DOCUMENT RESUME

ED 199 561 CE 028 518

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TITLE The Impact of Job-Performance-Aided Training on Training Effectiveness and Job Performance.
PUB DATE Apr 81
NOTE 50p.; Paper presented at the Annual Meeting of the American Educational Research Association (Los Angeles, CA, April 13-17, 1981).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Adult Education; Comparative Analysis; *Guides; Interviews; Job Analysis; *Job Performance; *Job Skills; *Job Training; *Program Effectiveness; Reference Materials; Student Attitudes; *Task Analysis; Teacher Attitudes; Training Methods

ABSTRACT

A study compared job-performance-aided (JPA) training developed for a nontechnical area (census enumerator/interviewer) with training developed using the instructional systems design (ISD) model. (JPA training, an elaboration of the ISD approach, requires redesign of job reference materials into job-performance aids to simplify training and job performance.) Three pairs of census district offices, matched on variables related to difficulty of enumeration, were randomly assigned to the two training methods and used training guides prepared using the two models. Data from 1197 JPA-trained and 1389 control enumerators were available for analysis. Attitudinal data, collected before and after job experience, served as basis for comparison. (Only some collected performance data were analyzed for reasons described.) Both training approaches were very successful in terms of positive ratings by trainees. JPA trainees, however, gave significantly higher ratings of training quality, job preparedness, reading ease of training materials, adequacy of training length, and ratings of specific activities. They also reported significantly higher level of on-the-job manual use and better coverage of critical job tasks during training. Supervisors familiar with both training approaches expressed preference for the JPA training. (Questionnaires, job performance record, and data tables are appended.) (YLB)

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The Impact of Job-Performance-Aided Training on Training Effectiveness and Job Performance 1/

A paper prepared for the 1981 annual meeting of the American Educational Research Association's SIG: Training in Business and Industry

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ABSTRACT

The purpose of this study was to determine the incremental benefits resulting from the use of job-performance-aided (JPA) instruction when compared with training developed using the instructional systems design (ISD) model. Training guides for a non-technical job area, i.e., census enumerator (interviewer), were prepared using the ISD model and the JPA model. Job-performance-aided training is an elaboration of the ISD approach which requires redesigning job reference materials into job performance aids as a means of simplifying training and job performance.

Three pairs of census district offices were matched on variables related to the difficulty of enumeration. The offices in each pair were then randomly assigned to one of the two training methods resulting in three JPA offices and three control offices. Data from 1,197 JPA-trained enumerators and 1,389 control enumerators were available for analysis. Enumerators were responsible for obtaining census information from households which failed to mail back census questionnaires. Attitudinal data, collected before and after job experience, served as the basis for comparison. Performance data were also collected, but for reasons described only a few of them could be employed in the analysis.

Although both training approaches were very successful in terms of positive ratings given by trainees, the JPA approach was consistently better on a variety of measures. Specifically, JPA-trained enumerators gave significantly higher ratings of training quality, job preparedness(after job experience), reading ease of training materials, adequacy of training length, and ratings of specific training activities. Moreover, JPA enumerators reported a significantly higher level of on-the-job manual use (job aid manual vs standard manual) and, after job experience, better coverage of critical job tasks during training. Other analyses indicated that enumerators with prior experience working in the 1980 Census reacted most positively of all groups studied on questions relating to training quality and preparedness. Finally, supervisors familiar with both training approaches expressed a decided preference for the JPA training. These findings necessarily apply only to the six district offices involved in this experiment.

Job reference materials, such as manuals that help an individual perform job tasks, have been an important part of the work place for a long time. However, until the advent of programed instruction and the introduction of models for the systematic design of instruction, relatively little attention was paid to the design features of technical reference materials and their relationship to the psychological characteristics of the user. This situation changed when psychologists, primarily in support of military technical training programs, initiated efforts to redesign technical manuals to reflect principles of human learning and to turn technical manuals into job performance aids (Foley, 1973). The long-range goals of these efforts were to simplify training and the job and to produce technical materials that could be used by personnel with lower aptitudes or weaker educational skills. (Chalupsky and Kopf, 1967).

The purpose of this study was to explore the use of job performance aids (JPA's) in a non-technical job area outside of military technical training. Specifically, in the context of a census interviewer's job the use of job-performance-aided training was compared with systematically designed training using standard reference materials.

Briefly, a JPA can be defined as any information-storage device or memory aid, such as a manual or checklist, that helps a person perform a job better. The present study focuses on the use of paper-and-pencil JPAs; that is, step-by-step descriptions of a job task that are presented in a variety of standardized formats (e.g., checklists, and algorithms).

As Chenzoff (1973) has emphasized, the distinguishing feature of JPA's lies not in their format, but rather in the systematic, task-centered approach used to develop them. JPA's are based on a task analysis and require a careful specification of the following characteristics of each job task: critical task cues, required materials or tools, decision points or questions related to performance of the task, and sequences of behaviors resulting from job decisions. In addition, the development of a JPA also requires that training requirements, as well as the experience and abilities of the user population, be considered.

The development of JPA's, however, is only one step in a systematic effort to improve training and job performance. Ideally, the design of job performance aids and training should be a coordinated, integrated process. After a task analysis, the decision must be made to include a specific job task either solely in training, solely in the job manual, or in both places. Obviously, the more content that can be excluded from training, the shorter and more simplified training could be.

Joyce et al.(1973) list a variety of factors that need to be considered before making the training-manual tradeoff for a particular task. For example, the list (not inclusive) includes ease of learning, ease of communication by book, task criticality, task difficulty, reaction time, task frequency, environmental considerations, safety considerations, consequences of errors, and the number of individuals who perform the

task. Lineberry and Bullock (1980) present some simplified decision rules for deciding if a task should be placed in training or not, but the essential rules are summarized as follows by Joyce et al. (1973). Specifically, tasks that go into training should be difficult to learn on the job, hard to communicate with words, require a great deal of practice, allow little room for error or result in serious consequences if errors are made, not require exorbitant sums of money to train, be performed frequently on the job, not allow time to refer to a manual, and be performed by a large number of individuals in the job area.

On the other hand, suitable tasks for a job aid manual are those that have long and complex behavior sequences, are rarely performed, involve readings and tolerances, can be mentally rehearsed before the need to perform them arises, benefit from the presence of illustrations, require reference information (e.g., tables, graphs, flow charts, schematics), and involve branch-like network of possible actions based on existing contingencie or job conditions. Despite the existence of these guidelines, a decis to include or exclude a task from a manual ultimately depends on the judgement of the training designer.

The development of job-performance-aided training follows easily from the development of the job performance aids and their incorporation into a job aid manual. Since job aids are based on a comprehensive task analysis, individual job aids mirror the performance of actual job tasks and can therefore be used to guide trainees through either individualized or group learning activities. The development of job aids also removes, prior to training, many of the ambiguities in procedures or instructions that might exist in traditional manuals. Accordingly, instruction is simplified both for the trainer and the trainee.

The use of job aids in training also has other benefits. A common problem with traditional manuals is that the performance of a particular task might require the user to access information in two or three different chapters of a manual and then, relying on memory, integrate this information to complete the task. In a job aid manual, on the other hand, all the information for a task should be in one location, if appropriate, with accompanying illustrations. Requiring trainees to use job aids during training also encourages active, skill-based learning, since problems can be posed that require the use of job aids for resolution.

In summary, a job aid manual might have the following characteristics when compared with a traditional manual designed for the same content area: its organization is problem or task oriented (i.e., job conditions or stimuli are used to structure the manual rather than descriptions of the tools or equipment used in the job), there is an increased use of visual illustrations, cross-referencing is minimized, decision points and critical information are identified, standardized formats are used to present task information, a cluttered look is avoided, principles of clear writing are employed (jargon is avoided whenever possible), small performance steps are identified, some information and illustrations are duplicated, the manual's table of contents is designed to encourage accessibility, and the education or experience of the user is taken into consideration.

Although work on the concept of job performa underway for the past two decades, there have been few l ions, and, for the most part, their use has been eval ively in military technical training. For example, studies ntext of military technical training have shown that JPA's ed maintenance personnel to outperform experienced worke l technical manuals (Foley, 1973); that medium-aptit electronics course, which used learner controlled instructio rmed comparably to a group of high-aptitude trainees on ing and field performance measures; that JPA's were well enance personnel whether or not they had input into thei ohnson et al., 1977; Richardson and Syster, 1977); and that used effectively with disparate instructional methods, such ed training or learner controlled instruction (Fredericks and 1977; Swezey, 1977).

The present study, investigated the use n a non-technical area, i.e., census enumerator or interviewer. interest were the incremental benefits that might accrue from the use , over and above those benefits resulting from instruction designed according to principles of instructional system design. Typically, in organizations with large training functions, procedural job manuals are produced independently of training materials. The use of a job-performance-aided (JPA) model for training design, however, requires that manual and training design be accomplished concurrently.

Accordingly, the primary purpose of this study was to compare the relative effectiveness of two training approaches; one developed using only the instructional systems design model (i.e., training and manual developed independently), and the other developed using the JPA model (i.e., training and manual developed concurrently).

Variables of primary interest included attitudes about the quality of training, self-ratings of a trainee's degree of job preparedness, reported use of job manuals, utility of different training activities, training length, ease of comprehension of training materials, and potential job problems. Job performance variables included attrition rates, production and quality control measures, supervisor ratings, and scores on a final review test.

Based on previous research, it was hypothesized that the JPA training would be simpler, more skill-based, and would emphasize problem-solving activities. Specifically, the amount of lecture would be reduced compared to traditional training. Moreover, the JPA materials should be perceived as easier to read and comprehend, the perceived quality of training should be equal to or better than the control training, fewer job problems related to poor training should be expected or experienced, and the adequacy of training should be judged better after job experience.

Expected on-the-job benefits of the JPA approach are increased use of the job aid manuals, closer adherence to procedures, and higher quality work.

METHOD

To deliver low-cost, small-group training in decentralized training sites, the Bureau of the Census develops training guides that are designed to be read verbatim to a group of trainees. These verbatim guides reference all required training materials (manuals, workbooks, audiovisuals, and job materials) and provide step-by-step instructions for training activities.

The verbatim training guides are generally used by supervisors (who are inexperienced trainers) to train the individuals who will be working for them. In this study, supervisors used the verbatim guides to train 8-12 persons for a two-day period (about 6.5 hours of actual training time per day).

Supervisors (trainers) received four days of training one week prior to the enumerator training session. During their training, supervisors received exactly the same training that they would be delivering to their crews of enumerators.

Training Materials

Two separate verbatim training guides were developed; one for the JPA training, and one for the standard or control training.

To insure consistency between the training guides, the author of the JPA training worked closely with the authors of the control training. Accordingly, both training guides used similar training aids and workbooks, although individual activities in the workbooks differed significantly because of the use of different job manuals. At a minimum, both training approaches were based on a task analysis derived from procedural manuals and interviews with experts in the job area, workbook exercises were job-oriented and geared to training objectives derived from the task analyses, criterion-referenced performance checks were employed throughout the training, small-group exercises were used to teach interviewing skills, audiovisuals were used to cover critical job concepts, and a final review test was used at the conclusion of each training approach.

Although there were many commonalities in the training approaches, the use of a job aid manual resulted in several significant differences. First, the JPA guide required approximately 25% less lecture time by the trainer. Although this resulted in an immediate time savings, the additional time was used in the JPA approach to include more skill-based exercises, provide more thorough coverage of critical job tasks, and include a remedial session at the conclusion of training for those persons failing to obtain a pre-specified criterion score on a final review exercise. Therefore, the JPA and control training approaches were designed to be approximately equal in length.

Another difference between the two guides was the comparative frequency of inserted trainer questions designed to encourage or test trainee comprehension of concepts. In the JPA guide, such questions occurred, on the average, every 176 words, whereas in the control guide, the frequency was once every 293 words.

Finally, the JPA guide could be compared to the control training guide in terms of the relative emphasis placed on individualized or group-centered learning activities. Seventy percent (70%) of the JPA training activities were individualized versus 56% for the control approach.

Subjects

Subjects were 2,586 adults (over 18) from six census district offices; two in the Northeast and four in the Midwest. All participants were required to pass a selection test that covered basic reading and math skills.

Only one type of training was used in a given district office. Accordingly, there were 1,197 persons trained using the JPA guides and 1,389 trained using the control guide.

Procedure

Training was scheduled to be conducted at the same time for all trainees, but unexpected field problems caused delays of as much as a week in certain offices. In no offices, however, did the training exceed two work days.

At the conclusion of training, subjects in both the JPA and control approaches completed final review tests and an anonymous end-of-training questionnaire (see Appendix A). After approximately 2-3 days of job experience, a similar, but expanded attitude questionnaire (see Appendix B) was again completed by the participants. Supervisors were instructed to obtain questionnaires from all enumerators, even those who were released prior to 2-3 days of job experience.

Since the primary job of a census enumerator (interviewer) in this study was to obtain census information from households which failed to mail back their census questionnaires, this particular job was expected to last only three-four weeks. In some offices, however, the actual time period was closer to two months. All enumerators were supposed to be paid piece-rate for each questionnaire completed, but field problems resulted in each office paying some of their enumerators an hourly wage instead.

During the period of employment, periodic performance and quality control information was collected for each interviewer (see Appendix C). The measures included two production indices; one was a gross measure of the number of questionnaires completed by an enumerator after three days of work. The other, collected on two different occasions (after approximately two and four days of work), was a count of the number of questionnaires passing a quality control edit.

Other performance measures included a supervisor's first review of an enumerator's work, which involved a review of completed questionnaires and administrative records, plus a telephone check of a random sample of five households interviewed by an enumerator. Also, a record was maintained of the enumerator's final job status, e.g., assignment completed, left to take another job, etc.

Production and quality measures were collected only during the 2-4 days immediately following training, because after approximately three work days, each supervisor was supposed to review all work up to that point and provide on-the-job training to deal with any deficiencies. Accordingly, any performance differences attributable to training should have been eliminated after this review.

Since this study was conducted in six different geographical locations, a full-time, data-capture clerk was trained in each office to coordinate the study, distribute and collect evaluation instruments, and deal with any problems that occurred. All of these individuals had previous census experience before working in this study.

Design

Using demographic variables obtained from the 1970 Census, three pairs of census district offices were matched on variables thought to be related to the difficulty of enumeration (e.g., density of population, educational and income characteristics, mail-back rates in the 1970 Census, etc). The offices in each pair were then randomly assigned to one of the two training methods, resulting in three experimental (JPA) and three control offices. Only one training method was used in a given office. Table 1 in Appendix D presents a comparison of the matched pairs of offices on the selected variables.

RESULTS

Immediately after the start of the mail-out mail-back phase of the Census, several major problems occurred that interfered with the collection of field performance data for this experiment. A critical part of each census enumerator's job required the use of a list of addresses (address register) for a geographical area. Each address on this list was mailed a questionnaire, and if one had been returned, an office check-in procedure indicated so by reporting the status (questionnaire received or not) of the address in the address register. A copy of the address register was then used by an enumerator to indicate which addresses needed to be interviewed.

Unfortunately, after enumerators had been trained and had started the household interviewing, numerous errors were discovered in the address registers. Since enumerators spent much of their time immediately following training correcting these errors, the performance measures collected reflected both training quality and the immeasurable effects of field problems. Further, since it could not be assumed that field problems were comparable in the experimental and control offices, meaningful statistical comparisons were precluded and, consequently, are not reported in this paper.

Field problems, besides invalidating the performance data, also interfered with other data-collection efforts and quality control checks. For example, Table 1 shows the percentage of evaluation forms returned from the JPA and control offices.

TABLE 1

Percent of Evaluation Forms Returned

Type of Data Collected	JPA	Control
Quantity and quality of completed questionnaires (after 2 days)	83.3%	63.1%
Quantity and quality of completed questionnaires (after 4 days)	76.4	50.0
Supervisor's review of work (after 2-3 days)	78.7	68.0
Supervisor's random reinterview of households (after 3-4 days)	35.8	28.5
Gross number of questionnaires completed (after 3 days of work)	89.3	82.5
End-of-training attitude questionnaire	97.6	79.5 [1/]
Post-training (after 2-3 days of job experience) attitude questionnaire	77.9	40.3 [1/]
Total Number of Enumerators	1,197	1,389

1/ An unknown quantity of these forms from the control group were reportedly lost in the mail. Moreover, these were the only special data-collection forms designed for this study. The other evaluation measures were standard census administrative records.

It is readily apparent in Table 1 that significantly fewer evaluation forms were collected in the control offices. In part, this lower response rate was caused by field problems since supervisors reported that normal procedures were ignored in an effort to correct the problems in the address registers. Other factors, such as lack of supervisor cooperation in the offices, undoubtedly also played a part.

Attitudinal Measures

Table 2 shows the response of enumerators to the question "How well prepared do you feel to go out and work as an enumerator?" for two time periods, at the end of training and after some job experience.

Table 2.

Enumerators' Self-Ratings of Degree of Preparedness

	End-of-training		Post-training	
	a. N = 1,158	b. N = 1,085	c. N = 919	d. N = 557
	JPA	Control	JPA	Control
Well prepared	47.8%	48.2%	60.8%	54.8%
Adequately prepared	51.6	50.1	38.0	42.7
Poorly prepared	0.6	1.6	1.0	2.3
Not prepared	0.0	0.1	0.2	0.2

The first conclusion that can be drawn from this table is that both training approaches were obviously quite successful in making enumerators feel that they were prepared for their jobs, both before and after job experience. Also, for both the JPA and control training, job experience actually increased the percentage of enumerators who felt that they had been "well prepared."

The partial and marginal association of the factors in Table 2 were tested using a log-linear model analysis for multiway frequency tables available in the Biomedical Computer Programs P-Series statistical package (Brown, 1977). To do this analysis, random patterns of missing data were assumed. Further, it was assumed that field problems and supervision did not differ between JPA and control offices. The best-fit model included all two-way interactions, but not the three-way interaction. The marginal association between degree of preparedness and experimental groups (i.e., between columns a. and b.) was not significant at the end-of-training comparison (x^2 = 6.15, 3 df, p = 0.1), but it was significant (x^2 = 8.45, 3 df, p = 0.04) at the post-training comparison (i.e., between columns c. and d.).

Since some research JPA's has indicated that less experienced personnel using job aids were able to perform at levels of proficiency comparable to persons with more job experience, it was hypothesized that enumerators who differed in prior census experience would not differ in their feelings of job preparedness after JPA training, but they would differ after standard census training. The same relationship would also hold for the post-training questionnaire results.

Although asking about job preparedness is obviously not the same thing as measuring actual performance, Table 2A in Appendix D shows that the hypothesis

was not supported . For example, comparing columns a. and d. in Table 2A, 60% of JPA enumerators with prior experience felt that they were "well prepared" versus 46.1% of the JPA enumerators with no prior experience. The response patterns in columns a. and d. differed significantly, although the identical comparison for the post-training questionnaire did not (see Table 2B in Appendix D). Also, contrary to the hypothesis, for the control enumerators there were no statistically significant differences on either questionnaire when experience was controlled for.

The results also suggest that JPA enumerators with prior census experience reacted more favorably to their training than control enumerators with prior census experience, but these differences were not statistically significant (see Table 2C, Appendix D).

Table 3 shows the responses of enumerators to the question "Overall, how would you rate the quality of the training?"

TABLE 3

Enumerators' Ratings of Quality of Training

	End-of-training		Post-training	
	a. N = 1,163	b. N = 1,093	c. N = 887	d. N = 526
	JPA	Control	JPA	Control
Very Good	57.0%	49.0%	58.7%	44.9%
Good	37.8	42.1	37.1	46.6
Fair	4.5	8.3	3.0	8.0
Poor	0.7	0.5	1.1	0.6

Again, it is readily apparent from this table that both training approaches were well received both immediately after training and after job experience. However, a log-linear analysis, identical to the one performed for the previous table, indicated that the JPA group gave statistically higher ratings of training quality. The marginal association between quality and experimental groups was significant for both the end-of-training (x^2 = 22.7, 3 df, p = 0.00) and post-training comparisons (x^2 = 36.8, 3 df, p = 0.00).

Although there were no findings in the research literature which would predict how more experienced personnel would rate the quality of JPA training, it was hypothesized that JPA-trained enumerators with prior census experience would give higher ratings of quality to JPA training than JPA-trained enumerators without prior experience, since they would have had previous census training as a standard for comparison. This outcome should not occur for control enumerators, unless the standard (control) training in this study also deviated qualitatively from typical census training packages.

Breakdowns of ratings of training quality, controlling for prior experience, are presented in Table 3A in Appendix D. But, although the differences are in the hypothesized direction, they are not statistically significant (see Table 3B in Appendix D).

Again, looking at just those groups with prior experience in Table 3A, proportionally more JPA-trained enumerators gave "very good" ratings to their training than their control counterparts. Both of these comparisons were statistically significant (see Table 3C in Appendix D).

Since one objective of JPA's was to simplify the presentation of information and improve comprehensibility, a logical question was to ask whether training materials were easy to read and understand. Table 4 presents the responses to this question which was asked only at the end of training.

TABLE 4

Enumerators' Ratings of Training Materials Comprehensibility

	N = 1,150	N = 1,080
	JPA	Control
Yes	95.8%	90.7%
No	4.2	9.3

The training materials in both approaches were judged easy to read and understand, but the JPA approach elicited a small, but significantly higher rating ($x^2 = 23.4$, 1 df, $p = .00$).

Table 5 presents the responses of enumerators to a question about the length of training.

TABLE 5

Enumerators' Ratings of Length of Training
(End of Training)

	N = 1,162	N = 1,088
	JPA	Control
Too Short	12.1%	15.1%
About Right	81.0	72.5
Too Long	6.9	12.4

It can be seen that proportionally more enumerators rated the JPA training as acceptable in length ($x^2 = 26.8$, 2 df, $p = .00$).

Of major interest at the completion of any training is the self-confidence a trainee feels about his or her ability to accomplish critical job tasks. Accordingly, enumerators were asked to check off major job tasks that they thought would either cause them difficulties on the job (asked on end-of-training questionnaire) or which were not covered well enough in training based on their job experience (asked on post-training questionnaire).

Table 6 presents a comparison of these job tasks based on the number of people who checked a task. This number was converted to a percentage and is reported in parentheses.

TABLE 6

Enumerator-Identified "Problem" Job Tasks

	End-of-Training (Expecting Difficulties)		Post-Training (Not Covered Well Enough in Training)	
	N = 1,168	N = 1,097	N = 932	N = 560
TASK	JPA	Control	JPA	Control
Locating addresses	8.0%	6.9%	8.3%	9.5%
Interviewing people	11.6	9.1	6.9	6.8
Completing the questionnaire	7.7*	5.6*	5.2*	8.9*
Completing the address register	4.6	6.0	4.6*	9.1*
Filling out payroll forms	8.2*	14.9*	11.3*	15.7*
Using the job reference manuals	5.1*	9.2*	4.4*	8.6*
Getting people to cooperate	49.4*	36.9*	14.7*	20.7*
Dealing with unusual situations	42.6	39.1	17.8*	28.0*
Answering respondent questions	10.4	10.8	6.9	8.4
Checking for missed housing units	19.4	18.6	12.7	15.5

*Indicated that chi-square statistic is significant, $p < .05$, 1 df.

A chi-square statistic (job task, checked or not checked, by training method) was computed for each task at the end of training and after job experience. At the end of training, only four job tasks produced significant chi-squares ($p < .05$). These job tasks dealt with completing the questionnaire, completing payroll forms, using job reference manuals, and gaining the public's cooperation to complete the census form.

For two of these tasks--gaining cooperation and completing the questionnaire--the JPA-trained enumerators expected more problems. However, the JPA-trained enumerators expected less problems in completing payroll forms and using job reference manuals.

After job experience, however, there were significant differences on six job tasks, and in all cases the control group felt that the tasks could have received more emphasis during training. These six job tasks dealt with completing the questionnaire, completing payroll forms, using job reference manuals, gaining the public's cooperation, dealing with unusual situations, and completing the address register.

As with previous analyses, the effect of prior census experience on an enumerator's self-confidence in preparing job tasks was of interest. Accordingly, it was hypothesized that JPA-trained enumerators, whether or not they had prior experience, would not differ in either their expectations of expected job problems or their opinions about which tasks needed more coverage in training. On the contrary, it was expected that control enumerators, with and without prior experience, would differ significantly in their reactions because of the absence of job aids to guide performance.

Table 6A in Appendix D presents a breakdown of Table 6 controlling for prior experience; however, the results do not support the hypotheses (see Table 6B in Appendix D). Although there was only one significant difference for the JPA-trained enumerators on the end-of-training questionnaire, there was also only one difference for the control enumerators. Moreover, on the post-training questionnaire, there were two significant differences for the JPA group, but only one for the control group.

A comparison between JPA and control enumerators for different levels of experience also showed (see Table 6C in Appendix D for statistical tests) that the perceptions of JPA and control enumerators with prior experience differed on only one-third the tasks that JPA and control enumerators without prior experience differed on both before and after job experience.

Although it was not possible in this study to obtain actual observational data on manual use, the question "On the average, how many times each day do you use a particular manual?" was asked of all enumerators after two-three days of job experience. Table 7 shows the average reported daily use of the two primary job reference manuals, either the job aid or standard manual, and the Questionnaire Reference Book (QRB) which provides detailed instructions for each question asked on the census form.

TABLE 7

Reported Average Daily Use of Job Reference Manuals

	N = 899		N = 532	
	JPA		Control	
Job Aid or Standard Manual	2.02	(2.13)[1]/	1.77	(1.81)
QRB	1.04	(1.66)	1.27	(1.59)

1/ Standard deviations are reported in parentheses.

An analysis-of-variance model for nested factors (census district offices nested under training approach) was used to determine if the reported use of the job aid manual or standard manual differed significantly in the experimental offices. (Winer, 1962, p. 184). Table 8 presents the results of this analysis.

TABLE 8

Analysis-of-Variance Table for Manual Use

Source	df	Sum of Squares	Mean Square	F
Training Approach	1	20.2	20.2	5.13 1/
District Offices	4	200.1	50.9	12.7 1/
Residual	1431	5612.7	3.9	

1/ Significant $p < .05$

This analysis showed that, not only were there significant differences in reported manual use between the JPA and control groups, there were also significant variations in manual use attributable to district offices.

Although the use of the QRB was not of primary interest in this study, because it was not redesigned (i.e., the same QRB was used in both training approaches), it is interesting to note that its reported use was significantly higher in the control group ($F=7.17$; $p < .05$) than in the JPA group. Also, the correlation between manual use and QRB use was 0.59 in the JPA group and 0.64 in the control. Further, prior census experience did not affect use of either the job manual or the QRB.

Another question on the post-training questionnaire asked each enumerator to give a self-rating of job performance. There were no significant differences in the response patterns shown in Table 9.

TABLE 9

Enumerators' Self-Ratings of Job Performance

	N = 901	N = 549
	JPA	Control
Very Good	37.4%	34.8%
Good	52.4	54.5
Fair	9.4	10.0
Poor	0.8	0.7

As mentioned previously, JPA-designed training should differ qualitatively from standard, systematically designed training. Accordingly, enumerators again were asked on two different occasions to rate the utility (most helpful, helpful, least helpful) of training activities in helping them learn to do their job. Table 10 presents the ranking of these activities derived by computing the average rated helpfulness of each activity where "1" was most helpful and "3" was least helpful. Standard deviations are reported in parentheses.

TABLE 10

Enumerators' Mean Ratings of the Helpfulness of Different Training Activities

End-of-Training				Post-Training			
JPA	Mean	Control	Mean	JPA	Mean	Control	Mean
Workbook	1.28 (0.48)	Prac Int	1.46 (0.59)	Manuals	1.39 (0.56)	Prac Int	1.55 (0.66)
Manuals	1.31 (0.49)	Manuals	1.48 (0.57)	Workbook	1.41 (0.54)	Manuals	1.62 (0.61)
Lecture	1.42 (0.57)	Workbook	1.53 (0.60)	Lecture	1.49 (0.58)	Lecture	1.63 (0.61)
Prac Int	1.56 (0.64)	Lecture	1.54 (0.60)	Prac Int	1.69 (0.68)	Wookbook	1.68 (0.62)
Audiovis 1/	1.60 (0.67)	Audiovis	1.56 (0.68)	Audiovis	1.78 (0.73)	Audiovis	1.74 (0.73)

1/ Audiovisual presentations used filmstrip and tape. End-of-training percentages are based on a minimum of 1,039 respondents; post-training percentages are based on a minimum of 539.

Practice interviewing was viewed as generally most helpful on both occasions in the control group, whereas in the JPA group, its mean rating was second from last in both instances.

The JPA group, on both occasions, ranked training activities that used either the job aid manual or the workbook as the most useful. Although this ranking differed from the control group's, a comparison of the mean ratings was not statistically significant.

One problem with the preceding table is that it uses average ratings to compare training activities. The use of averages could tend to obscure significant variations in ratings. For example, if half of a group rated an activity as "most helpful" and the other half rated the same activity as "least helpful", the average rating would be "helpful" which is not indicative of the true impact of the training activity on the trainees. Accordingly, Table 11 presents another ranking of the training activities on two separate occasions. However, in this case, the rankings are based on the percentage of enumerators in each group who selected a particular activity as "most helpful".

TABLE 11

Enumerators' Ratings of "Most Helpful" Training Activities

End-of-Training				Post-Training			
JPA		Control		JPA		Control	
Workbook	(73.5%)	Prac Int	(59.7%)	Manuals	(63.1%)	Prac Int	(54.2%)
Manuals	(69.7)	Manuals	(56.0)	Workbook	(62.3)	Manuals	(45.0)
Lecture	(61.7)	Audiovis	(54.9)	Lecture	(55.6)	Lecture	(44.5)
Prac Int	(52.3)	Workbook	(52.4)	Prac Int	(43.4)	Audiovis	(43.4)
Audiovis	(50.7)	Lecture	(51.3)	Audiovis	(40.3)	Workbook	(40.4)

The rankings of training activities between Tables 10 and 11 are identical for the JPA group. For the control group, however, audiovisuals, which had the lowest average rating of helpfulness in Table 10, fared better when the rankings were based on the number of times an activity was checked "most helpful."

It is also of interest to note in Table 11 that there was more agreement among the JPA enumerators about the most helpful training activities. On the end-of-training questionnaire the workbook and manuals were rated most helpful by 73.5% and 69.7% of the JPA enumerators, whereas on the post-training questionnaire, these percentages dropped to 63.1% and 62.3%. For the control group, practice interviewing and manual use were rated most helpful by 59.7% and 56.0% after training, with these percentages dropping to 54.2% and 45.0% after job experience.

Although the training activities in Table 11 differed in the JPA and control groups (audiovisuals were identical), a comparison of how enumerators rated the helpfulness of different generic training activities in their respective groups provides insights into their success in teaching job skills. In the development of materials for this study, it was evident that design deficiencies in existing job manuals severely restricted the utility and the types of learning activities that could be included, for example, in the workbook. Therefore, although the workbook in the control training was an integral part of the training and contained exercises similar to those in the JPA workbook, it nonetheless received far fewer ratings of "most helpful" from enumerators.

Additional Variables

Although a final review test was part of both training approaches, the same test was not used. Therefore, comparisons between training methods were not possible. Separate, one-way analyses of variances were computed, however, for each group. Table 12 presents these results which are based on 84 randomly selected tests from each district office. These tests were selected and re-scored to ensure consistency in the scoring standards.

TABLE 12

a. Analysis of Variance for JPA Final Review Tests

Source	df	Sum of Squares	Mean Square	F	p
Between	2	26.7	13.36	.57	.57
Within	249	5822.5	23.38		
TOTAL	251	5849.2			

b. Analysis of Variance for Control Final Review Tests

Source	df	Sum of Squares	Mean Square	F	p
Between	2	92.4	46.19	8.51	.0003 1/
Within	249	1352.1	5.43		
TOTAL	251	1444.5			

NOTE: The JPA final review test was criterion referenced; the control review test was multiple choice.

1/ Using the Scheffe' post-test procedure, average scores in one control office were found to be significantly lower ($p < .05$) than the other two.

The significantly lower test scores found for one of the control offices in Table 12b could theoretically be caused by differing aptitude levels of trainees in the different offices. Table 13 shows the average scores obtained by enumerators on the selection test used for this job. The control office with the lowest average selection scores did, in fact, perform significantly worse on the final review test, but the mean difference in selection scores was not statistically different.

TABLE 13

Average Selection Test Scores for Enumerators 1/

	JPA	Stan dev		Control	Stan dev
	36.0	8.4		35.1	8.8
	37.7	8.4		38.6	8.4
	38.8	8.1		38.7	8.4
Weighted Av	37.6	8.3	Weighted Av	37.4	8.7

1/ Maximum score is 54.

Other variables that theoretically could affect the attitudinal variables reported so far, especially the post-training results, are pay rates and questionnaire mail-back rates for the experimental groups. Although pay rates were supposed to be based on piece work for the enumerators in this study, managers of different offices were given the option to put people on an hourly rate to deal with unusual field problems. Mail-back rates are important because, in general, more difficult areas of enumeration have lower mail-back rates.

In the JPA and control offices, ultimately 22% and 24% of the enumerators, respectively, were put on an hourly pay scale. The mail-back rates for these groups were 84.2% and 86%, respectively. Neither one of these differences was large enough to affect either the conduct or conclusions of this study.

By the end of this particular census operation 62.7% of the enumerators in the JPA offices completed their assignments, compared with 55.8% in the control offices. Major reasons for failures to complete assignments are given in Table 14 as percentages of the total number of enumerators not finishing their assignments.

TABLE 14

Ranking of Major Reasons for Enumerator Separations

N = 1,140		N = 1,160	
JPA		Control	
Pay dissatisfaction	3.2%	Pay dissatisfaction	1.7%
Work dissatisfaction	4.2	Take another job	6.2
Poor performance	4.9	Poor performance	10.7
Take another job	7.6	Work dissatisfaction	10.9
"other"	17.4	"other"	14.7

It would not be meaningful to calculate any statistical comparisons between these groups because of the field problems mentioned earlier. For example, differences in attrition rates could be caused by field problems, differences in supervision, differences in pay systems, training differences, or a combination of the preceding. There is some evidence, for example, that field problems were somewhat worse in the control offices than in the JPA offices. This evidence comes primarily from comments written on the post-training questionnaire. Table 15 presents a summary of these comments expressed as a percentage of the number of people completing the questionnaire.

TABLE 15

Common Problems in Census Operations Reported by Enumerators

N = 932		N = 560	
JPA		Control	
Problems with address registers	(8.4%)	Problems with address registers	(6.4%)
Inadequate pay	(3.4)	Inadequate pay	(4.3)
Bad maps	(1.0)	Followup started too soon	(3.6)
Poorly designed questionnaires	(1.0)	Poorly designed questionnaires	(1.4)
		Poor training	(1.0)
		Bad maps	(1.0)

In this table, problems with address registers and a too early start of the followup operation to obtain census information from non-respondents, probably refer to the same problem. For example, if the followup interviewing started before all questionnaires were checked in, the address registers would contain incorrect information.

One final extraneous variable of interest concerns the experience levels of enumerators. Based on an analysis of responses to an item on the end-of-training and post-training questionnaires, which asked about previous job experience, the enumerators in the control offices were found to be more experienced than their counterparts in the JPA offices.

TABLE 16

Enumerators Reporting Prior Experience Working in the 1980 Census

	End-of-Training	Post-Training
JPA	12.5%	11.5%
Control	17.3	18.9

Although these differences were statistically significant ($p < .05$) on both occasions, the percentages of enumerators reporting prior experience in both groups changed little from one questionnaire to the next. This finding supports the assumption that, although the number of missing questionnaires was higher in the control group, the sample of questionnaires obtained was representative.

DISCUSSION

The major objective of this study was to determine the incremental benefits that resulted from the use of job-performance-aided instruction, (i.e., systematically designed instruction that used job aids), when compared with instruction that only incorporated principles of instructional system design. Incremental benefits in this case were defined as measurable performance differences related to the quantity and quality of an enumerator's work, attitudes about training and training activities, and reported use of job manuals. A secondary objective was to demonstrate that training and job manuals could be simplified using within-house training capabilities.

The results indicated small, but consistently higher, ratings for the JPA training on questions about preparedness (post-training), quality (end-of-training and post-training), comprehensibility of materials, length of training, and specific job tasks (particularly after job experience). The differences between the JPA and control groups in perceptions of job tasks that were expected to cause problems (end-of-training), or which were not covered well enough in training, were particularly interesting because they could be linked directly to differences in training content or emphasis. And, after job experience, all the differences indicated that the JPA training had done a better job of covering major job tasks.

Although this study was unable to compare the job performance of JPA enumerators, with and without prior census experience, comparisons on attitudinal items indicated that JPA enumerators with prior experience gave proportionally higher ratings of preparedness immediately after training. A finding that did not occur for the comparable groups of control enumerators. However, prior experience also seemed to lessen the effects of differences in the training approaches. Specifically, although JPA and control enumerators without prior experience differed in their expectations on three job tasks that they thought would cause problems at the end of training, the JPA and control enumerators differed on only one. After job experience, the JPA and control enumerators without prior experience differed on six tasks that they thought were not covered well enough in training, whereas the JPA and control enumerators with prior experience differed on only two.

One of the more important variables in this study, especially in the absence of valid performance data, was the average daily use of manuals reported by enumerators in the period of time immediately following training. Since formal training was relatively short, the manuals served as an important reference source for job tasks. Accordingly, the more they were used, the better job performance was expected to be. Although both the JPA and control enumerators

reported using job reference materials (procedural manual and QRB) about three times each day, the JPA group used their field procedural manual (job aid manual) more frequently (66% vs 58%). It appears, therefore, that increased use of the job aid manual in training translated to increased use of the manual on the job. Other evidence to support this conclusion came from the enumerators' ratings of the adequacy of training on major job tasks, both prior to and after job experience. At the end of training, only 5.1% of the JPA enumerators expected that use of job reference manuals would cause problems, compared to 9.2% of the control group. After job experience these percentages dropped to 4.4% and 8.6%, respectively.

Further evidence that job-performance-aided training was qualitatively different from training not using JPAs is provided in Tables 10 and 11. The JPA-trained enumerators consistently rated using manuals and workbooks as the two most helpful activities for learning the job, whereas the control group consistently rated practice interviewing and using manuals as the two most helpful activities. In general, the JPA group also gave the training activities higher (more positive) ratings, again reflecting more effective training. To reiterate, however, enumerators in both training approaches gave all the training activities an average rating of at least "helpful".

Based on the preceding discussion, it appears that job-performance-aided training had a significant impact on trainees' attitudes and reported use of procedural manuals, even though ratings of the control training were quite positive. As with any experimental study, however, there were several other variables that might have had an impact on the results.

First, the job-performance-aided instruction used in this field experiment was developed and implemented within the limitations imposed by the use of a verbatim training guide, a mode of instruction not widely used or even recommended by training specialists. As Swezey (1977) and Fredericks-Hoover-Rice (1977) demonstrated, however, JPA's can be adapted to a variety of instructional approaches (e.g., learner-controlled instruction and computer-based training). Actually, it is pointless to think of using JPA's independently of modes of instruction, since the choice of instructional mode should influence the use and effectiveness of JPA's in training.

Also, with respect to this study, the use of verbatim training guides introduced controls which may be difficult to match in future studies. Specifically, the use of a verbatim guide, although a limiting factor instructionally, nonetheless insured the standardized presentation of both training approaches.

Second, unlike most of the evaluative studies of JPA's, this study dealt with a non-technical area and, except for enumerators with prior census experience, users did not have a chance to compare different manuals (e.g., job aid vs standard). Moreover, the training was intense but limited in duration (two work days). And the expected length of the job was only a month, although in one experimental office the actual period was closer to two-and-a-half months.

Third, the trainee population was widely divergent in terms of education and experience. Although actual demographic characteristics are not yet available for enumerators, evidence from past censuses indicates that trainees range from the marginally literate to persons with advanced degrees. Generally, however, weak educational skills were considered to be the norm when both training approaches were designed.

Fourth, as with any large-scale field study, the size of the effort and the inability to control major sources of variation (e.g., field problems) force a cautious interpretation of the results. In this study, serious field problems occurred in all participating offices, but it was impossible to determine if the effects were more severe in the JPA group as opposed to the control. Although certain findings can be used to argue that field problems were worse in the control offices, which could have influenced post-training attitudes, there was additional evidence that field problems were just as severe in the experimental offices. For example, the last office to close out its census operations was a JPA office, and another JPA office discovered that approximately 20% of its mail returns were misplaced by the U.S. Postal Service for two weeks into what was projected to be a three to four week operation. The response problems indicated in Table 1 for the control offices reflect, in part, a lack of cooperation by supervisors in those offices, as well as the inability of data-capture clerks to establish good working relationships with the field staff so that materials were distributed and collected.

Finally, all conclusions about post-training differences on evaluation items, or changes from end-of-training to post-training, must be qualified because of the large differences in the percentages of evaluation forms returned from the JPA and control offices. These differences may reflect the failure of data-collection clerks in these offices to do their jobs, or they may reflect situational differences that could have had a confounding effect on the measures used. Contact during the study with the data-collection clerks indicated that failure to establish good working relationships with field personnel, turnover of clerks, and competing office responsibilities may have contributed to a failure of clerks in the control offices to obtain as many forms as the JPA clerks.

Cost of JPA Development

In general, based on discussions in the literature, it appears that JPA's cost more to produce, but as Chenzoff (1973) also noted, there are no good cost comparisons between JPA's and standard approaches for developing technical materials. Unfortunately, this study did not directly address this issue.

Part of the problem in generating cost estimates is that two different products are actually being compared, since JPA's require a different approach to training design and development. JPA's, for example, definitely require more design time.

Other important considerations when discussing the costs of JPA's concern the selection of formats and the job area. For instance, job aids developed for maintenance tasks in the military often employ photographs and complex schematics, both of which are expensive to produce. Moreover, hardware changes, which are common and frequent, require expensive revisions.

In contrast, the present study used simple and inexpensively produced job aids which could be produced in draft form by a typist for testing and validation. However, final copy required the aid of a graphics specialist to lay out the manual. Moreover, once procedures were finalized, the job aid manual required no further revisions, but even had they been required, changes could easily have been accomodated.

Although any conclusion must be qualified, it was the experience in this study that any increase in costs due to the increased design and development time required for JPA's was offset by shortened design and development time for accompanying training, more effective training, and improved trainee attitudes.

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FORM D-359
(11-27-79)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

ENUMERATOR TRAINING EVALUATION

20th Decennial Census – 1980

INSTRUCTIONS: The Bureau of the Census wants to know how you feel about the training that you just finished.

Please answer the questions below. Do not write your name on this form.

ENTER YOUR 4-DIGIT DISTRICT OFFICE CODE NUMBER HERE ⟶ | | | | |

1. Is this your first job working in the 1980 census?

1 ☐ Yes
2 ☐ No

2. How well prepared do you feel to go out and work as an enumerator?

Mark (X) one

1 ☐ Well prepared
2 ☐ Adequately prepared
3 ☐ Poorly prepared
4 ☐ Not prepared

3. Where were you trained?

1 ☐ In a room with 3 or more people
2 ☐ On the job – How long did the training last?

_____ Hours

4. The following is a list of different activities used in training.

Mark an (X) in the appropriate column that best describes how each activity helped you learn your job.

	Very helpful	Helpful	Least helpful
a. Lecture by trainer (reading from training guide)	1	2	3
b. Practice interviewing (either with trainer or fellow enumerators)	1	2	3
c. Workbook exercises	1	2	3
d. Reading or using manuals	1	2	3
e. Audiovisuals (slides and tape recordings)	1	2	3
f. Other – Specify _____	1	2	3

5. Was the length of training –

Mark (X) one

1 ☐ Too short?
2 ☐ About right?
3 ☐ Too long?

6. Overall, how would you rate the quality of the training?

Mark (X) one

1 ☐ Very good
2 ☐ Good
3 ☐ Fair
4 ☐ Poor

7. Were the training materials easy to read and understand?

1 ☐ Yes
2 ☐ No

8. The following is a list of different parts of your job.

Mark an (X) by each that you think will cause some problems when you start working.

1 ☐ Locating addresses that did not return a questionnaire
2 ☐ Interviewing people (asking the questions)
3 ☐ Completing the questionnaire (address label, "For Census Use Only" box, etc.)
4 ☐ Completing the address register
5 ☐ Filling out payroll forms
6 ☐ Using the job reference manuals
7 ☐ Getting people to cooperate
8 ☐ Dealing with unusual situations
9 ☐ Answering questions asked by respondent
10 ☐ Checking for missed housing units
11 ☐ Other – Specify _____

9. What one thing did you dislike most about the training?

_____

_____

Comments on reverse ⟶

FORM D-860
(11-24-79)

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

TRAINING AND PERFORMANCE EVALUATION FOLLOWUP ENUMERATOR

20th Decennial Census – 1980

INSTRUCTIONS: Before you began working, you completed a questionnaire about your training for this job. Now that you have had some job experience, the Bureau of the Census wants to know how that training helped you in your job, and how you feel about your job.

Please answer the questions below. Do not write your name on this form.

ENTER YOUR 4-DIGIT DISTRICT OFFICE CODE NUMBER HERE ⟶ [ ][ ][ ][ ]

1. Is this your first job working in the 1980 census?

1 ☐ Yes
2 ☐ No

2. How well prepared were you to go out and work as an enumerator?
Mark (X) one

1 ☐ Well prepared
2 ☐ Adequately prepared
3 ☐ Poorly prepared
4 ☐ Not prepared

3. Where were you trained?

1 ☐ In a room with 3 or more people
2 ☐ On the job

4. The following is a list of different parts of your job.
Mark an (X) by each that was not covered well enough in training.

1 ☐ Locating addresses that did not return a questionnaire
2 ☐ Interviewing people (asking the questions)
3 ☐ Completing the questionnaire (address label, "For Census Use Only" box, and item 2 on back page)
4 ☐ Completing the address register (columns 10 and 13)
5 ☐ Filling out payroll forms
6 ☐ Using the job reference manuals
7 ☐ Getting people to cooperate
8 ☐ Dealing with unusual situations
9 ☐ Answering questions asked by respondents
10 ☐ Checking for missed housing units
11 ☐ Other – *Specify*

_____

_____

_____

5. The following is a list of different activities used in training.
Mark an (X) in the appropriate column that best describes how each activity helped you learn your job.

	Most helpful	Helpful	Least helpful
a. Lecture by trainer (reading from training guide)	1	2	3
b. Practice interviewing (either with trainer or fellow enumerators)	1	2	3
c. Workbook exercises	1	2	3
d. Reading and using manuals	1	2	3
e. Audiovisuals (slides and tape recordings)	1	2	3
f. Other – *Specify* _____	1	2	3

6. How would you rate your own job performance so far?
Mark (X) one

1 ☐ Very good
2 ☐ Good
3 ☐ Fair
4 ☐ Poor

7. If asked, would you work in another census job?
Mark (X) one

1 ☐ Yes
2 ☐ No
3 ☐ Depends on the job

8. On the average, how many times each day do you use –

a. Enumerator manual or job aid manual?

b. Questionnaire reference book?

9. Overall, how would you rate the quality of the training you received for this job?
Mark (X) one

1 ☐ Very good
2 ☐ Good
3 ☐ Fair
4 ☐ Poor

10. The following is a list of suggested improvements.
Mark (X) in order of importance the three changes which you think the Bureau of the Census could make to improve your job

	Most important	Next most important	Third most important
a. Improve the training . . .	1	2	3
b. Pay more money	1	2	3
c. Simplify the job (get rid of the manuals)	1	2	3
d. Allow work on Sunday . .	1	2	3
e. Allow overtime work . . .	1	2	3
f. Pay by the hour, not the questionnaire	1	2	3
g. Do all interviewing using the telephone	1	2	3
h. Have enumerators work in teams	1	2	3
i. Simplify the questionnaire	1	2	3
j. Have better supervisors	1	2	3
k. Pay enumerators on time	1	2	3
l. Other – *Specify*	1	2	3

11. Are there any neighborhoods in your assignment that you have been afraid to work in?

1 ☐ No
☐ Yes – What should the Bureau let you do about it? *Mark all that apply*

2 ☐ Nothing special, just do your normal job
3 ☐ Leave those addresses to last
4 ☐ Let you work with another enumerator
5 ☐ Ask another enumerator to go there
6 ☐ Not go back if people are not home the first time
7 ☐ Tell your crew leader to work with you
8 ☐ Go there only during the daytime
9 ☐ Other – *Specify*

12. What was your employment status when you were hired for the 1980 census?
Mark (X) one

1 ☐ Looking for a full or part-time job (temporary or permanent)
2 ☐ Not working, not retired, not a student, not looking for a job
3 ☐ Retired
4 ☐ Student
5 ☐ Employed, job starts in the future or temporarily laid off
6 ☐ Employed
7 ☐ Something else – *Specify*

13. Comments

FORM D-857(AT)
[illegible]

U.S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS

ALTERNATIVE TRAINING EXPERIMENT

FOLLOWUP I ENUMERATOR PERFORMANCE RECORD

20th Decennial Census – 1980

Form D-275 – Record of Training

1. D.O. code	2. C.L.D. No.	3. Training dates April ____ to April ____

4. Enumerator name | 5. Telephone No.

6. ED No. (0000, if reserve) | 7. Review test score

8. Did the enumerator complete training? *Mark (X) one*
1 ☐ Yes 2 ☐ No 3 ☐ Don't know

Forms D-267A or D-267B – Field Employee Selection Aid *(Enter "99" if no test score)*

9. Selection test score (item D)

Form D-185 – Record of First Review
(Enter "99" if form is not available.)

10. Number of "No's" in Part A

11. Part A results
Mark (X) one
1 ☐ Satisfactory
2 ☐ Needs improvement
3 ☐ Unsatisfactory
4 ☐ No form completed

12. Number of short form errors

13. Number of long form errors

14. Part B results
Mark (X) one
1 ☐ 0–4
2 ☐ 5–20
3 ☐ More than 20
4 ☐ No form completed

Form D-158 – Record of Reinterview
(Enter "99" if person's name is not on form.)

15. Number of fails *(Look for more than one box if there are any fails.)*

Form D-170 – QC Enumerator Daily Progress Record
(Use first two forms for each crew leader district.)

16. Date (item 6) April ____	17. No. of acceptable questionnaires
18. Date (item 6) April ____	19. No. of acceptable questionnaires

Form D-152 – Crew Leader Record of Assignments
(Use at end of Followup I.)

20. Did enumerator complete ED? ("X" in front of ED No.)
Mark (X) one
1 ☐ Yes
2 ☐ No
3 ☐ Don't know
4 ☐ Not on form

Form D-291 – Employee Pay Voucher
(Check at end of Followup I.)

21. Reason for separation
Mark (X) one
1 ☐ Assignment completed
2 ☐ Pay dissatisfaction
3 ☐ Work dissatisfaction
4 ☐ To take another job
5 ☐ Poor performance
6 ☐ No form available
7 ☐ Other – *Specify* _____

Form D-153 – Crew Leader Record of Progress
(Use at end of Followup I.) (Enter "999" if person is not on form.)

22. Copy the third entry for each enumerator or last entry)

APPENDIX D

APPENDIX D

TABLE 1

Comparison of District Offices On Matching Variables
Based on 1970 Statistics

		Pair 1		Pair 2		Pair 3	
		JPA	C	JPA	C	JPA	C
Total Population		626106	622603	704391	689104	644456	651737
% Black		3.1	5.2	3.3	2.8	2.0	2.7
% Urban		88.3	98.2	68.4	80.9	100	100
Median Age		31.8	31.7	25.9	26.7	38.3	33.0
Median Education		12.1	12.2	12.1	*	11.2	11.4
Median Income		10290	10606	10942	9856	11168	11040
Allocation Rates	1/Pop	1.0	1.1	1.1	1.1	1.5	1.6
	Housing	2.2	2.1	1.8	2.1	2.4	2.5
Mail-back rate 1970		*	*	77.9	78.0	*	*

* - data not available JPA - job performance aided C - Control

1/ These rates are an estimate of missing census data for population (POP) and housing questions.

TABLE 2A

Ratings of Degree of Preparedness Based on Prior Census Experience

Question Pre: "How well prepared do you feel to go out and work as an enumerator?"

Post: "How well prepared were you to go out and work as an enumerator?"

End-of-Training

	Prior Experience			No Prior Experience		
	(145) JPA a.	(188) Control b.	(333) Overall c.	(1013) JPA d.	(895) Control e.	(1908) Overall f.
Well prepared	60.0%	53.2%	56.2%	46.1%	47.2%	46.6%
Adequately prepared	40.0	46.3	43.5	53.2	50.9	52.1
Poorly prepared	0.0	0.5	0.3	0.7	1.8	1.2
Not prepared	0.0	0.0	0.0	0.0	0.1	0.1

Post-Training

	Prior Experience			No Prior Experience		
	(106) JPA	(105) Control	(211) Overall	(813) JPA	(452) Control	(1265) Overall
Well prepared	66.0%	58.1%	62.1%	60.1%	54.0%	57.9%
Adequately prepared	32.1	37.1	34.6	38.7	44.0	40.6
Poorly prepared	1.9	3.8	2.8	0.9	2.0	1.3
Not prepared	0.0	1.0	0.5	0.2	0.0	0.2

NOTE: Base for percentages is reported in parentheses above group designation.

TABLE 2B

Chi-Square Statistics for JPA and Control Groups Controlling for Prior Census Experience

	End-of-Training		Post-Training	
	χ^2	p	χ^2	p
JPA (Cols. a. vs d.)	10.4	.01	2.9	.41
Control (Cols. b. vs e.)	3.6	.31	6.7	.31
Overall (Cols. c. vs f.)	11.9	.01	6.1	.11

NOTE: All comparisons are based on 3 degrees of freedom.

TABLE 2C

Chi-Square Statistics for JPA vs Control Groups for End-of-Training and Post-Training

	Prior Experience		No Prior Experience	
	χ^2	p	χ^2	p
End-of-Training	2.2	.33	6.5	.09
Post-Training	2.6	.45	7.9	.05

NOTE: All comparisons are based on 3 degrees of freedom.

TABLE 3A

Ratings of Quality of Training Based on Prior Census Experience

Question: "Overall, how would you rate the quality of the training?"

End-of-Training

	Prior Experience			No Prior Experience		
	(145) JPA a.	(188) Control b.	(333) Overall c.	(1018) JPA d.	(903) Control e.	(1921) Overall f.
Very Good	62.8%	47.9%	54.4%	56.2%	49.3%	52.9%
Good	32.4	44.7	39.3	38.8	41.5	40.0
Fair	4.8	7.4	6.3	4.4	8.5	6.4
Poor	0.0	0.0	0.0	0.8	0.7	0.7

Post-Training

	Prior Experience			No Prior Experience		
	(98) JPA	(100) Control	(198) Overall	(784) JPA	(426) Control	(1210) Overall
Very Good	69.4%	45.0%	57.1%	57.4%	44.8%	53.0%
Good	25.5	41.0	33.3	38.5	47.9	41.8
Fair	3.1	13.0	8.1	3.1	6.8	4.4
Poor	2.0	1.0	1.5	1.0	0.5	0.8

NOTE: Base for percentages is reported in parentheses above group designation.

Table 3B

Chi-Square Statistics for JPA and Control Groups Controlling for Prior Census Experience

	End-of-Training		Post-Training	
	X^2	p	X^2	p
JPA (Cols. a. with d.)	3.4	.33	6.9	.07
Control (Cols. b. with e.)	1.9	.59	5.1	.16
Overall (Cols. c. with f.)	2.6	.46	9.2	.03

NOTE: All comparisons are based on 3 degrees of freedom

TABLE 3C

Chi-Square Statistics for JPA vs Control Group for End-of-Training and Post-Training

	Prior Experience		No Prior Experience	
	X^2	p	X^2	p
End-of-Training	7.4	.03	18.1	.00
Post-Training	15.1	.00	23.9	.00

NOTE: All comparisons are based on 3 degrees of freedom.

TABLE 6A

Percentage of Enumerators Checking Job Tasks Prior to And After Job Experience

End-of-Training question: "The following is a list of different parts of your job. Mark an (X) by each that you think will cause some problems when you start working."

Post-Training Question: "The following is a list of different parts of your job. Mark an (X) by each that was not covered well enough in training."

End-of-Training

	Prior Experience			No Prior Experience		
	(146) JPA a.	(189) Control b.	(335) Overall c.	(1021) JPA d.	(905) Control e.	(1926) Overall f.
Locating addresses	7.5%	8.5%	8.1%	8.0%	6.6%	7.4%
Interviewing people	16.4	11.1	13.4	11.0	8.7	9.9
Completing the questionnaire	6.8	4.2	5.4	7.8	5.9	6.9
Completing the address register	2.7	4.2	3.6	4.9	6.4	5.6
Filling out payroll forms	4.8	12.7	9.3	8.7	15.5	11.9
Using job reference manuals	7.5	13.2	10.7	4.8	8.4	6.5
Getting people to cooperate	45.2	45.5	45.4	50.0	35.0	43.0
Dealing with unusual situations	37.7	38.1	37.9	43.4	39.3	41.5
Answering respondent questions	8.2	10.1	9.3	10.8	10.9	10.9
Checking for missed housing units	11.6	15.9	14.0	20.6	19.2	19.9

NOTE: Base for percentages is reported in parentheses above each column.

TABLE 6A (Continued)

Post-Training

	Prior Experience			No Prior Experience		
	(107) JPA a.	(106) Control b.	(213) Overall c.	(820) JPA d.	(454) Control e.	(1274) Overall f.
Locating addresses	5.6%	5.7%	5.6%	8.7%	10.4%	9.3%
Interviewing people	2.8	0.9	1.9	7.4	8.1	7.7
Completing the questionnaire	2.8	5.7	4.2	5.5	9.7	7.0
Completing the address register	3.7	6.6	5.2	4.8	9.7	6.5
Filling out payroll forms	1.9	10.4	6.1	12.6	17.0	14.1
Using job reference manuals	1.9	7.5	4.7	4.8	8.8	6.2
Getting people to cooperate	15.0	17.9	16.4	14.8	21.4	17.1
Dealing with unusual situations	12.1	35.8	23.9	18.7	26.2	21.4
Answering respondent questions	2.8	5.7	4.2	7.4	9.0	8.0
Checking for missed housing units	1.9	14.2	8.0	14.1	15.9	14.8

NOTE: Base for percentages is reported in parentheses above each column.

TABLE 6B

Chi-Square Statistics For JPA and Control Groups Controlling for Prior Experience

End-of-Training

	JPA		Control		Overall	
	χ^2	p	χ^2	p	χ^2	p
Locating addresses	0.0	0.96	0.6	0.46	0.1	0.74
Interviewing people	3.2	0.07	0.8	0.37	3.4	0.06
Completing the questionnaire	0.0	0.80	0.5	0.48	0.8	0.36
Completing the address register	0.9	0.34	0.9	0.33	1.9	0.16
Filling out payroll forms	2.1	0.15	0.7	0.40	1.7	0.19
Using job reference manuals	1.4	0.23	3.8	0.05	7.2	0.01*
Getting people to cooperate	1.0	0.31	6.9	0.01*	0.6	0.45
Dealing with unusual situations	1.5	0.22	0.1	0.81	1.4	0.24
Answering respondent questions	0.6	0.42	0.1	0.82	0.6	0.44
Checking for missed housing units	5.9	0.01*	0.9	0.33	6.1	0.01*

*Indicates significant difference, $p < .05$

TABLE 6B (CONTINUED)

Post-Training

	JPA		Control		Overall	
	χ^2	p	χ^2	p	χ^2	p
Locating addresses	0.8	0.37	1.7	0.19	2.6	0.11
Interviewing people	2.5	0.12	6.0	0.01*	8.8	0.00*
Completing the questionnaire	0.9	0.34	1.3	0.26	1.8	0.18
Completing the address register	0.1	0.82	0.7	0.42	0.4	0.55
Filling out payroll forms	9.7	0.00*	2.3	0.13	9.7	0.00*
Using job reference manuals	1.2	0.26	0.1	0.82	0.5	0.48
Getting people to cooperate	0.0	1.00	0.4	0.51	0.0	0.88
Dealing with unusual situations	2.3	0.13	3.5	0.06	0.6	0.45
Answering respondent questions	2.5	0.12	0.9	0.35	3.2	0.07
Checking for missed housing units	11.8	0.00*	0.1	0.77	6.5	0.01*

*Indicates significant difference, $p < .05$

TABLE 6C

Chi-Square Statistics for JPA vs Control Groups Controlling for Prior Census Experience

	End-of-Training				Post-Training			
	Prior Experience		No Prior Experience		Prior Experience		No Prior Experience	
	χ^2	p	χ^2	p	χ^2	p	χ^2	p
Locating addresses	0.1	0.91	1.2	0.28	0.0	1.00	0.8	0.37
Interviewing people	1.6	0.21	2.5	0.12	0.2	0.60	0.1	0.73
Completing the questionnaire	0.7	0.42	2.6	0.11	0.5	0.49	7.3	0.01*
Completing the address register	0.2	0.67	1.8	0.18	0.4	0.53	10.9	0.00*
Filling out payroll forms	5.2	0.02*	20.2	0.00*	5.3	0.02*	4.3	0.04*
Using job reference manuals	2.2	0.14	9.7	0.00*	2.7	0.10	7.6	0.01*
Getting people to cooperate	0.0	1.00	43.6	0.00*	0.2	0.69	8.5	0.00*
Dealing with unusual situations	0.0	1.00	3.1	0.08	15.1	0.00*	9.5	0.00*
Answering respondent questions	0.1	0.70	0.0	0.97	0.5	0.49	0.8	0.37
Checking for missed housing units	0.9	0.34	0.5	0.50	9.3	0.00	0.6	0.46

*Indicates significant difference, $p < .05$.