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ABSTRACT

Closed circuit television equipment was used to produce two versions of a program on the psychology of learning for showing to student teachers. Program A was designed in accordance with the suggestion that the more a presentation approximates reality, the more effective it will be. Program B was designed in accordance with the suggestion that a presentation will be more effective if the information is "precompressed" before transmission. Comparisons were made of the effectiveness for transmitting relevant information of each of the different techniques used to produce Program A and Program B and also of the total programs. The findings indicated the "precompressed" procedure to be more effective than the "realism" procedure. (Author)

The Instructional Effectiveness of Television Presentation Techniques

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Closed circuit television equipment was used to produce two versions of a programme on the Psychology of Learning for showing to student teachers. Programme A was designed in accordance with the suggestion that the more a presentation approximates to reality, the more effective it will be. Programme B was designed in accordance with the suggestion that a presentation will be more effective if the information is 'pre-compressed' before transmission. Comparisons were made of the effectiveness for transmitting relevant information of each of the different techniques used to produce Programme A and Programme B and also of the total programmes. The findings indicated the 'pre-compression' procedure to be more effective than the 'realism' procedure.

Many of the conventions and techniques employed in the production of television programmes were originally developed in the motion picture industry. They have not been developed specifically for instructional television purposes. Barrington (1965) suggested that valuable information might be obtained from research designed to determine which presentation techniques are most effective in promoting learning.

This opinion was supported by the views of other research workers at that time. Siepmann (1963), considering instructional television, said "Its effectiveness is clear. Its improvement is paramount. The most vital need is for perfection of the product". Whitley (1963) concluded "It is therefore proper that more research should be devoted to this important area of television technique". Travers (1964), considering the effectiveness of visual and aural presentations, said "A more important problem is that of determining the particular techniques which can be effectively used".

Since 1964 writers have continued to stress the need for research into the effectiveness of television presentation techniques. A report issued by Leeds University Centre for Television Research (1966) concluded "There is still lacking, however, a set of principles, verified by research, to which planners and producers of educational programmes can refer for guidance in selecting and organising teaching materials

for television presentation. Burns and Smith (1966) noted that the television teacher had little empirical evidence to guide him when preparing his presentations. They observed that "Important decisions relative to the selection of proper visuals and auditory effects are left to chance or decided on the basis of convenience". This observation had already been made by Travers (1964) who claimed that audio-visual aids had not been related to the learning process in a theoretically sound way but had been employed as knick-knacks designed to enliven the classroom in some manner as if such enlivenment would necessarily have any effect on the course of learning.

Mialaret (1966) observed that the whole question of determining, as objectively as possible, the best way of utilizing audio-visual material remained wide open to educational experiment. He commented " - without fear of contradiction it can be said that research is scanty in this field". Dwyer (1967) also commented " - considerable research needs to be conducted in relation to the types of visual materials presented via televised instruction".

Travers et al (1967) reported that discussions with persons who either produced audio-visual teaching materials, or were recognised as experts in this field, made it absolutely clear that there was no agreement concerning the principles that should be followed in designing such materials. A review of the materials confirmed that decisions had been made in terms of hunches and intuition rather than in terms of a set of well defined principles developed from research.

The writer contributed to a Council of Europe survey of the use of television for teaching in a number of countries. One of the conclusions of this survey reported by Schorb and Bakker (1968) was that those engaged practically in instructional television had not received any support worth mentioning from research.

Mielke (1968) observed that a television producer would not find a goldmine of production principles in the research literature. He emphasized that the poverty of research dealing with television production strategies stood in striking contrast to the plethora of gross media effectiveness comparisons that left message treatment variables unanalysed.

Miller (1968), stressing that the period of comparative studies of instructional television had passed and that there was little room for the facile opinion survey, claimed "There is now a need for more quality research".

Reid and MacLennan (1967) reviewed some three hundred and fifty investigations concerned with instructional television and film and reported that a disappointing aspect of the research on instructional television over a period of ten years had been the relatively small number of studies dealing with production variables or variation in methods of organising and presenting the programme content. Surveying the situation again two years later, Perraton (1969), concluded "We have no clear evidence on the kind of variations in production techniques that significantly contribute to learning from instructional television".

Various suggestions have been made as to the reasons for the scarcity of empirical research in this area. Travers, et al (1967) observed that although audio-visual techniques imply a theory concerning the way procedures for transmitting information bring about learning, producers would be hard pressed to state the underlying theory in precise terms because those engaged in creative arts are typically intuitive in their approach. This had been noted by McQuaill (1965) who said "One would like to see on the part of those who make programmes more reliance on evidence and less on assumption and intuition".

Saettler (1968) said that the ~~physical science or~~ media concept of instructional technology had predated the behavioural ~~science~~ concept and had been relatively little influenced by educational needs or psychological theory. More attention was given to media than to method, to audio-visual aids rather than to a technology of teaching.

The conclusions reached by Conant (1964) were similar to those of Travers and Saettler. He claimed that those engaged in the study or practice of theology, philosophy, law, and political science had tended to employ a theoretical - deductive mode of thinking whilst those engaged in medicine and the natural sciences had tended to employ a mode of thinking which may be regarded as empirical-inductive. He then said that teachers tended to reject the validity and utility of the empirical mode preferring the theoretical - deductive mode when it was clearly inappropriate or inadequate and that the mode of thought prevailing in most teacher - education institutions was the theoretical - deductive. In Conant's view "The

typical educational practioner neither generates nor seeks theories of instruction, nor is he committed to the testing of hypotheses or to the design of experiments concerning the instructional process".

Saettler (1968) also commented that university scholars had not generally undertaken research into instructional systems because they had been traditionally contemptuous of 'educationists' and any activity dealing with problems of learning and teaching in the lower schools had not been considered academically respectable.

Saettler (1967) had also noted that various curriculum study groups had tended to focus on content rather than on the learning of content and instructional procedures and that they had been totally convinced of the theoretical value of their respective approaches before they began.

It would appear that teachers and teachers of teachers have not been, in general, disposed to undertake research aimed at improving the effectiveness of teaching - learning procedures. Research into methods of teaching and learning in general has been neglected and, in particular, little attention has been paid to the effectiveness of presentation variables in instructional television.

As Field (1963) pointed out, early television studies had been largely sociological or psychological and had had little to do with television as a medium of instruction. It is certainly true to say that the vast majority of studies relating to teaching by television have been concerned with comparisons of the overall effectiveness of teaching by television and other methods.

There have been some attempts to obtain experimental data on which to base audio visual teaching practices. The review of research on the transmission of information by audio visual media by Day and Beach (1950) concluded that the evidence indicated that, in general, audio visual presentations were more effective in transmitting information than either audio or visual presentations alone. However, Travers et al (1967) claimed that the studies reviewed by Day and Beach were ill designed and should be regarded as being only of historical significance.

Whatever the reasons for the lack of research findings, the evidence indicated a need for research into presentation variables. After studying hundreds of ~~researches~~ studies concerned with teaching by television, Chu and Schramm (1968) concluded that the vital question remaining to be answered was how to teach most effectively by television.

The traditional theoretical rationale underlying audio-visual instruction has been that materials may be ordered on a continuum ranging from concreteness to abstractness and that the closer an object approximates to the concrete end of the continuum the more effective it will be in the instructional situation. This continuum is often referred to as 'the realism continuum'. This view was expressed at the turn of this century by Adams (1910) and is still widely accepted by writers in the audio-visual field including Dale (1968).

However some researchers have questioned the validity of the 'realism continuum' for the design of audio-visual presentations. Perhaps the most important reports have been made by Travers et al (1966 and 1967) based on Broadbent's model of human

that information arriving at the receptors is compressed so that information reaching the occipital cortex is more like a line drawing than a half-tone illustration. This would suggest that the logical realism continuum is not the most effective predictor of visual effectiveness. Edited detail and simple line drawings may be more effective for transmitting information than realistic photographs.

It could be that realistic detail may prove distracting and interfere with learning and therefore it may be advantageous to compress information before it reaches the receptors, i.e. at the transmitter.

The writer decided to investigate the effectiveness of pre-compression of information and of realistic presentation in increasing learning from instructional television. In particular the investigation would be designed to compare the effect on learning from instructional television of presenting information through auditory and visual communications channels using different production techniques.

The Experimental Procedure:

Several considerations influenced the choice of subject matter for the experimental television programmes. In order to facilitate the measurement of information gains it was decided that a topic not previously studied by the experimental population should be selected and that it should be one which would provide a considerable amount of factual information for transmission by television. In addition the topic would have to be acceptable as an area of study by the experimental population. In other words it would have to 'look right' or have high 'face validity'.

As the experimental population would be made up from student teachers, it was decided that an appropriate subject area would be learning theory. In particular the work of Professor B F Skinner on operant conditioning leading to programmed learning in the classroom was chosen as being likely to meet the considerations outlined above.

Two versions of an experimental programme were produced and recorded on one inch video-tape. The message to be transmitted was the same in each case but different treatments were used for Programme A and Programme B.

In the programmes Skinner's laboratory experiments on the use of reinforcement to shape-up and maintain complex behaviour in pigeons were described. The procedures used to extinguish this conditioned or learned behaviour were also described. The application of developments from these procedures to the shaping of children's learning and to the control of behaviour in the classroom was then illustrated.

Programme A was designed in accordance with the concept of a logical realism continuum which suggests that the more a programme approximates to reality, the more effective it will be. Programme B was designed in accordance with Broadbent's model of the human perceptual system which suggests that a programme will be more effective if the information is 'pre-compressed' before transmission.

In order to increase control over the 'teacher variable' the same presenter was employed in both experimental television programmes.

As the experimental groups in the investigation received similar instruction through television, no differences between the achievements of the groups after the instructional session should be attributable to a Hawthorne effect.

Five production techniques were used in the production of Programme A and the effects of each technique and the total programme on the learning of the experimental subjects were compared with the effects of five different production techniques used to produce Programme B and the effect of the total programme.

The comparisons made were as follows:

Production Technique	PROGRAMMES A	PROGRAMMES B
1	Visuals + Presenter	Visuals Animated
2	Laboratory Set	Grey Curtain Set
3	Cine Films	Animated Models
4	Superimposition of Printed Words on Visuals as Words are Spoken	Caption of Printed Words Alone after Words are Spoken
5	Visuals with Relevant Noise and Commentary	Visuals and Commentary
Total Presentation	Realistic Information	Pre-compressed Information

The experimental programmes A and B were shown on six 23" television monitors in a large lecture hall.

The Hypotheses

Six null hypotheses were formulated for experimental investigation.

$H_0 1$ There is no difference between the achievement of students who have received televised instruction in psychology from a programme in which visuals are manipulated by a studio teacher and that of students who have received similar televised instruction from a programme in which the visuals are animated.

$H_0 2$ There is no difference between the achievement of students who have received televised instruction in psychology from a programme using a simulated psychological laboratory as a visual setting and that of students who have received similar televised instruction from a programme using plain grey curtains as a visual setting.

$H_0 3$ There is no difference between the achievement of students who have received televised instruction in psychology from a programme using cine films with a commentary and that of students who have received similar televised instruction from a programme using animated diagrams with the commentary.

$H_0 4$ There is no difference between the achievement of students who have received televised instruction in psychology from a programme in which printed words are superimposed on visuals as the words are spoken and that of students who have received similar televised instructions from a programme in which the printed words appear alone on the screen after they are spoken.

H_05 There is no difference between the achievement of students who have received televised instruction in psychology from a programme in which the visuals are accompanied by relevant background sound and a commentary and that of students who have received similar televised instruction from a programme in which the visuals are accompanied by the commentary alone.

H_06 There is no difference between the achievement of students who have received televised instruction in psychology from a programme using 'realistic' information and that of students who have received similar televised instruction from a programme using 'Pre-compressed' information.

The Experimental Sample:

The subjects forming the experimental groups were second year college of education students. There were 327 students in the sample and of these 231 were women and 96 were men.

Methods of Measurement and Tests

Information was obtained about each student's performance on the Mill Hill Vocabulary Scale, the A.W. Heim A.H.5 Test of High Grade Intelligence, and the Eysenck Personality Inventory (Form B).

The scores on M.H.V.S. and A.H.5 were combined as transformed Z scores to give ability measures designated A measures. The subjects were matched on these measures and sex and allocated at random to one of the two experimental treatments.

The test which was used to measure information gains was an objective type test of 100 items, constructed by the writer, covering the content of the experimental television programmes. The 100 items were made up of 47 multiple choice type items and 53 recall type items. Each of the multiple choice items was given six alternative responses. For the 53 recall items, solid lines were used to indicate the need for a particular word or words and a broken line was used to indicate that the answer did not require a particular word or words. Particular test items related to those sections of the programmes produced by each of the five different techniques.

The 100 items test was used as a pre-test and post-test. As the subject matter covered by the experimental programmes A and B was new to the students one would expect zero and near zero scores to predominate on the pre-test. Consequently it was expected that the pre-test might not be used in the statistical analysis but that in such an event it would have served to prepare the subjects for the kind of questions they would be asked on the post-test.

No time limit was set for the completion of the 100 items tests on any occasion.

In marking the tests, the scores of the subjects on the items relating to those parts of the programmes produced by each of the five production techniques were extracted and tabulated along with the score on the total test.

The number of zero scores on the pre-test and the size of the correlation coefficient for pre-test/post-test scores justified the expectancy that the pre-test would not be used in the statistical analysis. The variate used in the analysis

Statistical Analysis

As a result of wastage of subjects and completed questionnaires, it was not found possible to incorporate the personality measure into the analysis. An analysis of variance was carried out on the scores of subjects on the 100 items criterion test in respect of each of the sections of the test relating to the parts of the programmes produced by the five production techniques and the total test. In each case a 2 x 2 x 2 factorial design was employed. There were two sexes two levels of ability, and two treatments. After a check on homogeneity of variance, the validity of the F tests was accepted and where F proved significant the mean scores of subjects in the relevant calls were inspected.

As a check on the accuracy of the calculations of the F ratios, t tests were carried out on the relevant mean scores on the basis of $F = t^2$ for one degree of freedom. In every case the accuracy of the calculation of F was confirmed.

The Results

The treatment factor was significant for presentation variable 2 ($P<.05$) and for presentation variable 3 ($P<.01$). The ability factor was significant for presentation variables 1, 2, 3, 5 and 6 ($P<.01$) and for presentation variable 4 ($P<.05$). The sex factor was significant for presentation variable 5 only ($P<.05$).

In the light of th~~is~~esl data, the six null hypotheses $H_0 1$ to $H_0 6$ were checked

$H_0 2$ was rejected. The achievement of students in treatment B was superior to that of students in treatment A

$H_0 3$ was rejected. The achievement of students in treatment B was superior to that of students in treatment A

$H_0 1$, $H_0 4$, $H_0 5$ and $H_0 6$ could not be rejected.

In comparisons 1, 4, 5 and 6, the techniques used in Programme B produced higher scores (but not significantly higher) than those in Programme A.

Although it was not found possible to include the personality measures in the factorial design and the analysis, the scores of a number of subjects on the total criterion test were inspected in the light of their scores on the E.P.I. (Form B) completed before the experimental viewing sessions. It was found possible to select four women and two men for each of the four catagories:

Neuroticism	High/	Extraversion	High
"	High/	"	Low
"	Low/	"	High
"	Low/	"	Low

in respect of Ability Levels 1 and 2 of Treatments 1 and 2.

The Scores of these subjects provided further support for the findings resulting from the analysis of the data which did not take into account personality measures.

Implications of the Research

On the basis of the evidence from the investigation and related researches the writer would make the following observations relating to the production of instructional television programmes in general:

1 'Simple' studio sets will be more effective than 'sophisticated' sets.

2 Diagrams and models will be more effective than photographs and films.

3 A programme using animation without a presenter may be expected to be more effective than one employing a presenter.

4 Cutting to printed words after speech may be expected to be more effective than superimposition of words as they are spoken.

5 A programme without 'realistic' sound may be expected to be more effective than one with realistic sound when a commentary is used.

6 A programme employing 'pre-compression' of information may be expected to be more effective than one using 'realistic' information.

Further research aimed at improving instructional television programmes should be undertaken. More information is needed about the effectiveness of presentation techniques and the pre-compression of information. For example, is the effectiveness of pre-compression related to the age of the students? Is it related to their cognitive abilities? The writer found some evidence to suggest that the pre-compression procedure was particularly effective with less able students. Again is

the pre-compression procedure also effective when the aim is to teach students to generalise and form concepts?

The writer hopes that some of the findings of his investigation will be of practical value to teachers and producers concerned with instructional television.

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