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**PRODUCTION AND EVALUATION OF  
AN INSTRUCTIONAL TELEVISION PROGRAMME ON  
ENVIRONMENTAL POLLUTION FOR  
THE INDONESIA OPEN LEARNING UNIVERSITY  
(UNIVERSITAS TERBUKA).**

**R. BENNY A. PRIBADI**

**A Thesis  
in  
The Department  
of  
Education**

**Presented in Partial Fulfillment of the Requirements  
for the degree of Master of Arts  
Concordia University  
Montreal, Quebec, Canada**

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## **Abstract**

### **Production and Evaluation of an Instructional Television Programme on Environmental Pollution for The Indonesia Open Learning University (Universitas Terbuka).**

**R. Benny A. Pribadi**

The primary purpose of the thesis was to evaluate an instructional television programme on environmental pollution in the Indonesia Open Learning University (Universitas Terbuka). The content of the programme was based on one of the courses which is offered by the Faculty of Education in Universitas Terbuka. During the production, a formative evaluation was conducted to improve the quality of the programme. The design applied was the three stage model including subject matter expert appraisal, one-to-one and small group testing. A one group pretest-posttest design was used for evaluating the effectiveness of the programme within the small group testing.

The sample of the target population consisted of 20 students who were enrolled in the Educational Faculty of Universitas Terbuka. All must take an environmental pollution course as one of the required courses. A 40 item cognitive questionnaire was constructed based on the objectives of

the programme. A t-test analysis revealed that there was a significant difference between the subjects' pretest and posttest scores ( $p < .05$ ). A 20 item questionnaire concentrating on ITV production variables was also distributed to the target population in order to measure the effectiveness of message design, content organization and technical quality of the programme. Based on the results, recommendations are provided for improving the effectiveness of programme. Overall, the study supports the rationale for increasing the use of instructional television in Universitas Terbuka.

## **ACKNOWLEDGEMENTS.**

I would like to express my appreciation to the many persons who contributed their time , guidance and cooperation, in order that this study successfully reached its objectives. Thanks are due to :

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All of my colleagues in The Educational Faculty and Video Studio of Universitas Terbuka who gave their contribution during the production of the ITV programme.

Finally, I would like to thank my parents, my brothers and my sisters for their generous support and encouragement during the completion of my studies at Concordia University.

Montreal, Quebec,

R. Benny A. Pribadi.

March, 1991

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## Chapter I

### INTRODUCTION.

#### Rationale of Thesis.

Television broadcasts have been used as one of the instructional media in the Indonesia Open Learning University (Universitas Terbuka) since its establishment on September 4, 1984. The purpose of using television broadcasting is to support instructional processes which are mainly conveyed through printed media. Since the geography of Indonesia is an archipelago, it is important for Universitas Terbuka to use communication channels which can be used for delivering the course materials to students of Universitas Terbuka who live in several distributed areas. Indonesian satellite communication and the national television network make it possible for Universitas Terbuka to broadcast its television programs.

Continuous communication is an important thing to be maintained by Universitas Terbuka since the students have irregular contact with their institution. Even though the costs of production are quite high, the broadcasting of instructional television can be used to attain this purpose. By the same token, because the production costs of these programs are quite expensive, they should be able to convey instructional messages effectively and increase students' motivation.

Chu and Schram's (1967) review showed that television has been used

widely for educational purposes. As an instructional medium, television has the potential to stimulate the learning process. The main purpose of using television as an instructional medium is to teach specific subject matter to specific target audiences (Crow,1977). Since the aim of instructional television is to increase learning, research on this instructional medium should be focused on how the programs can teach best (Coldevin,1981).

In order to produce better instructional television programs, formative evaluation methods should be employed, particularly those which focus on television variables and techniques necessary to create an effective message design. Two decades of application have strongly suggested that formative evaluation can be applied to improve the quality of instructional television.

The Universitas Terbuka has used television broadcasting to support its instructional process since its inception. It is now considered necessary for Universitas Terbuka to conduct formative evaluation in order to improve the effectiveness of its television programs. In this respect, formative evaluation should be focused on the improvement of production variables and content organization of instructional television. As Coldevin (1981) has suggested, production variables may be delineated to include " technical "

or hardware factors and " content organization " or software strategies. Technical or hardware factors may be described as production techniques dictated by unique conventions of the medium such as setting, lighting, composition and special effects, while the content organization might include opening - closing formats, attention directing and controlling cues, pacing and rhythm of segments and repetition and review.

All of these production and technical variables were used in producing the instructional television programme, Environmental Pollution, the evaluation of which is the focus of this thesis. Technical factors including setting, lighting, composition and special effects were applied to increase the attractiveness of the programme, while content organization concerned those factors that facilitate the acquisition of knowledge or content of the programme. The key to improvement lies in evaluation and this study intends to provide an example for Universitas Terbuka to follow in effectively delivering instructional messages through television.

#### The Purpose of Thesis.

The purpose of this thesis is to design and evaluate an instructional television programme which can be used as one of the audio visual material prototypes in Universitas Terbuka. A programme on



environmental pollution was developed. The content of the programme was based on one of the course materials which is offered by the Faculty of Education in Universitas Terbuka. Some television production variables and techniques were employed to make the programme more effective in delivering the instructional messages (content). After production, the three stage formative evaluation model was applied to improve the quality of the programme. Summative evaluation was also applied to determine the final quality of the programme.

## Chapter II

### REVIEW OF RELATED LITERATURE.

The worthwhile contributions of television as one of the instructional media have been advocated by Quick and Wolf (1962), Diamond (1964) and Schramm (1972). Television can provide a wider window on the world. It is possible to see and hear people that one might not normally come into contact with, such as eminent experts and panel discussion groups. These potentials of television can be used beneficially for instructional purposes.

In order to achieve its instructional purposes, considering the interactions between the content and production variables of the programme is necessary. Mielke (1970) noted the important link between the content and the production variables of instructional television as follows: "...The interaction between the content and the presentation style is typical. The effect of televised content and presentation style depend in part on how it is produced. Effects of production variables depend in part on the content being presented." (p. 239). Furthermore, Lazarus (1977) noted the importance of employing messages design principles in order to produce effective instructional television. The message design principles should consist of the interaction between pedagogical rationale and production variables.

Several studies have been conducted regarding the effects of television production variables. Coldevin (1981) classifies the concentration areas of research on production variables of instructional television as follows :

- Presentation / technical variables ( e.g. camera factors, setting, colour versus monochrome, still versus motion pictures, visual and audio reinforcement, and speed of presentation).
- Content and subject matter organization (e.g. televised lecture, interview and discussion formats, audience reaction inserts, review strategies, direct explanation versus inserted questions).
- Performer characteristics (e.g. sex, age, appearance, dress, camera-eye-contact).

#### Presentation / Technical Variables.

Previous research on audio visual reinforcement indicates that superimposed captions of key words improve retention of news items (Findahl & Hoijer, 1976). In another study, Coldevin (1975) found that a combined audio visual treatment was significantly more effective than sound alone and superior to visuals alone in presenting review statements. Findahl and Hoijer (1976) also found that a voice over with relevant visuals was more effective in stimulating newcasts items than either treatment alone.

### Content and Subject Matter Organization.

Coldevin (1975) compared three types of review strategies including summary (appearing at the end of instructional units), massed (inserted at the end of sub-units within the broad instructional units), and spaced (the same as massed review but with a five second pause between individual review statement presentation). The findings of the study indicated that all three strategies facilitated significantly greater information recall and provided uniform support for the use of reviews when tested against a programme containing no review segments. The most effective strategy, however, was that which contained the pause between review statement presentations.

Webster and Cox (1974) studied the use of different colour codes to highlight certain kinds of information in the program. Their findings suggest that prior knowledge of colour codes was able to significantly improve more information recall on both delayed and retention tests. Finally, a study examining activity eliciting potential indicated that active responses which can be reinforced with immediate knowledge of results appears to offer distinct benefits to message design (Coldevin, 1975).

### Performer Characteristics.

Baggaley, et al (1980) found that prestige and prior knowledge of a presenter significantly enhanced students' rating of his performance. The presenter with a positive introduction was rated significantly more straightforward, strong, honest, reliable, expert and relaxed.

The amount of eye contact or proportion of time a lecturer or newsreader should look directly into the 'take' lens of a camera has received a variety of theoretical suggestions in television production handbooks. Most recommend a maximum amount of eye contact with the audience (Coldevin, 1981). The effects of eye contact level as presenter enhancement factors have been studied by Coldevin (1979). In a teleprompt simulation versus desk script format, he found that a professional newsreader was rated as significantly stronger and more organized in the desk script version. Further study of eye contact level has been conducted by Baggaley, et al. (1980). They reported that a medium eye contact condition was perceived as adding more precision to the speaker's delivery. In a desk script or medium contact delivery, a presenter is seen to be working at his or her craft rather than merely delivering a monologue.

Missed cues which are described as common mistakes that might be

observed during a news delivery have been studied by Coldevin (1979). In this study, three conditions were used in preparing a four segment news story. In the first treatment, a professional newsreader delivered a flawless presentation of material ; in the second, one missed cue was introduced during the first cut and another between the third to final segment cut. Each lasted from two to three seconds or long enough to be noticed, but because of the speaker's professional background - and perhaps experience - were smoothly corrected. The third treatment had missed cues between each cut. Testing results showed that, by and large, a student audience was prepared to forgive the errors in the slightly flawed treatment, but the credibility of the presenter was seriously undermined in the multiple missed cue condition.

The choice of an ITV presenter is often made on the basis of competence in a particular subject area. The assumption is made that he or she will be an effective communicator as well (Coldevin,1981). Wardel (1976) examined the validity of this assumption by preparing three treatments in which the same material was presented by an ITV instructor, a role player, and a trained communicator (professional newsreader). Dependent measures consisted of attitudes towards the three presenters and a

cognitive achievement test. The results showed no significant differences in attitudes towards the three presenters, but those who viewed the trained communicator's delivery had significantly higher learning scores than either of the two groups.

Whenever possible the findings emerging from the foregoing body of literature were used as guidelines in producing the television material to be formatively evaluated in this study.

### Chapter III

#### MATERIAL PRODUCTION AND FORMATIVE EVALUATION.

##### Goal of the Instructional Material.

A topic on environmental pollution was selected to be produced as an instructional television (ITV) programme. The goal of this programme was to effectively convey instructional material concerning environmental pollution which included :

1. The use of chemical products in daily life.
2. Water, air and soil pollution caused by chemical products.
3. Factors causing environmental pollution.
4. The effects of environmental pollution.
5. Methods to prevent environmental pollution.

The goal of the programme was made more specific in order to facilitate the design of the programme and construction of the cognitive test instrument for evaluation.

##### Front End Analysis.

A front end Analysis was conducted in order to develop the content and the objectives of the instructional television programme. In this study, the front end analysis was done by interviewing the subject matter expert



(SME) about the objectives, the structure and the content of the programme.

Available instructional material of the topic - Environmental Pollution - was also studied to formulate ideas for the programme's presentation. The results of the front end analysis were the objectives and a content outline of the programme that could be applied in writing the script.

#### Objectives of the Instructional Material.

After conducting a front end analysis, the criterion referenced objectives of the instructional material were formulated. These were applied such that after viewing the instructional video programme, 75 % of the sample of the target population would be able to correctly identify 75 % of the test items relating to the following :

1. Explaining the use of chemical products to fulfil human needs;
2. Stating the types of environmental pollution - water, air and soil pollution;
3. Explaining factors causing environmental pollution;
4. Stating the effects of environmental pollution; and
5. Explaining how to prevent environmental pollution.

#### Content and Format of the Instructional Material.

Title : Environmental Pollution.

Duration : 25 minutes.

Format : Video Tape (PAL) either U-matic or VHS.

Producer : The Indonesia Open Learning University (Universitas  
Terbuka).

The programme consisted of instructional messages on environmental pollution including the use of chemical products, types of pollution, factors causing environmental pollution, the effects of environmental pollution and the methods for preventing environmental pollution.

Some production techniques such as graphic illustrations and audio visual reinforcement were applied in the programme in order to gain audiences' attention. The content organization or software strategies included the opening - closing format, cues and advance organizers, and review sequences; activity eliciting strategies were applied to make the content of the programme more interactive.

The opening of the programme shows a beautiful scene of a city park in Jakarta. This was intended to gain the attention of the audience. The first sequence of the programme describes the use of chemical products to fulfil the needs of human beings. This sequence shows relevant visual illustrations such as the use of detergents, fertilizers and gas for daily activities.

The sequence of using chemical products is followed by the description of concept and types of environmental pollution. The types of environmental pollution are illustrated with the examples of soil, water and air pollution. This sequence also shows the laboratory experiment for examining the acidity of soils. This was intended to make the audiences aware of using the proper amount of fertilizer to grow plants.

The third sequence describes factors causing environmental pollution including: industrialization, urbanization, population density, life style and economic development. Visual illustration of the sequence shows how these factors cause environmental pollution.

The next sequence describes the roles of human beings in preventing environmental pollution. Visual illustrations of this sequence show the simple recycling process of used materials, such as papers, rubbers, etc. The programme is closed by summarizing the whole content of the programme and its sequences.

#### Formative Evaluation.

After finishing the prototype production, a formative evaluation was administered in order to improve the programme while it was being developed to make it as effective as possible. The use of formative

evaluation methods was intended to produce a good quality of instructional television programme which could be used as one of the instructional material prototypes by Universitas Terbuka.

The objectives of the formative evaluation were :

- (1) to detect the weaknesses of the programme regarding the message design, content organization and technical factors;
- (2) to determine the effectiveness of the programme in terms of information acquisition with a sample of the target population.

More specifically the evaluation of the instructional television programme was concentrated on the following factors:

**Message Design.**

- Clarity of instructional objectives.
- Accuracy of the content.
- Comprehension level of the programme.
- Interest level of concepts being presented.
- Density of content.
- Relevancy of visuals to content.
- Interest level of visuals being presented.
- Comprehension level of narration.

- Pacing of the programme.
- Clarity of demonstration.

### **Content Organization.**

- Interrelationship of concepts being presented.
- Interrelationship of narration and visuals.
- Systematic design of programme structure.
- Comprehension level of programme structure.
- Frequency of concept repetition.

### **Technical Quality.**

- Clarity of Pictures.
- Clarity of colour.
- Clarity of narration.
- Clarity of graphic illustrations.
- Clarity of visuals.

### **Formative Evaluation Stages.**

In order to ensure the accuracy of information and progression of collected data, the evaluation was done in three stages including : expert appraisal, one-to-one testing, and small group testing (Dick & Carey, 1985).

### **Expert Appraisal.**

The prototype of the instructional television programme was reviewed

by a subject matter expert in order to judge its content accuracy such as completeness of information and instructional sequences which were being used. The subject matter expert with whom the programme was evaluated holds an M.Sc degree in chemistry. She is a professor of environmental pollution and also works as Vice Dean of Academic Affairs of The Chemistry Department at the Institute of Teachers Training and Education (IKIP Jakarta).

After reviewing the programme, she suggested some small revisions including some definitions and examples of the concepts which were being demonstrated. These factors were revised before administering the next stage of the evaluation, one-to-one testing.

#### **One-to-one testing.**

The one-to-one testing was administered to obtain initial reactions to the programme from the sample of the target population. The programme was tested with three students who were representative of the target audience. The test was administered individually, in order to detect major problems which might result in revision and modification of the instructional strategy or overall content organization.

The students were encouraged to describe difficulties that they had with the learning sequences and the concepts which were being taught in the

programme. At the beginning of the testing session the students were informed that any mistakes that they might make were probably due to the deficiencies in the materials and not theirs.

The data from the students showed that most of them were concerned with the structure of the programme. Specifically, they preferred less concept repetitions within the programme. Therefore, this factor was revised before conducting the final evaluation stage, small group testing.

#### Evaluation Design.

The evaluation design employed for the small group testing was adapted from a research design called " the one group pretest-posttest design" (Campbell & Stanley, 1966). The design consisted of pretesting and posttesting a single group of subjects. The evaluation design is illustrated in the diagram as below :

**O<sub>1</sub>.....X.....O<sub>2</sub>**

**O<sub>1</sub>** = Indicates the first observation or measurement, pretest.

**X** = Indicates the television programme to be evaluated or treatment.

**O<sub>2</sub>** = Indicates the second observation or measurement, posttest.

### Constraints of the Design.

Since there was no control group and no randomization, the design has some threats to internal validity (Campbell & Stanley, 1966). However, the design is still widely used because of its advantages.

The threats to internal and external validity which include history, maturation, testing, instrumentation and mortality are considered as the constraints of the design that should be minimized. Thus the interval between the pretest and posttest was kept short in order to control for history and maturation. The pretest could, however, influence students' posttest performance due to the nature of its interaction with the treatment. Therefore, the threat of testing can not be discounted (Popham, 1988). In order to minimize further biasing or cueing of the group, the posttest was administered immediately after screening the programme. An identical test was used to eliminate the violation of the evaluation's internal validity. The students who participated in the evaluation were carefully chosen in order to prevent selection effects. They had not taken a course on environmental pollution and hence this eliminated bias and high prior knowledge.



### Production and Evaluation Procedures.

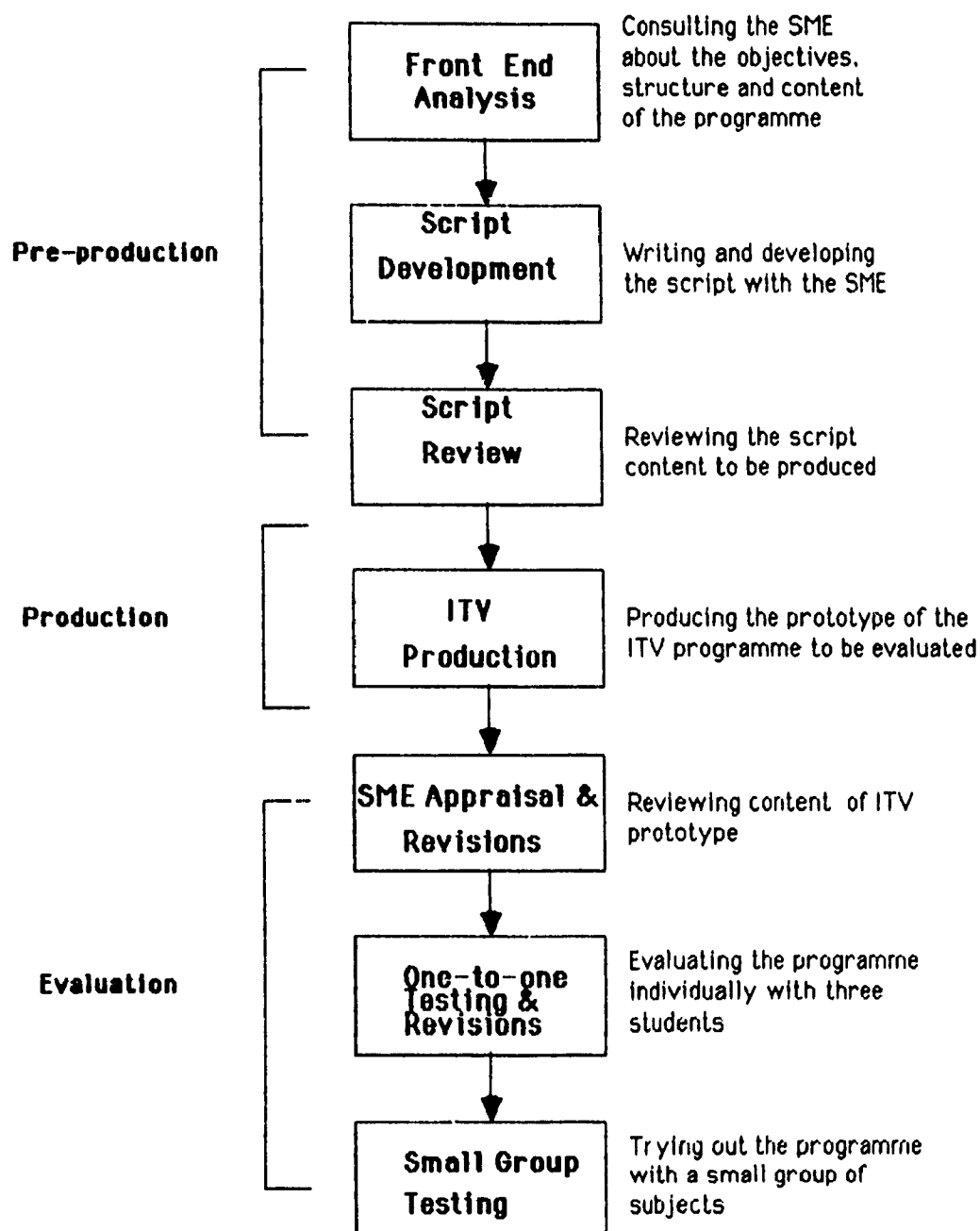
The sequences of production and evaluation of instructional television were as follows:

- Front end analysis by consulting the subject matter expert (SME) about the objectives, the content and the structure of the programme to be presented.
- Script development with the subject matter expert.
- Production of instructional material (instructional television).
- Subject matter expert appraisal of instructional material prototype and revision.
- One-to-one testing with three students and revision of instructional material.
- Small group testing with 20 students representative of the target audience. A classroom was used for screening instructional material. A television monitor and Sony video cassette recorder (VCR) were provided in the classroom.

Figure 1 describes the sequences of production and evaluation which were employed in the study.

Figure 1.

Production and evaluation procedures.



## Chapter IV

### SUMMATIVE EVALUATION.

#### Small Group Testing.

The summative evaluation or small group testing was employed with twenty students who were representative of the target audience. The cognitive pretest was administered before the students watched the programme. After screening the programme, they were asked to complete the cognitive posttest and production variable questionnaires.

#### Testing Instrumentation.

##### **Cognitive test instrument.**

True-false and multiple choices test types were used as the cognitive test instrument for the small group testing. All questions in the cognitive test instrument were intended to measure subjects' cognitive achievement before and after watching the instructional television programme. There were 30 true-false and 10 multiple choice items in the test instrument. The construction of these items was based on the objectives of the programme. The score of each individual student was judged in terms of the total number of right answers to the questions were being asked. A four digit student card number was used to identify the target populations' pretest and posttest scores.

### Item Analysis.

An item analysis of the cognitive test instrument was conducted in order to know the weaknesses of each individual item in measuring the cognitive achievement of the subjects. The item analysis was based on subjects' pretest - posttest scores (Figures 2 and 3).

Figure 2.

Subjects' cognitive achievement on the pretest.

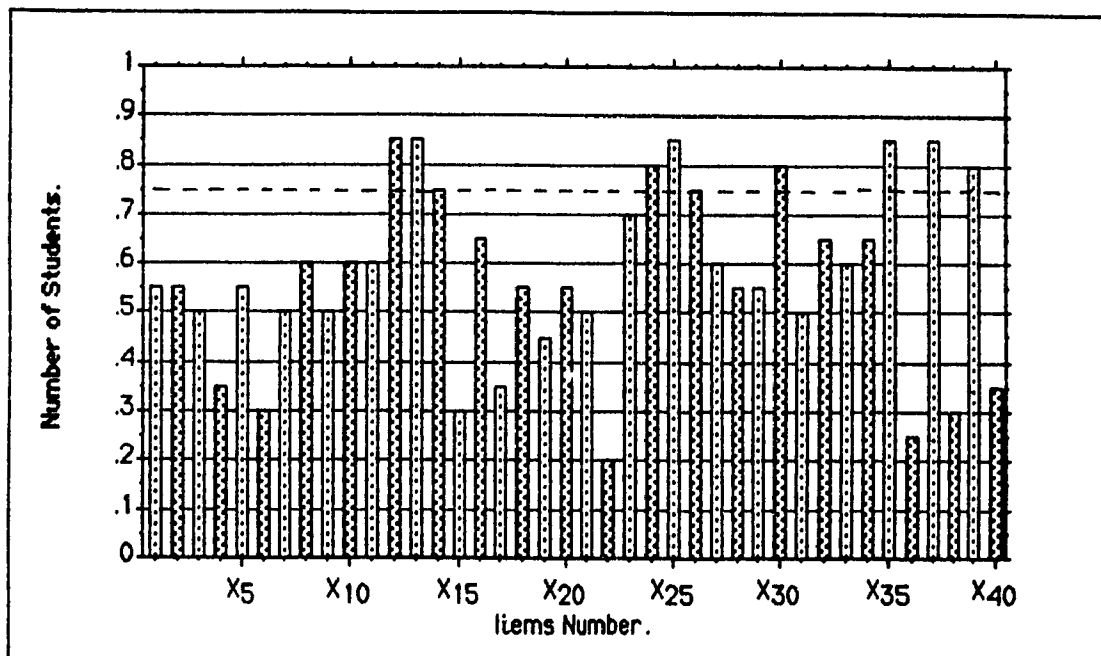
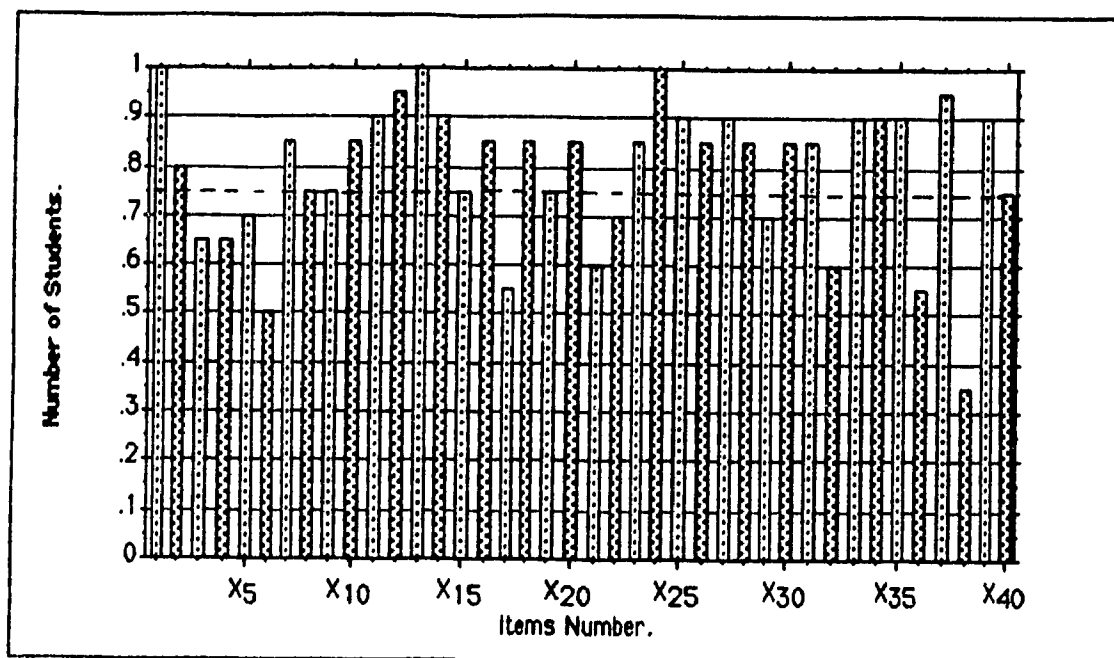


Figure 3.

Subjects' cognitive achievement on the posttest.



The analysis of subjects' cognitive achievement on pretest and posttest indicated that responses to items 3, 4, 6, 17, 21, 32, 36 and 38 were weak. Most of the subjects did not achieve the predetermined cognitive achievement level. This was probably due to the inherent weakness of the items *per se* or the content areas of the ITV programme related to each item. Based on the observations, an item analysis revealed that items 3, 21, 32 should be reformulated, while the content areas of the ITV programme relating to items 4, 6, 17, 36, 38 should either be re-shot or have more material added to bolster the information acquisition.

### **Content and Programme Format.**

In order to measure the overall quality of the programme, a five point Likert type scaling instrument was developed. The audiences were asked to rate the programme on specific points including message design, content organization and technical quality. The five point numerical scale ranged from strongly agree (5) to strongly disagree (1). Demographic information such as sex, profession and age was also included in the instrument.

### **Sample of Target Population.**

After consultation with the subject matter expert, it was decided that the Indonesia Open Learning University students from the Educational Faculty represented an appropriate target audience for the content of the instructional television being evaluated. They were carefully selected from the study groups located in Jakarta. All must take the environmental pollution course as one of the required courses in their study program. The sample of target population for the small group testing consisted of 20 students with the following demographical characteristics ( Table 1).

TABLE 1

## Frequency and Percentage of Demographic Variables of Target Population

## Sample

---

<u>SEX</u>	
* Male	8 ( 40 % )
* Female	12 ( 60 % )
 <u>PROFESSION</u>	
* Teacher	7 ( 35% )
* Non - teacher	13 ( 65% )
 <u>AGE</u>	
* 20 - 25	8 ( 40 % )
* 26 - 30	8 ( 40 % )
* 31 - 35	4 ( 20 % )

---

## Chapter V

### RESULTS OF SUMMATIVE EVALUATION.

#### Cognitive Achievement.

The means of the pretest and posttest scores are shown in Table 2. A t-test analysis revealed a significant overall difference between subjects' pretest and posttest scores ( $p < .05$ ).

TABLE 2

Means of the Subjects' Pretest-Posttest Scores

Pretest $\bar{X}$	Posttest $\bar{X}$	df	t	p
23.0	31.70	19	9.724	<.05

Table 4 shows the significant differences between teachers and non - teachers performances on the cognitive pretest and posttest. The study further revealed that non-teachers (N-13) have significantly higher gain scores ( $t=3.55$ ,  $df=19$ ,  $p < .05$ ) than teachers (N-7). The difference between teachers' and non-teachers' performances on the pretest and posttest is shown in figures 4 & 5.



TABLE 3

Mean of Teacher and Non-teacher Subjects' Scores on Pretest and Posttest

	Pretest $\bar{X}$	Posttest $\bar{X}$	Gain Scores	df	t	p
Teachers	28.14	33.29	5.14	6	-7.30	<.05
Non-teachers	20.23	30.84	10.61	12	-10.93	<.05

Figure 4.

Bar graph comparison of teachers' pretest - posttest scores.

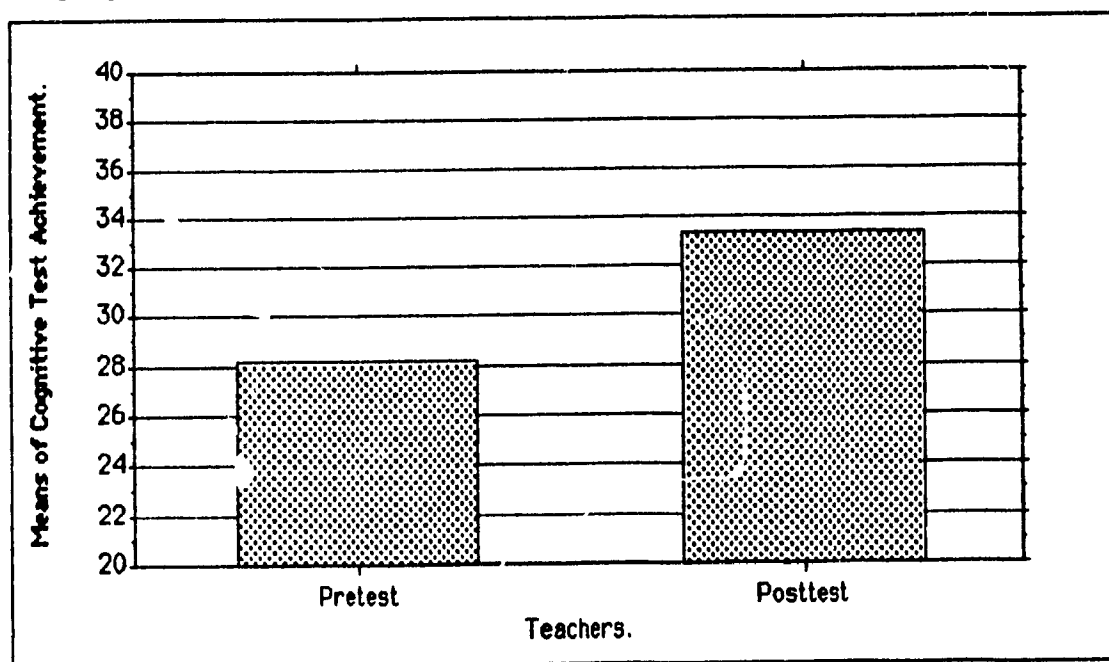


Figure 5.

Bar graph comparison of non-teachers' pretest - posttest scores.

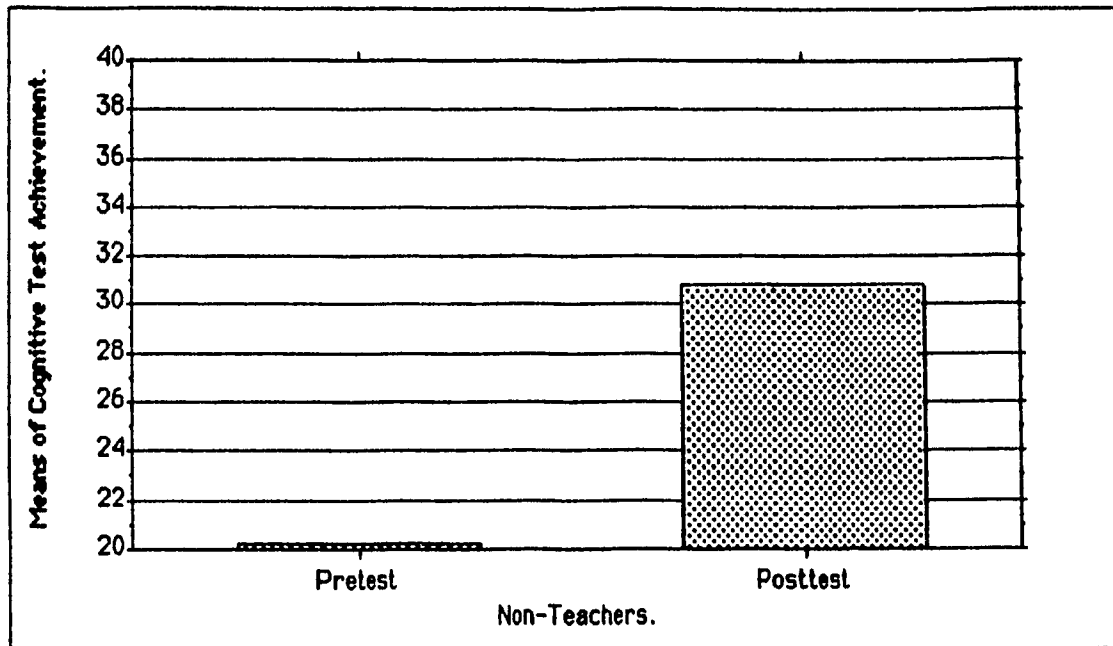


Table 4 shows the significant difference between means of male and female subjects' performances on pre and posttest scores. There was no significant difference between male and female subjects' gain scores ( $t=.78$ ,  $df=19$ , NSD). Figures 6 & 7 show the difference between male and female subjects' performance on pre and posttests.

TABLE 4

Means of Male And Female Subjects' Performance on Pretest and Posttest

	Pretest $\bar{X}$	Posttest $\bar{X}$	Gain Scores	df	t	p
Male	23.12	31.50	8.37	7	-6.09	<.05
Female	22.91	31.83	8.91	11	-7.30	<.05

Figure 6.

Bar graph comparison of male subjects' pretest - posttest scores.

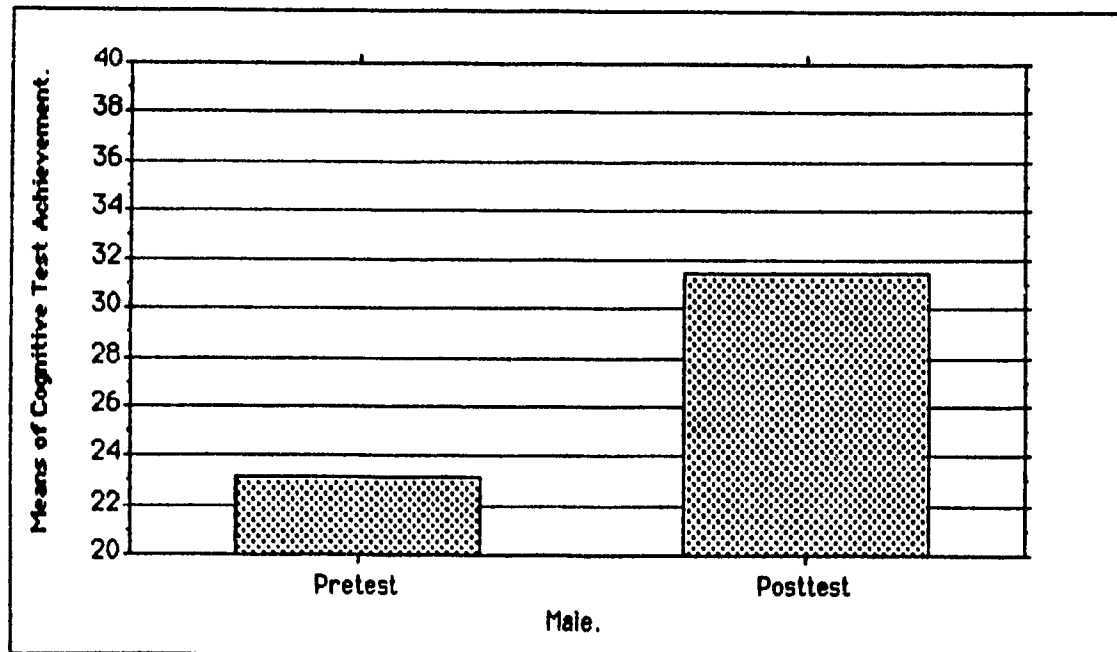


Figure 7.

Bar graph comparison of female subjects' pretest - posttest scores.

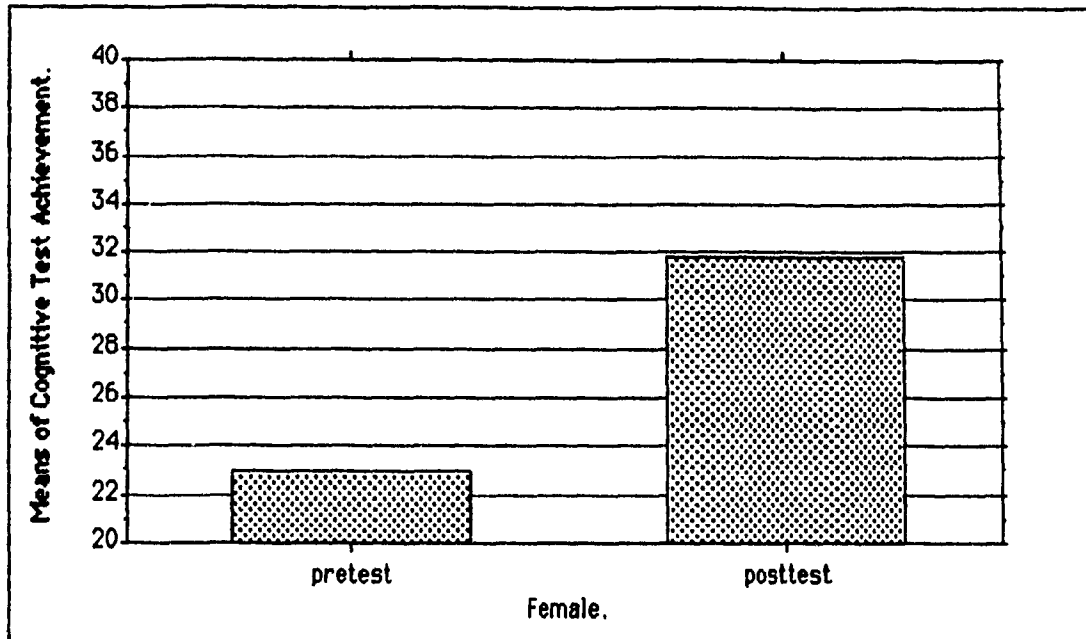


Table 5 shows the means of pretest and posttest scores segmented by subjects' ages. In this study, the subjects' ages are categorized into Older or above 30 (N-8) and Younger or below 30 (N-12). The study revealed that younger subjects have significantly higher gain scores ( $t=1.40$ ,  $df=19$ ,  $p<.05$ ) than older subjects. The differences between them is shown in Figures 8 & 9.

TABLE 5

Means of Pretest and Posttest Scores Segmented by Subjects' Ages

	Pretest $\bar{X}$	Posttest $\bar{X}$	Gain Scores	df	t	p
Older	25.87	32.75	6.77	7	-6.87	<.05
Younger	21.08	31.0	9.91	11	-10.27	<.05

Figure 8.

Bar graph comparison of older subjects' (above 30) pretest-posttest scores.

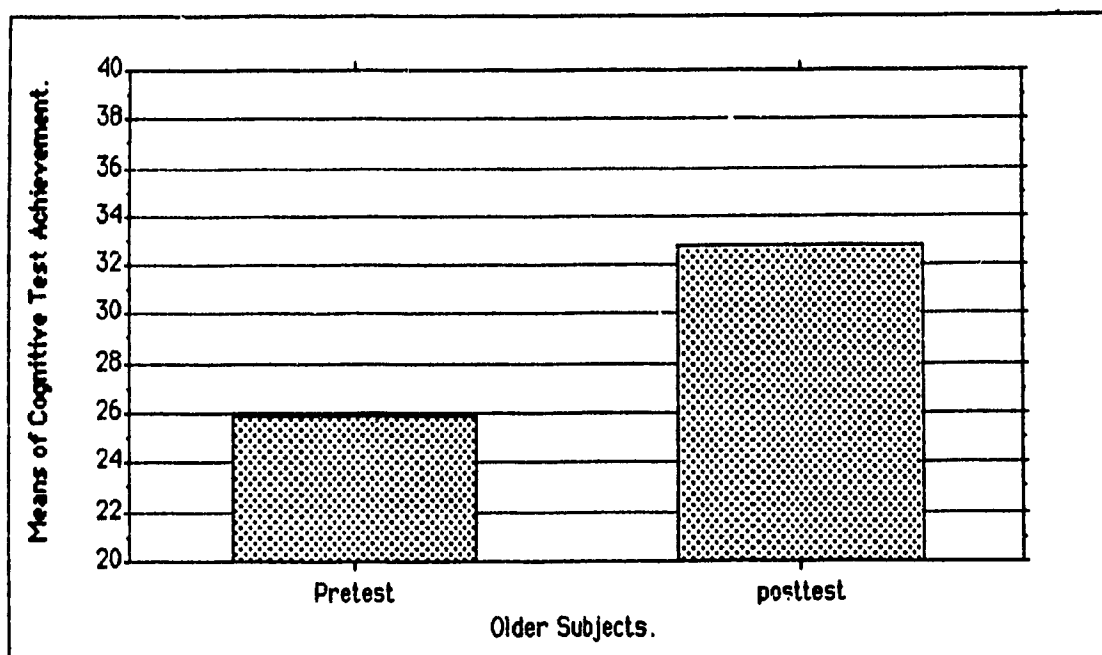
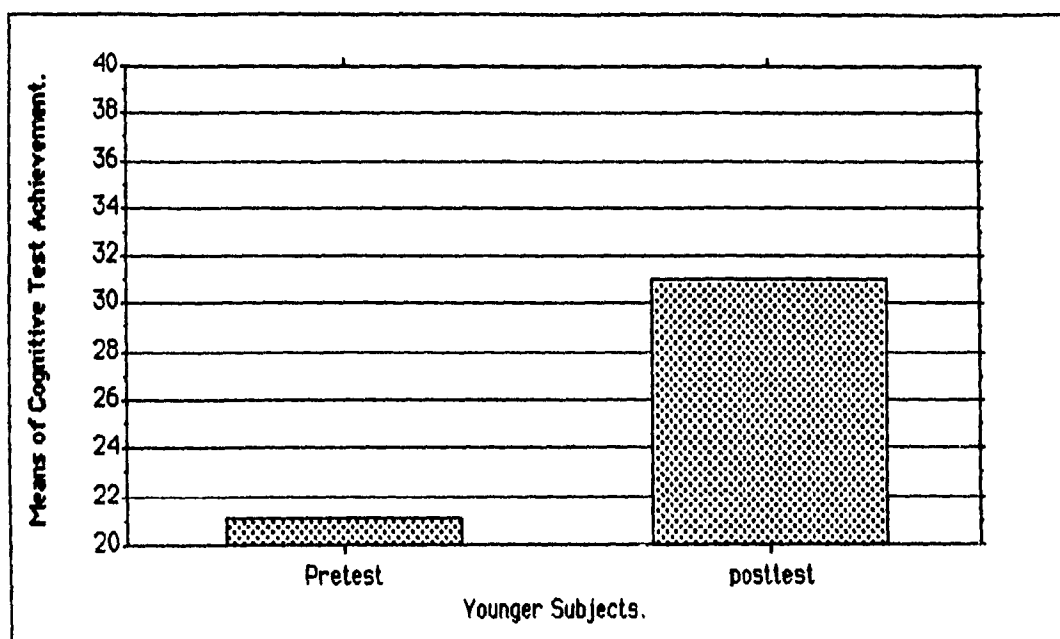


Figure 9.

Bar graph comparison of younger subjects' (below 30) pretest-posttest scores.



Figures 10 & 11 show the overall subjects' pre and posttest scores.

Figure 10.

Bar graph distribution of subjects' scores on pretest.

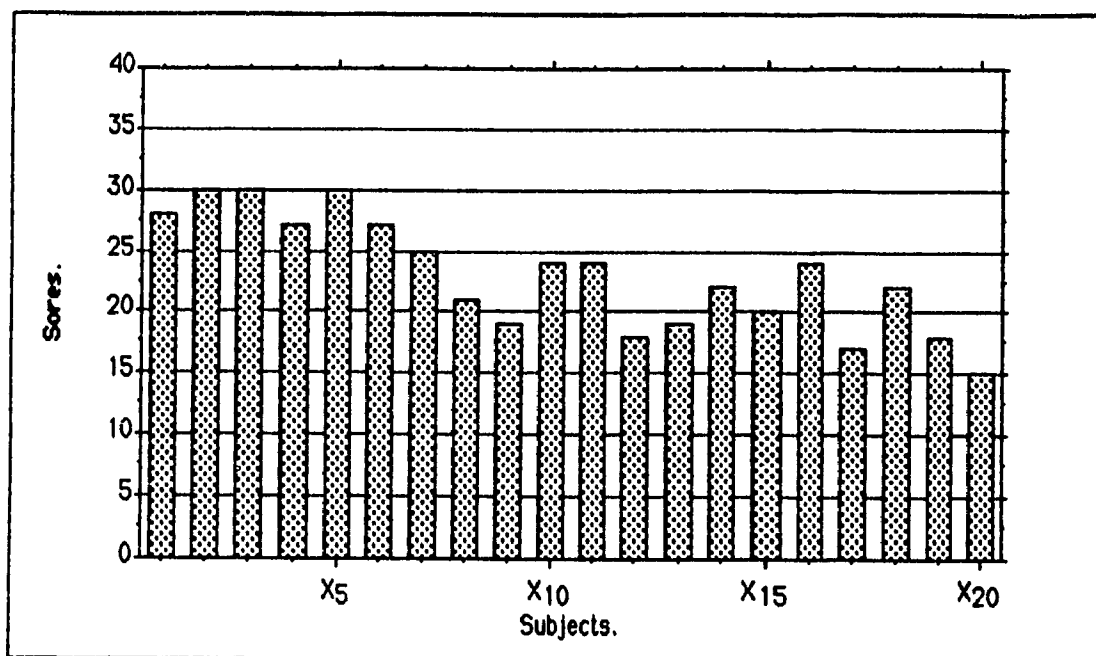
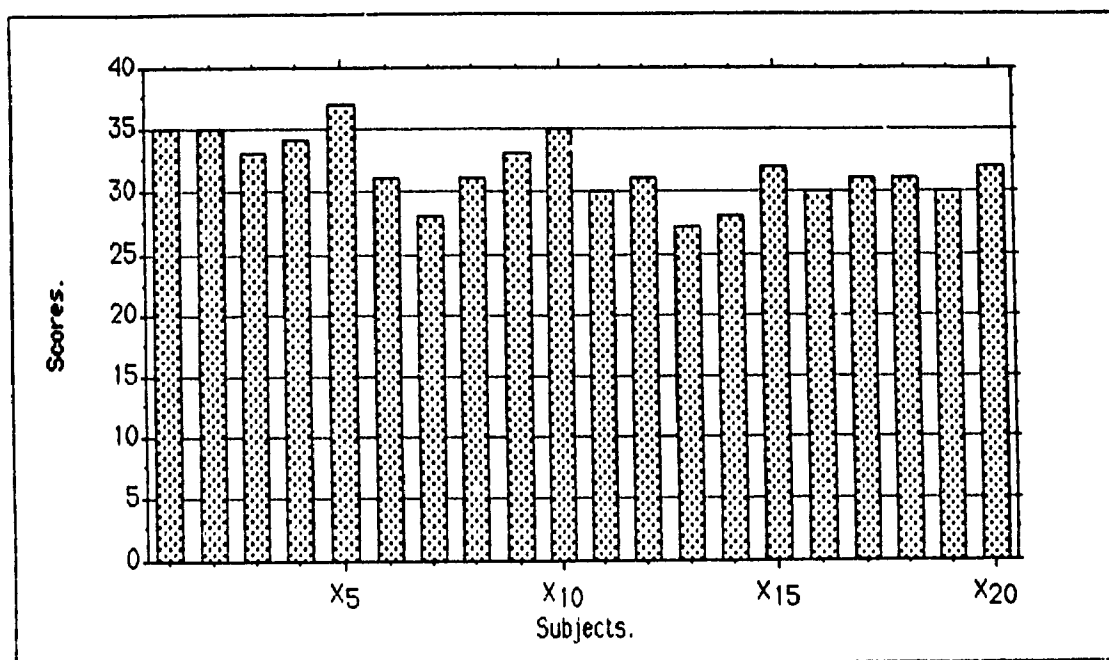


Figure 11.

Bar graph distribution of subjects' scores on posttest.



### Production Variables of Instructional Television (ITV).

#### **Message Design.**

Table 6 shows the results of the means and standard deviations of the 5 point Likert- scale for the message design variables evaluated. The critical mean was set at 3.75. This standard was set because it is relatively close to the 4 or agree scale on the positive end of the questionnaire. The quality of the programme in all items is good ( $\bar{X} > 3.75$ ). Figure 12 shows the graphic distribution of the variables.



TABLE 6

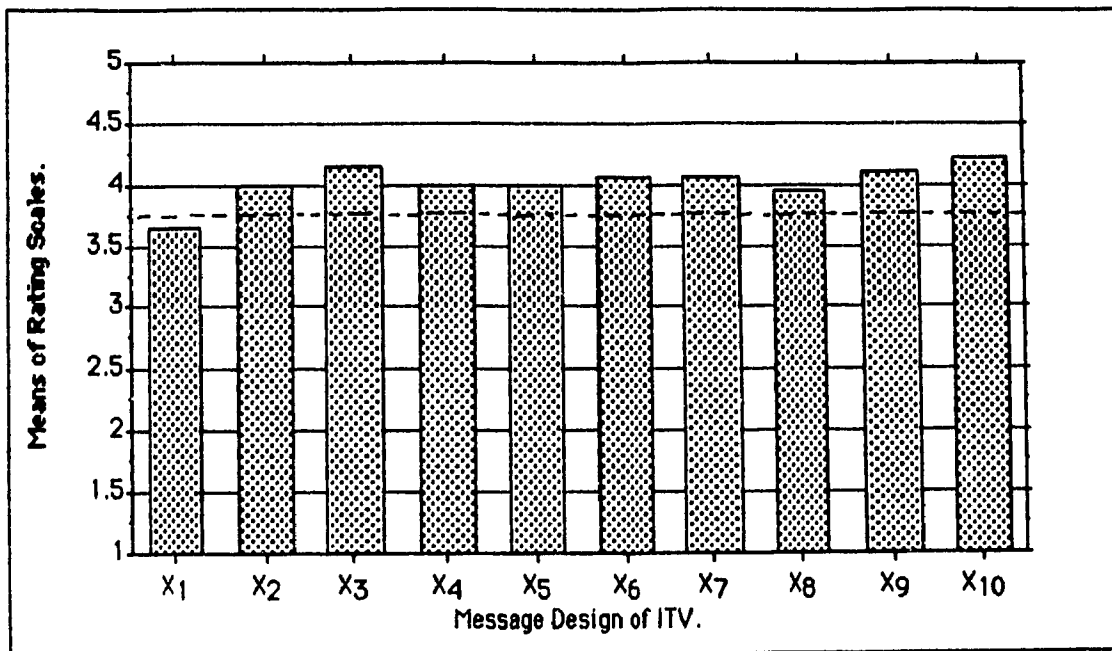
Means and Standard Deviations of 5 Point Likert-Scale for the Message Design Variables

Production Variables	$\bar{X}$	SD
<b>Message Design.</b>		
- Clarity of Instructional objectives	3.65	1.08
- Accuracy of the content	4	.97
- Comprehension level of the programme	4.15	.93
- Interest level of concepts being presented	4	.86
- Density of content	4	.79
- Relevancy of visuals to content	4.05	.68
- Interest Level of visuals being presented	4.05	.78
- Comprehension level of narration	3.95	.99
- Pacing of the programme	4.10	.64
- Clarity of demonstration	4.21	.63

The overall means of message design variables of instructional television was 4.02. Figure 12 shows the bar graph of subjects' mean ratings.

Figure 12.

Bar graph of means of message design factors.



### Content Organization.

Table 7 shows the means and standard deviations of the content organization factors.

TABLE 7

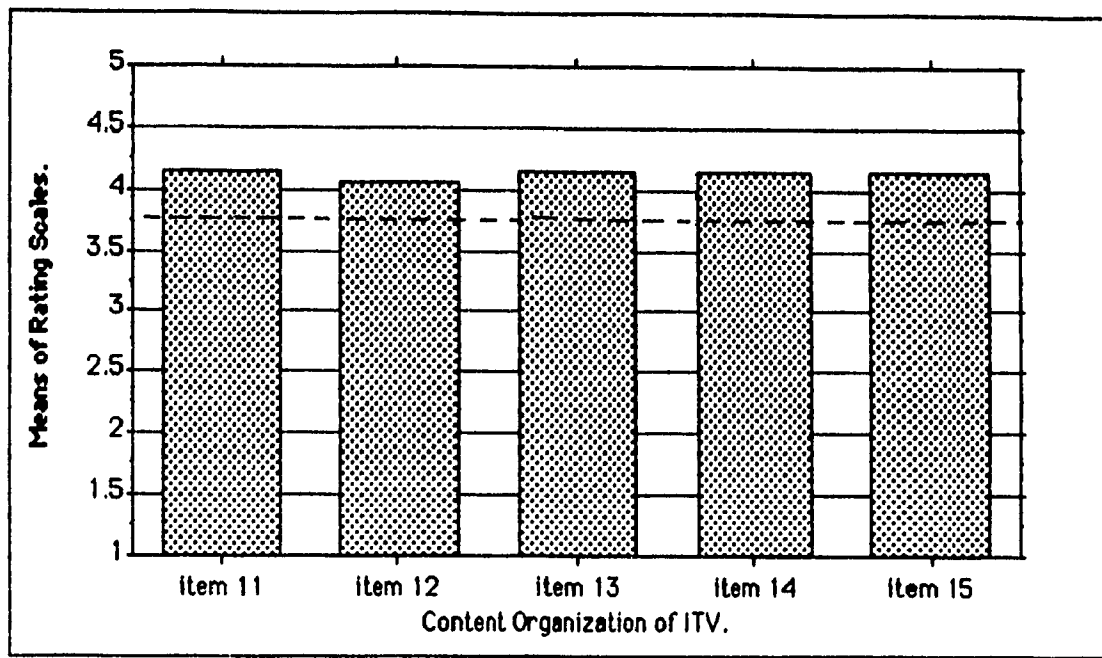
Means and Standard Deviations of 5 Point Likert-Scale for the Content Organization Factors

Production Variables.	$\bar{X}$	SD
<b><u>Content Organization.</u></b>		
- Interrelationship of concepts being presented	4.15	.59
- Interrelationship of narration and visuals	4.05	.62
- Systematic design of programme structure	4.15	.49
- Comprehension level of programme structure	4.15	.74
- Frequency of concept repetition	4.15	.67

The overall means of content organization of the instructional television programme was 4.13. Figure 13 shows the bar graph of subjects' mean ratings.

Figure 13.

Bar graph of means of content organization factors.



### Technical Quality.

Table 8 Shows means and standard deviations of the technical quality factors.

TABLE 8

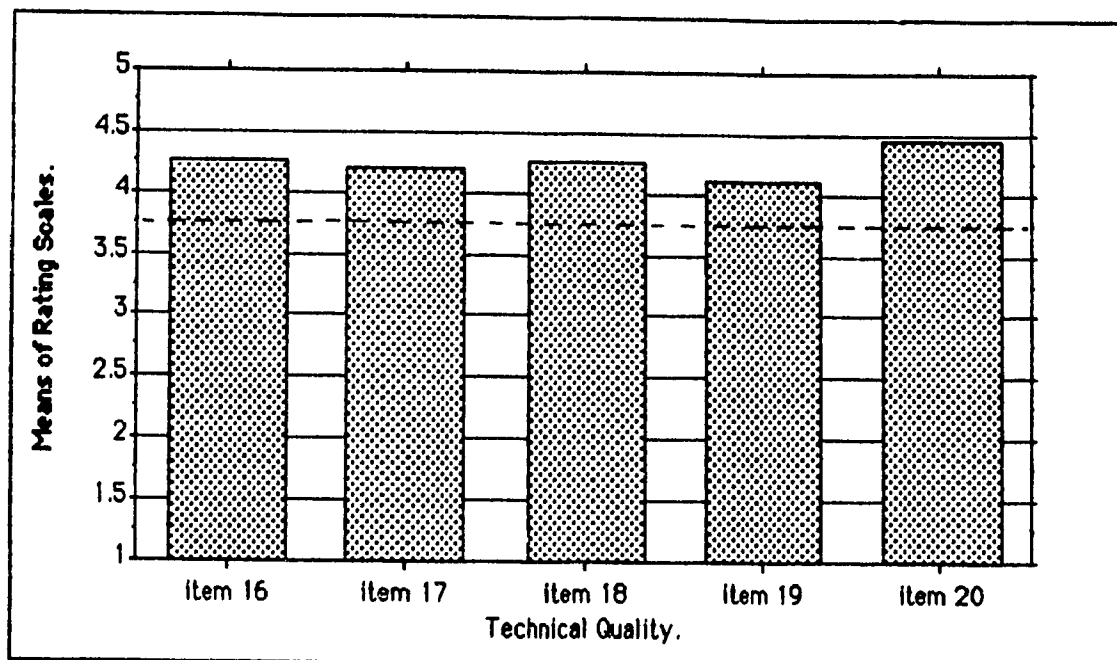
Means and Standard Deviations of 5 point Likert-Scale for the Technical Quality Factors

Production Variables	$\bar{X}$	SD
<b><u>Technical Quality.</u></b>		
- Clarity of pictures	4.25	.63
- Clarity of colour	4.20	.79
- Clarity of narration	4.25	.63
- Clarity of graphic illustrations	4.10	.71
- Clarity of visuals	4.45	.51

The overall means of technical quality of the instructional television programme was 4.25. Figure 14 shows the bar graph of subjects' mean ratings on the technical quality factors.

Figure 14.

Bar graph of means of technical quality factors.

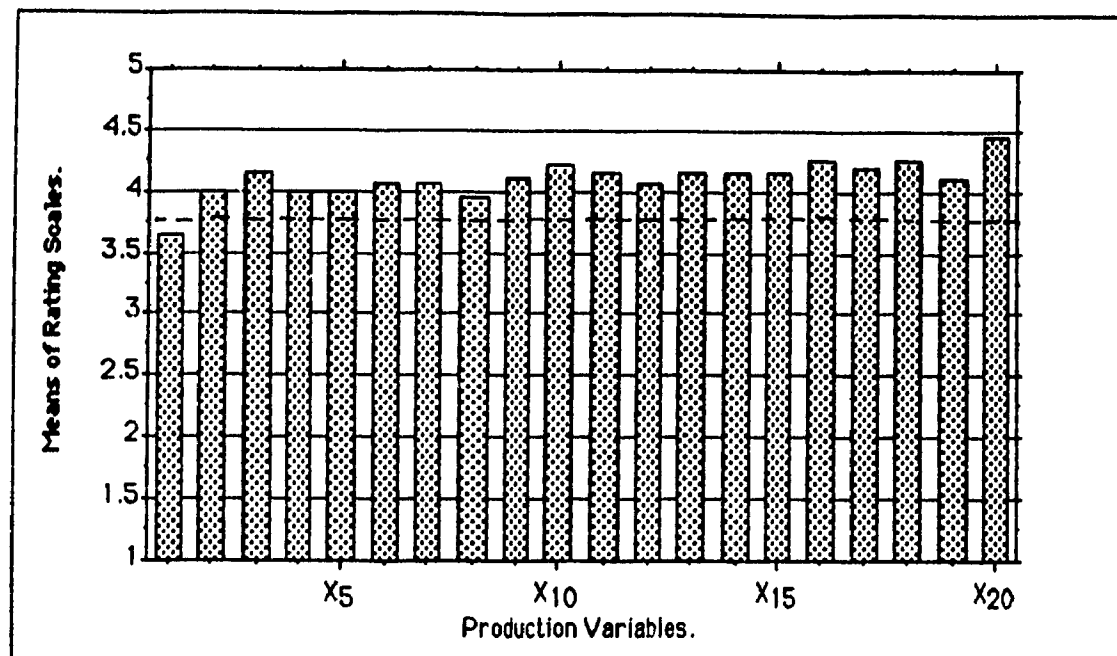


### Overall Mean Ratings on Production Variables.

Figure 15 shows the bar graph of overall means of subjects' rating on all production variables of the ITV programme including its message design, content organization and technical qualities.

Figure 15.

Bar graph of total production variables.



## Chapter VI

### CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS.

The purpose of this thesis was to produce and evaluate an instructional television programme on environmental pollution. Cognitive achievement and subjects' ratings of the production variables were analyzed in the study. The conclusions and discussion which follow are organized around the two main foci of the evaluation.

#### Conclusions.

##### **Cognitive Achievement.**

The salient demographic variables of the sample of the target population namely profession (teacher and non-teacher), sex ( male and female) and age (older and younger) were analyzed in order to determine their effects on cognitive achievement. It was found in this study that :

- The overall mean of subjects' posttest scores ( $\bar{X}=31.70$ ) was significantly higher ( $p<.05$ ) than the mean of their pretest scores ( $\bar{X}=23.0$ ).
- There were significant differences ( $p<.05$ ) between pretest and posttest scores of both teachers and non-teachers. Non-teacher



subjects, however, had significantly higher gain scores ( $p < .05$ ) than teachers.

- Both male and female subjects had significantly higher posttest than pretest scores ( $p < .05$ ). However, there was no significant difference in gain scores between male and female subjects, even though female scores were slightly higher. This finding is consistent with the conclusion drawn from Dwyer's study (1972). He noted that both male and female subjects learn equally well from identical types of visual presentations.
- There were significant differences ( $p < .05$ ) between pre and posttest scores for both older (above 30) and younger (below 30) subjects. But, younger subjects had significantly higher gain scores ( $p < .05$ ) than older subjects.
- The instructional television programme achieved the predetermined standard of cognitive achievement (C R O). Eighty five per cent of the sample achieved 75 per cent of the content objectives of the programme.

### **Production Variables.**

The means of the 5 point-Likert-scale were higher than the predetermined critical levels ( $\bar{X} > 3.75$ ). This indicates that the sample had

a positive attitude towards the instructional television programme on environmental pollution. Caution should be exercised, however, in assuming that all students had a highly positive response since the Likert scales were not randomly assigned to positive or negative directional polarity.

Based on this analysis, the study reached the conclusion that the instructional television programme on environmental pollution was highly effective and had a significant impact on the sample of the target population in terms of cognitive acquisition and ratings with regard to production variables.

### Discussion.

The significance difference in gain scores between teacher and non-teacher subjects was primarily due to the pretest scores of teachers. In this respect, the means of teachers' pretest scores were higher than non - teachers'. It can therefore be concluded that the teachers had higher entering knowledge of the topic than non-teacher subjects, even though none had yet taken the environmental pollution course. Most of them are chemistry teachers in the high school. The finding that non-teachers had a higher gain score indicates that they were very interested in the topic of

the programme. And both teacher and non-teacher subjects achieved significant differences between pretest and posttest scores.

There was no significant difference in gain scores between male and female subjects, even though female subjects were slightly higher than male. This finding indicates that the programme had no impact on gender per se. Both male and female subjects gained equally from the instructional television programme. And both sexes had a significant difference in scores between pretest and posttest.

The analysis also revealed that there was a significant difference in gain scores between older and younger subjects with the difference favouring younger subjects. This finding might be related to the previous finding on the subjects' profession and to the ages of teacher and non-teacher subjects. Most of the teachers in this study were older than non-teacher subjects.

The analysis of 5 point Likert-scale indicates that regardless of demographic segmentation, the sample had a positive attitude towards the message design, content organization and technical qualities of the programme.

### Recommendations.

The following recommendations are offered for further development of using instructional television in The Indonesia Open Learning University (Universitas Terbuka).

1. The production of instructional television programmes must be focused and designed for specific target audiences. This will facilitate the process evaluation of the programme.
2. The practice of formative evaluation of instructional television programmes should be continued in order to make them more effective in delivering instructional material to students. The evaluation of the programme should include its effects on students' cognitive achievement and attitudes towards the production variables including message design, content organization and technical quality.
3. The sample of the target population should be large enough and representative of the students who use the programme. The demographic characteristics of the sample of the target population should be made more extensive so that the effects of instructional television on various characteristics of students can be assessed.
4. Testing of different message design formats and content organization should be applied in order to make the programmes more effective

in delivering instructional materials.

5. Based on the current observations, an item analysis revealed that items 3, 21, 32 should be reformulated. And the content areas of the ITV programme relating to items 4, 6, 17, 36, 38 should either be re-shot or have more material added to bolster the information acquisition. Try out of cognitive test instruments is recommended in order to make them better attuned for measuring audiences' cognitive achievement. As well, the instrument for assessing the production variables should be made standard in order to make comprehensive analyses of the programmes for Universitas Terbuka.
6. The formative evaluation of an instructional television programme should involve : the students, subject matter experts and the producers of the programme. These components should work collaboratively to produce effective instructional television programmes.

In summary, this study has demonstrated the considerable value of evaluating prototype television programmes. It is to be hoped that it might serve as a model for future development of television support of materials produced at Universitas Terbuka.

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**APPENDIX A**  
**Summary of Responses to Production Variables**  
**Questionnaire of Instructional Television**  
**(ITV).**

1. The objectives of the programme were clear.

Strongly agree	7 (35 %)
Agree	10 (50 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

2. The content of the programme was related to its objectives.

Strongly agree	9 (45 %)
Agree	9 (45 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0

3. The programme was understandable.

Strongly agree	8 (40 %)
Agree	9 (45 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

4. The concepts presented in the programme were interesting.

Strongly agree	7 (35 %)
Agree	10 (50 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

5. The content presented in the programme was very dense.

Strongly agree	7 (35 %)
Agree	11 (55 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0

6. The visuals of the programme were relevant to its content.

Strongly agree	7 (35 %)
Agree	10 (50 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

**7. The visuals of the programme were interesting.**

Strongly agree	4 (20 %)
Agree	12 (60 %)
Neutral	4 (20 %)
Disagree	0
Strongly disagree	0

**8. The narration of the programme was understandable.**

Strongly agree	3 (15 %)
Agree	14 (70 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

**9. The pace of the programme was moderate.**

Strongly Agree	10 (50 %)
Agree	7 (35 %)
Neutral	0
Disagree	0
Strongly disagree	2 (10 %)

10. The concepts demonstrated in the programme were clear.

Strongly agree	6 (30 %)
Agree	10 (50 %)
Neutral	3 (15 %)
Disagree	1 (5 %)
Strongly disagree	0

11. The concepts presented in the programme were interrelated.

Strongly agree	7 (35 %)
Agree	10 (50 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0

12. The narration and visuals of the programme were interrelated.

Strongly agree	5 (25 %)
Agree	12 (60 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

13. The structure of the programme was systematic.

Strongly agree	7 (25 %)
Agree	8 (40 %)
Neutral	4 (20 %)
Disagree	0
Strongly disagree	0

14. The structure of the programme was understandable.

Strongly agree	7 (35 %)
Agree	19 (45 %)
Neutral	4 (20 %)
Disagree	0
Strongly disagree	0

15. The concept repetitions within the programme were moderate.

Strongly agree	6 (30 %)
Agree	10 (50 %)
Neutral	4 (20 %)
Disagree	0
Strongly disagree	0

16. The picture quality of the programme was clear.

Strongly agree	6 (30 %)
Agree	11 (60 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0

17. The colour quality of the programme was clear.

Strongly agree	7 (35 %)
Agree	11 (55 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0

18. The narration of the programme was clear.

Strongly agree	7 (35 %)
Agree	11 (55 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0

19. The graphic illustrations of the programme were clear.

Strongly agree	6 (30 %)
Agree	11 (55 %)
Neutral	3 (15 %)
Disagree	0
Strongly disagree	0

20. The visual illustrations of the programme were clear.

Strongly agree	6 (30 %)
Agree	12 (60 %)
Neutral	2 (10 %)
Disagree	0
Strongly disagree	0



**APPENDIX B**  
**Questionnaires Regarding Production Variables of**  
**Instructional Television (ITV).**

PLEASE SHOW HOW YOU FEEL ABOUT THE INSTRUCTIONAL TV PROGRAMME THAT YOU HAVE WATCHED BY CIRCLING ONE OF THE SCALES BELOW THE STATEMENTS. THE FOLLOWING ARE THE MEANINGS OF THE NUMBER ON THE SCALE.

- 5 : Strongly agree
  - 4 : Agree
  - 3 : Neutral
  - 2 : Disagree
  - 1 : Strongly disagree
- 

**Example 1.**

The objectives of the instructional TV programme were clear.

Strongly disagree   1       2       3       4       5   Strongly agree

If you agree with the above statement you will circle 4 on the scale.

**Example 2.**

The Instructional TV programme was very interesting.

Strongly disagree   1       2       3       4       5   Strongly agree

If you disagree with the above statement you will circle 2 on the scale.

**BEFORE YOU START PLEASE FILL IN THE INFORMATION AS BELOW:**

- The last four digits of your student card :.....
- Sex : Male (       ) Female (       )
- Profession : Teacher (       ) Non-Teacher (       )
- Age : .....yrs.

1. The objectives of the programme were clear.

Strongly disagree 1      2      3      4      5 Strongly agree

2. The content of the programme was related to its objectives.

Strongly disagree 1      2      3      4      5 Strongly agree

3. The programme was understandable.

Strongly disagree 1      2      3      4      5 Strongly agree

4. The concepts presented in the programme were interesting.

Strongly disagree 1      2      3      4      5 Strongly agree

5. The content presented in the programme was very dense.

Strongly disagree 1      2      3      4      5 Strongly agree

6. The visuals of the programme were relevant to its content.

Strongly disagree 1      2      3      4      5 Strongly agree

7. The visuals of the programme were interesting.

Strongly disagree 1      2      3      4      5 Strongly agree

8. The narration of the programme was understandable.

Strongly disagree 1      2      3      4      5 Strongly agree

9. The pace of the programme was moderate.

Strongly disagree 1      2      3      4      5 Strongly agree

10. The concept demonstration of the programme was clear.

Strongly disagree 1      2      3      4      5 Strongly agree

11. The concepts presented in the programme were interrelated.

Strongly disagree 1      2      3      4      5 Strongly agree

12. The narration and visuals of the programme were interrelated.

Strongly disagree 1      2      3      4      5 Strongly agree

13. The structure of the programme was systematic.

Strongly disagree 1      2      3      4      5 Strongly agree

14. The structure of the programme was understandable.

Strongly disagree 1      2      3      4      5 Strongly agree

15. The concept repetition within the programme was moderate.

Strongly disagree 1      2      3      4      5 Strongly agree

16. The picture quality of the programme was clear.

Strongly disagree 1      2      3      4      5 Strongly agree

17. The colour quality of the programme was clear.

Strongly disagree 1      2      3      4      5 Strongly agree

18. The narration of the programme was clear.

Strongly disagree 1      2      3      4      5 Strongly agree

19. The graphic illustrations of the programme were clear.

Strongly disagree 1      2      3      4      5 Strongly agree

20. The visual illustrations of the programme were clear.

Strongly disagree 1      2      3      4      5 Strongly agree

## **APPENDIX C**

### **Cognitive Test Instrument.**

Dear students,

We would like to ask you several questions about the programme that you have watched. We simply want to know how much you have learned from this programme. Before you start please fill in the information as below :

- The last four digits of your student card :.....
- Profession : Teacher (        ), Non-Teacher (        )
- Sex : Male (        ), Female (        )
- Age :.....yrs.

PLEASE CIRCLE T IF THE STATEMENTS BELOW ARE TRUE AND CIRCLE F IF THEY ARE FALSE.

-----

1. T - F Atmosphere, hydrosphere and lithosphere constitute physical media in which chemical elements can be found.
2. T - F All chemical elements in our environment can be classified as gas, liquid and solid.
3. T - F Water, carbondioxide and nitrogen can be classified as organic compounds.
4. T - F Proteins, fat, carbohydrates and vitamins can be classified as anorganic compounds.
5. T - F Fe, Ca, P, S and Al are needed in the large amounts by human beings.
6. T - F Human beings need limited amounts of oxygen and hydrogen for their life.
7. T - F Environmental pollution is not caused by changing of life cycle.
8. T - F The form of chemical elements is changed in a life cycle process.
9. T - F A photosynthesis process transfers mechanical energy into chemical energy.



10. T - F Environmental pollution can be classified as soil, water and air pollution.
11. T - F Pesticides must be used properly to prevent soil pollution.
12. T - F Soil will be more fertile, if we use fertilizer excessively.
13. T - F Plastics and aluminium can be decomposed easily by decomposer bacteria.
14. T - F Indicator paper can be used to determine soil acidity.
15. T - F The scales on indicator paper will indicate above 7 for the high acid soil.
16. T - F The scales on indicator paper will indicate below 7 for the low acid soil.
17. T - F The scales on indicator paper will indicate 7 for neutral soil.
18. T - F The excessive use of a fertilizer will be harmful plants.
19. T - F Macronutrients in soil are available in a limited amount.
20. T - F Hydrocarbon compounds and nitrogen oxide will cause eye and respiratory irritation.
21. T - F Industrial pollution consists of  $\text{H}_2\text{S}$ ,  $\text{NH}_3$ , and  $\text{CH}_4$ .
22. T - F Detergen Pollution can not be decomposed by green algae.
23. T - F Environmental pollution is frequently caused by the excess of human activities.

24. T - F Factors causing environmental pollution are interrelated.
25. T - F The function of the ozone layer is to prevent the harmful effects of ultraviolet lights.
26. T - F Only governmental institutions are responsible for preventing environmental pollution.
27. T - F The role of human beings is important to prevent environmental pollution.
28. T - F Aluminium cans and plastic litter can be recycled to be useful goods.
29. T - F One of the methods to prevent environmental pollution is recycling.
30. T - F High population growth will influence environmental pollution.

PLEASE CHECK WHICH OF THE STATEMENTS GIVEN BELOW IS CORRECT BY PLACING A CIRCLE AROUND THE APPROPRIATE LETTER.

31. Chemical elements which are needed as much as possible are :

- A. Calcium.
- B. Magnesium.
- C. Oxygen and hydrogen.
- D. Ferrum.

32. Which of the following chemical elements can be classified as

organic compounds :

- A. Water,
- B. Proteins.
- C. Fat.
- D. Vitamin.

33. Environmental pollution is caused by :

- A. A transfer process of chemical into mechanical energy.
- B. A change of structure and function of life cycle.
- C. A stable life cycle in the environment.
- D. A change in chemical compounds.

34. In the photosynthesis process :

- A. Sunlight is transfered into mechanical energy.
- B. Chemical energy is transfered into mechanical energy.
- C. Sunlight is transfered into chemical energy.
- D. Mechanical energy is transfered into chemical energy.

35. Litter that can not be decomposed is :

- A. Paper.
- B. Alumunium cans and plastic.
- C. Rubber.
- D. Cartons.

36. High acid soil will damage :

- A. Soil plasms.
- B. Decomposer bacteria.
- C. Plants.
- D. Soil structure.

37. Leakage of the ozon layer is caused by :

- A. The excessive use of pesticides.
- B. Industrial pollution.
- C. Aerosol and freon-12.
- D. Deforestation.

38. The following chemical element that can cause environmental pollution is:

- A. Carbon monoxide.
- B. Sulfur dioxide.
- C. Carbon dioxide.
- D. Nitrogen dioxide.

39. The pollution of carbon monoxide can be classified as :

- A. Water pollution.
- B. Air pollution.
- C. Soil pollution.
- D. Sea pollution.

40. The factor that is not considered as the primary cause of environmental pollution is :

- A. High population growth rate.
- B. Increasing capital income of people.
- C. Recycling process.
- D. The use of technology for daily life.

## **APPENDIX D**

### **SCRIPT.**

**THE SCRIPT OF AN INSTRUCTIONAL TELEVISION  
PROGRAMME ON ENVIRONMENTAL POLLUTION**

**By:**

**R. Benny A. Pribadi**

**The Education Faculty of  
The Indonesia Open Learning University  
Jakarta, 1989.**

## VIDEO

## AUDIO

CLOSE UP CAPTION

MUSIC (FADE IN).

UNIVERSITAS TERBUKA PRESENTS:

BEAUTIFUL PART OF A CITY PARK  
IN JAKARTA SUPERIMPOSED BY  
FOLLOWING TITLES;  
ENVIRONMENTAL POLLUTION.

MUSIC.

PROGRAM OF STUDY: CHEMISTRY.

MUSIC.

SCRIPT WRITER :

MUSIC (FADE OUT).

BENNY A. PRIBADI.

J.R.E. KALIGIS.

PRESENTER.

Hello ?

Today we will discuss the  
problems of environmental  
pollution. Recently,  
environmental pollution is  
considered as an interesting  
problem to be discussed.



**VIDEO**

MONTAGE SHOTS SHOW TRAFFIC JAM AND SMOKE COMING FROM CAR AND INDUSTRY, AND PEOPLE IN LINE WAITING FOR PUBLIC TRANSPORTATION.

**PRESENTER**

CLOSE UP A LADY USING DETERGENT FOR WASHING CLOTHES SUPERIMPOSED BY CAPTION OBJECTIVE # 1.

SMOKE FROM CAR AND INDUSTRY SUPERIMPOSED BY CAPTION OBJECTIVE # 2.

DESIGNATED AREA FOR GARBAGE AND LITTER SUPERIMPOSED BY CAPTION OBJECTIVE # 3.

**AUDIO**

As we know, there are many factors that cause environmental pollution. These factors are; industry, economics and human factors. These factors are interrelated with each other.

There are five important points that will be discussed in this programme. These are :

The use of chemical products in daily life (OBJECTIVE 1).

The definition and types of environmental pollution (OBJECTIVE 2).

Factors causing environmental pollution (OBJECTIVE 3).

**VIDEO**

GARBAGE ACCUMULATES IN AN  
OPEN AREA SUPERIMPOSED BY  
CAPTION OBJECTIVE # 4.

RECYCLING PROCESS DONE BY  
PEOPLE SUPERIMPOSED BY  
CAPTION OBJECTIVE # 5.

CU PEOPLE USING DETERGENT FOR  
WASHING THEIR CLOTHES  
SUPERIMPOSE CAPTION :  
ATMOSPHERE, HYDROSPHERE AND  
LITHOSPHERE.

CAPTION OF DIFFERENT FORMS OF  
CHEMICAL ELEMENTS.

PRESENTER

**AUDIO**

The effect of environmental  
pollution (OBJECTIVE 4).

Methods for preventing  
environmental pollution  
(OBJECTIVE 5).

We know that people need  
chemical elements for daily  
life. These chemical elements  
can be found in the air or  
atmosphere, water or  
hydrosphere and soil or  
lithosphere.

The chemical elements are used  
in different forms such as gas,  
liquid and solid.

Chemical elements can be  
classified into organic and  
anorganic compounds and metals.

## VIDEO

CAPTION OF EXAMPLE OF  
INORGANIC AND ORGANIC  
COMPOUNDS.

CAPTION OF ESSENTIAL  
SUBSTANCE OF METALS SUCH AS:  
C, M, P, S and A.

PEOPLE USE WATER AND OXYGEN  
FOR THEIR LIFE (DRINKING,  
BREATHING ETC).

## AUDIO

The examples of the anorganic compound are: water, carbon dioxide, and nitrogen. Protein, Fat, carbohydrate and vitamins are classified into organic compounds.

Another chemical element is metal. Metal is useful for our life. It can be found in different form such as: calcium, magnesium, phosphorus, sulphur and alumunium.

Some of the chemical elements are useful and other are poisonous. Hydrogen and oxygen are useful for us. They are essential to our life. Mercury, sulphur dioxide and carbon monoxide are harmful to us.

**VIDEO**

PEOPLE USE FERTILIZER TO GROW  
PLANTS.

GARBAGE OF NON-RECYCLABLE  
MATERIALS SUCH AS PLASTICS  
AND ALLUMINIUM ACCUMULATE IN  
CERTAIN PLACE.

TRAFFIC JAM AND PEOPLE  
THROWING LITTER IN A PUBLIC  
PLACE.

**AUDIO**

There are certain chemical  
elements that can only be used  
in limited quantity. These are:  
nitrogen, phosphorus and  
sulphur.

To meet their needs people can  
modify their environment.  
Frequently modification of the  
environment leads to the  
environmental pollution.

In a modern society like ours,  
there are many human behaviour  
and activities that cause the  
problem of environmental  
pollution.

**VIDEO**

INFERTILE AREA WHERE THERE  
ARE NO PLANTS AND LIVING  
THINGS.

PRESENTER.

ANIMATION OF PHOTOSYNTHESIS  
PROCESS.

**AUDIO**

The problems of environmental pollution occur if natural life cycles within it are changed. The structure and equilibrium of the environment will be destroyed if people intentionally change these life cycles.

There is a transfer process of chemical elements within the natural life cycles.

For example, in a process of photosynthesis. The sun which functions as the source of energy is transferred into chemical energy in the form of foods. People, then, transfer the chemical into mechanical energy in the form of work.

**VIDEO**

**PRESENTER.**

**CAPTION      DEFINITION      OF  
ENVIRONMENTAL POLLUTION.**

**PRESENTER.**

**CAPTION TYPES OF POLLUTION.**

**AUDIO**

Now, we are talking about definition of environmental pollution. What is environmental pollution ?

Environmental pollution can be defined as a condition in which a certain amount of chemical elements change the structure and the function of natural life cycles so that they can be harmful to human life.

In this programme, we only discuss the environmental pollution which is caused by chemical elements.

Environmental pollution can be classified into; soil pollution, air pollution and water pollution.

**VIDEO**

**PRESENTER.**

**PERSON WHO THROWS LITTER FROM  
HIS CAR. CLOSE UP LITTER  
WHICH IS THROWN BY HIM.**

**A GIRL USES FERTILIZER TO  
GROW PLANTS IN HER GARDEN.**

**AUDIO**

How does the soil pollution occur? We are talking about soil pollution and its example in the following discussion.

Look ! This behaviour will cause soil pollution. The litter which is thrown by him can not be decomposed by decomposer bacteria. Those plastics and alumunium cans will cause soil pollution.

The excessive use of fertilizer will also create soil pollution. It is true that improper use of fertilizer by farmer will change the acidity level of soil.

**VIDEO****AUDIO**

**PRESENTER.**

How do we know the acidity level of soil ? The following experiment will show you the way to examine the acidity level of soil.

**A STUDENT AND AN INSTRUCTOR  
DO AN EXPERIMENT IN LAB.**

How do we know the acidity level of soil ?

**INSTRUCTOR.**

To examine the acidity level of soil, we have to do a simple experiment. First of all, we should mix this soil with pure water. Then, put the result in a reaction tube. After that, by dipping indicator paper into the mixed water you will know the acidity level of that soil.

**STUDENT.**

Can we know that the use of a certain fertilizer will change the acidity level of soil ?



## VIDEO

## AUDIO

INSTRUCTOR    EXPLAINS    THE  
EXPERIMENT TO STUDENT.

Yes we can. By doing the same experiment we can detect the effect of using fertilizer to acidity level of soil. For example, urea will make the acidity level of soil become low. And conversely, phosphate, will make it high.

INSTRUCTOR    CONTINUES    TO  
EXPLAIN THE EXPERIMENT.

The acidity level of soil can be detected by using indicator paper. The scales on the indicator paper will show above 7 for the high acid soil. And conversely, they will show below 7 for the low acid soil.

STUDENT.

What about the neutral soil ?

INSTRUCTOR.

For the neutral soil the indicator paper will show 7.

**VIDEO**

**PRESENTER.**

**MONTAGE SHOT OF PLANTS AND  
FLOWERS IN A GARDEN.**

**PRESENTER.**

**AUDIO**

Based on this experiment, we can conclude that fertilizer must be used properly to prevent soil pollution. We have the proof that high or low acidity level will be harmful to every plant that we want to grow.

Another factor that causes soil pollution is macronutrients which are available in soil. Every plant needs macronutrients, but only in correct amount. The excess of macronutrients will be harmful to the plants.

We have discussed the soil pollution. Now, we are discussing air pollution. Do you know how the air will be polluted ?

**VIDEO**

A MAN HAS TROUBLE WITH HIS  
EYES DUE TO AIR POLLUTION.

MONTAGE SHOT OF UNHEALTHY  
FOLIAGE ON A TREE.

CAPTION CHEMICAL ELEMENTS  
CAUSING AIR POLLUTION.

**AUDIO**

Hydrocarbons and nitrogen oxide  
in the air will cause  
pollution. They can cause  
irritation to the eyes and also  
disturbances in the respiratory  
system.

Air pollution will also affect  
the process of photosynthesis.  
It will prevent the energy  
coming from the sun to the  
foliage.

The chemical elements that  
cause chemical pollution are;  
carbon monoxide (CO), sulphur  
dioxide (SO<sub>2</sub>), and nitrogen  
oxide (NO<sub>x</sub>).

**VIDEO**

CHIMNEYS OF AN INDUSTRY AND  
CARS WHICH CAUSE BLACK SMOKE  
TO RISE.

PRESENTER.

A SMALL RIVER WHICH IS  
POLLUTED BY PLASTIC AND  
ALUMINIUM CANS.

CAPTION FACTORS CAUSING WATER  
POLLUTION.

**AUDIO**

Carbon monoxide is produced by cars while sulphur dioxide is produced by certain industries. These chemical elements will rise to the atmosphere and return to the earth in the form of acid rain. This kind of rain will damage the ecosystem on the earth.

How about water pollution ?

Water will be polluted if human activities change physical, biological, and aesthetical nature of water.

Frequently, water pollution is caused by the excessive use of chemicals at homes and industries.

**VIDEO**

A SMALL RIVER POLLUTED BY  
WASTES COMING FROM INDUSTRIAL  
AREA.

DETERGENT POLLUTANT GOES FROM  
HOMES TO SMALL RIVER.

A FARMER USING PESTICIDE IN A  
PADDY FIELD IN A SUBURBAN  
AREA.

PRESENTER.

**AUDIO**

Water pollution which is caused by a certain industry consists of sulphur and nitrogen. Bacteria will decompose these elements to be  $H_2S$ ,  $NH_3$  and  $CH_4$ . These elements will be poisonous if they mix with certain metals.

The excessive use of detergent is another example of factor causing water pollution. Detergents can only be decomposed by green algae.

The use of pesticide will also cause water pollution. Pesticides will mix with water. This polluted water, of course, will be harmful to all life forms.

What factors that can be considered as the causes of environmental pollution ?

**VIDEO**

MONTAGE SHOT OF PEOPLE USING  
PUBLIC TRANSPORTATION,  
TRAFFIC JAM, SMOKE COMING  
FROM INDUSTRIES, CARS ETC.

CAPTION FACTORS CAUSING  
ENVIRONMENTAL POLLUTION.

MONTAGE SHOT OF HOUSING AREA  
AND PUBLIC MARKET WHERE THE  
POPULATION IS VERY DENSE.

PEOPLE ACTIVITIES IN AN  
INDUSTRY. MONTAGE SHOT OF ITS  
PRODUCTS AND ALSO ITS WASTES.

**AUDIO**

There are five factors that can  
be considered as the causes of  
environmental pollution. These  
constitute the excess of  
people's activities. These  
factors are:

- Industry.
- Urbanization.
- Population density.
- Life style.
- Economic development.

All of these factors are  
interrelated. For example,  
population density will cause  
an increased need for food,  
housing and transportation.

To meet their needs for daily  
living people have to increase  
their production or industry.  
As a consequence this excess  
results in environmental  
problems such pollution.

**VIDEO**

MONTAGE SHOT OF PEOPLE  
DRIVING CARS AND USE PUBLIC  
TRANSPORTATION. THEY FILL  
GAS.

PRESENTER.

COUNTRYSIDE AREA WHICH HAS  
CLEAN AND HEALTHY ENVIRONMENT  
DISSOLVE TO A BIG CITY IN  
WHICH PEOPLE ARE BUSY DOING  
THEIR BUSINESS.

PRESENTER.

MONTAGE SHOT OF RAIN FOREST  
FROM LONG SHOT TO CLOSE UP.

**AUDIO**

The increase of travel and  
mobility has resulted in gas  
consumption. The excessive  
use of gas will create  
environmental pollution.

Could you differentiate between  
life in a countryside and life  
in a big city? It is different  
within a big city, living in a  
countryside is healthier due to  
less population. In general, a  
big city has more population  
than a countryside.

Another factor that causes  
environmental problems is  
deforestation.

Deforestation to create an area  
for housing can bring about  
floods and soil erosions.

**VIDEO**

THE SUNLIGHT COMING FROM  
TREES IN A RAIN FOREST.

ALLUMINIUM CANS, PLASTIC BAGS  
ACCUMULATE IN A GARBAGE  
CONTAINER.

PRESENTER.

**AUDIO**

Forests have an important  
function for us. They protect  
us from drought.

Modern life style can also  
cause environmental problems.  
People tend to use non-  
recyclable materials such as  
plastics and aluminium  
containers. These will  
accumulate on earth and will  
not be broken down.

From these illustrations, we  
have seen that population  
density, urbanization,  
Industry, life style and  
economic development are  
interrelated factors  
contributing to environmental  
pollution.



**VIDEO**

PRESENTER.

MONTAGE SHOT OF PEOPLE  
CLEANING A PUBLIC PARK.  
CAMERA SHOWS EVERY BEAUTIFUL  
PART OF THAT PARK.

PRESENTER.

SHOT OF A MAN WHO USES  
FERTILIZER WITH DIRECTIONS TO  
PREVENT SOIL POLLUTION.

**AUDIO**

What should people do to overcome environmental pollution? People have important roles to play in preventing and overcoming the problems in their environment. People have the ability to modify their environment so that the pollution can be minimized.

There are many actions that people can take to solve these environmental problems. These are simple actions.

People have to use fertilizer based on directions. They also have to minimize the use of gas by pooling their resources. For example, they can use public transportation, walking etc.

**VIDEO**

A CHILD THROWING GARBAGE INTO  
A DESIGNATED AREA IN A PARK.  
CLOSE UP OF PLASTIC GARBAGE.

CLOSE UP OF CHIMNEYS OF AN  
INDUSTRY CUT TO INDUSTRIAL  
WASTES THAT GO TO THE RIVER.

PEOPLE DO SIMPLE RECYCLING  
PROCESS.

**AUDIO**

Throw garbage and litter in the  
designated places. Do not use  
non-recyclable materials such  
as allumunium and plastic  
containers.

Industries should provide  
disposal for their wastes. For  
example, they have to build  
special places for their  
wastes. They must neutralize  
their waste so that it has  
minimum effects on human.

The practices of recycling must  
be applied to overcome  
environmental pollution. Use  
only recyclable materials so  
that they can be re-used.

**VIDEO**

**PRESENTER CLOSES THE  
PROGRAMME.**

**AUDIO**

Today, we have discussed an interesting topic - environmental pollution - which looks at the problems, effects and also solutions. I hope you have gained a better understanding of your environment. See you in the next programme. (MUSIC FADE IN - FADE OUT).

**FADE TO BLACK.**