of a specialized format which extracts important words or ideas and highlights them in the text. The instructional advantages of this approach have been argued by Horn (1976) who has developed a more structured approach called "information mapping." A simple example is shown in Fig. 4.

6.2. *Videobased training*

To this point, all the training approaches discussed have involved "paper and pencil" technologies. However, other possibilities for presenting census training include: cable television, teletraining via satellite, audioconferencing, videobased training (using a VCR and a television monitor), and computer-based training. Although appealing

Fig. 4. Illustration of an information mapping format

MORE THAN ONE HOME	While working, you might encounter someone who has more than one home. For example, someone who lives in a northern state in the summer and in a southern state in the winter. In this situation, ask the person where he or she lives most of the year. If most of the year is spent at the current address, then list him or her on the questionnaire.
VACANT-UHE	An entire household that lives most of the year in another home is called a "UHE." And this living quarters would be classified as "Vacant-UHE." The "UHE" stands for "usual home elsewhere." However, you must still complete a questionnaire for the living quarters.

because these approaches offer potential improvements in training effectiveness, all of them also have accompanying costs. Specifically, they are expensive to develop and revise, they require special development skills, and they pose significant logistical problems when used in the field.

We have investigated many of these alternatives and have focussed on the use of videotapes for training census field workers. However, none of the applications we have developed so far are meant to "stand alone" or to present training in its entirety. Instead, videos have been developed to present overviews, to motivate, to stimulate discussion, and to present topics that are amenable to a video format.

The most significant use of videos in the 1990 census will occur prior to classroom training sessions for "nonresponse" enumerators – those enumerators who will visit addresses to obtain a questionnaire from households which did not return one in the mail.

Our plan for 1990 is to hold large group (200 to 400 people) orientation sessions which will last about two hours and precede classroom training which will be held in dispersed sites for groups of about 8–15 enumerators. These orientation sessions have been designed for urban areas and will serve two specific purposes: to motivate enumerators and to communicate basic messages about the census.

An evaluation of this approach conducted in 1986 (Mockovak (1987a)) arrived at the following conclusions:

1. The orientation sessions had a positive effect on enumerator attitudes dealing with belief in the confidentiality of census data, the uniqueness and value of census questions, and the importance of the 1986 census.
2. Attitudes affected by the orientation training were found to be positively correlated with measures of enumerator performance.
3. Apparently the most important attitudes in terms of job performance dealt with the perceived value of census questions and belief in the confidentiality of census data.
4. Orientation sessions acted as a screening device for enumerators. Of the group of attendees who did not continue with the classroom training, an estimated 26% dropped out after the orientation session once they realized what the job entailed.
5. Orientation sessions pose logistical problems (crowd control, equipment operation) that, if not handled properly, could defeat the purposes of the sessions.

6.3. Use of simulation to teach map reading skills

The ability to use maps is a critical job skill for many census field workers, but it also appears to be lacking in a large part of the American population. Results from a recent survey (Feinberg (1986)) of the literacy skills of young American adults found that 57% could not decipher a street map.

This lack of map-reading skills has been apparent in census training classes and has led us to consider novel approaches to teaching map-reading skills. An approach which we believe has great potential is called the "Geographic Gameboard" or "Abbotsville."

Abbotsville is an imaginary community that was created specifically to teach enumerators to read maps. Abbotsville itself is represented by a map-like drawing. However, unlike a map, it does not use special symbols to represent reality. Instead, the intent was to design Abbotsville so that it was portrayed as realistically as possible.

Therefore, most things that an enumerator would see while canvassing an area are represented with three-dimensional drawings. For example, homes, commercial buildings, apartment buildings, churches, roads, farms, rivers, lakes, and power lines are all obvious and visible, as if the enumerator was a bird flying over the town.

The actual drawing of Abbotsville itself is about 79 cm by 53 cm and is accompanied by a census map that corresponds to the geographic area of the town. Since Abbotsville is a "special" town, it was designed to include many geographic features and living arrangements that we know cause confusion and problems for enumerators. In essence, the Abbotsville simulation lets us teach map-reading skills by having the enumerator canvass a realistic geographic area. Therefore, enumerators can make mistakes and learn from them in the classroom – not on the job.

Evaluations of this simulation have been very positive. Training sessions using Abbotsville maximize "time on task" because trainees learn procedures and skills by using maps. An evaluation test that was used at the end of an early version of the training found high levels of retention of critical job skills and knowledge. Based on these results, the Abbotsville simulation was used to train all enumerators working in prelist activities (these activities develop a list of addresses for the census mail out) for the 1990 census. A detailed discussion of the development of Abbotsville and accompanying evaluations is presented in Mockovak (1987b).

7. Conclusions

Training for census operations in the United States poses a variety of constraints and challenges. Unlike other countries, we must recruit virtually all our workers from the general population. Therefore, census workers come from diverse educational, ethnic, and cultural backgrounds. Moreover, knowledge of the census and its objectives is often deficient and maintaining an adequate work force is almost always a problem.

To meet these challenges, we have not developed a training panacea. Instead, our approach is a multifaceted one that relies on both research, common sense, and a judicious use of new training approaches. Underlying this approach are the following principles which have been discussed briefly in this paper.

1. Simplify training as much as possible, especially emphasizing the use of job aids in reference manuals.
2. Limit training sessions to a half day and incorporate actual job experience into the training design whenever possible. That is, trainees learn in the classroom, apply the skills on the job, then return to the classroom for follow-up instruction.
3. Design training so that the acquisition of knowledge proceeds from the simple to the complex and from the most common to the least common job skills.
4. Emphasize "learning by doing" and increase "time on task" in classroom training either through the use of simulations or other types of participatory techniques.
5. Introduce variety into classroom training in the form of different instructional activities or training approaches (for example, videos, simulations, group discussions, practice interviewing).
6. Build motivational components into all training packages. In doing so, be sensitive to the instructional needs of adult learners.

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