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ABSTRACT

The early development, prebroadcast research, early production concepts, formative research, summative research, evolution of production, and promotion and outreach activities of "The Electric Company" (TEC) are presented. Conclusions discuss (1) the uncertainty of the future of TEC despite its success and positive reception as an educational innovation; (2) some immediate questions regarding promotional activities, funding, valuable products, and teacher utilization; and (3) steps which have been taken to begin to answer these questions. A list of references is included. (CMV)

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CHILDREN'S TELEVISION WORKSHOP

THE ELECTRIC COMPANY

FINAL REPORT ON A TELEVISION READING SERIES

June 1978

DEDICATION

This account of the development of The Electric Company is dedicated to Samuel Y. Gibbon, its Executive Producer. His remarkable appreciation of the processes of learning and teaching, as well as of the art of entertaining, has made The Electric Company an enjoyable and helpful program for millions of children.

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I. INTRODUCTION

The Electric Company (TEC) was created by Children's Television Workshop (CTW) after the initial success of Sesame Street. Widespread illiteracy in this country had become a focus of national concern. Since Sesame Street appeared to be so promising at the preschool level, it was proposed by CTW that a similar approach might become an aspect of a significant nationwide campaign against illiteracy.

The program made its debut in October, 1971. One hundred and thirty (130) shows were created that season, and each season thereafter through 1976-77, at a cost of roughly $5.5 million per year. By several criteria, the program has been a success: it is now carried by approximately 243 public broadcasting stations; a two year multi-site evaluation conducted by Educational Testing Service identified gains in reading scores directly attributable to the program; target age viewers continue to total an estimated 6 million children ages 6-11 on a weekly basis; the program won Emmys in 1973, 1974, and 1977, the Ohio State Award, and the prestigious Japan prize as well.

The final two seasons of The Electric Company (designated Series A and Series B) are now being broadcast on public television, in alternation, through at least 1980. CTW is monitoring the response of in-school and home viewers to this repeat pattern in order to determine its impact on audience size and on effective classroom use. Future planning must be based on these observations.

The following document is an account of the main points of the history and development of The Electric Company, the research that supported it, and its influence at home, at school, and in the community. The report also serves to direct the interested reader to the substantial body of publications related to TEC which has been built up over the years.

II. EARLY DEVELOPMENT

Television seems, at first, to be an unlikely medium for reading instruction. In fact, critics of The Electric Company concept in its early stages claimed that television and print were essentially antithetical (e.g. Parker, 1974). However, for many reasons, teaching reading via television was not such an unlikely venture.

As part of the program's early development CTW's advisors designated "poor readers, 7-10 years old," as the most needy audience for the program. These were children who had already tasted failure in school reading programs, and for whom television could provide a non-threatening and familiar alternative to the classroom experience. It was planned that the program be primarily for viewing at home, a respite from the pressure - and perhaps even humiliation - of the classroom. (At the same time, it was hoped that teachers would also use the program and considerable promotional effort was to be aimed at them.) The target viewers and their peers were known to be steady and sophisticated television viewers. Televised reading instruction, if carefully designed, could take advantage of this visual sophistication. Sesame Street had already taught us some ways to do this.

Finally, it was decided that the program would necessarily focus on the most basic reading skills, which its advisors felt to be simple decoding skills, such as mastery of letter/sound correspondence. Thus, while it might indeed have been inappropriate to attempt advanced reading instruction via television, there was reason to think, based on the Sesame Street experience, that the building blocks of the written code might be effectively presented via the dynamic and visually versatile medium of television.

When The Electric Company went into production in 1971, over a year had been spent in planning and exploration. Consultation with experts in appropriate fields (reading, language, child development, educational research) began as soon as the idea to develop such a program was conceived, and continued to play an important role throughout the years of program production. A group of consultants was formed into a permanent Board of Advisors and a special Research Advisory Committee which assisted the staff on a regular basis. These groups met frequently at first, then yearly. The former dealt primarily with questions of program substance, while the latter advised on appropriate areas of research activity and on questions of research design.

Initially over a hundred individuals were consulted, both individually, and in seminars. Beginning in 1970 a task force consisting of Sam Gibbon, Naomi Foner, and Barbara Fowles consulted psychiatrists, psychologists, psycholinguists, sociolinguists, reading experts, bilingual education specialists, librarians, writers and illustrators, and many creative film and television people in this country and in England and Canada.

In addition to discussing his or her special field of interest and its relevance to learning to read, each consultant was initially asked to consider a number of basic questions, including the following:

1. Can television be used to teach reading?
2. Considering the nature of the target audience,* is it necessary to present a comprehensive beginning reading curriculum, or can the program focus on a selected number of basic reading skills?
3. Would there be problems of interference if the televised instruction differed from the instruction offered the child in the classroom?
4. Should we adopt a single method of instruction for our program or present a "cafeteria" of methods?
5. What method of reading instruction do you prefer, and why?
6. What reading skills should be taught to the target audience?
7. How might those skills be presented on television?
8. In what sequence should those reading skills be presented?
9. Is it possible to have any useful effect if the instruction is not sequenced?
10. To what degree does difference in spoken dialect interfere with learning to read written standard English?

These questions were formulated on the basis of a review of the issues relevant to elementary reading instruction as well as concerns raised in the process of producing Sesame Street.

The first of two curriculum seminars convened in March of 1970 at Arden House in Harriman, New York. At the beginning of the conference a tentative set of goals was presented to the participants for their consideration. The goals were divided for purposes of discussion into the

*Initially this was defined as second grade children performing in the lower half of their reading class, and third and fourth grade children in the lowest quarter. After the first season, survey feedback caused this definition to be expanded to include all first graders.

broad categories of decoding, comprehension and motivation. Specific skills were proposed in each category. Participants were asked to consider the goals in relation to a number of issues, including sequencing and pacing of instruction, dialect and language difference, and program format.

On the basis of recommendations from the Arden House Conference, and continued consultation with individual experts, a tentative curriculum was drafted and then revised. During the spring and summer of 1970, details were added, the scope of the instructional goals refined, and teaching strategies were made more explicit.

In October 1970, a second two-day seminar was held in New York City. Important outcomes of this seminar included curriculum refinements, and policy statements on the role of sequencing and on the use of non-standard speech. The policy on sequencing follows:

1. The Workshop must assume that few children will watch every program in the series. Furthermore, new viewers will be constantly added, at least during the first three months of the series. Therefore, no program in the series should require of the viewer that he has seen any previous program.

2. While sequencing of instruction from program to program within the series is probably ruled out, any individual program can be sequenced so as to progress from less complex to more complex material in the half-hour. Such sequencing within individual programs is desirable.

3. Frequent repetition of a program element embodying material which is beyond the capacity of a given child at the time of first presentation will permit that child opportunities for working his way through the material. Program elements designed for such repetition must be highly entertaining so that children with more advanced reading skills can benefit from the review of instruction which they have already mastered.

4. The Workshop staff will continue to search for a way to graduate the difficulty of instruction in a gentle upward slope across the series without excluding the late-coming viewer. One arrangement might be to apply such a gradation of difficulty to the first half of the series and then repeat the same gradation through the second half..

5. If no sequencing from program to program proves feasible, the series will still be beneficial to the target audience.

This sort of careful consideration was given to each major issue. Following the general discussion of workshop policy with regard to these major issues, the seminar participants worked in small groups addressing themselves to a detailed review of the draft curriculum, and the proposal of some teaching techniques suitable to the medium.

The original curriculum for The Electric Company was formulated following this seminar by the team of CTW staff members.*

The purpose of the curriculum was two-fold. First, the curriculum clearly stated the goals of the program. It served as an internal "contract" to be fulfilled in production. One reason the curriculum goals were stated in operational terms ("The child can...") was to provide a basis for later determining the extent to which the program had achieved its objectives.

Second, the curriculum statement provided the basis for preparation of scripts and for their translation into production. It indicated to the writers exactly what aspects of reading were to be dealt with in the program and how. Again, the form of the curriculum in operational statements was significant: in giving the writer and producer a description of what behavior the child should learn from the program, an operational

*A detailed discussion of this curriculum appears in a subsequent section.

statement suggested particular production strategies to be used in presenting those skills which paralleled the desired behavioral outcomes.

The curriculum also served the more mundane but vital purpose of helping to schedule the instructional content of each show. Finally, it was a continuing means for providing teachers and parents who needed to make decisions about using the program with bases for such decisions.

Curriculum revision was an important continuing function of the research and production staffs. (This revision process will be discussed in a later section.)

In addition to consultations with expert advisors, the study team undertook a number of other activities related to curriculum development. Forty widely used classroom instructional systems were analyzed in order to identify: a) principles of instruction exemplified, b) skills introduced and c) their order and rate of introduction, d) "sight words" introduced at each level. This provided an indication of how children are generally expected to perform in school.

Over fifty reading classes in more than a dozen schools in various parts of the country were visited. A wide range of instructional methods were observed in actual classroom operation by the task force members. This approach offered a more accurate picture of the motivational properties of various methods.

Members of the now expanding research and production staffs attended a number of professional reading conferences during the year, including the Annual Convention of the International Reading Association and the Teachers of English to Speakers of Other Languages (TESOL) and two Right to Read conferences. In addition, a paper entitled, "Pre-reading on Sesame Street," was prepared by Sam Gibbon and Edward Palmer for the Committee on Reading of the National Academy of Education, whose deliberations were attended by

members of TEC staff. The value of the Gibbon and Palmer paper, in the development of The Electric Company, was that it forced the translation of implicit assumptions about reading instruction into explicit principles which would then be communicated to the producers of the new program. It also forced a detailed analysis of the way reading or pre-reading was dealt with on Sesame Street and this too would prove useful in developing the new reading program.

It was decided that The Electric Company should focus on basic reading skills, since this had been seen most frequently by the program's advisors as the critical area in terms of ultimate success or failure in learning reading. If the child succeeded in mastering these most basic skills, the prognosis for success with the more complex aspects of reading was good; if the child failed at this point, he or she was likely to experience even more reading difficulty and fall further and further behind.

It was also recognized that the most sensible approach to televised reading instruction would be to concentrate on the subset of needed skills which television could best present. Clearly, television is more appropriate for presenting individual elements of the code, and for concretizing the basic conceptual relationship between print and speech, than it is for offering instruction in dealing with extended passages of print. Therefore, it was decided that, rather than attempting a comprehensive reading course, TEC ought to do what television can do best.

These factors converged to suggest that TEC's curriculum should not be comprehensive, but rather should be limited to the essentials of beginning reading, and be aimed at the child who had failed to grasp these skills in school.

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1) Portions of this paper were later revised and incorporated in a chapter entitled "Sesame Street, The Electric Company, and Reading," authored by S. Gibbon, E. Palmer and B. Fowles in Carroll, J. and Chall, J., Toward a Literate Society. New York. Random House, 1975.

First graders were not originally included in the primary target audience for TEC, primarily because the program's eclectic and unsequenced approach (necessary for reasons outlined earlier) might be confusing to a child for whom this whole business of reading was totally new. Also, at this time, the question of how to approach beginning reading was extremely controversial. The failing second grader, the "bull's eye" of the target, was chosen as the child who would have some familiarity with print and not enough history of failure to have become demoralized.

The needs of this target group dictated a focus on particularly critical basic skills, but did not by itself determine the nature of TEC's curriculum. There are several ways of approaching beginning reading, and the differences among these approaches are significant. It was eventually decided that the program should adopt a "cafeteria" approach focusing on phonics or 'decoding' skills as those skills which would provide the child with the most useful and generalizable tools for grappling with written language. At the same time, 'phonics' was rather broadly interpreted and several approaches to decoding written language were actually employed. This maximized the likelihood that the program's content would bear some relation to the child's formal reading instruction, and also provided for the varying learning styles among viewers.

III. PREBROADCAST RESEARCH

Once the initial curriculum was established, a study was carried out to determine the level of functioning of target viewers in the stated goal areas. The test population consisted of 100 bi-lingual children (Spanish-English) in upper Manhattan and 100 black children in Bedford-Stuyvesant, Brooklyn. Subjects were second and third grade students (7-10 year olds), classified by us as non-readers, poor readers, or average readers on the basis of scores on the Metropolitan Achievement Test provided by the schools. The second major focus was to look for particular problems of children in these two ethnic groups, which were expected to form a substantial sector of the program's target audience.

Among non-readers, scores on reading items were so low that the differences between ethnic groups were meaningless. Analysis of group differences suggested that, on the whole, the major reading difficulties of the two groups were similar and basic. However, the data also suggested that the difficulties included various dialectal problems as well as confusion in letter-sound correspondences, poor blending ability, word and letter reversals, sequencing difficulties, poor listening skills, poor auditory and visual discrimination, poor decoding, poor comprehension skills, and limited sight vocabulary development. Analysis of errors made by these children led to recommendations for approaches and teaching strategies to be employed on the new program. Some of these were:

1) The show should stress the reasonable, methodical aspects of the decoding process.

2) The show should make it clear that each letter or "chunk" contributes to the sound and therefore the meaning of the word.

3) Because of difficulty with final clusters for Black English-speaking and Spanish-speaking children, special emphasis on the ends of words may be required.

4) Because dialect interference occurs in reading digraphs, ch, sh, and th should receive special attention.

5) Visual confusables (p/q, b/d) and alternative spellings (ee,ea) require the development of special procedures and strategies.

6) The teaching of morphemes (-ed, -ing) requires stress on the correspondence between the sound and the written symbol.

7) Production must be geared to encouraging cautious readers and pointing out to wild guessers that they can increase their chances of hitting the right word if they pay attention to the clues given in the written word.

8) Emphasis must be placed on the fact that sentences make sense and that their meaning is related to the words contained in them.

A smaller study was aimed at characterizing the typical vocabulary of the target audience. In addition to consulting basic word lists, conversations of inner-city children (6-11 years old) were taped in their homes, non-supervised playgrounds, and in and around stores and delicatessens in order to develop vocabulary profiles of this group. Our intention was to try to make the task of learning to read easier by basing instruction on familiar spoken vocabulary.

Baseline Appeal Studies

We also carried out a survey of the interest and television preferences of children. Researchers recorded interviews with 104 target-age children (6-11 years), wherein they were asked what television shows they watched, which were their favorites, what books they liked and related questions. The most preferred live action shows at that time were: Sesame Street, I Love Lucy, Lost in Space, Lassie, The Three Stooges, The Courtship of Eddie's Father, Batman, Creature Features, Bewitched, and Star Trek. The most popular cartoon shows were Popeye, Superman, Felix the Cat, Archie, Scooby Doo, Bugs Bunny - Road Runner, Batman, Here Comes the Grump, Banana Splits, and Johnny Quest. There was a decided preference for cartoon over live-action shows.

Among print materials, the sample of children expressed a preference for comic books and picture books over print-dominated materials.

Similar probes were conducted on a periodic basis for the purpose of updating The Electric Company's appearance and feeling. This led, for example, to the eventual introduction of the "Spiderman" character into The Electric Company.

During the pre-broadcast phase an effort was made to get some of the preliminary concepts into production as soon as possible in order to evaluate them. The earliest products of this effort were animations commissioned from independent production houses. The appeal of each of these animations was evaluated, primarily in relation to the appeal of those commercial programs which were most popular with children. The comparison of an educational production to pure entertainment may seem unfair, however, we recognized that TEC's competition in the child's home setting was just this sort of commercial entertainment. If TEC could not compete, then it could not reach the failing and somewhat unmotivated reader. For the most part, TEC animations stood up well under comparison.

By early summer 1971, five half-hour test shows had been completed in anticipation of an October premiere. These shows were subjected to thorough appeal and achievement testing in New York City public schools, using second and third grade children with reading problems. The children found the program attractive, but achievement results were more difficult to interpret. It became clear that short-term achievement measures of the pre-test/post-test variety were simply not meaningful as a means of formatively evaluating TEC.

IV. EARLY PRODUCTION CONCEPTS

Because The Electric Company was originally intended for viewing primarily at home, it had to be capable of competing with the commercial programs children habitually watched in TEC's time slot. (This was not normally the case for an explicitly educational program, since most of them were offered primarily as part of school television services.) Thus, it was of utmost importance that the program be attractive to the target viewer. For this reason, the writers selected for the program had prior experience as comedy writers, not as educational writers. Firstly, they acquainted themselves with the reading curriculum and then they set about developing ways of integrating it into comedy sketches. The major premise was that effective pedagogy, while necessary, would be useless unless children watched the program because they enjoyed it.

As a program for reading instruction, The Electric Company naturally needed to present a great deal of print, a medium which does not seem to naturally mesh comfortably with televised entertainment formats. Therefore, an important design problem for TEC was to successfully integrate print and entertainment. This task was further complicated by the fact that the resulting mixture of humor and pedagogy had to look distinctly different from Sesame Street, lest the new program be dismissed as "baby stuff." For children already sensitive to the fact that they were falling behind in school, a slick, grown-up looking show, which could nevertheless present the simplest subject matter, was essential.

The producers reasoned that one way to accomplish all this was to work with the surface of the screen. The name The Electric Company was chosen to reflect the fact that, rather than depicting three-dimensional realistic situations as

Sesame Street did, TEC would employ electronic magic, fluid fantasy settings, and a great deal of two-dimensional representation. The television screen thus assumed some of the properties of the printed page. Using television in this way allowed for the uncluttered presentation of limited amounts of print which could compel attention by moving, undulating, blushing, or otherwise responding to speech or sound effects.

The name The Electric Company also connotes another aspect of the program - a "company" of actors, Black, Hispanic and white, male and female, child and adult, who offered each viewer an opportunity for identification, since imitation is known to be an important way in which children learn. Characters portrayed by these actors were straight and 'hip', shy and bold, cheerful and crabby, in order to make all sorts of children feel included. Also, the fact that each actor took many different roles suggested implicitly the value of bi-lingualism and bi-dialectism.

Television, with its advantage of visual movement, offered many opportunities to clarify concepts and relationships which often remain obscure on the printed page. (Many viewers also had the advantage of color.) Thus, movement and color cues (or shading on black and white sets) were utilized to signal to the viewer exactly which symbol in a string of written symbols corresponded to a given speech cue. Also various techniques for carrying the eye from left-to-right (a wave of color, change in size, etc.) were used to model the process of verbal blending, a cornerstone of beginning reading which is extremely difficult for some children to grasp.

Certain formats were used repeatedly during the first season because of their unique strengths. A description of a few of these, and the

rationale for using each one, follows:

- The Telestrator: This is a device which allows words to appear on the TV screen as they are written by an unseen hand. This is a visually compelling technique, in keeping with the magical, electronic tone of the program, which also reinforces the conceptual relationship between print and speech. Because it is dynamic, when used with an accompanying voice, which reads the print, it is an excellent way of demonstrating the "sounding out" process, and it takes full advantage of the dynamic properties of television.
- Animation With Speech Balloons: The speech balloon is a convention familiar to virtually all children because it is borrowed from the comic book. Coupled with animation and audio, the speech balloon convention permits animated characters to speak, while their dialogue simultaneously appears in print in balloons emanating from their mouths. This synchrony of speech and print again models this essential relationship, both in general and for specific words, particularly those stressed or repeated in the dialogue. The several advantageous facets of this balloon technique are well illustrated by the following animation involving a determined plumber and a wise-cracking parrot: the plumber arrives at the door, tools in hand, and knocks. The parrot inside on his perch squawks, "Who is it?" The plumber, fooled by this, replies, "It's the plumber. I've come to fix the sink." The words of both characters appear in balloons in synchronization with their dialogue. This exchange is repeated several times. The plumber's nerves snap and

he collapses. At this point, the lady of the house returns, spies the prostrate plumber on her doorstep and asks rhetorically, "Who is it?" From inside we hear the parrot reply, "It's the plumber. He's come to fix the sink!"

Because the humor of this segment derives from repetition (with a final twist), viewers are given an opportunity not only to grasp certain properties of the relationship between print (including punctuation) and speech, but they also have a chance to master reading of "Who is it?" and perhaps other repeated words.

- Message Man: The Message Man is a character conceived for two purposes. The first is to provide modelling of the process of "sounding out" unfamiliar words and synthesizing the newly analyzed sounds into intelligible messages. The second is to create a lovably inept character who might help the child having reading problems to relate to the program. The Message Man is a gentle little fellow who laboriously works out several simple messages such as "Do not pull string," posted in his path by an officious messenger. The Message Man reads the message, at first with much distortion, but eventually in recognizable form. (These distortions are similar to errors children tend to make in similar circumstances.) As he reads, he tracks the print with his inordinately large, upturned nose. The trouble is that as he struggles he loses the sense of the message, ignoring a key word or syllable (in this case, "not"). He then pulls the string, or commits some comparable error, and brings disaster upon himself. Finally, he reads the message accurately ("Do not pull string.") in a morose tone. Thus,

these segments also illustrate the importance of attending to meaning throughout the decoding process. (CTW was occasionally criticized for the punishment Message Man received, but the format was retained because of its many strengths, and because it made a realistic point about the consequences of an inability to read.)

- Crank: The character dubbed J. Arthur Crank was used primarily for motivational purposes. Crank voices the confusions and frustrations the child may experience when presented with the many inconsistencies of written English. Crank is used to make viewers feel that they are not alone in their frustrations. It is also hoped that by voicing explicit complaints about difficulties with the written language, Crank might help children to see that there are problems inherent in the system, and not all failures are due to their own inadequacies. During the first season, Crank was only a telephone voice, calling in complaints as a member of the audience. Subsequently he was made a visible character and integrated into the program.

V. FORMATIVE RESEARCH

Formative research in television was virtually unknown before Sesame Street. The purpose of formative research, as the term implies, is not to evaluate the program as a whole, but rather to modify the program in a positive direction before and during the production phase (Palmer, 1975). Formative research continued to play a critical role throughout the years of production of The Electric Company and was the most important function of the full-time research staff.

The primary function of formative research is to serve the needs of the program's research and production staffs, rather than to validate CTW's efforts to reach a larger audience. Thus, two critical attributes of formative research, speed and flexibility of methods, depart markedly from the typical demands of basic research. Speed is critical because production questions must be answered quickly; flexibility is essential because many issues must often be addressed in a single research effort. Thus, simple and 'open-ended' techniques, such as group observations, are of enormous value in formative research.

An important part of formative research, because of its relative novelty in television, was the development of new research methods and the adaptation and improvement of old ones. A characteristic of formative research is that several methods, formal and informal, are applied to a given question, in order to provide maximally reliable answers in a relatively short period of time.

Another function is effective communication of research results to production personnel. Often, this proves to be a matter not so much of correcting an approach to instruction, but rather one of legitimizing the producer's

creative intuitions about the correct approach to a pedagogical problem, and defining the good and bad aspects of a given approach so that it can be used more effectively in similar future pieces. Sometimes, however, research results must guide production to new strategies. The most effective approach may be counter-intuitive.

Appeal Measures: A concern with the appeal of The Electric Company was crucial, since the viewers had to be attracted to the program. The distractor, the most frequently used measure of appeal, was originally devised by Edward L. Palmer, CTW Vice President for Research, and had been (and continues to be) used extensively by the Workshop research staff in appeal studies for Sesame Street. It consists of a rear screen slide projector, about the same size as a television screen, placed at the same height as and adjacent to the television set, at a 45° angle. The projector screen displays attractive color slides which change every 7.5 seconds, while a piece of video-taped test material is shown on the television screen. The viewer is told to look at whatever stimulus he chooses as an observer records the degree of attention for each 7.5 second interval. Children are observed individually, and a composite record of several children watching the same show is compiled by averaging attention levels for each interval. This provides a point-by-point analysis of attention patterns which proves to be useful on a continuing basis, in spite of certain limitations. The primary strength is that it does not rely on the child's making an overt response to the material, and is therefore more like ordinary viewing than are more intensive methods of evaluation.

Another value of this method is that it provides a display of moment-to-moment fluctuations in attention patterns, which is in the form of data, not interpretation. Thus, such presentations make possible the development of in-

terpretations by researchers and producers together, as well as by researchers alone.

Over the years, the CTW research staff experimented with modifications of the distractor graph which might make it faster and more accurate. One such methodological study was conducted in 1973 at Harvard Graduate School of Education under the supervision of Harry Lasker and the CTW research staff. The Harvard group had six subjects view at one time, and responses were recorded by a hidden video camera facing the group of children. Viewing the tape, an observer then measured the attention of each child. This eliminated most problems related to scorer fatigue (one can stop the tape at any time, rest, and then go on) or losing track of the intervals. The method also did away with the problem of losing part of each interval while looking away to record the score. It did so by mechanizing the entire process via an electronic contact button which the observer pressed whenever the child's eyes left the screen. The resulting graph was then divided into time intervals for charting purposes. The Harvard group used the same distractor normally used, a repeating slide carousel with the slide-screen placed at an angle to the television screen. The major difference lies in the fact that six children watched at one time. The larger group did not seem to effect viewing conditions drastically; and even if they did, such disturbances would be more similar to the in-school viewing situation.

Attempts were made to adapt this improved procedure to simpler, more portable equipment. A time-lapse camera was employed in lieu of the video tape recording. ("Time sampling" has the advantage of being reliable. Nothing has to be judged or kept track of and several people can count at once. But it also has the disadvantage of measuring only one instant of time

at regular intervals rather than the entire interval.)

To see whether "time sampling" might be an adequate method for measuring attention, the following comparisons were made:

Twenty children in groups of four were photographed watching TEC show #150. One photograph was taken each second. Three analyses were then prepared:

a. the number of children watching every second

b. the number of children watching every fifth second

c. the number of children watching every tenth second

The graph showing percentage viewing every fifth second was very similar to that showing every second. Sampling every tenth second was less accurate. It was decided that "time sampling" one picture every five seconds would do as well as one per second, i.e. that no significant information was lost by failure to record completely continuous data.

Harvard data was similarly analyzed on the following bases:

a. continuous measure (the entire interval) using the mechanized Harvard Procedure (with video tape)

b. number of children who watched every fifth second

c. continuous measure as judged by an observer watching the tape of the same children used in the other two graphs, but without any breaks, simulating the conditions of our normal distractor procedure

Each observer watched one child on the tape at a time, judging during what portion of the interval the child watched the screen.

The mechanized continuous measure was clearly the most precise measure, since the data are most nearly complete and the method relies least on judgment. Using that as a base line, it was found that the "time sampling" curve deviates less

(an average of 2.4 percentage points), even though all three graphs represented a measure of the same children watching the same show at the same time.

This time-lapse approach was used occasionally in TEC formative research. However, it, and all other revisions in the research method, necessarily confronted us with the problem of comparability between past and present evaluations of appeal. This was critical, since establishing whether improvement occurred over time was an important function of this method. However, for study of appeal within a program or segment, long range comparability was not an issue and such methods proved useful.

Distractor studies were not always used to determine the appeal of the programs and were seldom used alone. Rather, the primary use of the distractor method was to determine the appeal of particular pieces of experimental production.

Distractor research had another important function, implied previously. Over time, careful analysis of distractor data allowed the research staff to identify appealing attributes with some consistency. At first, such attributes were identified informally, by examining the distractor data. However, Langbourne Rust who came to CTW as a Spencer Foundation Trainee in 1971 and subsequently joined the research staff, attempted to systematize the process of identifying attributes correlated with extreme appeal scores.

Rust examined segments falling into high and low attention categories in order to formulate hypotheses about attributes conducive to viewer attention. Attributes present in most high-attention segments, and absent from low attention segments, were presumed to be appealing attributes.

Once Rust had identified a set of attributes filling these criteria, the next step was to validate them. Trained raters scored new segments for presence

or absence of the identified attributes. The predominance of the identified high-appeal attributes was hypothesized as predictive of a high attention score. These predictions were then tested against actual viewer responses in the distractor situation.

The attributes Rust identified by this procedure generally confirmed and extended the informal analysis of the formative research staff, e.g., chasing themes, slapstick, functionally-relevant action, strong rhythm and rhyme, and children on screen were all found to be associated with high attention, while a "lecture" quality was associated with low attention (Rust, 1971).

Because the identification of program attributes had proven, over the course of several broadcast seasons, to be a useful tool for the improvement of the program, and because accumulated research had begun to relate various of these attributes to particular viewer outcomes, a coding system was eventually created in order to describe as completely as possible, all TEC segments. This came to be seen as a particularly valuable activity when the fifth and sixth seasons of TEC were designed as the final seasons, to be used as reruns through 1980. With at least temporary cessation of production, it began to seem likely that TEC segments might eventually become a "library" to be drawn upon for special purposes such as preparing video-cassettes for specific research purposes by CTW and other groups. Descriptions of segments according to these attributes which had been determined by past research to be related to appeal and/or comprehension would be extremely helpful in the process of selecting segments for some specific purpose. Accordingly, an exhaustive coding system was prepared defining attributes related to appeal (e.g. type of humor, type of theme, characters) and to comprehension (e.g. manner of presenting print, pace, density or instructional content). Each of these dimensions was analyzed into an exhaustive

set of alternatives. For example, humor was broken down, as follows:

a) sight gags

b) incongruity

c) puns

d) childlike whimsy

e) parody

Thus, each segment could be described completely and retrieved for various purposes according to the presence or absence of a large number of attributes, e.g., appeal to a particular audience, suitability for a highly specific skill level, instruction in a particular goal area, or suitability for a particular language or dialect group.

Trained coders, who had a high degree of familiarity with the program and the responses of children to it, spent almost one year coding the entire library of TEC material. These data are now filed in accessible form for future use.

Since the children in TEC audience are relatively reflective and articulate, distractor observations were very often augmented by group observation sessions in which five or six children watched the show together. In this instance, the observer chatted with the children in a friendly way before the viewing session and encouraged them to comment freely while the material was on the screen. The observer recorded verbal remarks and physical movements that occurred during the viewing session. This method, though extremely simple, was used regularly.

It was, for example, used extensively in an early major evaluation of The Electric Company, carried out under controlled viewing conditions in Kingston, New York, during The Electric Company's first six weeks of broadcast.

A study by CTW researcher Milton Chen (Chen, 1972), conducted in the summer of 1972, using the first season's programs, is another example of the use of the group

observation technique for acquiring formative data. Chen's assumption was that comprehension is related to active viewer participation. His study focused on the recording of spontaneous verbal responses to the program. Chen sought to relate verbal response to various program attributes. He then developed production approaches which would maximize overt reading responses, many of which were subsequently incorporated into the program.

After the second season, the group observation method was enhanced by the addition of a microwave video transmission system connecting CTW to nearby P.S. 191 in New York City. This allowed CTW to transmit selected material to viewing groups at the school, and to monitor as well as videotape their visual, verbal and behavioral responses unobtrusively from the remote observation point at CTW. It was possible to control the pan, zoom and focus of the classroom camera remotely from CTW. It was also possible to ask the children questions before and after the broadcast through the transmitter system, and these, too, could be preserved on video tape. Superimposition of the program being viewed by the children on the corner of the television screen monitor at CTW was also possible.

Populating The Electric Company with attractive characters was critical not only to building an audience but also to providing models for children to identify with, since the capacity to bring about learning through identification is an important aspect of instructional television.

In order to make decisions about major changes in cast and format from season to season, it was helpful to determine the appeal of particular characters and repeating formats apart from any particular segments. For this purpose a simple technique was devised by TEC research staff, using photographs as a means of eliciting children's responses to various characters. We assumed

that children would respond favorably to those characters they found most attractive.

Though details varied, essentially these studies required samples of target audience children who were TEC viewers at home or at school to:

a) identify main characters in photographs

b) describe the character's role in the program

c) rank the characters for appeal

The latter was most often accomplished by a sorting approach (piles of liked vs. disliked characters) or by asking the child to choose most and least favorite characters. (A rank ordering of the entire set proved to be too complicated for most of the children.)

Children were also asked to tell why they liked or disliked the characters selected, partly to insure that selections were based on properties of the program character and not merely those of the photograph before them, and partly to determine attributes that rendered characters and formats appealing to the target viewer.

Comprehension and Achievement Measures

In formative testing of educational materials, appeal was only one of the attributes to be studied. Program segments had to be designed for high comprehensibility as well. Therefore research also focused on the viewer's ability to comprehend and absorb the educational message of program segments.

The first thing to be determined, of course, was whether the viewer was attending to relevant aspects of the segments, since lack of visual or aural attention virtually assures lack of comprehension, while visual attention to relevant aspects of the stimulus is at least a preliminary indication of learning.

In answering this question, eye-movement recording proved to be one of the most useful research tools for TEC. A child's eye-movements were recorded as he or she viewed selected program segments. This was accomplished by constraining the child's head and beaming a fine point of light onto the cornea of the child's eye. The reflection of this beam of light was recorded by a video camera. (This could later be superimposed on an image of the material being viewed to produce a composite record which could be analyzed for attention patterns.)

Most of the early eye-movement research conducted on The Electric Company was carried out by Dr. Kenneth O'Bryan at the Ontario Institute for Studies in Education. Later work was done at Harvard's Center for Research in Children's Television, which operates in conjunction with CTW.

O'Bryan first studied the responses of children with normal and retarded reading levels while they were viewing a variety of segments from TEC (O'Bryan and Silverman, 1972). His purpose was to identify format elements which contributed to or interfered with attending to print. After identifying key stimuli (usually print), eye-movement data for several children in each reading level category were analyzed by computer to determine relative attention to those stimuli according to the following indices:

- number of fixations (or percent of fixations on key elements vs. irrelevant elements)
- duration of each fixation
- number of shifts between stimulus elements

On the basis of these quantitative analyses, O'Bryan then identified negative and positive format structures. Positive factors included: integration of print with action, dynamic presentation of print and an animated

format. Negative factors included placement of print in the lower quarter of the screen, distracting action and rapid presentation. This led to the development of guidelines for formats which would be more successful in inducing children, especially poor readers, to attend to print on the screen. These guidelines were refined over several evaluation cycles until O'Bryan felt that maximum information had been gleaned from the method and that maximum compatibility of stimulus elements had been achieved (O'Bryan and Silverman, 1973.)*

The eye-movement technique was an effective measure of attention and also made for an effective communication of results through presentation of the actual film data. Attention, however, is a necessary but not sufficient condition to insure that comprehension has been maximized. Additional approaches were needed to ascertain whether the presentation was clear, and paced in such a way that the target viewer could absorb the material without confusion.

The technique most often used to evaluate comprehension of TEC is called simply the "stop-tape" technique. Basically, this technique involves showing individual children experimental program segments and interrupting the video tape at predetermined points to question the child as to what he or she has seen. Most often the questioning is carried out at the conclusion of each segment, but a variation on the technique interrupts the segment in order to use the child's ability to anticipate what will happen next as an index of his grasp of what has happened so far.

Because of the nature of the stop-tape procedure, it is not possible to combine it with other measures during a single exposure. This limitation was established in an evaluation of the method conducted by TEC research staff.

*Eye-movement research relating to TEC has also been carried out at the newer Harvard facility, primarily by Fowles, Flagg, and Scinto. The primary aim of this work is to use eye-movement measures to explore the scan patterns of pre-readers on various stimulus structures. Final reports of this work are in preparation.

Two groups of children viewed an identical series of TEC segments. The two groups performed equally on a pre-test of goal areas covered in the program. However, the group which then viewed the series in an uninterrupted condition was significantly out-performed by the children in the "stop-tape" testing (interrupted) condition at post-test. This was interpreted to be attributable to the effect of the stop-tape testing in focusing the child's attention on salient aspects of the segment and eliciting active responses to these.

As an aside, it should be noted that while this interruption produced effects that were methodologically undesirable, it also led researchers to suggest that characters actually in the program might serve a similar direct-cueing function. It was this suggestion which eventually led to the design of whole segments intended to focus the child's attention on goal areas through explicit guidance.

Stop-tape was the most frequently used method of comprehension testing for TEC. However, since it depended on the availability of already-produced material, it was not useful for the evaluation of materials too questionable to put right into production. In this situation story boards were substituted for videotape. (Story boards are sequenced paper-and-pencil plans for a television segments, usually animated, which show key visuals with the complete audio track indicated in writing boards.) With these visuals as focal points, children could be questioned about proposed sequences, much as in the stop-tape procedure.

Since the creation of animation is very expensive and time-consuming, this approach was extremely useful. However, there were obvious disadvantages. The basic shortcoming of this method was that conclusions drawn on the basis of a presentation made in one medium had to be applied to presentations to be made in another. In one case, for example, children using rebus books (where pictorial

symbols stand for syllables) were able to go through the material at their own pace, and found it quite enjoyable. However, it later turned out that pacing of animated rebuses was a problem in terms of attention and appeal, a problem that had not been identified by research relying on the individually-paced materials.

The use of free verbal report was another variation on the original stop-tape technique. In this case, individual children were shown completed program segments and asked to respond to them. But rather than answering pre-determined questions, the child was asked to give an open-ended or free description of the segment in response to instructions such as, "Tell me all about the one we just saw." The child was encouraged to produce as much detail as possible, but any prods offered were entirely non-directional (e.g., "Can you remember anything else about it?").

Analysis can be approached in many ways, depending on the production questions to be addressed. The major use of free verbal report with regard to TEC was as part of a study conducted by Fowles in 1972 (Fowles, 1973). The assumption was that those segments which elicited the most talk about educational factors would tend to be most effective in teaching.

In this study, the children's verbal reports were analyzed (after being segmented into units corresponding to phrases) from two points of view; first, the number of verbal response units devoted to instructionally relevant vs. instructionally irrelevant aspects of the segment, and second, the accuracy and cognitive level of verbal units related to the curriculum content of the segment.

The advantage of this mode of research was that, unlike Rust's work with program attributes, free verbal reports dealt with attention to print within segments, rather than attention to segments as wholes, and augmented the information provided by eye-movement research by exploring not only the child's

attention to the curriculum-related aspects of the segment, but also, through verbal reports, his interpretation of those elements. Attributes of the segments, defined according to a system drawing heavily upon the previously cited work of Rust and O'Bryan were compared for effective and ineffective segments, according to the criterion of percent of relevant verbalizations. The importance of attributes, such as: functionally relevant action, integration of print, dynamic presentation of print and moderate information load were confirmed.

In the Fowles study an attempt was also made to relate the quality of verbal report and segment organization to learning or achievement. That is, did children who talked more about print learn more from the presentations? No systematic answer to this question was obtained. Although such "achievement" testing was used subsequent to this study, when no other approach was possible, it was not considered to be a particularly useful formative research tool for TEC. There were several reasons for this. First, formative research studies were necessarily short term, while mastery of reading skills in most cases required long-term cognitive integration and repeated exposure. Second, the intended TEC audience was primarily composed of poor readers. Therefore, to expect measurable pre-test/post-test effects in a short time was particularly unreasonable.

The alternative was to identify the most logical precursors to changes in achievement and to make the assumption that positive changes in these measures were a good indication that, with repeated exposure, positive changes in achievement scores would result. Thus, TEC research relied primarily on measures of attention, comprehension and recognition as indicators of effective learning, and left actual assessment of gains to long-term summative research. Early summative studies, however, did provide information useful for the design of programs in subsequant seasons.

An approach to the evaluation of comprehensibility of TEC formats through test analytic procedures was explored by Marks (1973) in an analysis of the "Fargo North" format, a series of segments in which a bumbling private detective decodes messages for his customers, using context and other cues. The purpose of this sort of research was to identify the critical bits of information necessary for successful performance of a given task in order to insure that instructional materials were clear and completed.

Marks analyzed the segments in terms of "Critical Message Units" and the order and manner in which they were presented in the course of the segment. She then identified the skills required of the viewer in order to comprehend that segment. (This was compared to an analysis of problem solving strategies aimed at determining the adequacy of the process as modelled in the segments.) The following guidelines for segments modelling a problem solving approach to reading grew out of this task analysis investigations:

1. Questions should be framed so as to constrain the number of alternative solutions.
2. Grounds for rejecting an answer should be made clear.
3. Grounds for rejecting an answer should be made more concrete and explicit.
4. Use more words and key phrases like "I think" and "I figure out problems," and
5. Encourage the idea that "Fargo is controlling the decoding machine" and not the reverse.

This led to improvement in the Fargo North segments, which emphasized decoding skills relying on context cues. Marks' work illustrates an approach whereby recurrent formats can be refined to improve pedagogical effectiveness.

Special Formative Studies

Maximizing the appeal and comprehensibility of TEC for the target audience was the major purpose of formative research. However, since a widely-broadcast television program is available to everyone, not just the group for which it was intended, it was useful to explore the responses of certain of these groups to the program in order to maximize potential uses and benefits and increase the cost/effectiveness ratio.

In particular, soon after TEC began regular broadcast, anecdotal evidence began to accumulate indicating that preschool children, with no formal preparation other than Sesame Street, were learning to read from TEC. Studies of the responses of preschoolers to TEC were undertaken as a result of this rather unexpected finding.

A small, pilot examination of responses of pre-schoolers was conducted for CTW by Sproull (1975). Sproull directed her investigation at determining whether exposure to TEC might facilitate the transition of pre-school children to first grade classroom reading instruction. Accordingly, Sproull located six groups of preschoolers of mixed sex and ethnicity in summer day-care situations and exposed them to eight weeks of daily viewing of TEC.

During the eight weeks of exposure, daily observations were made of both selected individual children and the viewing groups. (Children in the control group viewed Mister Roger's Neighborhood, a program which does not deal with reading.)

All children were pre-tested and post-tested. Sproull found that basic reading skills were generally not acquired in an eight-week period as indicated by negligible pre- to post-test gain. However, the children found the show highly appealing, were responsive to it, and developed a good knowledge of several of the program's formats. Sproull postulated that eight weeks was simply

not long enough for pre-schoolers to make the conceptual breakthrough required for beginning reading, though their interest in the program suggested that such meaningful breakthroughs could occur. She suggested a follow-up study of longer duration.

Another CTW-supported study focusing on a special audience was completed at the Harvard Graduate School of Education by Drs. Jeanne Chall and Helen Popp. Their work focused on children with unusually severe reading problems. Subjects for this study were generally identified as being in the lowest decile in reading performance, according to national norms.

Using a combination of attribute analysis of program segments, short-term learning measures and observation of viewers, the investigators sought to identify TEC segments most suited to children with severe reading problems. Twenty-six children in grades 1-3 were pre- and post-tested after viewing specially prepared 10-minute tapes of selected TEC materials. Having identified some likely segments, these investigators organized learning sequences, based on these segments, for children with severe learning problems. (They are now independently developing ancillary materials which meet the needs of this group. The hope is that these materials will eventually be published).

As noted above, The Electric Company was originally conceived as a program to be viewed at home, though there was always concern for making the program useful for teachers as well. It soon became apparent (through surveys to be discussed in a subsequent chapter) that TEC's in-school audience was very large and growing steadily. Therefore, it became important to give more attention to TEC as a classroom tool as well. The decision to use the fifth and sixth seasons of TEC on a re-run basis strengthened the need to give attention to classroom needs. Constant re-runs may not attract a consistent home audience, but they are better suited to the school situation, where a new crop of viewers is available each year. There is also a pedagogical advantage, in that the teacher has a chance

to become familiar with program content and to prepare and refine classroom-related activities.

Through a questionnaire, the TEC formative research staff explored the use of TEC in the classroom in order to identify effective patterns of use and locate impediments to effective use within the program itself. Such a questionnaire was distributed in 1974 to sixty teachers located in a 300-mile radius of New York City, who were known to be regular users of TEC.

The results of this survey indicated that teachers found the show more useful when related activities were conducted before or after viewing, and that materials for conducting such activities would be useful. (Only a short TEC guide, primarily a program schedule, was available at this time. A "TEC Activity Book" for the classroom was soon made available in response to this need.) The teachers also suggested that a program with fewer curriculum items per show would be easier to deal with in the classroom.

This preference for fewer goals led to a formative investigation in which mock-ups of programs with fewer goals, edited from completed material, were evaluated for appeal and instructional effectiveness. These shows were found to be about equal to other programs in appeal, while they were pedagogically more effective in terms of comprehension and recall measures. For this reason, individual TEC programs from later seasons have many fewer goals than earlier ones.

Research that was carried out in preparation for the fifth and sixth seasons reflected the need to design a program maximally suited to school use while maintaining all of the program's proven strength in appealing to the home viewer.

One production created for experimental purposes only was designed as a prelude to the first two seasons of TEC. In the past, material had not been

produced solely for evaluation purpose (though an occasional segment had been discarded before being aired, based on field testing) because production is extremely expensive. However in this case, experimentation of two kinds was carried out: 1) segments using formats quite different from typical TEC material and 2) multiple versions of the same segment, with a single factor varied.

The experimental materials were produced and evaluated in a series of field tests. Two sets of experiments were conducted. The first set comprised three experiments:

Set I: Experiment I

It was suggested that a fifteen-minute program would allow the teachers more flexibility, and more time for follow-up activities. Therefore, a comparison was made between the following program structures:

a) TEC Show #392 unchanged (30 minutes) viewed by the control group.

b) Show #392 re-edited into two fifteen-minute halves, with a minute of abstract computer animation separating them. Each half contained part of the material on each goal covered in the original 30 minute program. Both halves were seen, with no pause between them, by Experimental Group I.

c) The first half of this re-edited version only was viewed by Experimental Group II.

Apparently, seeing the curriculum twice over in the half hour (Experimental Group I) was confusing. On the other hand, the children who saw only 15 minutes performed as well on a word recognition test as the controls. Both groups improved most on the words shown with highest frequency. Two things must be kept in mind when considering these results (and all of the results reported here.) First, all post-testing was done immediately after viewing and no follow-up testing could be carried out. Second, all the children performed extremely

poorly on the pre-test and showed rather small but significantly different gains at post-test, as would be expected under these conditions.

Experiment II: This small experiment compared a program with only two curriculum goals (h and ow) with a regular TEC program teaching h and ow along with three other goals. Interestingly, the two-goal viewers were no more likely than the controls to be able to recognize, in an array, the goals of the program they had seen (h and ow). On the other hand, transfer words (words not actually appearing on the program) were more often learned by the two goal group. Since this was a small informal study, the results were only suggestive. It must also be noted that recognition is not necessarily equatable with learning. However, the shortcomings of more stringent learning tasks have been discussed earlier.

Experiment III: Experiment III dealt with structuring the program to encourage an appropriate learning-set by directing the child's attention to those aspects of the program central to instruction. To this end, Show #392 was again re-edited, this time with an "index" in the lower right corner of the screen. The index was simply a small box containing the letter units which were the focus of the segment. The box remained on screen during almost the entire show changing as the goal changed. One experimental group saw the indexed version and was alerted beforehand to the presence of the index and its function. A second experimental group saw the indexed version with no prior comment. A control group had no index. No clear differences in learning emerged among the three groups. Apparently, the index did not serve its expected purposes of helping viewers to sort out the key information in the show.

Set II

The second set of studies was intended to evaluate several new formats designed to involve children more directly with the program. We were, in this

case, more interested in attention and spontaneous overt responses to the material than in learning. Many of these segments, in fact, didn't actually "teach" anything. Several were word games modelled by children on the set, who then encouraged viewers to join in, or repeat the game. We hope to encourage pupils and teachers to follow-up with their own variations on these games after the program. Another segment (the first of this kind) encouraged the children to take pencils and paper and write down words as they viewed, in order to match wits with a show character. It was reasonable to assume that school children would have these materials available.

The main influence of this research project on the program was to decrease the number of goals per show and to increase explicitness in teaching.

To the end of maximizing classroom effectiveness of the program, another CTW-sponsored study was conceived by Dr. E.L. Palmer and Milton Chen of CTW and carried out by Phillip Deppe in the spring of 1976 to explore the effectiveness of direct overt teacher interaction with TEC as a teaching approach. Deppe's task was to design teacher interventions which could be carried out during viewing to improve student attention and comprehension, and to demonstrate the viability of those interventions.

Both intact and specially restructured shows were tested in television alone vs. television with simultaneous teacher-interaction conditions. A group of selected master teachers selected appropriate whole programs and appropriate segments for inclusion. Intervention activities including asking students to read from the screen, calling attention to key information, instructing students to write, and the like, were prepared based on these program materials. The individual segments were then edited together into experimental shows. The interventions were organized into a special booklet for the teachers who were to take part in the experiment. These booklets listed segments, goals, and intervention instructions in an easy-to-follow- form. Objectives of the intervention:

were also included. Teachers were carefully trained in a day-long Workshop situation as part of their participation in the study.

Children were pre- and post-tested, and all groups were systematically observed during the course of the experiment. Testing involved both achievement testing and "visual efficiency" testing designed by TEC formative research staff. The purpose of the latter was to determine whether children who had been exposed to teacher interventions, which would presumably heighten the salience of the curriculum-related aspects of segments, would be better at picking out those salient aspects at the conclusion of the experiment.

Pre and post-test comparisons, and observation of classroom processes indicated that teacher intervention was useful particularly when the program had been restructured to accommodate it. Possible uses of these findings are now being explored. In particular, the possibility of developing materials which might be made generally available to teachers for further research is being explored. There are also implications for restructuring TEC, perhaps in cassette form. The re-designed programs would resemble Deppe's shows in that they would each contain fewer goals. (Teachers involved in the Deppe experiment reported finding his restructured tapes easier to use.) Plans are under consideration to elaborate upon this teacher-interaction experiment.

Curriculum

Development and revision of the program curriculum was not exclusively a formative research activity. Nevertheless, it is most usefully considered within this realm.

The adequacy of the original curriculum was evaluated at the end of the first season (and again at the end of every season). This evaluation process was based on three major sources of input:

1) formative research findings

2) summative research findings

3) advisor input

While formative findings related primarily to the adequacy of how the instructional material was presented, it also necessarily revealed much about the adequacy of the curriculum itself in terms of the appropriateness of the level of a particular goal, and the ability of television to present that goal. Some reading skills were simply not very suitable to television presentation, whether or not they were necessary for the development of real reading skill.

Summative research, helped to answer the same questions: i.e., Are the curriculum goals too easy or too difficult? Is TEC more successful in communicating some curriculum areas than others?

Advisor input was another primary source of curriculum revisions. The Electric Company had its own Advisory Committee (Appendix A), which in addition to shaping the original curriculum, met at the conclusion of each broadcast season to give observations on the previous season and make recommendations for changes in both curriculum and formats. Evolution was clearly toward a stress on principles and processes. This development can be clearly seen when one contrasts

the '76-'77 version of TEC curriculum with the very first season. More attention to extended reading practice was also a consistent trend.

Research Interaction with the Production Process

The formative research staff participated directly in the production process at certain points. First, all scripts were read by at least one member of the research staff. A sheet of comments, prepared in a standard format clearly referencing segment numbers, was returned to the writer and a copy given to the producer. Researcher and writer discussed these comments in an informal way. These comments were concerned primarily with the presentation of the curriculum content of the segment, but other aspects of the segment were sometimes noted as well, i.e. appropriateness of length, pace, and verbosity, tastefulness, acceptability of affective content and of characterization, though all of these were more typically the concern of the producers and writers themselves.

Scripts were revised on the basis of research and production review before being produced. All revisions were also reviewed by all concerned. The research staff did not play the role of unilateral judge of program content. In most cases the review and revision process led to workable adjustments with regard to the material to be produced.

In addition to comments for the purpose of script revision, the research staff also prepared a separate sheet of "Studio Guidelines" for each script. These were made available to the producer, studio producer, director and others directly responsible for the production process. These guidelines consisted of suggestions for the most educationally effective way of presenting the script material visually, and for making the non-educational aspect of the segment as entertaining as possible without interfering with the educational message. These

specific guidelines supplemented a set of general guidelines, prepared in the form of a Writer's Notebook. These principles, based closely on the curriculum document, presented the rationale and preferred approach to each category of curriculum goal.

The influence of the formative research process did not stop even after program segment had entered studio production. Researchers monitored all studio activities, either directly or via a special cable connection between the production facility and the research offices. Researchers monitored the production process for clarity and pace of presentation, characterization and other factors. Criticisms were phoned directly to the studio during taping. Minor changes could be made at this point, in the way material was presented. Seldom were major difficulties encountered at this point, since the segment had been thoroughly reviewed prior to this final review.

The manner in which such a segment was evaluated depended, of course, on the nature of the perceived problem, e.g., if the segment appeared to be slow and lengthy a distractor study might be done in order to see whether attention to the segment was sustained. If the segment appeared educationally confusing, a stop-tape procedure would be developed to check comprehensibility.

A new version of the segment might be developed on the basis of these findings; the original version might be retained and used; or the segment might be scrapped altogether. Researchers cooperated with the production staff in reviewing every bit of TEC material at the end of each season and ranking each segment for quality. Those considered to be of lower quality were used with low frequency in subsequent programs, or they were discarded.

VI. SUMMATIVE RESEARCH

Summative research is carried out in order to assess the effects of a program as a whole, mainly to insure that the program is worth continuing from a pedagogical and economic point of view and to discover those aspects of the program requiring revision. A two year summative evaluation of The Electric Company was carried out by Educational Testing Service* of Princeton, New Jersey. This study was broadly conceived and planned by the CTW research staff and the CTW Research Advisory Committee, in cooperation with ETS.

ETS designed special tests, tailored to the curriculum of The Electric Company and administered them before the first season of TEC was aired, to children in 100 classrooms in Fresno, California and Youngstown, Ohio. Both sites were chosen as medium-sized cities with large disadvantaged populations (Hispanic in the former and Black in the latter) which included high percentages of children with reading problems. Also, these were cities where broadcast arrangements met the conditions of the experiment. Half the classrooms then viewed TEC daily, while the other half did not view the program. (At this time TEC was not available for at-home viewing by the control group children). The sample was constituted as follows:

First graders at all levels of reading	20% of sample
Second graders in lower half (according to national norms) in reading achievement	40%
Third graders in lowest quarter	20%
Fourth graders in lowest quarter	20%

Of course, since TEC's primary audience for its first year was to be the at-home viewer, ETS also included a home-viewing test condition in Richmond, Va. and Washington, D.C.

*ETS won this evaluation contract through a competitive bidding procedure.

Both sites received the program via UHF, which meant youngsters serving as controls, and therefore given no encouragement or tuning instructions, would be unlikely to tune in the program. Both cities had large disadvantaged populations, mainly Black. Though viewing at home, these children were also contacted, pre-tested, and assigned to experimental or control conditions on the basis of classroom membership. The classroom served as testing location and unit of analysis for both groups.

At the end of the first season, all the children in both samples were re-tested. During the second year, a sub-sample of the school viewers were re-tested after exposure to a second season or after no such exposure. Some new children, for whom Season II was the first exposure to TEC, were added to the sample.

Analysis of the results of the in-school aspect of the experiment indicated statistically significant differences in scores on seventeen of nineteen sub-scales of the ETS-designed test, and on a brief subtest of the Metropolitan Achievement Test. These results favored the children who had viewed the program. Differences held for first through fourth grades, though they were largest for the youngest children. They also held for poor readers as well as 'average' achievers and for Blacks and Hispanics as well as whites; males as well as females (see Table I).

Table II (pages 44B & C), based on findings reported by Educational Testing Service, details areas where viewing classes scored signficantly higher than non-viewing classes in Fresno, California, and Youngstown, Ohio. Included in the second-grade study were "target" students who saw the show regularly and

The Electric Company: Viewer Gains

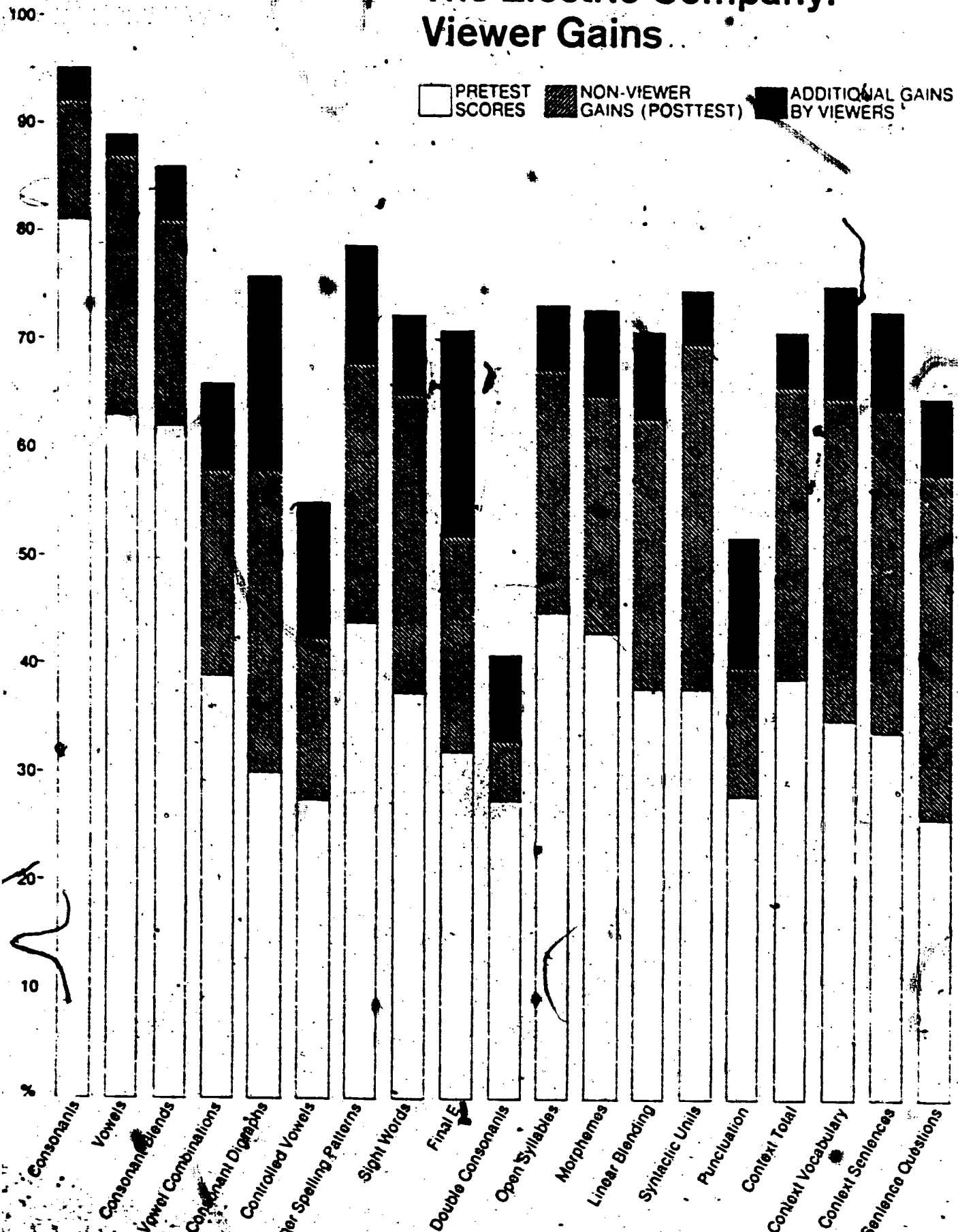
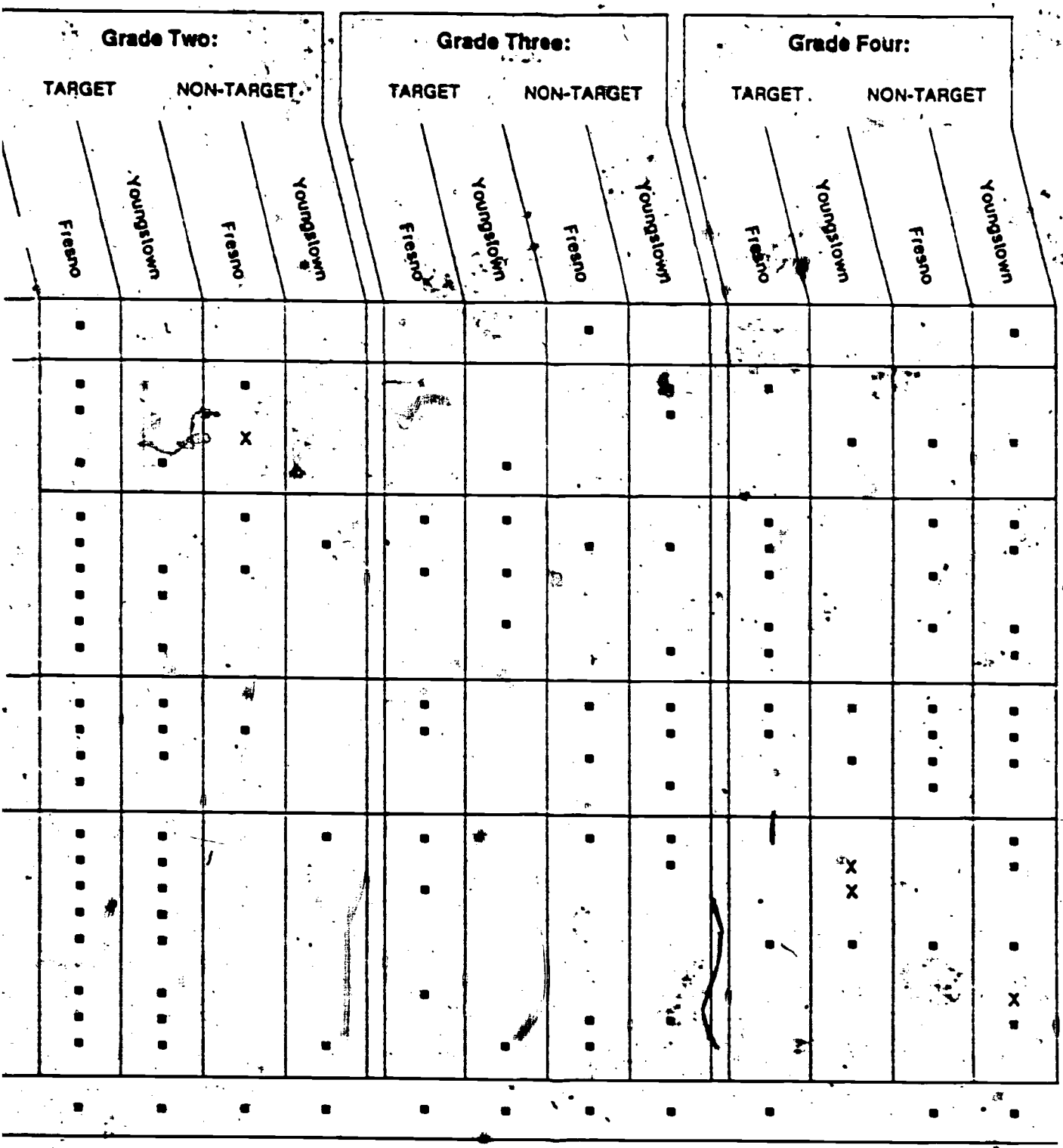


TABLE · I

How Electric Company Viewers Fared: Pattern of Achievement

TEST AND SUBTESTS	Grade One: (All Target) TOTAL Number of Items	Fresno	Youngstown
Matching Words	8		■
Blending Total	28	■	■
Consonants	13	■	■
Vowels	6	■	■
Consonant Blends	9		■
Chunking Total	28	■	■
Vowel Combinations	9	■	■
Consonant Digraphs	6	■	■
Controlled Vowels	4		
Larger Spelling Patterns	5	■	■
Sight Words	4		■
Scanning Total	14	■	■
Final E	6	■	■
Double Consonants	4		■
Open Syllables	4		■
Reading for Meaning Total	45	■	■
Morphemes	10		■
Linear Blending	8	■	■
Syntactic Units	7		■
Punctuation	5	■	■
Context Total	9		■
Context Vocabulary	4	■	■
Context Sentences	4	■	■
Sentence Questions	8		■
Grand Total	123	■	■

TABLE II



In all boxes where squares appear, there is a 90 out of 100 or better chance that the differences favoring the show's viewers occurred as a result of their watching The Electric Company rather than by chance. Blank boxes on the grid indicate areas where differences are not considered significant. (The several X marks on the grid indicate where differences favored non-viewers.)

scored in the lower half according to national reading norms, and "non-target" students reading at or above grade level. Third and fourth grade "target" students were those scoring in the lowest quarter, again using the national norms.

A definite pattern favoring viewers emerges in the 123-question test covering the 19 curriculum areas included in the experimental series' first season. Greatest gains were made by second graders who were rated as poor readers, and by first grade classes. All four grades showed some progress as a result of viewing the show.

No such differences were found in the at-home situation, because the intended differences between viewing and non-viewing conditions broke down. The teacher's encouragement of the experimental classes to view at home did not result in a viewing rate higher than that for control children. Thus exposure to TEC was at about the same rate for both experimental and control groups. There was a corresponding lack of difference in achievement.

Since the at-home study failed to establish the experimental conditions needed for a valid comparison between viewers and non-viewers, and because there was no adequate way to control and measure at-home viewing at a reasonable cost, it was decided that no further attempt would be made to study the effects of home-viewing, and that results obtained in school-viewing circumstances would have to be relied upon as the most accurate yardstick of the program's effectiveness.

The second year follow-up of in-school samples revealed that: a) children who saw only the first season still retained by the end of the second season an advantage in reading achievement relative to non-viewers of session one; b) the second season of TEC alone was about equally effective as the first season alone, and c) a second season of viewing produced very small increments in performance over a single season's viewing.

The latter finding seems disappointing, but is actually only reasonable. The curriculum of TEC covers very basic reading skills, and children who master these in the course of one year's viewing simply have little left to gain from the program. This finding presented the temptation to include more complex material to allow such children to grow. However, to do so could have tended to discourage and threaten the poor readers who needed the program most, so TEC remained focused primarily on basic reading skills for its entire lifespan. The program was nevertheless continually revised in order to maintain its appeal, and in order to refine stategies for presenting these basic skills effectively.

Survey research may be usefully included under the heading of summative research, since its ultimate goal is the same, i.e., to determine the effectiveness of the program as a whole.

A survey of classroom use of The Electric Company was conducted during the program's first season by Robert Herriott and Roland Liebert of Florida State University in conjunction with Research Triangle Institute of North Carolina in order to estimate the program's penetration of the nation's school systems and to assess teachers response to it (Herriott and Liebert, 1972).

As the authors point out, the results were remarkable, given the more usual pattern of slow acceptance of educational innovations on the part of school systems. Only two months into its first season the show was being used in some capacity in about one fourth of all those public and private schools housing the appropriate grades (one through four). (The school, not the classroom was the unit of analysis). Among schools having full technical viewing capabilities (sufficient TV sets and a clear signal), usage rose to 40% and in urban schools with capabilities, 70%. Altogether an estimated two million children were viewing The Electric Company at school. When

Liebert (1973) conducted a follow-up survey the next year, he found the audience had risen to an estimated 3.5 million. (At this time, A.C. Nielsen surveys estimated that another 3 million were viewing at home.) School penetration had increased from 23% of the nation's schools in the first season to 34% in the second, an increase of about half in one year.

These surveys also questioned teachers extensively about their manner of using the program and their assessment of it. Teachers reported being quite satisfied with the program. In fact, 85% in the first and 87% in the second season gave the program a "very favorable" rating. Among teachers who used the program both seasons, 48% increased the favorability of their assessment while only 7% gave the series a lower rating the second year. Teachers in both seasons attributed to the program improvements in pupil reading, interest, decoding, spelling, and vocabulary. These surveys made it clear to the CTW staff that the original notion that TEC might not be accepted and used by teachers had been mistaken. It was now obvious that teachers were eagerly making effective use of the program. Therefore, it became important to re-think the program and determine whether changes should be made in order to better accommodate this major portion of the audience. Some changes in focus, to be discussed in a later section, grew in part out of this consideration.

In 1977, a third survey* was undertaken in order to provide a baseline against which the effects of re-running the program might be measured in the school context. The results of this sixth-season survey indicated that, given the declining elementary school population, the proportion of this group exposed to TEC in school had held steady since the last survey. (About 29% of all elementary schools in U.S. were using the show, compared to about 25% initially, and 34% in 1972-1973.) Utilization had, however, been reallocated somewhat with the number

*(For financial reasons, the sample for this survey is a sub-sample of the 1972-1973 sample, so no schools opened since then were included.)

of children in upper grades (grade three through grade six) declining and the number of first grades using the program increasing. In fact, there had been an estimated 67% increase in the number of schools in which first grade classes were viewing TEC. Also, even though the proportions of schools viewing had dropped from 34% to 29%, the proportion of pupils viewing the series had held.

The RTI study indicated that even in 1977 two major technical barriers to utilization of The Electric Company remained: limited broadcast signal and the fact that many schools still lacked the technical capability for viewing. Of those schools having such facilities, 57.4% were using the program. Also, about 25% suggested that more information about how to use the program was needed. (One advantage of the current re-run situation is that program content has become "stabilized," allowing for easier design and distribution of support materials. A complete handbook for repeat seasons A and B has been created and should go a long way toward eliminating program information problems.)

Perhaps the most interesting finding from the third survey was that an estimated 24% of schools housing grades 1 through 6 now have the capability for video-taping programs for limited later replay. (And this figure may actually underestimate that number since no new schools, which are more likely to be built with modern technical facilities, are included in this estimate.) The existence of such facilities means that many schools may be able to use TEC more flexibly.

In 1977, Keith Mielke conducted a related survey (Mielke, 1977) in order to identify conditions within schools which either facilitate or impede adoption of The Electric Company by teachers, in order to maximize use during the period of repeat broadcast of TEC.

Mielke focused not on technical barriers (which CTW can do little to control) but on attitudinal and organizational barriers which prevent use of TEC in schools having adequate audiovisual capability. To obtain his information he interviewed over 70 classroom teachers and several ITV personnel.

Mielke found that, relative to other ITV programs, there are few barriers to use of TEC. Nevertheless, the following problems were identified in the report:

- Teachers do not receive accurate or sufficient information about TEC and its support materials
- Enthusiasm for the program may be waning simply because of its longevity
- The program does not have a "serious" educational image with some teachers

Thus, Mielke recommended renewed promotion of the program, stressing its serious educational content and the availability of supplementary materials. He has also recommended development of a guide for the complete re-run series (which has been accomplished) and creation of a film or cassette to show teachers how they can make use of the program. A film is under consideration.

VII. EVOLUTION OF PRODUCTION

A. Procedures

While the instructional content of TEC was not sequenced from simple to more complex material over the course of a season, it was, nevertheless, carefully organized. An Assistant Producer, in consultation with the research staff, prepared a schedule in units of one week, in which the number of minutes devoted to each area of the curriculum (e.g., consonants, vowels, punctuation) was defined. Then individual items within these categories (e.g., consonants: b, d, and g) were slotted into this schedule in order to give each one time over the course of the season, with repetitions carefully spaced and more difficult

elements receiving more attention.

Writers then received assignments based on these "lesson plans." Each writer prepared approximately one half-hour program each week. On the sheet he or she received was a list of goals to be covered and a list of animations and/or films which had been scheduled into the program in advance by a producer. The writer's responsibility was then to write new material appropriate to the goals and to provide an overall structure or theme for the program. For the first season, writers were strictly confined to an invariant order in which the curriculum elements were to be presented in the program, beginning with simple blending skills and ending with comprehension strategies. During subsequent seasons, writers were freed from this restriction and encouraged to use the material in whatever way would result in the most coherent presentation.

Once a script was prepared, the first typed version was reviewed by the head writer and by the producer. The writer then made revisions and the second typed version was also distributed for review. Finally, a third version was prepared for production preparation and eventual taping. The whole process took several weeks.

The taping process was carefully monitored by the studio producer (on the set) and by the writers and executive producer and research staff (by remote monitor). At times research staff members were in the studio to advise on new or controversial production.

B. Early Production

The style and pedagogical approach of TEC shifted considerably over the program's life span. Part of this shift was the result of the widespread in-school use of the program, and part of it was the result of increased recognition of what television could do best in the area of reading instruction.

Despite its popularity with educators, parents, and children, the first season's program had shortcomings in the eyes of the CTW staff and its advisors. The first was its rather fast pace. The program had been designed in this way because an upbeat and varied pace had proven to be extremely successful in the case of Sesame Street in attracting and holding children's attention. Also, the cartoons which elementary school children are so fond of have a rapid-fire style, while the material being presented was admittedly difficult for the intended audience, who needed a more leisurely exposure to it.

Also, it became obvious that in an attempt to cover all the stated goals reasonably often during the coverage of the season, too many goals were being sandwiched into each show, leaving some viewers confused. The number of goals per show was therefore decreased. In subsequent seasons, it was decreased even further - occasionally to three goals per show. This allowed not only for an increase in the number of minutes of exposure to each goal, but also for presentation of that goal from a variety of approaches.

One of the writers who joined the staff for the second season of TEC commented that print was being placed in "little coffins" at the bottom of the screen. Her phrase was extremely apt: Eye-movement recordings (see "Formative Research") of children viewing early TEC segments revealed that children were unlikely to pay attention to print carefully framed in the lower portion of the screen. While this "subtitle" approach might be effective with those who are already literate, it merely made it easier for the poor readers who were the subjects in the eye-movement experiments to circumvent the print and focus on the action elsewhere on the screen. When this was discovered, new ways of presenting print were developed emphasizing the integration of print into the action (using signs, giant letters, etc.),

and placement of print in a central location on the screen. This resulted in a decided increase among poor readers in the tendency to scan the print.

Along with this invariant approach to the placement of print, the first year's programs tended to employ rigid models for key reading strategies such as blending and use of context clues. The logical, but inevitably arbitrary, nature of these strategies meant that it quickly became difficult for the writers to develop plausible instances in which the strategies might be used. It also meant that the viewer who mastered these strategies would find them useful in only a limited number of situations. Therefore, in subsequent seasons, flexibility in approaching these tasks was stressed. In the case of blending, several alternative approaches (e.g., backward chaining, word families, syllable blending) were developed and presented to the writers as alternatives to a left-to-right, phoneme-by-phoneme model. In the case of context cues, the idea of using a set of alternatives presented explicitly, was abandoned altogether in favor of a more concrete approach stressing pragmatic use of available clues of many kinds. Formulation of more general conceptions of an approach to context cues was left for the viewer to synthesize for him or herself over time.

Not all the needed modifications in the programs were in the area of curriculum presentation. Some of the entertainment aspects of the program were revised on the basis of research input. It seemed reasonable at first to employ a great deal of verbal humor in a program focused on reading. Thus puns and similar forms of humor were used rather heavily in the first season. However, it soon became obvious that except for the very simplest instances, the target audience lacked the verbal sophistication required to appreciate this genre of humor. A subsequent study (conducted by Fowles

and Glanz of the CTW staff in 1976) confirmed that appreciation of verbal humor is closely related to cognitive development and reading ability, and is therefore not likely to be attractive to the poor reader. This discovery presented a problem because it meant opportunities to integrate instruction and entertainment were diminished. However, there proved to be many other ways of integrating print, e.g., relying on visual rather than primarily verbal jokes.

A related difficulty was the inclusion of parodies (e.g., a TV chef called "Julia Grownup"), which was extremely funny to adults, but failed to amuse children because they simply were not familiar with the orgin of the parody. Of course, some aspects of these parodies could be amusing nevertheless, but it was clear that this was not the best way to tickle children. Thus, parodies were used less in subsequent seasons unless these parodies were based on figures such as Spiderman, Kung-Fu, and others that would be more familiar to children.

C. Middle Years

Each new season's production saw revisions in the program resulting from research input and from experience with the workability of various production approaches. Though countless small changes were made during the 'middle years' of production, they can be subsumed under six important directions of change:

Emphasis on process. While The Electric Company from the beginning had focused on presenting bits and pieces of the written code, in the context of certain strategies, the emphasis gradually shifted toward even more modelling of the linguistic and cognitive processes of strategies involved in the act of reading. Special attention was devoted to blending, which is most crucial to the earliest stages of reading and at the same time conceptually difficult. Since blending is a dynamic activity, television was very suitable

for its effective presentation. The mental processes one must employ to identify a succession of individual sounds and synchronize them into intelligible words could be visualized on the screen quite easily, in contrast to classroom treatments which could only describe the process indirectly.

The blending process was modelled at all levels, and the commonalities in blending at the word, phrase and sentence level were stressed in order to give the viewer some feeling of control over the enormous body of information one must absorb in the course of learning to read. The child was encouraged to see these strategies as keys capable of opening not one, but an infihite number of doors.

One format which proved effective in modelling such strategies at several levels was the so-called "silhouette blend." In this series of segments, each one focusing on a different phoning unit, the profiles of two actors are seen face to face. Only silhouettes are visible so that facial features are not available as distractions. The character on the left pronounces, with exaggerated lip movement, the first element of a word, e.g. "ch." Simultaneously, a printed ch appears to emerge from the character's mouth and moves to the middle of the screen. The routine is then repeated with the remainder of the word, e.g. "-ip," emerging from the mouth of the character on the right. The two printed elements merge (chip) and the characters together pronounce "chip." Several words in succession, with a common element such as initial ch are presented and then repeated. The whole sequence is accompanied by extremely engaging syncopated music. These segments were created using digraphs (as above), single letters (b-it) and syllables (can-dy). Thus the common format serves not only to model a specific strategy, but to make the more general point that the same strategies are relevant at several levels of analysis.

Importance of Animation. As The Electric Company evolved, animation emerged as in especially effective, if costly, medium of instruction. There were two main reasons for this. The first was appeal. Not only are children initially attracted to almost anything presented in a cartoon format, but research indicated that they continue to find animation attractive after many exposures, while the appeal of live-action segments tended more rapidly to decline with repeated exposure. This high repeat factor had other favorable implications as well. With an audience of children with reading problems, frequent repetition of material is pedagogically necessary. Animation allowed more of this repetition to occur with less chance for boredom. This became particularly important in the creation of the season A and B programs.

Aside from its greater appeal, animation had unique instructional strengths, because unlike live-action film or studio production, it is not at all constrained by reality. Animation can be used to directly depict the contents of one mind and communicate them to another. The mental processes required for reading can be presented concretely, with a minimum of explanation. Thus, for example, the cognitive process of separating the letters in a word for phonic identification and then fusing them into intelligible speech can be depicted as a physical separation followed by progressive linking of letters into a complete word unit. This is an advantage when dealing with the poor reader or with any young child.

As previously noted, animation can be effective in demonstrating such conceptual relationships as that which exists between print and speech. Animation can also be used to create a situation in which a change in print is instantaneously reflected in a change in some object or situation, thus drawing attention to both the changing features of the word and the meaning of the word as reflected in the situation. For example, in animation created

for a song written by Tom Lehrer, the magic "silent - e" changes "can" into "cane," "tub" into "tube" and so forth. As the words are changing, objects on the screen change accordingly. A tin can reshapes itself magically into a walking cane.

Animation is also particularly effective in illustrating the relationship among punctuation, intonation and meaning. The freedom from temporal and physical constraints which animation achieves with ease allows sentence intonation and the corresponding relevant situation (cues by a visually salient change in punctuation) to change simultaneously. An example of this is an animated cartoon in which a single sentence, "I am going over there," with changing punctuation and concurrent changes in intonation, narrates an entire tale wherein the narrator strolls across a surrealistic landscape ("I am going over there.") and spots a giant ice-cream cone ("I am going over there!"). As he runs eagerly toward it, a monster emerges to block his path. ("I am going over there?"). He beats a hasty retreat ("I am going over there!"). All this takes only a few seconds.

Thus animation, despite its expense, came to be more prominent in the third and following seasons of The Electric Company. For example, the "Letterman" series, an animated "take-off" on Superman, was initiated. In each of the many episodes, Letterman changes unpleasant circumstances by substituting one letter for another and creating a magical change in the corresponding situation. For example, changing "coat" to "boat" causes a sturdy ship to appear and save a group of children from drowning.

Meta-linguistic Principles. The increased emphasis on process in The Electric Company was accompanied by a stress on presenting the conceptual underpinnings of reading. Influenced by the work of John Downing, L. Gleitman, P. Rozin, C. Cozden and others, The Electric Company staff became aware

that the major barrier to learning to read for many children, particularly those who are not exposed to books and reading in the home, is a lack of understanding of what reading is, what it is for, and its relationship to spoken language. These children are unacquainted with basic meta-linguistic principles and are handicapped by this deficiency in their attempts to master the content of reading instruction.

In response to this situation, several key meta-linguistic principles were incorporated in the curriculum and emphasized in production. It was often possible to communicate these principles (e.g., the invariant left-to-right sequence of print) in the course of presenting some other aspect of the curriculum once it became clear that these background properties of the written code should be brought to the fore. As many previous examples have suggested, television has a particular talent for presenting this sort of abstract principle in a form accessible to children who are not yet abstract thinkers.

Visual Simplification. Formative research, particularly eye-movement research, revealed that some Electric Company segments were simply too "busy." Others, while not so complex, nevertheless were designed so that instruction and entertainment were placed in competition. Thus, an attempt was made to simplify new segments and to balance entertainment and print to achieve a mutually reinforcing, rather than a competing effect. The former was accomplished by simplifying sets and costumes, eliminating as much distracting detail as possible, eliminating unnecessary movement and gesticulation by actors, and using less complicated plots. The latter was accomplished by creating situations in which print would be critical (rather than irrelevant and "tacked on") to the plot, by instructing actors to orient their signi-

ficant gestures toward print while reducing other gestures, and carefully structuring action sequences so that moments of important instructional content would not coincide with the most interesting entertainment. (Unless, of course, the two were one and the same, an ideal design.)

Eye-movement research was extremely helpful to the process of developing progressively more effective ways of accomplishing these goals. The research-production interaction around this problem was so effective that Dr. O'Bryan, who was responsible for most of the relevant eye-movement research (see Formative Research), eventually concluded that no further refinements in the program were possible on the basis of his research.

Opportunities to read. Advisors to The Electric Company were persistent in recommending that the program ought to offer some opportunities for actual "reading" (i.e., decoding of passages of print longer than a single sentence and embodying some narrative sequence). They correctly pointed out that without this addition the program could give the viewer a distorted conception of what reading is all about. The problem, of course, was to design segments that could provide opportunities for extended reading which would be amenable to television presentation. Two particularly successful formats were developed in response to this need. The first, called the "Very Short Book" was a series of stories, three or four sentences in length, based on traditional fairy tales or fables, but each with a comic twist at the end. These were presented in a 'tableau vivant' style, with actors framed as if on the pages of a story book, with print running across the top. An off-stage voice read the print, and each segment concluded with the actor/illustrations coming alive to do something unexpected and amusing. These segments were effective because the magical quality of the living illustrations charmed the children, and because the unpredictable endings held their attention.

They had the additional advantage of providing some semblance of the experience of actually reading a book.

The second format designed to provide for reading practice was based on the popular "Spiderman" comic book character. These were live-action adventure sequences in which the familiar hero never spoke. Instead, his speeches appeared in comic book style "balloons" over his head. In order to follow the simple plot it was necessary for the viewer to read the contents of the balloon - usually a short sentence. This situation provided considerable motivation to read and became extremely popular with viewers. Capitalizing on the popularity of these segments, a special Electric Company "Spidey" comic was designed for newsstand distribution as a way of providing additional reading matter of a controlled kind. This comic looked much like any other, but had carefully placed print, short messages, controlled vocabulary and was designed to encourage the poor reader to read rather than to merely rely on pictures.

D. Final Years

When the decision was made to produce two final seasons of The Electric Company and then allow these to be rerun through 1980, it was with the understanding that substantial use of the program was likely to continue during this period. Repeated programs could be less attractive to a home viewer who might view for several seasons. However, in a school situation where the program is typically used in only one or two grades, a given child would have only limited exposure to the program, and therefore little or no chance to experience repetitions of particular programs. Therefore, changes planned for the final season were made partly with an eye to school use. (At the same time, of course, it was felt to be necessary to keep

experimentation to a minimum and concentrate on those approaches which had proven over the years to be the very best instructionally and to be enduring in appeal). Thus, changes during the final seasons were concentrated in the following areas:

Explicitness of Educational Goal - It had been clear from the outset that the more explicit the manner of presentation of the educational goals, the more likely they were to be understood by the target viewer. On the other hand, to belabor a point would tempt the home viewer, particularly the child threatened by instructional challenges, to flip to another channel. Better to hold the viewer and settle for a more moderate rate of teaching. For a classroom situation, however, the constraint on direct instruction could be modified slightly, and therefore new program segments tended to be more explicit about their purpose, and a bit more didactic in style, though never stodgy or "talky."

Active Involvement - In creating new formats for seasons A and B an attempt was made to increase opportunities for active physical and verbal involvement with the program. This is perhaps not an obvious accommodation to classroom viewing, but it was done for two reasons: it is well known that children learn better when they are actively engaged in the learning process. However, it had been felt that the child viewing at home - often alone - would be unlikely to respond actively to the program. Children, once they are old enough to realize that television events are not real, are not likely to jump up and participate in events on the screen. However, in a classroom group where the other class members become real-life participants in the situation, they are much more likely to do so.

In fact, it had been observed in formative studies of classroom viewing situations that children viewing in groups would respond to almost any opportunity to chime-in with the program, whether or not there was an explicit

invitation to do so. However, teachers were sometimes reluctant to allow this behavior if they considered it to be disruptive. Therefore, the second important purpose of these segments was to help suggest a sort of "permission" for active involvement which might suggest a more relaxed classroom atmosphere for viewing.

Fewer goals per program. Over the years, formative research has resulted in a steady decrease in the number of different goals addressed in each half-hour. With seasons A and B, this trend continued and several programs were produced with only three different goals per half hour. This was more in keeping with the poor reader's learning rate and also made the teachers pre- and post-viewing activities easier to organize and more coherent for the children.

Enduring Appeal - Though school children in controlled viewing circumstances were seen as an important audience for seasons A and B, it was important to maximize re-runability (appeal of repeated programs) of the programs for the at-home audience and its acceptibility to children in classrooms.

Several steps were taken to accomplish this. First, old segments, which had proven to have enduring appeal (e.g., the "Letterman" series), were selected for inclusion. Also as noted earlier, animation stands up better under repetition than live-action material. Therefore, a larger portion of the budget for the final season was allocated to new animations. Finally, earlier seasons of The Electric Company had relied, to an extent (particularly in the creation of live-action material), on current cultural and social phenomena (e.g., a "Kung-Fu" type character, a "Kojak" take-off, use of popular music and dress styles). The inclusion of such segments inevitably dated

the program -- a disadvantage in a re-run situation at home or in school. An effort was made to produce relatively timeless material for the final seasons.

VIII. PROMOTION AND OUTREACH

Because The Electric Company was to be broadcast almost exclusively on PBS channels, which had not usually been very popular with the children for whom the program was intended, an intensive pre-premiere effort was made to notify as many teachers, parents and children as possible about the nature of the program, its purpose, and local viewing schedules. In areas where the program was to be broadcast on a UHF channel, campaigns were organized to instruct people in correct tuning in order to receive the program. This awareness campaign won a Silver Anvil Award in 1971 from the Public Relations Society of America.

One effective component of this campaign was detailed information presented in the format of an attractively illustrated paperback book, which was distributed free of charge to school teachers across the country. This book explained the curriculum, production approaches and rationale for the program at a level specific enough to be useful to teachers, and at the same time accessible to parents. Requests for this popular paperback continued for several years.

A half-hour TV special introducing the program was also produced, largely for parents, and was broadcast on commercial channels in order to alert the maximum number of viewers. A Teacher's Guide to the program was created

and the first issue circulated via ITV instructors and other means. Subscription forms for subsequent issues were included and were also inserted in the paperback books described above.

Appropriate magazines and newspapers were informed of the new program and encouraged to preview material and interview CTW staff members. Because Sesame Street had already generated a strong interest and even controversy among journalists, The Electric Company was given ample attention by the press and by professional journals such as the Journal of Reading and The Reading Teacher.

Members of The Electric Company staff attended appropriate conferences, such as the Clairmont Reading Conference and national and local meetings of the International Reading Association in order to inform professionals about the program and its sound pedagogical foundations, and to answer their questions.

CTW's Community Education Services (CES) unit was formed to reach people directly at a local level, particularly through informal channels such as neighborhood groups, and help them maximize the educational significance of the program for themselves. Beginning with efforts to educate people on tuning-in UHF channels, CES subsequently developed many programs to increase community involvement with the program. And now that production has ceased, CES continues to play an important role in maintaining the level of program use in informal settings.

Tutoring programs have been a mainstay of CES effort over the years. Groups such as Boys' Clubs, Scout Troops, Community Centers, churches, libraries and service organizations, such as the Lions Club, have devised after school, Saturday or summer tutoring programs with the assistance of

CTW's Regional Offices (there are now six such regional offices). Some materials for these programs are provided by CTW, but stress is placed on items which teachers, parents and children can easily make themselves, or obtain at low cost.

The most ambitious tutoring project developed by CES came about through collaboration with the Neighborhood Youth Corps program, which is a component of the Federal Office of Manpower Administration designed to provide work experiences for young people with the goal of increasing their subsequent employability.

The effort began in summer 1971 with Sesame Street and pre-schoolers and has expanded in the summer of 1972 to include seven to ten-year-olds viewing The Electric Company. The 1972 project encompassed cities of all sizes as well as several rural communities, and sites in Puerto Rico and the Virgin Islands. There were a total of thirty-three sites involved, but many, such as New York City, had more than one viewing center. At its peak in 1972, the project employed about 10,000 Neighborhood Youth Corps youngsters. The viewing centers were usually under the direction of a local organization or agency which provided varying services from hot lunches and television sets to volunteer help. Wherever possible, sponsoring agencies were encouraged to provide paid supervisory personnel with appropriate training. When this was not possible, parents, college students, and other community members were trained by CES and employed in these programs.

The NYC enrollees viewed The Electric Company with the attending children and carried out activities with them to reinforce the program. Monitoring of these efforts was carried out by the CES staff at CTW, in order to improve communication and training for the NYC staff from year to year. This project continued for several seasons.

Another successful CES effort was carried out in Appalachia, first with Sesame Street and then with The Electric Company. In this case, CTW's Appalachian Field Services Office (covering Kentucky, North Carolina, Tennessee, Virginia, West Virginia, and Southeastern Ohio) loaned individual parents cassette tape recorders and specially-made audio tapes - one per week of shows - explaining difficult points, giving local examples, describing reinforcing activities for the parents to do, and providing general background. Each parent was also provided with simple supplies such as crayons and paste purchased by the county school system with Title I funds. Parents were invited to attend workshops conducted by CES staff. Many poorly educated parents reported having profited from this experience as much as their children..

CES is continuing its efforts to increase use of The Electric Company outside of the formal educational setting. Materials are in the planning stage which, upon completion, could be offered to Community Organizations interested in forming after-school clubs, or integrating language arts activities into already existing clubs. These materials are slated to include a guide for tutors, a handbook for club leaders and sponsors, and other items.

Other efforts to reach the at-home audience have focused on the creation and distribution of commercially available materials, notably "The Electric Company Magazine" and "Spidey Comics," which serve to provide reading practice to reinforce the program and also draw attention to the program. Both have enjoyed a substantial circulation and have been used by many classroom teachers, though they were not specifically intended for this purpose.

The Public Relations Department and the Products Group have combined efforts with CES, in order to promote classroom use of TEC.

The most important school-related CES activity has been a series of teacher workshops in local school systems all over the country. Personnel in the six regional CES offices are trained by CTW staff to conduct these workshops, and they in turn work directly with small groups of teachers. Workshops focus on familiarizing teachers with the program and demonstrating classroom activities which the teacher can employ to enhance the program. These workshops will continue through the re-run period.

As was mentioned earlier, a Teacher's Guide and paperback book were among the initial means of familiarizing teachers with The Electric Company. The original Guide, a monthly listing of daily program goals with brief activity suggestions, was replaced in subsequent seasons by a more substantial Teacher's Guide/Activity Book in two volumes, which teachers could order at low cost. These are now available in a revised form to cover the material which will be aired through 1980. This includes sixty ditto masters for classroom activities. A Handbook providing show-listing for the entire period is also now available.

PBS channels and ITV coordinators have also played an important role in alerting teachers to The Electric Company through announcements over the air, and through distribution of print material from the Workshop. Some ITV centers have also conducted teacher workshops and other activities to promote interest. The Electric Company staff participated directly in many such workshops and provided materials for others. This liason between CES staff and ITV coordinators continues.

In the early years of The Electric Company, promotional efforts were of course, focused on the at-home audience. Nevertheless, as it became clear that the in-school audience was a significant one, increased promotion

of the program to teachers, and provision of information on the effective use of the program became logical steps. Thus, a substantial effort was made in 1977 to reach teachers, inform them of the re-run situation, and provide materials for use in their classrooms. In September '77, a mailer for ordering The Electric Company ditto sheets described earlier was sent to over 600,000 elementary school teachers, and a more comprehensive mailing list is being developed to assist future efforts of this kind.

Teacher responses to the mailer, and to questions in the RTI surveys having to do with support materials, suggest that there may be a viable market for such materials which can be sold directly to teachers at moderate cost. To this end, both the School and Day Care and trade division of CTW Products Group are actively developing products related to The Electric Company. For example, eleven new trade books have been put out this season with titles directly related to The Electric Company.

A discussion of promotional and outreach efforts must include mention of several experimental programs in which TEC has been employed in literacy training for audiences other than the one for which it was intended. For example, an Opportunity Industrialization Center in Philadelphia used the program successfully as part of an adult literacy program with CTW (largely through CES) providing evaluation materials and other help to the program leaders. CES was also responsible for working with a program for Vietnamese refugees run by West Arkansas Community College at Fort Chaffee, Arkansas. The Electric Company was one of several program broadcast daily to the refugees in their barracks homes. Reception to the program was enthusiastic, particularly among the children, who tended to need English instruction much more than their parents.

CES field offices have developed programs appropriate to their particular area. For example, offices in areas with large Hispanic population have explored the use of The Electric Company in ESL programs. Similar exploratory efforts have been made with American Indians and with the children of migrant workers, though no permanent large-scale programs have been established to date, since continued funding for these and sustained involvement of appropriate outside agencies is always a problem.

Clark School for the Deaf in Northampton, Massachusetts has been using The Electric Company successfully on a continuing basis, as has a Manchester, New Hampshire disability center. Hundreds of programs of this kind, formally and informally organized, are being carried out across the country without direct intervention on the part of CTW. However, CTW freely provides advice, articles, and other materials when contacted by these programs.

Perhaps the most successful of these projects, carried out entirely by a school system itself, was developed in Lincoln Heights, a largely Black community in Ohio. Here, TEC was taped off-air and made available to teachers on an extremely flexible basis through video tape. School officials attributed substantial gains in reading scores in the community almost entirely to the extensive use of TEC in the classrooms.

IX. CONCLUSIONS

The future of The Electric Company is at this time uncertain. There may well be problems with The Electric Company becoming dated. If it does not seem feasible to extend the re-run period beyond 1980, then the question becomes one of whether to allow the program to die altogether, to consider the feasibility of re-packaging it in some form or to initiate new production. This decision must be based on information gathered as the current re-run period draws to a close. There is no doubt that The Electric Company has

been an extremely successful and well-received educational innovation, and the decision concerning its future will be made very carefully and conscientiously.

Meanwhile, many immediate questions about the program need to be answered. To what extent ought promotional activities continue? Where will funding for further activities come from? What sorts of products would be most valuable? How can teacher utilization of the program be enhanced? Several steps have been taken to begin to answer some of these questions:

- Joan Ganz Cooney has formed a special CTW staff committee to review all products and publications related to The Electric Company proposed by all departments of CTW in order to insure that quality and educational value are maintained.
- A review of possible strategies for publicizing The Electric Company to teachers has been prepared, and a mailing list of interested teachers for future marketing efforts is being developed.
- A.C. Nielsen has been commissioned to continue monitoring the size and composition of The Electric Company's at-home audience during the re-run period.
- Plans are underway to continue monitoring teacher utilization of the program during the re-run period.
- CES continues to promote and develop ways of enhancing use of the program.

Efforts to work with ITV coordinators, the NEA, colleges of education and the many other organizations and institutions still actively supporting use of The Electric Company among their constituencies will continue. Further decisions must await the results of these efforts.

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