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## PROCEDURES FOR IMPROVING TELEVISION INSTRUCTION

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# PROCEDURES FOR IMPROVING TELEVISION INSTRUCTION<sup>1</sup>

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**P**REVIOUS articles (3,6) have described the HumRRO studies (2), the purpose of which was to make a basic comparison of television instruction with regular instruction under closely controlled conditions. In these studies, current teaching procedures, subject matter content, and presentational sequences were not altered. No attempt was made to obtain the best television presentation possible. The results of that study indicated that under these restrictive conditions, television instruction was superior to regular instruction with subject matters involving the manipulation of small parts, paired associate learning, and the teaching of relationships among moving parts. No superiority for television was found, however, for subject matters of the lecture or lecture-demonstration type.

In the exploration of the teaching effectiveness of any new medium, an early step is to compare it with older, traditional techniques. A number of experimental comparisons reported in the

<sup>1</sup> The substance of this paper was presented at an American Psychological Association Symposium on Military Television in September 1954.

literature (1,4,5) leave no doubt that television does teach. The general purpose of the second series of HumRRO studies was to initiate a closer investigation of certain advantages and limitations of the television medium. Our concern now shifted toward the pedagogical effect of varying the type of presentation given to a television class and the application of some training techniques which film research has singled out as relevant. This paper will discuss this second series of studies.

We had already learned from the first HumRRO study how television compared with traditional class room instruction under controlled conditions (2). But to what extent could techniques be adopted which could improve the effectiveness of lecture-demonstration classes? With Army basic training subject matters it had been found that the teaching effectiveness of television was not superior to regular classroom instruction with lecture or lecture-demonstration type material, even among duller basic trainees (2:30). But in these comparisons, maximal exploitation of the medium was precluded by attempts to equate classroom and television versions as much as possible, save where some inherent properties of television, such as close-ups, made their utilization mandatory. Thus, it was felt that it would be singularly important to determine whether improved utilization of TV could yield increases in the level of teaching effectiveness in areas which our previous study had suggested were unpromising. Therefore, we selected lecture-demonstration classes involving the teaching of fairly abstract concepts where the student's opportunity to ask questions during the instructional hour has been traditionally regarded necessary. The classes consisted of brighter Army trainees for whom our previous study (2) had led us to believe television did not possess comparatively greater teaching effectiveness. To make the task more challenging, the classes selected were four of the most difficult hours of a six-month Radio Repair Course, as indicated by the number of student failures and other school indices.

These hours were normally scheduled early in the principles of electricity section of the course, and dealt with the characteristics of four types of basic radio circuits: Inductive, Capacitive, Series Resonance, and Tank Circuits. The four hours were all of the lecture and blackboard variety. They dealt with the electronic properties of inductors, and capacitors and their effect upon current flow when used in different functional combinations in radio circuits. The objectives of the lessons included a good understand-

ing of the effects of inductors and capacitors on the phase relationships among current, voltage, and counter-electromotive force, with direct, alternating, and pulsating direct current circuits. Trainees were all selected from upper groupings of the electronic aptitude distribution.

Preliminary work involved the preparation of objective tests based upon official lesson outlines for each hour. The tests were administered and revised until they were deemed acceptable on the basis of conventional psychometric requirements. Once the tests were completed, measures were obtained of trainee learning immediately upon the termination of each selected hour, taught in the regular classroom manner. In obtaining this base line, as it were, against which successive improvements in the television versions could be measured, there was no interference with or modification of the usual conduct of classroom presentation.

Production of the television versions proper began with the preparation of scripts for each of the four instructional hours. Each hour of instruction was entirely modified for television presentation with the official lesson plan outlines providing the teaching objectives for each hour. These revisions consisted of a number of different operations. Using test data accumulated at the end of each hour of regular instruction, item analyses were performed. These yielded information about weaknesses of the regular classroom instruction in imparting specific portions of the lesson. In effect, item analyses were used to pinpoint trouble spots where improvement was sorely needed. In such cases, meetings between research psychologists and television personnel were held to discuss how the unsatisfactory portions of the lesson could be presented more effectively by combinations of improved script writing, visual aids, instructor handling, and such production devices as superimposures and close-ups.

Addressing ourselves to the problem of reducing teaching time, close scrutiny of the behavior of instructors standing before a class revealed much irrelevant ad-libbing, reliance upon home-brewed analogies which often broke down even the course of their presentation, and lengthy answers to student questions of frequently dubious cogency. Revisions of regular classroom presentations thus also included attempts to omit much verbal material possessing little relevance to the main concepts of the lesson.

An assessment of highly relevant student questions had previously been made, and such questions and answers were included

in a rhetorical manner in the instructor's television script. Repetition and elaboration of elements critical for the understanding of concepts were stressed. Normal presentational sequences were altered in order to permit the making of inferences on the part of the trainees in anticipation of the actual conclusion-drawing by the instructor. It should be clear of course, that many of these *pedagogical* improvements could just as easily have been made on the regular classroom presentations. The distinguishing feature is the *administrative* advantage offered by television of presenting a well-sharpened educational tool to a large number of student groups, insuring the dissemination of standardized instruction of tested effectiveness.

The same instructor was used with successive versions of each instructional hour. At all times, the instructor would deliver his lecture while reading from a cueing device mounted at eye level on each camera, in such a way that the instructor appeared to be looking directly at the audience.

The results indicate that with the procedures outlined above, it was possible to obtain as much as a 50 percent reduction in the time normally required to present some of these hours in the regular classroom, and still achieve a significant enhancement of learning. This is the extreme case. In most cases, the significant teaching effectiveness of the television versions was maintained only when the normal presentation time was reduced 30 percent or less. For example, when the television version of a 50-minute Tank Circuits class was abbreviated to 18 minutes, the television group's superiority disappeared as mean differences lost significance.

If the objective of reducing presentation time is neglected, classroom and television versions of approximately the same duration usually demonstrated a significant superiority for television classes. For example, in Inductive Circuits classes, television and regular instruction classes of approximately the same length showed superior teaching effectiveness for the television version beyond the .001 level.

Of research interest are the cases in which revision of presentational methods lead to *no* improvement in teaching effectiveness. It would be fruitful, we feel, to experimentally investigate the critical factors which lead to improvement in some instances and not in others. For example, attempts could be made to relate dimensional variation of repetition, confirmation, participation,

and conclusion-drawing variables to achievement scores. Unfortunately, such interests fell outside of the scope of our study which, on a grosser level, was more concerned with localizing problem *areas* rather than with the isolation of specific variables.

As it was possible to construct a more effective television version by using item analyses to reveal the weak points of the regular classroom presentations, it was also possible to attempt successive improvements of television versions in the same manner. Portions of the lesson where learning was demonstrably poor were improved by the introduction of such devices as repetition, oral or written participation, and mnemonic devices. During the instruction, especially after the presentation of particularly elaborate expositions, brief rest periods were introduced during which trainees could study their notes in order to rehearse and integrate before going on to other topics.

Although it was not our purpose to relate the introduction of specific learning variables to specific changes in test performance, we were interested to see whether techniques, of accepted value in film research, could be feasibly adopted for television training purposes. These operations were rather rapidly performed. Indeed, it became routine to present television version A on Monday, analyze the data for weak points the same day, rewrite scripts and plan new production techniques on Tuesday, go into rehearsal with the presumably improved version on Wednesday morning, and have it ready for testing Wednesday afternoon. The rapidity with which these critique, revision, and test operations can be conducted, suggests the desirability of adopting them as routine methods in television training.

We have already mentioned the use of a cueing device used during the television presentations. This equipment has additional implications which deserve some mention. In the HumRRO basic training study (2), no such device was used. One of the problems encountered was that even with 8 to 10 hours of rehearsals, some instructors with as much as a year's experience in classroom teaching would occasionally "blow-up" in the course of a television class, becoming disoriented, forgetting to include important lesson content, and other such things. It was thus highly desirable to determine whether some device could be employed to preclude such occurrences and also, if possible, to reduce the amount of rehearsal time needed to prepare an instructor for a television presentation.

For this purpose, a cueing device was installed in the studio.

This equipment consists of three units, each containing approximately a half-hour script in large type, running vertically down a roller system at adjustable speeds. All three units are simultaneously operated by a remote master control board operated by one person. One unit was mounted directly above the lens of each of the two television cameras that were used. The third was placed directly above a stationary television monitor toward which the instructor "on camera" would occasionally look.

Within two to three hours of spaced rehearsal time, all instructors satisfactorily adjusted to the prompter to the extent that they could permit themselves to face away for blackboard work, to move about freely, and look at and manipulate objects without becoming uncomfortable over momentary disruption of eye contact. The device quickly insured a smooth and continuous flow of presentation of telecast quality only a few hours from the time the instructor began his first television rehearsal.

A rather interesting finding emerged out of our experience with an enlisted man who had absolutely no previous experience in teaching any of the four electronic classes under investigation. In fact, he had had no teaching experience whatsoever. Our interest here was in the possibility of using cueing equipment to reduce the amount of instructor training time required for television instruction in technical subject matters. After two rehearsal hours, the teaching effectiveness of this inexperienced individual did not differ significantly from that of skilled instructors with intimate knowledge of their subject matter, as measured by trainee test scores. These results should be interpreted with extreme caution, however, since this pilot study was limited to one individual. A more extensive investigation of minimal instructor requirements in conjunction with the use of prompting devices is currently being designed. For the military, who are constantly faced with the problem of great turnover among highly specialized instructors, the implications of such possibilities are clear. For the psychologist interested in relating changes in training to changes in performance, the use of such devices may help to reduce the number of uncontrolled nonexperimental variables. This would simplify the task of relating the effects of specific training variables to test behavior, by virtue of increased intra-instructor reliability.

These are some of the methods and some of the results of

our television work at the Signal Corps Training Center, Camp Gordon.

To summarize, the purpose of the second series of studies at Camp Gordon was to explore the possibilities of enhancing the superiority of television instruction in the teaching of basic radio circuits, by employing training techniques which have been found successful by film researchers. A related objective was to attempt to achieve substantial reductions in the amount of time normally required to present such material. In addition, the use of a cueing device was investigated to determine whether the television training time for instructors could be reduced.

The results indicate that television presentations of difficult subject matters can be made to yield considerable savings in time, while the level of learning is either increased or remains constant. The critical factors which lead to improvement in some instances but not in others are still obscure, however. Cueing devices are extremely effective in substantially reducing television training time for sophisticated instructors, and in insuring a dependable level of performance. Cueing devices may prove, after appropriate research, highly useful in facilitating the rapid training of totally inexperienced individuals as acceptable television instructors.

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