

TOTEM

Transfer of Training Evaluation Model

□ 1995

**Waste Isolation Division
Westinghouse Electric Corporation
Carlsbad, New Mexico
Executive Summary**

This paper describes the analysis, design, development, implementation, and evaluation of the transfer of training evaluation model (TOTEM). Personnel from the Waste Isolation Division (WID) of the Westinghouse Electric Corporation developed TOTEM in 1993. WID manages the Waste Isolation Pilot Plant (WIPP) for the United States Department of Energy (DOE).

The purpose of TOTEM is to provide organizations with an efficient method for determining the effectiveness of objective-driven classroom training. Specifically, TOTEM measures the transfer of training rate from the classroom to the job. TOTEM accomplishes this through anonymous post-training surveys of trainees. The model focuses on trainee responses to three fundamental questions concerning each course enabling objective:

- Before the class, could you perform xxxx?
- Can you currently perform xxxx?
- How often are you applying your knowledge of xxxx on the job?

xxxx = the enabling objective restated

The WID performed a field test of TOTEM in 1993 using an in-house classroom training course, BUS-100 , Business English. This 40-hour course contains 43 enabling objectives. The following is an example of a question series taken directly from the field test survey:

- 7a. Before taking BUS-100, could you identify proper agreement between a subject and a verb? Y N
- 7b. Can you currently identify proper agreement between a subject and a verb? Y N
If you answered N [NO], skip to question 8a
- 7c. How often are you applying your knowledge of subject-verb agreement in your job? 0 1 2 3 4 5
- 7d. *If your answer to 1c was 0 (Never), please explain why :* _____

The field test indicated the following for the course:

- Course transfer of training rate: 53%
- Range of transfer of training rates by objective: 11-80%
- Course prior knowledge rate: 30%
- Range of prior knowledge rates by objective: 3-89%
- Incomprehension rate: 16%
- Range of incomprehension rates by objective: 0-40%
- Course training/job disconnect rate: < 1%

The field test results provided the Business English trainer with concise feedback for revising course content to improve the transfer of training.

Based on the field test, the WID determined that TOTEM could be a cost-effective tool for determining training effectiveness. WID believes that TOTEM merits full-scale development, including commercialization. Therefore, the WID and the DOE are making TOTEM available to U.S. organizations through the DOE's technology transfer program.

To obtain non-exclusive rights to TOTEM at no cost, please complete Section III of the accompanying technology transfer instrument and return it to the WID address listed on the form.

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1.0 Analysis

1.1 Needs Analysis

The Waste Isolation Division (WID) of the Westinghouse Electric Corporation manages the Waste Isolation Pilot Plant (WIPP) for the United States Department of Energy (DOE). Located near Carlsbad, New Mexico, the WIPP will be the nation's first underground repository for transuranic waste.

In 1993, the WID Organizational Development (OD) section determined that it needed an improved mechanism for evaluating the effectiveness of its classroom training. To that point, OD had been relying on post-training examinations and feedback forms to evaluate the effectiveness of its 100+ in-house, classroom courses. Facing a shrinking budget, ever-growing internal and external scrutiny, and the challenge to continually improve its courses, OD recognized that its examinations and feedback forms provided limited information on the most important factor related to training effectiveness: the transfer of training from the training setting to the job.

OD determined that it needed a transfer of training evaluation mechanism that met the following conditions:

- Must provide an overall transfer of training rate from the classroom to the job for any given course
- Must provide transfer of training rates from the classroom to the job for all major content areas of any given course
- Must provide instructional staff with clear, concise feedback for systematically improving transfer of training rates: 1) content areas that need more instruction; 2) content areas need less instruction; 3) content areas that should be left alone
- Must be user (instructional staff, administrative staff, and management) friendly -- easy to use and interpret, readily computerized
- Must be budget friendly -- inexpensive to use
- To ensure valid results, must 1) determine if the trainees possessed the skills and knowledge *before* taking the class 2) minimize defensive and organizationally-desirable responses 3) maximize honest and frank feedback

OD elected to perform an analysis to determine if an off-the-shelf model was available to meet its needs.

1.2 Analysis of Available Models

Based on its needs analysis, WID OD conducted a search to identify viable training evaluation models. OD searched books, journals, and conference papers; contacted universities and training companies; attended conferences specifically devoted to assessment and measurement; and contacted training organizations in other industries.

OD located a total of 13 models which held some promise for meeting the WID criteria. It is interesting to note that only two appeared to have been used extensively by practitioners out in the field. Using the criteria listed in section 1.1 of this paper, OD eventually eliminated all of these models from consideration. Figure 1 summarizes the problems encountered with the 13 models reviewed.

Figure 1 -- Percentage of Models That Met Each WID Criteria

77%	Provides an overall transfer of training rate from the classroom to the job for any given course	
38%	Provides transfer of training rates from the classroom to the job for all major content areas of any given course	
38%	Provides instructional staff with clear, concise feedback for systematically improving transfer of training rates: 1) content areas that need more instruction; 2) content areas need less instruction; 3) content areas that should be left alone	
15%	Is user (instructional staff, administrative staff, and management) easy to use and interpret, readily computerized	friendly --
15%	Is budget friendly -- inexpensive to use	
0%	1) determines if the trainees possessed the skills and knowledge before taking the class 2) minimizes defensive and organizationally-desirable responses 3) maximizes honest and frank feedback	desirable

The model that received the highest rating involved surveying managers and supervisors six months after the training to determine if the trainees were applying the training on the job. This model met all WID OD criteria except the three-part final criterion:

To ensure valid results, must 1) determine if the trainees possessed the skills and knowledge before taking the class 2) minimize defensive and organizationally-desirable responses 3) maximize honest and frank feedback

Based on previous experience with this model in other industries, OD management identified the following problems with this model:

- Managers and supervisors would be unlikely to rate trainees accurately on many critical tasks (such as safety-related tasks) because to do so could reflect on their capabilities and credibility as managers and supervisors
- The model offered limited means to determine if trainees could perform objectives before taking the training
- Results could be easily skewed by "the most recent

behavior" evaluation method known to be employed by some managers and supervisors. In other words, the boss would evaluate the trainee on the basis of "what has she/he done for me lately?" or "she/he performed well last well (poorly) last week, so I'll rate her/him high (low)."

1.3 Decision to Develop an In-House Model

After eliminating available models from consideration, the WID OD approached several training development firms about the possibility of co-developing a model that met its criteria. Unfortunately, WID OD could not find a partner willing to make a matching investment in this research and development effort.

Based on this, WID OD opted to develop a model on its own using existing resources. This decision further increased the need to develop a simple, inexpensive mechanism. To help ensure that the project focused tightly on transfer of training, OD elected to call the proposed model, the "Transfer of Training Evaluation Model," or TOTEM.

2.0 Design

2.1 Laying the Foundation

Over several months in 1993, the WID OD staff lay the foundation for TOTEM. The first major hurdle to overcome was the problem of determining which group(s) of employees would provide input into transfer of training rates -- trainees, their supervisors and managers, subject matter experts, peers and/or their instructors.

Initially, OD considered a 360° degree survey approach involving all of these groups of employees, but eventually eliminated this possibility due to the overwhelming complexity and cost of using a 360° model on a large scale.

OD quickly rejected the manager/supervisor-as-evaluator approach because of the problems described in Section 1.2 of this report.

Next, OD rejected the subject-matter-expert (SME)-as-evaluator approach because such an approach would 1) place an extraordinary burden on employees who already met demanding work schedules; 2) require the designation of SMEs in non-technical training areas; and 3) present complex logistical problems because many SMEs were also classroom instructors.

OD then considered the peer-as-evaluator approach. On paper, this approach appeared to hold promise. However, OD eventually rejected this approach because of nearly universal negative feedback from informal

employee focus groups, many of whom believed it was not their job to evaluate fellow employees.

All of this led OD to select the trainee-as-evaluator approach for TOTEM. OD liked this approach because 1) trainees are ultimately in the best position to determine how much transfer of training occurred and in what areas; 2) of all groups of employees, trainees would be the easiest group to survey from a logistical standpoint; and 3) in terms of evaluator labor, the-trainee-as-evaluator approach would cost much less than all of the other approaches.

On the downside, OD was concerned that employees would answer survey questions defensively and feel pressure to provide organizationally-desirable responses. Therefore, OD determined to build anonymity into TOTEM's trainee-as-evaluator approach.

OD also elected to ask questions that did not challenge the trainee's job competency and which did not have readily apparent organizationally-desirable responses.

OD determined to survey trainees approximately six months after the conclusion of a training course. OD staff members believed the six month interval would allow time for the training "halo" effect to wear off and provide the trainee enough time to have opportunities to use most or all of the acquired skills and knowledge on the job. OD opted to initially use paper-and-pencil surveys because they are easy to use, tabulate, and interpret. OD believed that the surveys would be easy to computerize at a later date.

To provide transfer of training rates and usable feedback in all content areas, OD determined to ask the trainee questions about each course enabling objective. Some OD staff members argued that this approach would be too labor intensive. After considerable discussion, OD agreed to ask questions about each enabling objective, but employ a "cookie cutter" approach to asking questions to minimize survey development time.

To provide the overall transfer of training rate for a course, OD elected to use the mean of the enabling objective percentages. Staff members discussed weighting objectives by importance, but rejected this approach because of its complexity and subjectivity.

Finally, OD agreed to include a question related to each enabling objective to determine if the trainee possessed the skill and knowledge related to that objective before taking the class.

Before completing this phase, OD reviewed the criteria listed in Section 1.1 of this report to ensure that the TOTEM framework addressed all of the criteria. It did.

2.2 Designing the Model Logic

OD first considered the strategy for determining if the trainee could perform the objective before taking the class. This was a particular concern because

OD management had regularly heard complaints from trainees that they already knew much of the material covered in courses. OD management reasoned that if OD could establish that a large percentage of trainees knew a given objective before the class, the amount of time spent covering that objective could be significantly reduced. Perhaps, the objective could even be eliminated. OD decided to ask the trainee a straightforward question concerning pre-class knowledge:

- a. *Before taking [insert course number], could you [insert objective]? Y N*

If the trainee answered Y (YES), then transfer of training from the classroom did not occur for that objective. If the trainee answered N (NO), the trainee had met one of three conditions necessary to conclude that transfer of training occurred for that objective.

Next, OD needed to determine if the trainee retained the knowledge/skills necessary to perform the objective. Again, OD elected to ask a straightforward question:

- b. *Can you currently [insert objective]? Y N*
If you answered N [NO], skip to question Xa

If the trainee answered N (NO), then transfer of training from the classroom did not occur. If the trainee answered Y (YES), the trainee had met one of three conditions necessary to conclude that transfer of training occurred. OD added the direction, *If you answered N [NO], skip to question Xa*, to save time and confusion -- there is no sense in asking a trainee how often she/he applies an learning on the job, if, in fact, the learning did not take place.

Finally, OD needed to determine if the employee was applying knowledge/skill obtained in the classroom on the job. OD elected to use a question modified from the U.S. Department of Energy's formal job analysis process:

- c. *How often are you applying your knowledge of [insert objective] on the job? 0 1 2 3 4 5*

- d. *If your answer to c was 0 (Never), please explain why:*
-

Trainees would be told to answer question c based on the following:

- | | | |
|---|---|-----------------------|
| 0 | = | Never |
| 1 | = | Once per year or less |
| 2 | = | A few times per year |
| 3 | = | Monthly |
| 4 | = | Weekly |
| 5 | = | Daily |

If the trainee answered 0 (Never) to question c, transfer of training from the classroom did not occur. If the trainee answered 1, 2, 3, 4, or 5 to question c, the trainee had met one of three conditions necessary to conclude that transfer of training occurred. This proved to be the question that generated the most debate among the OD staff. Some of

the trainers argued that emergency/abnormal operations courses would fair poorly because trainees were unlikely to ever perform such tasks as fighting a fire. These instructors did see the need to make a serious attempt to quantify transfer of training for these critical courses. In the end, OD determined that question *c* would be modified slightly for designated enabling objectives related to emergency/abnormal tasks:

- c. *How often are you applying (have you applied) your knowledge of [insert objective] in drills or real life situations?**
 0 1 2 3 4 5

**For designated emergency/abnormal tasks only*

Some favored using a yes-no type question. Others preferred the scaled approach because it could yield data for future research into the effectiveness of objectives. In the end, the OD manager elected to go with the 0-5 scale primarily because he thought it would be perceived to be less threatening to a trainee than a yes-no question. Finally, OD added *d* to facilitate instructor lesson plan improvements.

With the addition of *d*, the question set for each objective was complete. Figure 2 shows the generic question set (the cookie cutter), and Figure 3 shows an actual question set.

Figure 2 -- Generic TOTEM Question Set

- a. Before taking [insert course number], could you [insert objective]? Y N
- b. Can you currently [insert objective]? Y N
If you answered N [NO], skip to question Xa.
- c. How often are you applying your knowledge of [insert objective] on the job? 0 1 2 3 4 5
- d. If your answer to c was 0 (Never), please explain why:

Figure 3 -- Example TOTEM Question Set

- 7a. Before taking BUS-100, could you identify proper agreement between a subject and a verb? N
- 7b. Can you currently identify proper agreement between a subject and a verb? Y N
If you answered N [NO], skip to question Xa.
- 7c. How often are you applying your knowledge of subject-verb agreement in your job? 0 1 2 3 4 5
- 7d. If your answer to 7c was 0 (Never), please explain why:

With that decision, OD had developed the basic logic of TOTEM:

Transfer of training occurred only if the trainee's response on a given objective is as follows:

- a. is N ,
- b. is Y ,
- and c. is ≥ 1 .

OD determined that the transfer of training rate for a given enabling objective would be calculated by determining the percentage of surveyed trainees whose response for the objective's question set is N , Y , and ≥ 1 . For example, if 14 of 35 surveyed trainees answered the question set for enabling objective #7 with N , Y , and ≥ 1 , then the enabling objective's transfer of training rate is 40 percent.

Further, OD determined that the transfer of training rate for a course would be calculated by averaging all of the course's enabling objective transfer of training rates. For example, the transfer of training rate for the following 5-objective course in Figure 4 is 45 percent.

Figure 4 -- Sample Calculation of Course Transfer of Training Rate

Objective	Transfer of Training Rate
1	25%
2	50%
3	75%
4	25%
5	50%

Calculation: 225 divided by 5 equals 45 percent.

OD determined that the model would also provide a substantial amount of information about why an objective had a low transfer of training rate, and what could be done to improve the rate.

A large percentage of Y answers on question a would indicate that trainees knew the material before taking the class. Therefore, the amount of time spent on the objective could be reduced or, perhaps, the objective could even be eliminated. OD called the measurement derived from Y answers on a , the prior knowledge rate.

A large percentage of N responses on question a combined with a large percentage of N responses on question b would typically indicate that more the objective needed more time/explanation: trainees apparently did not learn to perform the objective. OD called the measurement derived from N responses on questions a and b , the incomprehension rate.

Finally, a large percentage of *N*, *Y*, and *O* responses to questions *a*, *b*, and *c* respectively would indicate that the associated knowledge/skill is not really needed to perform the job; the time spent on the objective should be reduced or eliminated. OD called the measurement derived from *N*, *Y*, and *O* responses the training/job disconnect rate.

2.3 Designing the Model Interpretation Scales

To make the model user friendly, OD management elected to establish a set of interpretation scales. Some OD staff members argued that the scales should be set only after field testing. These staff members argued that it would be difficult to set meaningful interpretation scales ahead of time because of the wide disparity in transfer of training data published in the training field. Some authors indicated that the real transfer of training rate in the U.S. was just 10 percent. Others suggested 20 percent. Some believed it was 50 percent.

Other OD staff members argued that OD should ignore the conflicting and often contradictory statistics and focus on the goals of the training organization. As the OD manager put it, "I don't care if some of the training gurus say that a 25 percent transfer of training rate is acceptable. I don't think it is acceptable. I would not be satisfied if all of our courses had a 25 percent transfer rate. I think we should set the standards ahead of time so our goals drive our actions rather than having the curve drive them."

In the end, OD elected to establish interpretation scales before field testing. Figure 5 shows the scales that OD constructed.

Figure 5 -- TOTEM Interpretation Scales

<i>Course Transfer of Training Rate</i>	
(average of all enabling objective transfer of training rates)	
0 - 33%	LOW -- All objectives with UNACCEPTABLE rate(s) must be revised before the course can be offered again
34 - 66 %	MEDIUM-- All objectives with UNACCEPTABLE rate(s) should be revised before the course can be offered again
≥ 67%	HIGH -- No revision is required
 <i>Transfer of Training Rate by Objective</i>	
(For a given objective, number of <i>N</i> , <i>Y</i> , and ≥ 1 responses to questions <i>a</i> , <i>b</i> , and <i>c</i> divided by the total number of responses)	
≥ 50%	ACCEPTABLE
0 - 49%	UNACCEPTABLE
 <i>Prior Knowledge Rate by Objective</i>	
(For a given objective, number of Responses to question divided by the total number of responses)	

0 - 66% ACCEPTABLE
≥67% UNACCEPTABLE -- Investigate reducing the amount of time spent on the objective

Figure 5 -- TOTEM Interpretation Scales -- continued

Incomprehension Rate by Objective
(For a given objective, number of responses with *W* for both questions *a* and *b* divided by the total number of responses)

0 - 33% ACCEPTABLE
≥34% UNACCEPTABLE -- Investigate increasing the amount of time spent on the objective

Training/Job Disconnect Rate by Objective
(For a given objective, number of responses with *W*, *Y*, and *O* for questions *a*, *b*, and *c* divided by the total number of responses)

0 - 33% ACCEPTABLE
≥34% UNACCEPTABLE -- Investigate reducing the amount of time spent on the objective

3.0 Design

3.1 Selecting the Development Team

The next step in the project was to determine the composition of the TOTEM development team. In the end, OD elected to have an instructor lead the team. The team consisted of the instructor, the OD manager, and members of the office professional council within the WID. The instructor chosen to lead the team normally taught office professional courses, such as business English, business writing, and other office management courses to secretaries, administrative assistants, and other office professionals. The OD Manager was appointed to the team to remove obstacles to successfully field testing and evaluating the model. The office professional council consisted of secretaries from each WID department.

Other organizations within WID expressed surprise about the team composition -- they figured that OD would load the team with technical trainers. The OD manager selected the office professional instructor and council for the following reasons:

- The instructor and council had an excellent working relationship; the instructor served as the council's mentor
- The instructor and council had hands on experience in performance-based training methodology, having performed a rigorous job analysis of the secretarial position
- The instructor and council had many successes completing complex, labor-intensive projects
- The office professional courses met project needs (see Section 3.2)

3.2 Selecting a Course for the Field Test

OD selected BUS-100, Business English, as the course to field test TOTEM. BUS-100 is a five-day, 40-hour course containing 43 enabling objectives (see Appendix A). BUS-100 made a logical choice because of the following:

- o It had been developed using the DOE's job and task analysis methodology. At the time the DOE, its contractors, and oversight groups were debating the value job/task analysis added to training
- o The course was in the middle of the soft/hard scale -- it wasn't as "hard" as many technical training courses, but it wasn't as "soft" as many professional development courses. Thus, it would be a good, representative course

3.3 Developing the Survey

Survey development turned out to be one of the easiest activities of the TOTEM project. The lead instructor quickly converted the 43 enabling objectives into a paper and pencil survey using the generic question set as the "cookie cutter" (See Appendix B for a sample of the pilot survey). The OD team was particularly encouraged by the short cycle time required to produce a customized survey, believing that the ability to produce a survey in a short amount of time was a key to success for TOTEM. The lead instructor had the office professional council review the survey to ensure that interpretations of questions were consistent. They were.

4.0 Implementation

4.1 Field Test

The WID field tested TOTEM in June, 1993. The development team administered the customized TOTEM survey to 35 randomly-selected office professionals who had successfully completed BUS-100, Business English. The office professionals came from eight different classes. Over 80% of the participants had taken the course in the target range -- 6 to 8 months before the survey.

The lead instructor administered the survey in two group sessions. This was the first time that WID had used group sessions to administer surveys: previous efforts involved mailing surveys to employees at their work stations or homes with limited participation (typically around 35 percent). In contrast, attendance at the TOTEM group sessions was nearly 90 percent. Another interesting by-product of the group session was the completeness of the results. In mail-in surveys, it was not unusual to have 5-10 percent of the questions unanswered. Less than 1 percent of the TOTEM survey questions were unanswered. OD credits much of this success to the group session process -- the instructor was able to give oral instructions in addition to the written instructions contained in the survey.

The survey was administered anonymously. Upon completing a survey, the participants placed their results in a slotted box. It took most participants 15-20 minutes to complete.

The lead instructor tabulated the basic results (transfer of training rates for the course and its objectives) relatively quickly. The OD development team, worked part-time for several months interpreting auxiliary data and determining ways to report data.

4.2 Field Test Results

Using the field test data and the interpretation scales (see Figure 5), the development team calculated the following for the BUS-100, Business English course:

- Course transfer of training rate: 53%
(MEDIUM rate; all objectives with UNACCEPTABLE rates should be revised before the course is offered again)
- Course prior knowledge rate: 30%
- Course incomprehension rate: 16%
- Course training/job disconnect rate: < 1%

As reflected by the interpretation scales in Figure 5, OD had not planned to calculate/monitor course rates for prior knowledge, incomprehension, and training/job disconnect. However, after reviewing the field test data, the development team thought these rates could be of value in improving courses. OD deferred making a decision about whether or not to calculate/monitor these rates in the model until further testing could be performed to determine if the rates were usable.

The development team was not surprised by the course transfer of training rate, which would have been high on most other transfer of training scales. OD credited the high rate to the fact that the course had been developed using rigorous job/task analysis. OD believed this also explained the low training/job disconnect rate. Finally, OD was concerned with the relatively high prior knowledge rate. Going into this project, OD figured that prior knowledge would be the biggest problem affecting BUS-100 because of the close relationship of the course to high school English. This discussion led OD to conclude that it might be appropriate to pre-screen office professional trainees using an examination or survey.

Results by objective follow:

- Range of transfer of training rates by objective: 11-80%
 - Objectives that had ACCEPTABLE transfer of training rates: 65%
 - Objectives that had UNACCEPTABLE transfer of training rates: 35%
-
- Range of prior knowledge rates by objective: 3-89%
 - Objectives that had ACCEPTABLE prior knowledge rates: 93%

- Objectives that had UNACCEPTABLE prior knowledge rates: 7%
-
- Range of incomprehension rates by objective: 0-40%
- Objectives that had ACCEPTABLE incomprehension rates: 81%
- Objectives that had UNACCEPTABLE incomprehension rates: 9%
-
- Range of training/job disconnect rates by objective: 0-9%
- Objectives that had ACCEPTABLE job/training disconnect rates: 100%
- Objectives that had UNACCEPTABLE incomprehension rates: 0%

The only major surprise that the OD team encountered here was the extremely low job/training disconnect rate -- it was even lower than expected. As previously indicated, OD chalked some of this up to the course's rigorous development. For a detailed analysis of the 43 objectives, see Appendix C.

4.3 Use of the Field Test Results

The lead instructor used the field test results to revise the BUS-100 lesson plan. The instructor reviewed the 19 objectives that had UNACCEPTABLE results. Specifically, the instructor revisited the poorly-performing objectives with the office professional council to determine changes necessary to improve the course effectiveness. In the end, the instructor performed the following:

- o Eliminated one objective
- o Significantly reduced the time/coverage of 2 objectives
- o Reduced the time/coverage of 9 objectives
- o Significantly increased the time/coverage of 4 objectives
- o Deferred action on three objectives

See Appendix D for more explanation. The instructor expressed confidence that the revised BUS-100 course would achieve a substantially higher

transfer of training rate than the original course -- she thought it would achieve a rate in the 70s.

5.0 Evaluation

5.1 OD Evaluation

OD returned to its original conditions for a transfer of training model to determine if TOTEM satisfied the conditions:

Must provide an overall transfer of training rate from the classroom to the job for any given course

CONDITION MET -- OD was convinced that TOTEM could be used for any of its 100+ classroom courses using the generic set of questions as a cookie cutter. OD recognized that courses with specific enabling objectives would probably fair better under TOTEM than courses with broad enabling objectives.

Must provide transfer of training rates from the classroom to the job for all major content areas of any given course

CONDITION MET -- Because all OD courses contained enabling objectives, OD saw that TOTEM could provide usable feedback in all major content areas.

Must provide instructional staff with clear, concise feedback for systematically improving transfer of training rates: 1) content areas that need more instruction; 2) content areas need less instruction; 3) content areas that should be left alone

CONDITION TENTATIVELY MET -- The field test results provided the BUS-100 instructor with clear, concise feedback for systematically improving transfer of training rates for most course objectives. The results for a few objectives were difficult to interpret. However, OD believed that with use, the model could be refined to provide feedback on virtually all objectives.

Must be user (instructional staff, administrative staff, and management) friendly -- easy to use and interpret, readily computerized

CONDITION EXCEEDED -- The lead instructor found the construction of a customized survey to be a relatively simple task. She and other OD instructors found it easy to interpret and use the survey results. The survey participants also indicated that it was easy to complete the survey. OD management found the results easy to use. The OD administrative staff believed that with the proper macros, a survey could automatically be generated from a course's enabling objectives. In subsequent use, OD planned to use optical scanning sheets and a machine grader to tabulate results.

Must be budget friendly -- inexpensive to use

CONDITION EXCEEDED -- OD calculated that with computerization, TOTEM would be significantly cheaper to use on a regular basis than all of the off-the-shelf models reviewed, particularly if surveys could be generated automatically from lesson plan objectives.

To ensure valid results, must 1) determine if the trainees possessed the skills and knowledge before taking the class 2) minimize defensive and organizationally-desirable responses 3) maximize honest and frank feedback

CONDITION TENTATIVELY MET -- Unlike other models reviewed, TOTEM takes into consideration trainee knowledge obtained prior to training. With TOTEM, OD sought to minimize defensive and organizationally-desirable responses and to maximize honest and frank feedback primarily through anonymity and by asking questions in a non-threatening manner. TOTEM needs more testing before this condition can be said to be met, but OD personnel were encouraged by the lack of evidence of organizationally-desirable responses to the survey, and to learn from personnel participating in the field test that they did not feel "compelled to answer in a certain way."

5.2 Postscript

The BUS-100 instructor completed revisions to the course in the fall of 1993. Trainees taking Business English during the fall of 1993 were targeted for a follow-up field study in late spring, 1994. If the TOTEM evaluation criteria were valid, the overall transfer of training rate of the revised course would increase. Unfortunately, the project had to be put on indefinite hold because of a change in the timing of the plant opening and resulting reorganization and redistribution of financial and human resources.

Rather than shelf TOTEM, WID personnel involved in the project continued to analyze the model and field test results. Finally, WID personnel determined that the model had potential commercial and Internal application in the private sector. Therefore, WID and DOE determined to make the model available to U.S. organizations through the DOE's technology transfer program.

To obtain non-exclusive rights to TOTEM at no cost (to create a commercial product, use internally in your organization, or to use as a teaching or research aid), please complete Section III of the accompanying technology transfer instrument and return it to the WID address listed on the form.

A final note -- past experience shows us that many people do not understand why Westinghouse would freely its share research with other organizations, including its competitors. WID developed TOTEM under contract to the U.S. Department of Energy. Sharing TOTEM with other organizations helps ensure that U.S. taxpayers receive maximum return on their DOE-funded research dollars. WID and DOE hope that all of its technology transfers ultimately generate new job and sales growth in the private sector. In this way, WID and DOE hope to contribute to U.S. economic competitiveness in a global economy

6.0 Appendix A

Field Test Course Enabling Objectives (BUS-100, Business English)

1. Identify the eight parts of speech
2. Identify subjective/objective case
3. Identify subjective case with linking verbs
4. Identify pronoun case with infinitives
5. Identify transitive, intransitive, and linking verbs
6. Identify active/passive voice
7. Identify proper agreement between a subject and a verb
8. Identify gerunds and possessive case modifiers
9. Identify split infinitives
10. Identify positive, comparative, and superlative degree adjectives
11. Identify FATS linking
12. Identify nine prepositions requiring objective case
13. Identify troublesome prepositions
14. Identify phrases, dependent clauses, and independent clauses
15. Identify simple, compound, complex, or a compound/complex sentence
16. Identify coordinating conjunctions
17. Identify conjunctive adverbs
18. Identify parenthetical adverb
19. Identify an interjection
20. Identify a comma series
21. Identify parenthetical commas
22. Identify appositive commas
23. Identify address commas
24. Identify coordinating conjunctions
25. Identify commas after dates and times
26. Identify "and" omitted commas
27. Identify the four introductory commas
28. Identify a nonessential comma
29. Identify a contrast, a limiting, and a contingent comma
30. Identify omission of words comma
31. Identify clarity commas
32. Identify a quote comma
33. Identify the purpose of a colon
34. Identify when a colon is used in a vertical listing or a horizontal listing
35. Identify the purpose of a semicolon
36. Identify a declarative, imperative, and indirect statement
37. Identify the purpose of ellipses
38. Identify a direct, indirect, or polite request
39. Identify the purpose of a dash
40. Identify possessive case
41. Identify correctly and incorrectly spelled words
42. Identify proper use of abbreviations
43. Identify the three step method for increasing vocabulary

7.0 Appendix B

Sample from Field Test Survey

- 1a. Before taking BUS-100, could you identify the eight parts of speech? Y N
- 1b. Can you currently identify the eight parts of speech?
If you answered N [NO], skip to question 2a Y N
- 1c. How often are you applying your knowledge of the eight parts of speech in your job? 0 1 2 3 4 5
- 1d. If your answer to 1c was 0 (Never), please explain why: _____

- 2a. Before taking BUS-100, could you identify the subjective/objective case? Y N
- 2b. Can you currently identify the subjective/objective case?
If you answered N [NO], skip to question 3a Y N
- 2c. How often are you applying your knowledge of the subjective/objective case in your job? 0 1 2 3 4 5
- 2d. If your answer to 2c was 0 (Never), please explain why: _____

8.0 Appendix C

Field Test Results: BUS-100, Business English*

Objective	Transfer of Training Rate**	Prior Knowledge Rate**	Incomprehension Rate**
1. Identify the eight parts of speech	63% A	20% A	17% A
2. Identify subjective/objective case	60% A	09% A	31% A
3. Identify subjective case with linking verbs	63% A	09% A	29% A
4. Identify pronoun case with infinitives	63% A	09% A	23% A
5. Identify transitive, intransitive, and linking verbs	80% A	03% A	17% A
6. Identify active/passive voice	<u>43% U</u>	54% A	03% A
7. Identify proper agreement between a subject and a verb	<u>20% U</u>	<u>71% U</u>	09% A
8. Identify gerunds and possessive case modifiers	71% A	09% A	20% A
9. Identify split infinitives	54% A	03% A	<u>40% U</u>
10. Identify positive, comparative, and superlative degree adjectives	51% A	29% A	20% A
11. Identify FATS linking	77% A	09% A	14% A
12. Identify nine prepositions requiring objective case	54% A	06% A	<u>40% U</u>
13. Identify troublesome prepositions	51% A	09% A	<u>40% U</u>

Objective	Transfer of Training Rate**	Prior Knowledge Rate**	Incomprehension Rate**
14. Identify phrases, dependent clauses, and independent clauses	63% A	29% A	09% A
15. Identify simple, compound, complex, or a compound/complex sentence	54% A	37% A	09% A
16. Identify coordinating conjunctions	54% A	40% A	06% A
17. Identify conjunctive adverbs	63% A	09% A	29% A

18. Identify parenthetical adverb	57% A	03% A	<u>34% U</u>
19. Identify an interjection	<u>49% U</u>	40% A	11% A
20. Identify a comma series	<u>31% U</u>	66% A	03% A
21. Identify parenthetical commas	71% A	20% A	09% A
22. Identify appositive commas	69% A	14% A	17% A
23. Identify address commas	<u>17% U</u>	<u>80% U</u>	03% A
24. Identify coordinating conjunctions	51% A	37% A	11% A
25. Identify commas after dates and times	<u>11% U</u>	<u>89% U</u>	00% A
26. Identify "and" omitted commas	<u>49% U</u>	16% A	26% A
27. Identify the four introductory commas	<u>49% U</u>	11% A	20% A
28. Identify a nonessential comma	57% A	26% A	17% A
29. Identify a contrast, a limiting, and a contingent comma	66% A	09% A	26% A
Objective	Transfer of Training Rate**	Prior Knowledge Rate**	Incomprehension Rate**
30. Identify omission of words comma	<u>34% U</u>	46% A	20% A
31. Identify clarity commas	<u>49% U</u>	40% A	11% A
32. Identify a quote comma	<u>40% U</u>	51% A	09% A
33. Identify the purpose of a colon	<u>43% U</u>	54% A	03% A
34. Identify when a colon is used in a vertical listing or a horizontal listing	54% A	43% A	03% A
35. Identify the purpose of a semicolon	57% A	37% A	06% A
36. Identify a declarative, imperative, and indirect statement	63% A	14% A	23% A
37. Identify the purpose of ellipses	60% A	26% A	14% A

38. Identify a direct, indirect, or polite request	60% A	34% A	06% A
39. Identify the purpose of a dash	69% A	20% A	11% A
40. Identify possessive case	<u>46% U</u>	23% A	20% A
41. Identify correctly and incorrectly spelled words	<u>20% U</u>	66% A	14% A
42. Identify proper use of abbreviations	<u>49% U</u>	37% A	14% A
43. Identify the three step method for increasing vocabulary	63% A	14% A	17% A
TOTAL	53% M	30%	16%

* Training/job disconnect figures are not included because they were statistically insignificant

** The three rates for each objective may not always equal 100% because of the following:

- Rounding
- Alternate answer patterns, such as "N, Y, 0"
- Unanswered questions

Legend

L = Low
M = Medium
H = High
A = Acceptable
U = Unacceptable

9.0 Appendix D

Corrective Actions to Improve Poorly Performing Objectives

Objective	Transfer of Training Rate	Prior Knowledge Rate	Incomprehension Rate	Corrective Action
6. Identify active/passive voice	<u>43% U</u>	54% A	03% A	Reduce time spent on objective
7. Identify proper agreement between a subject and a verb	<u>20% U</u>	<u>71% U</u>	09% A	Significantly reduce time spent on objective
9. Identify split infinitives	54% A	03% A	<u>40% U</u>	Significantly increase time spent on objectives; add more explanation, examples , and exercises
12. Identify nine prepositions requiring objective case	54% A	06% A	<u>40% U</u>	Significantly increase time spent on objectives; add more explanation, examples , and exercises
13. Identify troublesome prepositions	51% A	09% A	<u>40% U</u>	Significantly Increase time spent on objectives; add more explanation, examples , and exercises
18. Identify parenthetical adverb	57% A	03% A	<u>34% U</u>	Significantly increase time spent on objectives; add more explanation, examples , and exercises
19. Identify an interjection	<u>49% U</u>	40% A	11% A	Reduce time spent on objective
Objective	Transfer of Training Rate	Prior Knowledge Rate	Incomprehension Rate	Corrective Action
20. Identify a comma series	<u>31% U</u>	66% A	03% A	Reduce time spent on objective
23. Identify address commas	<u>17% U</u>	<u>80% U</u>	03% A	Significantly reduce time spent on objective; monitor objective for possible elimination
25. Identify commas after dates and times	<u>11% U</u>	<u>89% U</u>	00% A	Eliminate objective

26. Identify "and" omitted commas	<u>49% U</u>	16% A	26% A	Deferred action on this objective because the cause of the low technology transfer rate is unclear
27. Identify the four introductory commas	<u>49% U</u>	11% A	20% A	Deferred action on this objective because the cause of the low technology transfer rate is unclear
30. Identify omission of words comma	<u>34% U</u>	46% A	20% A	Reduce time spent on objective
31. Identify clarity commas	<u>49% U</u>	40% A	11% A	Reduce time spent on objective
32. Identify a quote comma	<u>40% U</u>	51% A	09% A	Reduce time spent on objective
33. Identify the purpose of a colon	<u>43% U</u>	54% A	03% A	Reduce time spent on objective
40. Identify possessive case	<u>46% U</u>	23% A	20% A	Deferred action on this objective because the cause of the low technology transfer rate is unclear
41. Identify correctly and incorrectly spelled words	<u>20% U</u>	66% A	14% A	Reduce time spent on objective
Objective	Transfer of Training Rate	Prior Knowledge Rate	Incomprehension Rate	Corrective Action
42. Identify proper use of abbreviations	<u>49% U</u>	37% A	14% A	Reduce time spent on objective