A RATIONAL APPROACH TO

THE DEVELOPMENT OF

ETV MATERIALS

by

Jorge Landa Portilla

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ABSTRACT

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Following the identified task of an Educational Technologist
of developing methodologies for the practical application of
scientific principles and procedures for approaching educational
tasks, a model for the development of educational television
materials or programmes is developed in this thesis. The basic
premise of the model is that the process of ETV development
involves taking numerous decisions during the design and production
stages, and that information can guide the taking of proper
decisions oriented towards the achievement of educational goals.
The information for these decisions can be obtained (a) through the
methodological analysis of the "ingredients" of TV programmes in
light of the educationally-relevant aspects identified by
scientific studies in the field of educational television and (b)
through proper "scientific" evaluation studies. The model includes
four basic components, two information-gathering oriented: Analysis,
and Evaluation, and two decision-making oriented: Design and
Production. Each component is integrated by a number of
subcomponents and aspects. The subcomponents and aspects respond to
trends in the literature of educational uses of television. While
the inclusion of Design, Production and Evaluation into models for
ETV development is not new, the insertion of an Analysis component
is. An integrated, practical approach to research and evaluation in
the context of ETV materials being is included too.

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I

would

like

to

thank

all

my

friends,

specially

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and

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(otherwise known as

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respectively)

To

Sofia Chantal,

my daughter,

who

is

the

living

expression

of

loving

and

hoping

(all children are a constant
reminder that hope is always
living among us sculpting
a place in reality for ideals,
of whom education is a true
representative)

and

who

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CHAPTER 1

INTRODUCTION

Television is a medium of communication that has been extensively used for educational purposes. With this educational utilization, it becomes immersed in the realm of what is Educational Technology.

The term "educational technology" has been used in many different instances and with different aims. One popular conception of it is the "product" or "hardware" approach that considers educational technology as the utilization of technological products or hardware (i.e. computers, television, slide-tape, etc.) for educational purposes. This conceptualization is quite limiting as to the role of educational technology. A wider conceptualization is that which considers this field within a more comprehensive understanding of the concept "technology" -the application of science to practical purposes- and has been known as the "process" or "software" approach. It envisions educational technology as the process of application of the sciences related to learning to practical situations, that is, to the solution of educational problems.

Considering educational technology from this second expanded view, we can conceive it as: a process of creatively

applying certain known and tested principles (science) to a
given practical purpose (Romisowski 1981).

In refering to the development of educational materials or
programs to be transmitted through television, we are speaking
of a practical purpose. If we consider the application of
science to this practical purpose, we are making full use of the
wider concept of educational technology when refering to the
educational applications of television.

Educational television can, then, benefit from both
approaches to the concept of educational technology. With the
first one it can be considered as a "product" or "hardware" that
can be used for educational reasons; with the second approach,
the "process" or "software", we can view the process of making
an educational television programme (or TV software) as an
application of science (known and tested principles) to a given
practical purpose that in the case is to solve educational
problems with materials transmitted through television.

Educational television programees are educational products
and the making or development of those products is an
educational process. Products and processes constitute the realm
of educational technology. The product part of a TV programme is
easily achieved by any type of TV material; the second aspect,
the "process", is more difficult to posses because it involves
the application of science principles...How can science
principles be applied to the process of developing or making a

television programee?

Romisowski (1981) suggests that educational technologists (the practitioners of educational technology) should develop and apply methods which are adequate to the educational purpose or problem under study. We can assume then that a technologist's application of science can be done through the development of practical methods.

In the case of an educational technologist interested in TV, one of his/her contributions should be to develop and apply methods (emerged from science) adequate to the purposes of making educational television programees. The making -or development- of educational television products can be considered as an educational process using methods for applying scientific principles to the use of television for the delivery of knowledge and the development of skills. (This conception of educational television development as an educational process will be expanded later).

Such is the aim of this thesis, to respond to the task of an educational technologist in developing and applying methods emerging from science to the practical purpose of making ETV materials.

The process of making a television program has traditionally been conceived only as a "creative" or artistic/craftmanship task. With a conception of the making of

television products also as an educational process, we can
approach the development of ETV materials both as creative or
artistic and educational or technological processes and
integrate the application of science to the creative practices
of TV producers and developers.

Now, what is really meant by an educational television
programme? On this matter there is a considerable degree of
confusion. It is commonly accepted that to educate implies a
process of helping someone -that who is being "educated"- to
achieve certain knowledge or skills goals or objectives through
certain means. Television can definitely be one of those means
and it has been widely shown that it can be an effective medium
for education, or more precisely, for delivering certain types
of knowledge, or helping to develop certain kinds of skills in
other words, it has proven itself as a good medium for helping
people learn something. Learning and education are terms
intimately related; without going into deeper concept analysis
it can be said that one implies the other. If a medium can aid
in promoting learning, it definitely has to do something with
education.

Casseneuve (1976) said that the very first premise for a
television product to be educational is that it has to have an
educational intention. The educational intention is definitely
an important asset but not the only one. This intention has to
be translated into more or less defined goals or objectives and,

in order to achieve those aims, the elements of the educational material (within itself and in its environment) have to be arranged in such a way as to help in reaching the initial goals or objectives. In other words, we are speaking of a process, of an educational process (as explained before).

This educational process, the process of making educational materials (in our case, making an educational television program) is an endeavour that can be better understood if it is conceived from a systems approach because it involves the arrangememt of the elements of the program itself and of its environment. This systems conception is another of the "methods" of the educational technologist to approach the question of education. According to Beishon and Peters (1976) a system is "a set of objects together with relationships between the objects and their attributes connected to each other and to their environment in such a manner as to form an entirety or whole" (p.12). Following this definition, educational television material can be considered as a system with objects and attributes that interacts with other systems in an environment.

Considering a television material as a system helps us to conceive of it as a set of elements with certain characteristics that integrete a single whole, which is deeply interrelated with its environment -for example the viewing situation- and with other systems -for example the school or the training center system. This systems view can also help us to understand the

making of Educational Television (or ETV) materials as a process, as a technological process, that, in order to be effective, has to arrange its elements following certain methods emerging from science or from practice. There are three basic considerations that have to be agreed upon when considering the making of a television material* as a technological process:

- First, that the arrangement or structuring of its elements' can be more effective, or more efficient, if it follows certain methodological procedures.

- Second, that the making of a television program does not mean only the technical steps needed for creating the physical parts of the product, (the technical procedures for recording, editing, etc.)

- Third, that the making of a television program involves the "creation" of something, and with such, artistic considerations are involved. Then, the making of a television program is both an artistic and a methodological activity involving methods emerging from certain sciences or disciplines.

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* Note: A television program can also be refered to as a television material, product or programme. In this thesis all these terms are used indistinctively, although the term "material" is favored because it can include: short TV spots, whole TV series, single TV programs and TV components of wider educational systems.

If these considerations are agreed upon, a methodological approach to the making of a television program can be searched.

This process of making an educational television material is perhaps better understood if the term "development" is used instead of "making"; the latter term connotes a more "creative" or artistic activity, and the term "development" implies an activity involving a process of structuring something through various stages. For this reason the term "development" will be used in this study. From an other point of view, the term "development" is more consistently used in the literature to refer to the processes of structuring educational materials.

The structuring or development of educational materials, although it can follow certain methodological roads, is still a human creative activity, and as such, it involves taking decisions all along the development process; decisions that are very important because, although it may sound simple to decide between one camera angle or another, it is a decision that a producer might take that can affect the psychological functions of the audience, and, maybe, the achievement of the goals of the program.

So, the educational processes promoted by educational television products, or more specifically, the processes of knowledge or skills development of an audience in interaction with television materials, are affected, or even shaped by the

decisions taken by the producers or developers of the products during the developmental processes. These desicions are of various natures, not only logistical and economical but also regarding the content of the programs, the strategies followed for presenting the subject matter, the use of specific production features, the symbolic codes emphasized. etc, etc. If, as mentioned before, the intentions of the producer of an educational program are educational or instructional, the decisions that he must take should be in one way or another oriented towards facilitating the learning processes involved in the interaction learner-TV message so as to accomplish his purposes.

Decision making is facilitated usually with adequate information. If one can have an accurate idea of the effects that specific options might have then the selection of alternatives aimed towards reaching one's goal is eased. The same is the case of an ETV developer or producer, if he can have adequate and accurate information regarding the possible instructional effects of some production options, then he can select better alternatives to achieve his instructional aims. Most of the instructional decisions that a producer-developer must take are those concerning the design (or planning) and production of TV materials; then, it is important to obtain information on different alternatives in those two areas so to develop adequate TV materials.

Information can be obtained either through research (whatever type) or through analysis. The activities that both methods elicit are various, and the more order oriented they are, the more effective and useful they can be. One useful way to refer to ordered activities within a method is Methodology -as an ordered approach for obtaining information. Analysis and research methodologies stand as useful approaches for obtaining information that can aid ETV producers or developers in the decisions regarding the design (planning) or production of educational programees.

The usefulness of the Systems approach for conceiving the processes of ETV development was stated earlier. In the context of educational technology, a systematic approach to instructional development has provided a range of different methodologies for structuring materials. Among these, the construction of models is one that, although perhaps overused, is useful for organizing the various processes that integrate the instructional development activity. A model that can integrate the processes involved in the development of educational television materials can be a methodological aid for developers and producers of ETV products. The purpose of this thesis is to propose a model for the development of ETV materials that integrates the two main aspects of development, namely design and production, and the two methods for obtaining information to aid decision-making: analysis and research (in

the form of evaluation).

Each of the four processes or components, Analysis, Design, Production and Evaluation, include a range of methodologies to study each of the main subcomponents, i.e. variables that usually integrate each component, that have emerged from various fields investigating the educational aspects of television, such as Cognitive Psychology, Semiotics, Aesthetical Analysis of TV messages, Communication Theory, Instructional Design, Experimental Psychology and Cybernetics, among others. These fields have contributed to the body of existing knowledge on either TV usage for education or to the four components mentioned and constitute aspects that the producer or developer of ETV has to bear in mind when integrating educational television materials.

The thesis will propose a basic 4-component conceptual model, the sub-components that have to be to be considered within each of these, aspects of those subcomponents, and methodologies that can be used for studying each of these so as to aid the decision-making processes when developing ETV materials. The purpose of this thesis, within the framework of the foregoing model, is intended to provide an answer to the basic problem stated in the next section.

The Problem

How can a "good" educational television programee be developed? Which aspects, aside from the logistical, technical and managerial aspects of TV recording, should be considered so as to ensure educationally "good" and adequate-to-audience TV programmes? These questions -or problems- are hard to answer because there are innumerable ways to proceed when making a television program. The literature covering the subject is overwhelming, mostly concentrated on the experimental study of particular "formats" (2460 research reports at the present time only in ERIC);...Shall the pertinent literature be reviewed before attempting to produce a program?...that seems nonviable. Then, what can be done to produce programs not only with "producer intuition" but with a certain foothold in the "scientific land" of educational theory and practice?

The answer to this last question is not all that easy, and certainly neither learning theory nor studies on the psychological effects of television have provided a precise answer; nevertheless some insights have emerged from various fields, such as Cognitive Psychology, TV Production Practice, Aesthetics, Learning Theory, Semiotics, Sociology of Culture, Cybernetics and Systems Thinking -among others- that can provide some methodological suggestions for proceeding in the decision-making situations when designing and producing educational television materials. The question now is how to

organize together all those insights that have emerged from the
fields mentioned before. One useful approach that has been
attempted by some educational TV institutions is that of
organizing the different variables into conceptual models
that can constitute themselves as guidance tools in the process
of developing TV programmes.

Literature Review on Models of ETV development

One such model is that used in the Children's Television
Workshop in the development of "Sesame Street" noted by Palmer
(1974). The basic purpose of this model is to relate a series of
major program attributes (independent variables) and viewer
outcomes (dependent variables) so to integrate principles of
message design. The utilization value of the model is suggested
by Palmer (1974) both as a tool for the development of programs
and as an improvement in the understanding of learning through
television:

> "Learning by way of televised presentations do occurr,
> and the objective of the formative research at CTW is
> to discover principles of program design by which this
> type of learning can be improved. In the specific case
> of "Sesame Street" and "The Electric Company", the re-
> search seeks principles of presentational learning
> appropriate to their educational goals, audiences, and

production techniques. However, there are more basic
objectives also, one...is to discover generalizable
principles of presentational learning" (p. 312).

The model highlights the need to define elements of program
design which can be reliable predictors of learning among
viewers. The statements that relate elements of program design
and empirical outcomes in viewers are what Palmer calls
"principles of presentational learning", and he suggests that
they can be generalizable to other type of televised
presentations or media. He even suggest that they must be taken
into consideration in any theory of what he refers to as
presentational learning (learning from media).

The model serves as a checklist for both producers and
researchers, suggesting program attributes that should be taken
into consideration when creating new segments or designing new
formative evaluations. It also brings together into categories
of program elements the hypothesized principles growing out of
the formative research (Palmer, 1974).

The model features four main categories of program elements
or attributes: Appeal, Comprehensibility, Activity-eliciting
potential (motor and psychomotor activities, emotional activity
and intellectual activity) and Internal Compatibility of
Elements. The usefulness of this model has been confirmed by the
success of "Sesame Street". Although it is one of the best
models yet developed, it concentrates more on the research

aspects, especially formative, and relates them to the design of
programs, but leaves aside major considerations regarding the
analysis of audience in terms of their cognitive schemas,
cultural behavior, etc. It is obvious that a major analysis
effort is included in the CTW program design and research
activities, but it is not systematized in the model as a major
component.

Another successful model is that used by the OECA (Ontario
Educational Communications Authority) as a guideline for their
activities when producing educational programees at TV Ontario.
This model applies not only to the production of TV series for
children, but for all type of audiences. The model, as stated
by Nickerson and Gillis (1979), stands as a very practical
application of theory into television production. It is
organized basically towards providing information to the
producers or developers for aiding decision-making during the
processes of television production basically with a formative
research approach. The utilization value of the model is
summarized by Nickerson and Gillis (1979) as follows:

> "To ensure that our programs 'work' and meet the
> criteria we have established for educational pro-
> gramming, the OECA has sought to work research
> and evaluation into all stages of the production
> processes. Our primary aim has been to maintain
> high levels of relevant information exchange

throughout production and thereby encourage informed
decision making. The evaluation model we employ
at the OECA attempts to outline, as well as possible,
the major stages of production as they exist for us,
the nature of the decisions at each stage, and the
manner in which evaluation can assist decision making"
(p.1).

This model contemplates three stages: Project Proposal, Concept
Development and Project Development. For each stage the role of
formative research is different in terms of the information it
has to feed in. For the first stage, project proposal, the
information provided is basically obtained with background
research on needs and interests of specific target groups,
information on size of audiences for specific types of
programming, summative evaluations of existing products and
information on new developments in educational broadcasting. In
the Concept Development stage the details of the proposal are
defined and the format of the production is chosen; formative
evaluation assists in a number of different ways and usually
culminates in a resource workbook developed for use by the
production team, administrators, and those involved in the
subsequent project development. The third and final stage,
Project Development, is basically the program production stage;
here, the formative evaluations enable the production staff to
refine or modify the television programs or other system

components while they are being produced. Summative evaluation
mechanisms are used also to assess the achievement of objectives
of TV series after being completed.

In general terms what the OECA model does is include
formative and summative research approaches into the processes
of defining, designing and producing educational television
programs. The numerous succesful programmes of TV Ontario prove
that this approach is a succesful one. Contrary to the CTW model
it does not relate program attributes to viewer characteristics
so to form principles of design, but stresses the role of
formative research to obtain information and aid
decision-making. This model also leaves aside major
considerations in the analysis of various audience and program
characteristics which may be taken into account in one way or
another in their procedures, but are not systematized in their
model.

Both models outlined above, the OECA and the CTW, in a
sense state the importance of the design, production and
evaluation components of a model for the development of
educational television projects, but do not attempt to include
an analysis component in a systematic way. Analysis is a very
important procedure for obtaining information and for
clarifying alternatives when a decision has to be taken.
Analysis has demonstrated in other areas of instruction to be of
great value (Gagne and Briggs, 1968; Dick and Carey, 1978;

Romisowski, 1981) and can be a useful aid for obtaining needed
information in an instructional material development process
other than the one coming from research or evaluation in the
traditional forms. There are many decisions that have to be made
in a developmental process that can be aided through analytical
procedures on various different aspects.

Analysis, the activity of dissection or examination of the
parts of a whole (as later will be defined), is a useful
procedure that can aid the process of development of television
materials and should be deeply and explicitly considered in
models as a systematic component and not as an implicit activity
that a professional should have among his/her tactics.

There are other models for development of ETV less known
but nevertheless interesting and seemingly useful. Baba (1980)
describes a model for planning, producing and evaluating
instructional television for the adult learner. This model
involves the interaction of faculty, television professionals
and students in the processes of content planning and
development of television scripts. Formative research is
emphazised. The model, of lesser scope than both previous ones,
again stresses the importance of the design, production and
evaluation but does not consider an analysis component, which,
in many cases, can aid the decision maker to consider a number
of variables necessary, if the ETV materials are intended to be
audience- effective.

The Agency for Instructional Television (AIT), which works with educational agencies in the United States and Canada in the development of school television, uses a tree-phase development process model: an Inititiation phase, which determines the needs and conceptualizes the project, a Production phase that translates the concept into a television program and suggests evaluation procedures, and thirdly an Assimilation phase that integrates the products into schools (Middleton, 1979).

According to Bretz and Shinar (1972), UNESCO developed an Instructional Television Training model from an evaluation of nine Brazilian educational television centers. The model is algorithmic in style and proposes that 22 stages -from the determination of the purpose of the instructional system to assesing students work after being exposed to the system -should be followed for developing instructional television systems. This model includes managerial as well as instructional stages indistinctly and attempts to be more than a model for development of materials, rather a model for implementing instructional television centers. Bretz (1971) also reports on a model sponsored by the United States Office of Education based on a review of other models being developed at the time, such as CTW's. The model, named "General model of Program Development", concludes that four basic components are needed: Planning, Development, Operations and Evaluation. The model represented more a conclusion of a study than an aim to design a methodological tool for the development of ETV materials; what

is interesting to note from it is that again an analysis
component is left aside. Olien (1975) proposed an
information-control system model for evaluation of adult
programs; although it is a model suitable more for evaluation
than to development, it is interesting that it proposes, from a
Communications theory perspective, a vital Initiation stage that
identifies and studies (in other words, analyzes) aspects
like the source, channel and audience. The other stages of the
model are production, delivery and reception; this model
constitutes one of the very few encountered in the literature
that integrates a sort of analysis component, still out of the
range of the so called "Instructional Materials Development"
models. There are other models that emphasize the importance of
formative evaluation as an aid for the design of TV programs,
but none that include systematically an analysis component among
its basic stages.

As mentioned before, Instructional Analysis is a well
established field among educational theory and practice; the
methodologies that have emerged from this practice can
constitute valuable tools for obtaining information for
decision-making in the development of ETV materials. Other areas
of analysis -aside from the instructional- can also be valuable,
and in fact are used continually, when designing and producing
television programs but have not been integrated formally and
systematically into models of ETV materials' development.

Other models in the field of educational television systematize the processes of production. One of great value, although not formulated in a systematic way, is that of Millerson (1972) that includes all the major processes involved in the production and design stages from a practical standpoint. A still better model, immersed totally in a systematic approach, is that proposed by Combes and Tiffin (1978) that includes planning, production, utilization and evaluation components. This model suggests practical procedures and has the great value of systematizing the steps that must be followed by an ETV producer or developer; still, although strongly suggested, it does not systematize analysis efforts nor does it offer directions for evaluation.

The models outlined above attempt to provide approaches to answer the problem posed initially that concerns the proceedings that should be followed so to develop educationally sound television programs. Most of the models have proven to be succesful but do not include systematically an analysis stage in their ranks. What will be done in this thesis is develop a conceptual model that includes four basic components:

    Analysis
    Design
    Production
    Evaluation

It is not assumed that the proposed model is a totally original

idea, but rather an attempt to systematize and integrate
seemingly diverse areas that are useful for decision-making in
ETV development, and to try to put theory into practice so that
some recent advances in some disciplines, such as cognitive
psychology, insert themselves in the practice of television
program development, an area much in need of scientific
background to orient its practices towards educational
achievements. The model presented in this thesis is the approach
I propose to confront the initial problem posed of how can a
good educational program be developed, and which aspects, aside
from the logistical, technical and managerial aspects of TV
recording, should be considered to assure educationally good
programs.

But a model is only the beginning of a solution. It is only
the skeleton, the backbone of a procedure. It is fine to propose
major stages, but what is more important are the sub-components
or categories included in each component. In a sense it is easy
to propose an Analysis or an Evaluation component, but, What
needs to be analyzed?...Which categories?...What of a program
should be evaluated? ...How?...Under which principles?...The
information coming from these -and many other questions-
constitute the practical output that is most needed by producers
and developers for decision-making. Here is the point where the
major theoretical and practical advances of the various fields
mentioned earlier, such as Cognitive Psychology and Evaluation

Methodology, come into play in the design of methodologies for obtaining information. It is those fields of knowledge that provide the categories, the sub-components, the "whats" that have to be taken into account in each component so to develop educational television materials according to scientific insights.

Certainly all the "whats" have not been discovered by learning theory -nor by any other education related theory-. Neither are methodologies totally validated for conducting studies on the categories included in each component. What the model in this thesis does is to reunite many categories under the major four components and suggest some methodologies for studying them that have been already explored by researchers and practitioners of diverse fields. This is intended to integrate a framework for including categories that should be considered when developing ETV materials and some methods for answering questions related to those categories. In this way important information can be obtained to aid decision-making processes.

The model constitutes more a conceptual framework than an explanation of the educational television development processes. I believe that this model is a conceptual tool rather than a microdissection of reality. The model is not, from any point of view, attempting to suggest that the development of ETV materials should follow it thoroughly or that this model constitutes an "ideal" approach towards ETV development. Such an

approach is common among model-builders and is presumptious, vague and completely unreal. After all, neither art nor science can be strictly confined into patterns, and, for many people as well as for me, TV encoding is an art as well as a science. The suggestions gathered in this model will, hopefully, constitute an analysis of the ingredients of ETV "cooking", and not a precise "cooking recipe". The "chef" -the ETV developer or producer- and his/her creative mind is responsible for the final mixing of the ingredients, the final aspect of the product, and, most important, the flavour that it leaves in its audience and the value of it on their lives.

Limitations of the Thesis

The proposed model is not useful for the everyday practice of TV recording; it is more directed towards the planning stages and control systems of ETV projects.

The model will be outlined and not validated empirically. Neither will the model be tested through simulation or actual implementation, at least not at this stage. It constitutes a theoretical, but not -yet- empirically validated approach. It is derived from the already established tradition of development of instructional materials that contemplate design, production and evaluation processes and the already mentioned approaches such as the CTW (Children's Television Workshop), the OECA (Ontario Educational Communications Authority) and other models that try

to reunite aspects that were not contemplated in those
preceeding it. Other aspects included in the model are an
Analysis component and an integrated perspective towards
evaluation. As said before this thesis does not constitute a
"Manual of Methodologies" nor an exhaustive review of techniques
for developing ETV materials, but a consideration of various
components, sub-components and categories and some methodolqgies
emerging from an Educational Technology perspective for
obtaining information prior to decision-making in the
development of ETV materials.

CHAPTER 2

BASIC COMPONENTS OF AN ETV DEVELOPMENT SYSTEM

-A 4-COMPONENT MODEL

Systems and Models

A System can be defined as a set of objects, together with
relationships between the objects and between their attributes,
connected to each other and to their environment in such a way
as to form a whole (Schoderbeck et al, 1980). Following this
definition, a television program, or a television project
-depending on the level of definition- can be considered as a
system because it is formed by a set of objects (or elements, if
prefered) interelated between them and between their attributes
(attributes of the various elements) and connected to an
environment (broadcasting system, school system, politics,
etc.). Hagett (1976) states, "models...represent idealized parts
of systems, just as systems represent an arbitrarily separated
segment of the real world" (p.317). In this sense a model of a
television system can represent some idealized parts of a
television system, as can the developmental stages be also
considered as a system per se —or as a subsystem of the whole
television system.

Models are not only representations of systems. They can
also serve as methodological tools for demonstration. In
everyday language, the term "model" has at least three different
usages: as a noun, it implies a representation; as an an
adjective, model implies ideal; as a verb, to model means to
demonstrate (Haggett,1976). In scientific usage Ackoff et al
(1962) have suggested that we incorporate part of all three
meanings; in model building we create an idealized
representation of reality in order to demonstrate certain of its
properties. A model of the developmental stages of an ETV
program is an attempt to create an idealized representation of
the ETV materials development processes in order to demonstrate
certain of their properties or characteristics that should be
considered.

A traditional definition of models might help to reinforce
their utilization value for understanding, examining or
predicting systems behaviour. The following definition is the
one provided by Gibbs (1978):

> "Models are a method of transfering a relationship
> or process from its actual situation to a setting
> where it is more conveniently studied. Models are
> selective approximations of a real situation which,
> because of their simplification, allow those aspects
> of the real world which are under examination to
> appear in a generalized form...Models can be used to

communicate facts and ideas, generate ideas, predict
systems behaviour and give insights into reasons for
systems behaviour" (p. 112).

Using this definition as a guideline, it can be said that the
model proposed in this thesis is:

(a) Used as a method for transfering the actual process of
Educational Television materials development to a
simplified setting where it can be more conveniently
studied.

(b) Selective in the sense that it only considers certain
aspects of the developmental processes stemming from
various disciplines related to Educational Technology and
leaves others related to TV apart, like the economical,
mananagerial, and logistical considerations that are
integral parts of Television's daily procedures.

(c) Concerned with generalizing the processes of development
into four aspects, so to simplify the examination of real
developmental processes of concrete television programs.

(d) Intended to serves as a means to communicate, from an
integral perspective, its own ideas as well as others
emerging from the study of various related areas to TV
theory and practice. Hopefully, it can also serve to
generate new ideas and give some insights into why some
ETV programs are better developed than others. It is

difficult to say, but perhaps the use of these types of
models can help to predict performance of ETV materials,
as is the dream of many "Instructional Media Theory"
advocates, such as Bates (1979), Palmer (1974) and others.

A 4-Component Model for·the Development of ETV materials

The proposed model comprises four major components or
sub-systems; two are information-gathering oriented, Analysis an
Evaluation, and two are decision-making oriented, Design and
Production. The decisions to be taken in the last two components
are aided with the informational outputs of the other two.

```
     _____         _____        _____
    I ANALYSIS I---------I DESIGN I--------I PRODUCTION I
     _____         _____        _____
         I                 ▲     I                I
         I                       I                I
         I                       I                I
         I                  _____       I
         I-------------I EVALUATION I------------I
                          _____
```
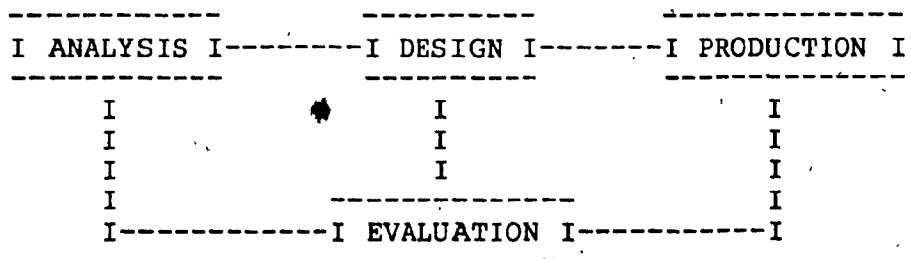
Each component or sub-system includes a number of
sub-components, or elements. The basic assumptions that guide
the integration of this model are:

1. That an effective educational television development
   system has to make appropriate decisions regarding various

aspects, elements or sub-components of each
decision-oriented component.

2. Through a proper Analysis, Design, Production and
Evaluation of those aspects, or sub-components, an ETV
system can be effective in educational terms.

The first three components of the system, Analysis, Design
and Production can be considered as stages in a developmental
process. The fourth component, Evaluation, more than a stage
constitutes the feed-back loops (both positive and negative) of
the system.

The key issues of the model are the categories, aspects or
sub-components that have to be considered in the four major
components, and the methodologies available for conducting the
processes leading to their study.

The sub-components within each of the basic stages that are
included in the model are common ones used for study of each
component, and the aspects or categories included in each of
those which have emerged from various fields related to
educational technology. An outline of the model follows; each
component, with corresponding sub-components and aspects are
explained in the subsequent chapters of this thesis. For a
graphic representation of the model, refer to appendix A on page
218 of this thesis.

Outline of the Model

I) ANALYSIS (Information gathering)

Sub-components:

1. Form

2. Content

3. Audience

4. TV Usage

Aspects:

1. Form

1.1 Production Variables Analysis

1.2 Symbolic Codes Analysis

1.3 Aesthetic Analysis

1.4 Structure of Content Analysis

2. Content

2.1 Instructional Analysis

2.2 TV-Content Functions Analysis

2.3 Adaptation to TV Potential Analysis

3. Audience

3.1 Demographical Analysis

3.2 Entry Behaviour Analysis (Visual Literacy and Content)

3.3 Cognitive Functions Analysis

3.4 Mental Skills Analysis

3.5 Cultural Patterns Analysis

3.6 Communications Patterns Analysis

3.7 Behaviour Analysis

3.8 Environmental Analysis

3.9 Needs Analysis

II) DESIGN (Decision-Making)

Sub-components:

    1. Form

    2. Content

    3. Structure

Aspects:

    1. Form

        1.1 Production Elements

        1.2 Symbolic Codes

        1.3 Aesthetic Strategies

        1.4 Structure of Content

        1.5 Audience-related principles

    2. Content

        2.1 Instructional sequence

        2.2 Instructional level

        2.3 Adaptation of content to TV potential

    3. Structure

        -Proposal, Plans, Scripts, Manual of Policies and Procedures.

III) PRODUCTION (Decision-making)

Sub-components:

1. ▓▓e-production
2. Pilot Production
3. Recording-Shooting
4. Post-production

IV) EVALUATION (Information gathering)

Sub-components:

1. Background Research
2. Formative Research
3. Formative Evaluation
4. Summative Evaluation

The four components outlined integrate the proposed concetual model of Educational Television development. The aspects included in some of the sub-components can be conducted with methodologies to be developed in the next chapters. One note of caution concerning these methodologies is recommended: they are not the only ones and do not pretend to be so; they are suggestions for decision-making. The same note refers to the aspects.

Perhaps even more important than the methodologies is the
inclusion of the various aspects of each sub-component. There
may be other aspects for each sub-component that are either
unknown to the author or have not emerged in the literature. The
purpose of the model is to integrate a conceptual framework for
developing ETV materials from an Educational Technology point of
view and not to determine a "one and only" best procedure for
developing ETV materials. Such is the sin of many model builders
and is certainly not my intention. The use of the ones proposed
or other methodologies depends on the desired level of precision
that is desirable for each individual ETV development task.
Sometimes a specific analysis or evaluation does not require the
use of a given methodology and only a brief consideration is
more than enough, sometimes a very precise methodology is
required. This depends on the intentions of the decision-makers.
Let's remember that methodology is an ordered approach for
obtaining information and this certainly allows for many
different ways in proceeding.

The four components proposed are not necessarily sequential
in nature; while usually analysis precedes design and
production, this does not mean that all types of analyses have
to be concluded before initiating any design activity. The
components are continuously interacting in a reiterative way,
that is, they are not static and discrete stages that precede
rigidly one another but are interactive components that
represent a cycle rather than a discrete succesion of stages.

CHAPTER 3

ANALYSIS COMPONENT

Analysis Defined

To analyze something generally means to "break" that
something into parts so to study its constituency. More formal
definitions obtained from specialized dictionaries express the
same basic idea. According to the Dictionary of Business and
Science (1968), analysis means reducing a complex phenomenon to
its elements, either physically or in logical thought; according
to the Dictionary of Science (1964), analysis denotes
descomposition into elements or constituent parts. The important
notion that remains is that of "breaking" a whole into parts.

In the context of Systems thinking, analysis is defined
similarly but slightly more distinctively: Schoderbeck et al
(1980) define analysis as "the breaking up of study subjects
into smaller and more manageable components for individual
examination and evaluation" (p. 335). Starr (1964) defines
analysis in terms of the principle of disassembly. Under this
principle analytical behaviour consists of operations that
involve division, dissection, classification, partitioning, and
similar actions. Following that principle, the same author gives
a definition of systems analysis as "that process of

disassembling some objective-oriented whole into its component parts" (p.391).

From the above definitions we can conclude that analysis refers to a process of disassembling, or breaking into parts, a complex whole so to examine, classify or study separately those individual parts or elements. This division into parts can be done physically or in logical thought. This conclusion stands as the interpretation of analysis used in this thesis.

In terms of the model for the development of ETV materials, the analysis component refers to the disassembling into parts of the functions of the constituents or elements of an educational television product so to examine, classify and study each separately -although on the real TV product they are deeply interrelated. The dissection of the ETV product was carried out with the aid of existing literature and by "logical thought". As the basic purpose of the model is not to explain the "physical ingredients" of an ETV product, such as visuals and music but the "developmental ingredients", that is, the functions and roles of each element, the analysis component refers to the disassembling of the functions of the elements that constitute the products (complex wholes) so to understand, classify, examine and study each one. This is done in order to be able to integrate those functions to the production of new ETV materials.

Analysis constitutes more a way of thinking than an
established step-by-step methodology. In analytical thinking
there are numerous ways to proceed under the principle of
"breaking into parts". Analysis generally is refered to as an
activity, rather than as a precise methodology; nevertheless
there are some useful guidelines to use when proceeding in an
analysis. One of such is the contemplation of various levels of
analysis according to the purpose of the task to be accomplished
(Romisowski, 1981). This means that an analysis can be carried
out at differential levels, from very superficial to very deep.
A superficial analysis can be the simple consideration of a
category, while a deep analysis can be a profound study under
rigorous methodologies. This notion is very important for the
utilization of the model proposed in this thesis because within
the context of TV production and development there are many
extraneous factors that constrain the tasks to be carried out
when designing or producing programs; two very important are
money and time. Usually there are not enough time or resources
to carry out an analysis task. In this case a mere consideration
of the categories of functions of the elements of an ETV product
can constitute the analysis component of that particular ETV
development task. The level of analysis is normally determined
by the magnitude of the project. If a project is definitely
important, as for example the development of ETV materials for a
nation-wide literacy campaign, the analysis tasks should be
quite deep as compared to those carried out when designing a

simple half-hour program on how to operate a machine.

Value of an Analysis Component in an ETV Development Process

Analysis is a useful approach for obtaining vital information on the functions of the elements of ETV materials. It can also yield useful insights on the categories or types of characteristics of the elements that should be considered when designing and producing educational materials for television. An analysis component can "dissect" or "classify" the various functions of the elements of a TV program and with so aid the purposive design of materials desired to cover specific educational functions.

A television program or project, in order to be considered a system, should be deeply related or addressed to a specific audience. The audience of any communicational message has to be so taken into account, that, in practical terms, program and audience, in an encoding-decoding process, constitute an integrated whole. This means that the parameters of the audience have to be considered in the various stages of the making of a television program, in other words, the audiences' characteristics have to be analyzed so to tailor the materials for them. This audience classification is another of the vital functions of the analysis components.

Roughly speaking the elements of a television program can
be classified as those related to the form of the program and
those refering to the content, or subject matter. Those of the
form have been often labeled as the language of television (Ide,
1974) or as production variables (Coldevin,1981). The "language
of television" has been formulated by Ide (1974) in terms of
eight elements: movement, time, space, color, facial images,
spoken words, natural sounds and music. These elements,
interrelated, integrate the form of a televised presentation.
These interrelated elements also serve some functions for
communicating, delivering, developing or actually teaching
something to its audience. The production variables can
constitute codes that, in order to be suitable for the audience,
have to be related to the symbolic codes used by the audience.
They also constitute aesthetic elements that perform related
functions. The conjunction, or structure, of the elements of a
televised message give "form" to the content of a program. In
order to develop an adequate "form" for a program, specific
analyses have to be conducted on the functions. The identified
functions, to be explained later, are precisely those refering
to the production variables, to the symbolic codes, aesthetical
elements and structure of content.

The content of a program is, perhaps, the most important
part of an educational presentation. It has to be deeply
analyzed so to provide the correct amount, level and sequence

and adapt it to the characteristics of an audience. The
tradition of Instructional Systems design has confirmed the
value of this type of analysis. The content of a television
materials also has to be analyzed in terms of its specific
adaptation to the capacities of the television mode in order to
design materials that take full advantage of the TV medium.
These are the values of an analysis of the content of ETV
material in its developmental stages.

In terms of the audience, in order to define an adequate
profile, various characteristics have to be analyzed. The
categorization of those characteristics used in this model are
the following: Demographic, Entry behaviour, Cognitive
Functions, Mental Skills, Cultural and Communicational Patterns,
Behaviour, Environment and Needs analysis.

The value of a proper analysis of the form, content and
audience of ETV materials is, as outlined above, obtaining
information on specific characteristics of the three aspects so
to orient decision making when designing, and later producing,
ETV materials. In any ETV development task very important
decisions (that are going to influence in one way or another the
way the material is going to be learned by the receptors) have
to be taken when making a design. If this design is preceded by
a proper analysis, then the decisions to be taken can be
grounded on information rather than on intuition or guesses.
This is the basic role of an analysis component of an ETV

developmental system.

As with a Systems approach a development task is not
contemplated as a static process that ends with an evaluation
component as a final stage, the analysis component also serves a
function of reexamination of the information reintroduced to the
system by formative evaluation so to correct the material while
still able to do so before the final production stage.

Aspects and Functions to be Considered in an Analysis component
----

Three main aspects are considered under the Analysis
component of the model: Form, Content and Audience. Each, in its
turn, comprises a number of categories. Those categories can be
studied, examined or simply considered at different levels
according to the magnitude of each ETV development project. In
the sections to follow some methodological suggestions are
proposed so as to obtain information on each category and for
the purposes of each ETV development task. The information
obtained from those analysis procedures can aid the
decision-making processes carried out by TV producers or
developers when designing or producing materials.

1. FORM

The categories of analysis under the first aspect, Form,

follow.

1.1 PRODUCTION VARIABLES ANALYSIS

Ever since the beginnings of educational broadcasting there has been an interest in the study of the effects of certain elements of the "TV language", particularly in the use of such elements for enhancing or promoting memory and comprehension. The literature on the subject is vast and often contradictory but some trends have emerged on the use of certain production variables for educational purposes. Useful at this point is the use of production variables schemas, such as the one proposed by Coldevin (1981) that recapitulates the major findings of research in the areas of production and performer variables.

The schema proposed by Coldevin builds upon existing categories and increases the specificity of the classification and includes some new areas. The value of the schema resides not only in its useful organization of the major findings of experimental research on production variables but also in that it provides a comprehensive catalog of the most important production variables. This classification can constitute a methodology per se useful to producers and researchers for some tasks of their developmental activities, such as classifying the production variables of possible use in their projects, for

studying the effects of them in the past, foressee possible
effects and plan formative evaluation and research activities
with them. Coldevin (1981) defines the most potent offering of
experimental research and of the survey he conducted with his
schema with the following words:

> " ... As a guide to conducting research, as
> a prescription for both design and analysis, and
> perhaps more importantly, a listing of production
> and performer variables which might be profitably
> re-examined in both educational and information
> television operations" (p. 96).

The framework, or schema, that the author proposes has two
main categories: production variables and performer variables.
The first category, production variables, has two
sub-categories, namely, technical variations and content
organization.

The technical variations are grouped into nine areas:

- Camera factors (angle & shot)
- Setting
- Lighting
- Color vs. Black & White
- Audio factors
- Visual/Audio-visual reinforcement

- Still vs. motion pictures

- Screen composition

- Special effects

These areas integrate the basic elements of the form of
messages. The other sub-category of production variables,
content organization, is focussed on ten areas:

- Opening-closing format

- Simplicity & complexity of treatment

- Graphic devices

- Expository delivery

- Review strategies

- Cues & advance organizers

- Pacing & rythm

- Order & balance of segments

- Activity eliciting potential

- Humorous inserts

These areas reunite findings on the use of content-structure
related elements, important in the presentation of the subject
matter of a program. The other main category, performer
variables, is grouped around nine areas of characteristics of TV
presenters that have been researched and found to influence the
way a televised message is perceived and learned. The nine areas
are:

- Dress

- Body type

- Age & appearance

- Sex

- Professional vs. amateur

- Eye-contact levels

- Missed cues

- Prestige & prior knowledge

- Interaction with relevant production variables

As suggested before, the main value of the above schema is not only that it reunites the major findings of experimental research on production variables, but also that it provides a comprehensive framework for organizing the range of production variables that relates to the existing research. This framework constitutes a useful methodological tool for an ETV producer or developer that can aid deciding on which production variables to use for a particular project and plan formative research and evaluation on them. Of course it is quite difficult to plan exactly all the production variables to use in a specific TV program. This framework is intended as a tool for deciding on the main variables that should be emphasized in the most important parts of the TV presentations.

There are other schemas that can also serve as methodological aids, such as those proposed by Schramm (1972) or

by Anderson (1972) but they are not as systematized and useful
as Coldevin's. Another author, Baggaley (1976, 1980) has done
quite a bit of experimental research on the use of production
variables. His experiments are worth mentioning because he has
set a trend in the study of production variables in the context
of specific types of programs. He reported on six types of
experiments in the context of information type or news programs
(Baggaley and Duck, 1976). These experiments constitute an
example (another methodological aid) of experimentation related
to specific decisions that have to be taken when designing or
producing educational programees. The experiments, carried out
in a fashion quite similar to that of real television
presentations areas, follows.

1. Variation of camera angle to show marginal details.

2. Visual background added.

3. Variation of angles for the "talking head".

4. TV audience reactions.

5. Interviewer reactions.

6. Multiple combination of the above variables.

As can be seen the variables under study constitute real
production elements of use in news-type programs. A possible
categorization of production variables under specific types of
programs stand as an interesting idea that can help designers of
ETV projects to build certain theories on how should TV be

utilized for specific program purposes. Another important grouping can be done under type of audiences. The cultural characteristics of the audience certainly influence the way production variables are decoded. (This point will be explained in a later section under Audience analysis).

The use of these schema can help analyze educational advantages for learning purposes of the elements of the "TV language" and so decide which of them, under which context and for what use can be suitable for the task in mind. The categorization is in itself a methodological aid and its analytical use depends on the level of analysis dictated by the magnitude of the TV project being developed. Of course the professional practice of TV production has yielded numerous insights on which elements to use for certain educational tasks; this information, which usually resides in the mind of skilled producers and is of invaluable help when taking decisions, can also be systematized in a categorization like that included earlier and constitute statements to aid the definition of policies and procedures for specific types of ETV projects.

1.2 SYMBOLIC CODES ANALYSIS

This type of analysis is quite related to that in the previous section, but from a more psychologically oriented point of view. It refers to the particular ways of interpreting

certain elements of production variables by the mental skills of
the viewer, that is, the particular ways in which some formal
aspects of messages are decoded by the viewers' cognitive
schemata. Unfortunately, a complete schema that correlates
production variables with mental skills does not exist yet but
the hypothesis and work of Gavriel Salomon (1972, 1974, 1979) is
quite illuminating at this point, in particular, his experiments
done with films designed to cultivate mental skills. According
to Salomon (1979) different symbolic codes will call upon
different sets of mental skills for the extraction and
processing of the coded information.

Olson (1974) defines symbolic codes as "a subset of
symbolic systems restricted to a particular medium" and a
symbolic system as "a set of symbols so organized as to form a
system of interrelated options which are correlated with a field
of reference, e.g. language, music, numbers" (p.12). In the case
of television, although it is still debated, the symbolic codes
are often refered to as the "language of television" (Berlo
1960, Davies 1964) and are constituted by a set of elements (or
symbols) and their interrelations. Those elements sometime can
be compared to certain production variables and belong to the
eight categories identified before by Ide (1974). The basic
assumption for considering the effects of the symbolic codes on
the viewer is that each element (or symbol) is responsible for
conveying certain meanings, for eliciting certain responses in

the viewers and this is directly related to the viewers

cognitive schemata. Salomon (1979) states that there are "two

mechanisms or procedures through which symbol systems and

specific coding elements can affect cognition: they call on,

that is, activate mental skills, and by exercising these skills,

they cultivate skill mastery. Or they overtly supplant mental

skills, and by modelling these skills the symbols are

internalized" (p.231). From this statement we can derive two

very pivotal notions on the importance of symbolic codes:

- First, that the symbolic codes of television have a role

  in the development of certain mental skills, and as such

  television can be regarded as an educational medium not

  only because it can deliver certain contents, or

  knowledge, but also because it can help in the

  development of mental skills; in other words, TV has a

  two-fold educational task: to impart knowledge and

  develop skills.

- Second, that the viewers must have certain skills

  developed so to interpret or decode some symbolic codes.

The same author proposes that symbols systems, or "the means by

which messages are encoded" are somehow isomorphic with the

internal modes we use for representing information; that is, our

mental "codes" or ways of thinking have to be related to the

external "modes" with which messages are encoded. In other words, the modes for "encoding" and "decoding" messages are similar in essence.

There can be different degrees of correspondance between the incoming mode of presentation and the mode in which the content is processed and stored. The important issue is that there must be correspondance between the external mode of the message (production variables and aesthetical elements) and the internal modes (cognitive functions) of receiving and structuring information in the viewer. The above arguments are presented to suggest the importance of the consideration of the symbolic codes of television in relation to the skills of the viewer. It is true, and it was expressed at the beginning of this section, that most of this relationships are hypothetical and that not enough empirical evidence exists, even less a precise methodology for exploring the relationships between them. Nevertheless it is very important for an ETV developer or producer to consider and hypothesize:

a. The possible relationships between the formal elements of a televised presentation and the skills a viewer needs to decode those elements so as to try to accomodate the form of the messages to the viewer's characteristics.

b. The potential of the TV medium for developing mental
    skills.

This might sound like a weak methodological suggestion but
in fact it is not. Salomon did analyse the possible
relationships of certain TV elements, like the zoom-in, and
mental skills, like that of relating parts to wholes, and
conducted his experiments according to those hypotheses. What is
needed in ETV is to follow this hypothesis formation example
(after an analysis of the possible relationships between
elements and mental schemata) and evaluate those hypothesis in
the context of the particular programs developed, through
formative research and evaluation mechanisms. Also, it is quite
important to analyze the formal elements to be used in a
particular ETV material in light of the skills needed to decode
them, especially if it is intended to be delivered to
individuals in cultures not used to the TV medium, as is the
case of many regions in developing countries.

This category also touches upon the importance of visual
literacy, which can be analyzed with the aid of
especially-designed, program-context oriented tests. Visual
literacy will be discussed in a further section.

1.3 AESTHETIC ANALYSIS

Aesthetic soundness has been defined by Arnheim (1969) as the "isomorphism between what is said and how it is said" (p.255). Although aesthetic soundness or beauty has been confined traditionally to "art" it should be an attribute of any communicative message. This statement has not been proved, obviously, by empirical research but nevertheless there is some logic in the idea that a communicational, and even more an educational message has to possess some aesthetic properties. One of them, and perhaps the most salient, is the tradition of art that says that a major quality a message must have -to convey meanings in proper form according to the receptors' schemata- is precisely that "isomorphism between what is said and how it is said". It is more than obvious that the way something is said certainly affects the way that something is remembered, comprehended and learned.

Without getting into a deep discusion it can be said that the visual media, in particular film and television, emerged from a western tradition in visual arts. Berger (1972) in his TV series and accompaning book `Ways of Seeing' demonstrated how "western" paintings converged in a series of aesthetical conventions and how those conventions trascended from painting into photography and TV. It is no mere coincidence that western culture, a culture that relies heavily on visual manifestations, is the culture that saw the birth of photography, film and

television. The visual forms, then, have followed an historical line and in doing so have borrowed certain aesthetic conventions or elements that are so much embedded in their forms that it is difficult sometimes to separate them from the media they use as vehicles. One example of such is the compostion of images under specific proportions. If painting, that is considered a form of art, has certain communicative (even educative) qualities, Why shouldn't TV, that has communicative, educative and expressive qualities not be considered related to art and as such with the inherent value of the use of aesthetical conventions to carry out its purposes?

The intention of the question posed above is not to polemicize but to raise the important point that television must be considered as a medium that is committed to the aesthetic soundness or quality of its products if it intends to be effective in the transmission of its messages, although empirical research has not proved so (and in a sense is apart from the realm of findings of empiricism).

It is useful for an ETV developer or producer to analyze the aesthetical conventions his/her particular TV project is going to emphasize because it is important to know how a message is going to be received by its viewers that belong to a certain cultural tradition. This may determine the way certain elements are interpreted. Furthermore, there is some work by various authors, including Arnheim (1969) that relate aesthetic

interpretations to psychological and cultural factors.

In the context of aesthetic analysis refering to television Zettl (1973) has identified five "Aesthetical fields" within the medium of television and has proposed a theory with them that can aid as a methodological tool for practitioners in the aesthetic analysis of the elements of the TV form. Those five fields include all the eight elements of the language of TV identified before by Ide (1974) and accomplish a more integrated and coherent method of explaining the characteristics of the television medium symbolic codes. The theory should not be confused with Coldevin's type of schema because it refers to a different realm: when Coldevin's schema reunites the major findings of the experimental research with the elements, Zettl refers to the aesthetic properties of the elements in relation to the effects that their use have on the viewers perception.

According to Zettl, aesthetics is used to analyze perceptions and to study how perception can be clarified, intensified and interpreted by TV and film for a specific recipient (Zettl, 1973). He accepts that there are a multitude of perceptual factors that act upon the receiver in a given moment, but he also states that there are enough perceptual constancies (among individuals) so that principles and critical standards can be developed. Those principles and critical standards are the aesthetic elements, or conventional symbolic codes that integrate a "cultural repertoire" of TV expression

and relate to the perceptual constancies of groups of viewers.

Zettl's work and theory provides a comprehensive framework for analyzing the aesthetical properties of the elements of TV; the five aesthetical fields are sufficiently categorized to allow a deep analysis. The information yielded by this type of analysis can help to decide on the aesthetical approach to be used to fulfill the educational aims of the TV materials. As in the other type of analysis, this one can also generate hypothesis that can be experimentally accepted or rejected with formative research techniques.

The five fields proposed by that author are the following:

I) First dimensional field: LIGHT

    a. External (ilumination of the scene):

       1. Chiaroscuro

       2. Flat

    b. Internal (energy that causes images on screen):

       1. Keying

       2. Effects

Extended first field: COLOR; functions:

       1. Informational

       2. Expressive

       3. Compositional

II) Two-dimensional field: AREA

    a. Structural factors

       1. Area orientation

       2. Size

       3. Basic screen forces

         .Main directions

         .Magnetism of the frame

         .Asymetry of the screen

         .Figure-ground

         .Psychological closure

         .Vectors

III) Three-dimensional field: DEPTH AND VOLUME

    a. Volume duality

    b. Graphic depth factors

    c. Depth characteristics of lenses

    d. Z-axis motion vector

IV) Four-dimensional field: TIME AND MOTION

    a. Subjective time

    b. Objective time

    c. Visualization

    d. Picturization

       1. Tertiary motion

         .Cut

.Dissolve

.Fade

.Transition effects

2. Editing

.Continuity

.Complexity (montage)

V) Five-dimensional field: SOUND

a. Sound and noise

b. Functions

1. Literal

.Dialogue

.Narration

.Direct address

2. Non-literal

.Descriptive

.Expressive

c. Elements of sound

1. Pitch

2. Timbre

3. Duration

4. Loudness

5. Attack-decay

Zettl proposes that the structuring of the elements of the fields oulined above elicit certain responses from the viewer, and as such, open the gate for the reception of a given message. A controversy might emerge from this point: It could be argued that eliciting an emotional response is not related with learning, or at least that the relationship can not be measured. It might be true that it is difficult to measure with conventional approaches, but that does not mean that there is no connection. Rudolf Arnheim said, as quoted before, that the isomorphism of what is said and how it is said is vital. Following this idea, if something "is said" to be learned (as is the case of most ETV programs), in order to have aesthetic beauty it has to be isomorphic with "how it is said", that is, with the aesthetic elements necessary for that task.

Zettl has been criticized because he has not provided enough evidence or data to support his ideas. The same has happened to Arnheim. The problem might reside in the fact that the impact of aesthetic qualities is difficult to be measured empirically. While those criticisms might be of considerable weight it is important to note that the measurable evidence is not the only possible. Feelings are, I would say, non-measurable in essence and still our emotions and feelings have something to do with the way we learn. Research on learning and media should not be so completely empiricized, it should allow room to other types of evidence than the merely quantifiable (as can be the logical, historical, etc.)

Aesthetic beauty is not a luxury in an ETV product or in any other communicative message; it is a requisite, a necessary accomplishment if it is intended to be effective. We are human beings, and as so each one of us belongs to a certain culture (although "pure" cultures almost no longer exist) and we perceive accordingly to the parameters that those cultures dictate. If we are to perceive (and learn, encode, or attend) a TV program, we will do so through our cultural and psychological "mediators", and if that program is to have an effect, it has to follow our cognitive as well as our cultural and aesthetical patterns. Its form (its aesthetical configuration included) has to be isomorphic with what is said, the content of the program. Form and content have to be a unity, a single whole. This point might not yet be evidenced clearly by empirical research but let's examine the best paintings, the best novels, the best dramas, the best films, the best music pieces of any given culture and we will confirm Arnheim's point: Aesthetic beauty, isomorphism between form and content, stands as the best quality of an artistic, communicative form.

Arnheim (1969) criticizes the tradition that has given to art a second rate in importance. He is against the classification that places the aesthetic qualities of a product behind the "intellectual" properties. He suggests that this might have been so due to the separation sought between perception and thinking. This might explain why in educational research on the elements of a TV program so much more emphasis

has been given to the cognitive aspects (the cognitive effects)
of the elements of the visual images of TV than to the
emotional, aesthetic aspects, in their relationship with
learning (Let just remember that ETV has also much of a visual
art). This might be another symptom of the separation that our
culture puts between science and art, research and production,
knowledge and feeling, objectivity and subjectivity, perception
and thinking...when in essence they are the same human
endeavour. We are heart and we are reason at the same time;
every bit of information we process is not done only cognitively
from the standpoint of our intellectual capabilities, it is also
processed emotively from the standpoint of our human feelings.
For me both the aesthetical qualities of a given image and the
cognitive ones are equal in importance for learning and for
education in general terms, just as science and art are equal in
importance for human development, just as our heart and our
reason for our daily life.

I consider the interaction of aesthetic and cognitive
aspects the very same as the interaction between perception and
culture and this is why I consider that the elements to be used
in ETV materials should be analyzed aesthetically when being
developed.

1.4 STRUCTURE OF CONTENT ANALYSIS

This category refers to the particular modes in which the programs are structured; the modes can be news, magazine type format, documentary, drama, etc. Although a precise categorization of the effects of particular modes of programs does not exist, perhaps because the interactions between subject-matter and type of program are extensive, it is quite useful to analyze which mode will be best for the particular educational aims in mind. Useful guides are the experimental uses of types of programs reported in specialized literature, the evaluation reports of existing TV series and the experience of TV producers. This type of analysis can yield information on which modes to use for specific purposes and audiences. One particularly useful example is the success that soap-operas have had for modelling desirable behaviors or promoting desirable social attitudes (Televisa, 1981). This type of analysis is used also, in light of the ratings of the programs, to hypothesize the preferences of types of programs by types of audiences.

The methodologies for conducting these type of analyses are not well defined. One simple and very common type is to group the existing programs in a given place by structure and thematic content and compare their ratings. Other, more deep approaches, have been attempted within a linguistic background, but none has proved to be totally accepted for analyzing the content of types of programs. This is even accepted by Metz (1974), one of the

film analysts of considerable stature in the structuralistic
current.

According to Baggaley and Duck (1976), with a
functional-thematic base certain aspects of the TV agenda can be
analyzed. One example of a categorization of programs, with this
functional-thematic approach is given by the same authors. This
categorization corresponds to the particular TV programs being
broadcasted in Britain at the time of their book; it is obvious
that the categorization of programs varies between different
places and times because tastes and preferences change. The
inclusion of the following categorization (provided by the two
authors mentioned) is, included here as a mere example of what is
meant:

Types of programs
- Thriller
- Romance
- General Interest
- Humor
- Pathos
- Musical Variety
- Personality Shows
- Games
- Cultural
- Sports and Passtimes
- News and Actuality Themes

- Educative

- Religious

- Political Propaganda

There may be an apparent confusion with one of the types of program mentioned: educative. This category is quite broad, and if we accept the ideas (common among producers of educational programs) that an educational program has to be entertainment and that an educational program can be classified according to the type of structure it follows, this discussion is avoided. Lets' recall that the above presented categorization was done for the analysis of all broadcast television in Britain, hot only educational broadcasting.

Hjelmslev (1963) refers to this category of analysis as the "form of the content" and states that it corresponds to the semantic structure that is attached to the cultural content of a TV program. It is unfortunate that even though many authors have identified the importance of an analysis as the one proposed here, none have proposed an adequate methodology to categorize the types of programs or to examine their attributes. Nevertheless it is quite useful to consider this type of analysis when developing ETV materials. Again, the magnitude of the project dictates the level of analysis; a very important project might resolve to use a linguistic-type analysis of messages to decide upon type of programs to be developed for specific purposes.

2. CONTENT

The categories under this second aspect, content, are the following:

2.1 INSTRUCTIONAL ANALYSIS

This aspect refers to the well established tradition of instructional analysis in the area of Educational Technology. A proper analysis of the content of a presentation can yield significant insights on how to delimit the amount of content, how to present it, in which order, etc. The information obtained with this type of analysis is most useful for deciding on the subject matter of a television program; which is, perhaps, its most important feature.

There are many different methodologies for proceeding in an instructional analysis. The most useful are those emerging from the systems analysis tradition. Among them, Romisowski's (1981) four-level approach is important because it provides a detailed method for analyzing an instructional task from the initial steps of objectives formulation to the final stages of strategy and method selection. Although not much has been agreed in terms of which strategies and methods for delivering information are best on TV presentations, such an analysis is invaluable not only for specifying objectives and instructional sequence but also for obtaining information or generating hypotheses on which

are the types of knowledge and skills that should be delivered, which expository or discovery strategy should be explored, the tailoring of content to certain cognitive functions, and other important decision points. Instructional analysis is perhaps the most important analysis that should be conducted because it provides important information for decisions on objectives of the materials, sequence,strategies, methods, control and evaluation items.

Other useful approaches for this type of analysis are those developed by. Gagne and Briggs (1968) and by Dick and Carey (1978). The approach by Romisoswki is more complete. It distiguishes four levels of analysis that cover all the aspects that should be examined, with a differential depth according to the needs of the developer and the tasks to be performed. The author provides a summary of the four levels that is reproduced here for explanatory purposes:

"LEVEL 1: Defines the overall instructional objectives for our system, as well as other non-instructional actions that should be taken to ensure success in overcoming the initially defined problems.

LEVEL 2: Defines (a) the detailed objectives that have to be achieved in order to enable us to achieve the overall objectives (hence the term "enabling objectives"), (b) the sequence of interrrelationship between these objectives (in terms of prerequisites) and (c) the level

of entry (defined by those objectives which will not be taught but which the learner must have mastered before entering the instructional system).

LEVEL 3: Classifies the detailed objectives according to some system or taxonomy of types of learning and assigns specific instructional tactics to each objective or groups of similar objectives. Thus typically one might find that the objectives of one lesson were all the same category or type (say "verbal information") so one would "dip into" one's bag of tactics and pull out a bunch labeled "for teaching verbal information" and use it.

LEVEL 4: Does not take the objective "as found" from level 2, but (a) analyses it further in order to discover exactly what is entailed in achieving this objective (in terms of basic motions, for physical skills, in terms of basic behaviour patterns or in terms of basic mental operations for other skills and knowledge) and then (b) matches instructional tactics to this micro level." (p.268)

The summary above outlines the method for analysing the components of an instructional system with an organized, multi-level structure. The use of this methodology can provide the ETV developer with consistent information on:

- The detailed objectives of the program.
- Nature and type-classification of the content and/or

- skills to decide strategies.

- Alternative strategies.

- Methods for organizing the content according to the strategies chosen.

- Suggestions for simulating classroom teaching techniques in the TV programs.

- Test item suggestions for testing the content.

Although the method was not designed specifically for television content analysis, it can easily be applied to it if all the stages suggested by Romisowski are carried out in the light of a television program's content analysis and if, as said in the introduction, we consider a television project as a system per se. According to the method outlined, the first level of analysis defines the objectives of the system; in terms of television this level can help to define the objectives to be pursued by analysing the type of subject or job delimited as the goal of the project. The second level can aid in defining the enabling objectives of the TV project and the sequence of these objectives within a program or series; this level can also involve task analysis if the project requires it. With a third level analysis, information on the categories of knowledge or skills to which the content of the materials belong can be obtained. With it useful decisions based on what is already known or can be hypothesized, can be taken regarding the methods and strategies to be used to deliver the content.

However, an extension to Romisowski' method is needed so to
adapt it to TV. The strategies and methods that the author
refers to are basically those that have been used in classroom
teaching. In terms of the strategies, the two most common are
expository and discovery. Although an expository strategy is
obviously easier to adapt to TV than a discovery one, this later
can nevertheless be creatively adapted to television simulating
real situations, as can be done with a documentary presenting
facts and letting the viewer discover principles, or arranging a
simulated discovery processes. These ideas have been explored
practically in the Open University in England with attempts to
categorize the functions that can be covered with television
programs in each type of subject (Bates, 1979). The same
adaptation that can be done with the strategies can be attempted
with the methods, like think-tanks, clinics, case studies, etc.
that can be adapted to the potentials, characteristics and
limitations of the TV medium. As can be deducted, there is a
need for research into the "bag of tactics" that can be used for
specific purposes in ETV. If after conducting an analysis of the
type mentioned in this section some hypothesis emerge on
particular strategies and methods that can be used to deliver
certain contents, then the so called "theory of Instruction
through media" can follow very practical grounds. Formative
research and evaluation can be of great help for testing these
hypothesis in the context of specific productions.

The analysis at level four can be of particular help when

developing ETV materials because it can aid in discovering
exactly what is "entailed in achieving an objective in terms of
basic mental operations" that can yield insights on the way
something is regularly done. It can be done, at least
theoretically, by a simulation of how a learner should learn
something relating this process to the one done when doing that
something (similar to Landa's (1976) algorithms on grammar
learning) and hypothesizing the basic paths that should be
followed by a person viewing a program. With these insights the
way of presentation of a program could be designed so to
approximate those paths and then deciding on the cognitive
functions that each part of the program play. There is no
evidence to support this idea, but since it has been assumed
that if a class lesson can be so planned, after a fourth- level
analysis, as to guide students in "an instructional mental path"
that specifically structures explanations, simulations,
debriefings and questions. Why shouln't a TV material be
designed in such a way? Fortunately, there exist some
instruments at present to explore the response of individuals to
TV programs in a moment-to-moment basis, like the PEAC system,
that can aid in testing hypotheses of content "path" structures.
This way of structuring contents, arbitrarily named here
"instructional mental paths" (to avoid compromising the notion
of information processing in the human being) has been the dream
of Instructional theorists, such as Landa (1976) or Gilbert
(1961), and some practical methodologies have emerged from such

concerns, such as Gilbert's mathetics (1961). It might sound a
wild idea but it can also be a practical exploration of
Romisowski's fourth level in the context of TV production, and
hence be regarded as an exploration of the "instructional
tactics" of TV.

Obviously the fourth level is seldom employed but it can be
very useful if a detailed analysis of what TV can do for the
learning of specific topics is required by a very important
project, such as the use of TV for literacy purposes in
developing countries. It can be said that most of the projects
can exit after a second level analysis and that a third level is
useful for generating hypothesis and, by sucessive
approximation, learn the best uses of TV in long range projects.
Such has been the case of the Open University.

Although the suggested methodology to be used was only
outlined here it can be seen that it is rooted in a whole body
of applied research on learning theories and instructional
practice.

2.2 TV-CONTENT FUNCTIONS ANALYSIS

This aspect can be regarded as an extension of the previous
one in the sense that it elaborates the ideas expressed in the
level three analysis: the "teaching" functions of educational
television programs for specific subjects. From these functions

some specific methods and strategies can be derived. This is also an area that has not been explored extensively and much of what can be said in this category belongs to what Schramm (1977) calls "the wisdom of experience" in media production. One effort to systematize the experience in the functions of TV comes from the Open University (Bates,1979), where the major functions of TV programs for specific subjects are outlined. Bates (1980) provide six functions of TV as an example of the eighteen defined by the Open University (from them, as an example, some methods are going to be derived):

- In Science/Technology/Psychology related programs, TV can serve the functions of demonstrating experiments or demonstrating experimental situations. From these functions, we can deduce that demonstrating experiments or experimental situations are suitable methods for making Science, Technology or Psychology related programs.

- In Maths/Science/Technology programs, TV can be used to

(a) Illustrate principles involving dynamic change or movement.

(b) Illustrate abstract principles through the use of specially constructed models.

(c) Illustrate principles involving two, three or n-dimensional space.

(d) To use animated, slow-motion or speeded-up film or video-tape to demonstrate changes over time (including

computer animation).

From this functions we can derive, accordingly, that illustrating principles involving movement or dynamic change, the use of constructed models, animation, slow-motion, etc...are suitable methods for making Maths/Science/Technology related programs.

- In Social Sciences/Educucational Studies/Technology programs, the primary function is to bring primary resource material, or case study material, i.e. film or recordings of naturally ocurring events, which, through editing and selection, demonstrate or illustrate principles. Similarly, we can derive that presenting edited case study material can help to illustrate principles in this type of programs.

The six examples presented illustrate the utility of such a type of analysis. For further reference on the other twelve functions of TV consult Bates (1979). There may be more functions of TV for educational programs that those identified by the Open University. Nevertheless the need for this type of analysis is demonstrated and it is hoped that a formative research effort within each ETV development project will increase the knowledge concerning the utility of various functions.

2.3 ADAPTATION TO TV-POTENTIAL ANALYSIS

Once the content is analyzed from an instructional point of view and the possible methods for utilization have been established, the content of the TV material still has to be adapted to the potential medium characteristics, that is, the advantages of the TV, so as to exploit its visual and auditorial capabilities. This category of analysis does not imply the use of an established methodology, but of a general procedure for the "examination" of the content of the material "in light" of the characteristics of the medium. Usually this analysis is known as the "visualization" of the lines of the script.

The information obtained from the production variables and the aesthetic analysis can yield almost all that there is to know on the formal aspects that can be used, but still those elements have to be used in the context of a specific content and have to convey meanings within that content. In a sense this type of analysis is an extension of the aesthetical but in relation to the specific content so to "clarify or intensify" it. As Zettl (1976) suggests, it establishes a deep "marriage" or interrelationship between form and content; in other words, "say" what has to be said with the full use of the potentials of television.

When one watches very-well and expensively-produced educational television materials, such as those belonging to the

series "Cosmos" by Carl Sagan or "Life on Earth" by David
Attenborough, of the BBC, it can be seen that the content of
these series was so well analyzed in terms of "how it could be
presented or explained through television" that the presentation
of the content really utilizes the full potential of the medium.
Animation, graphics, slow-motion, illustration of principles,
models, music, stop-motion, and other attributes are so
"married" with specific parts of the content that the messages,
or meanings, really are being conveyed though the use of the
unique attributes of the medium and do not constitute simple
adaptation of messages from other media, as could had been the
case of the accompanying books of the two series mentioned.

The tasks to be carried out under this type of analysis are
constituted by a deep examination of each part of the content
while bearing in mind the question "How can this be better
presented or explained with the unique attributes of
television?" (and, of course, in light of budgetary constraints
for the program or series).

This category of analysis can be viewed as the final step,
or the integrative effort of reuniting the information coming
from all the previous analyses carried out on the form and
content of a TV presentation. The experience and creative minds
of the producers are the most valuable analytical tools needed
here.

The decisions taken regarding the integration of specific

contents with specific elements can constitute hypotheses to be tested during formative, or even summative, evaluation stages. In this way the knowledge on the effects and use of TV for the particular reasons of the project being developed can be enhanced.

3. AUDIENCE

This sub-component of analysis refers to the common audience profile analysis but proposes an extended view to the traditionally used demographic and entry behaviour. The basic purpose of this sub-component is to obtain the most information possible on the characteristics of an audience so as to adapt ETV materials to them. The study of the characteristics of groups of human beings is difficult but, nevertheless a vital step that has to be carried out with the best accuracy possible. It can be said that to a great extent the effectiveness of an educational material depends on its adherence to the characteristics of its audience, a proximity that can be achieved only if the audience is properly analyzed.

The explanation of the categories under this, the third aspect of the analysis component, follows:

3.1 DEMOGRAPHICAL ANALYSIS

This category does require detailed explanation. It is
constituted by the traditional information-search on the basic
characteristics that make up an audience, such as ages, sex,
size of the population, geographical area of residence, income,
education level, configuration of families, leisure activities,
etc. This information is useful for making preliminary decisions
and to define the target population for the materials. This type
of information usually can be obtained through existing census
and marketing data or through traditional surveys and
descriptive statistical studies on samples of the population.

The demographic information is needed for deciding the
magnitude of a project and planning the overall strategy of the
system.

3.2 ENTRY BEHAVIOUR ANALYSIS

The term "entry behaviour" usually refers to the level of
knowledge on a particular subject that the viewer already has
before being exposed to new educational material. It is
information that is quite useful when deciding upon the level
and sequence of a presentation. So, an analysis of this kind is
necessary to carry out a proper instructional analysis. The
information on the entry behaviour of an audience can be
obtained through the use of tests on samples of that population

or through already existing research and data on the topic (such as curriculum reports, national standarized tests results, etc.).

In terms of the development of educational television materials, the term "entry behaviour" should be understood on a wider basis, because the knowledge level of the audience is not the only "behaviour" that is required to be known before deciding on the level of the content. It is important to know also the language-utilization level of the audience and what has been called the "Visual literacy" level, especially if the target audience of the programs are defined as children or adults of rural or suburban areas. Both aspects are quite useful for deciding on which "language" to use, both auditory (spoken) and visual.

The language level of the population in a sense provides information on the type of words that can be used (that are part of the repertoire of the audience) and the grammatical construction of the speech to accompany the visuals. It is obvious that a complicated narration represents an extra burden on less-educated viewer, who are in fact those that should be more deeply studied. This language utilization level also refers to literacy levels to make important decisions on the use of titles and graphic devices, and the "cultural" utilization of certain words and expressions. These matters are of great importance if the materials are developed for audiences of

diverse regions, within or outside national borders. The level of language utilization can also be studied with the aid of word-comprehension tests and analyzing typical conversations of a sample of viewers; already existing information on the subject sometimes exist in the forms of specialized vocabularies.

Regarding the "visual literacy" level of an audience, what is important to know is how pictures are decoded, or understood, by viewers. The definitions of visual literacy are many and often extend the scope of visual media. Debes (1970), as quoted by Fleming (1978), said that a visually literate person can interpret the visual actions, objects and or symbols, natural or man-made, that he encounters in his environment. In the case of visual media, such as TV, we are more concerned with the symbols, or codes, that are characteristic of the medium. These codes can be identified, and the ability to use or interpret them is what has been called media literacy. The interpetation of these codes, either technology-related, such as slow-motion, time lapse, high-speed, etc. or those designed to represent mental operations technically, like the use of split-screens or crosscutting (Fleming 1978) is what is important when developing ETV materials.

In addition, it is important to know the level of visual literacy of an audience so as to decide on the types of formal elements (production variables and aesthetical elements) that can be used to construct the "visuals" of a particular TV

program. Again, this is particularly important when the programs are targeted to children or rural adults from impoverished areas. It is vital to know which visual elements are properly understood and which are not. This has been dramatically illustrated by a situation created somewhere in Africa through a campaign against crop diseases with a film that used close-ups on certain insects and confused the members of a tribe on the magnitude of their problem: they thought that their problem with the diseases in their crops were quite minor compared to the problem somewhere else where the insects were very, very big...Or also by the examples collected by Forsdale and Forsdale (1966), quoted by Arnheim (1969), where Eskimos and African tribesmen are mentioned to have recognized only minor details in long films, or being confused by a panning shot as if houses were moving, or wanting to know how and why persons going off the edge of the screen disappeared.

At present there are no reliable tests that measure the level of visual literacy, or that correlate levels of visual literacy with production variables that can be safely used. These types of tests will definitely be useful for certain projects, especially in rural areas of the third world. In spite of this lack, the level of visual literacy can be analyzed with specially designed experiments (formative research) on the comprehension of certain elements or production variables. These are probably the most useful anyway since it is difficult to develop an internationally validated instrument.

3.3 COGNITIVE FUNCTIONS ANALYSIS

It is important to analyze, at least hypothetically, the
cognitive functions, or the way information is processed by the
viewers, to have an idea of how and in what order the cognitive
functions be appealed with the features or parts of an ETV
presentation. The word "hypothetical" was deliberately used
because the precise cognitive functions interacting with
specific aspects of ETV materials have not been clearly
delimited. In spite of this lack, authors like Salomon (1979),
Gagne (1980), Bovy (1982) and Winn (1982) have stated the
importance of considering the interrelation between internal
factors (cognitive processes or functions) and external aspects
(message features) in instruction. According to Winn (1982)
instruction "involves the control of cognitive processes by
means of carefully selected instructional strategies" (p.3).
What has to be done is explore the relationships between
specific internal processes and particular instructional
strategies, in our case, educational television strategies. This
is a research task that is recruiting more and more advocates.
In the meantime, that is, before research can provide
guidelines for the design of instructional materials, the
relationships should be hypothesized so to design materials
accordingly and evaluate their impact.

There are some schemas developed for understanding the
human processing of information and the major functions that

take place. There is some evidence to say that there is more than one information-processing system in our minds. Paivio (1971) proposed the dual coding hypothesis that states that there are two separate memory systems, one for verbal symbolic processes and another for nonverbal imagery processes. In this model the two systems may operate separately but are also deeply interrelated and can operate in conjunction. While linguistic stimulae might be processed by the verbal system, words may also evoke mental images, using then the other system. Conversely, while pictures may be processed by the nonverbal system, they may also be labeled and processed by the verbal system (Levie & Levie, 1975). Both types of systems are affected by TV depending on the type of material presented. Although little is known about the correlations between specific types or features of TV material and types of processing systems, it is useful to consider the way the information presented is to be processed. As William Winn (1980) suggests:

> "One determinant of whether visual information is encoded
> as images, words or propositions is the use to which the
> learner expects to put the information. The nature of the
> learning task is closely related to the way in which
> pictures give information, by the realism of their elements,
> the patterns between the elements, and the order in which
> they appear to be connected. Recall and manipulation tasks,
> depending heavily on the realistic representation of the

elements in a picture...tend to cause visual information to be coded as images. When the task requires the learning of the semantic differences between concepts presented in a logical picture, the information tends to be encoded in word-like sequences. When comparisons between visual information and information presented in other modes are required, or when learners are required to solve complex problems on the basis of information presented to them in visual displays, then the information tends to be encoded propositionally. Other determinants of how visual information is coded, such as learner aptitudes, are extremely important..." (p. 133).

This long citation establishes the practicality of presenting TV information in different modes, such as images, words or propositions according to the tasks the viewer are going to carry out with that information. Therefore, it is useful to analyze what the audience is going to do with the information presented and with this analysis predict how that audience is going to process that information and design it accordingly.

The dual-hypothesis theory presented above however, is not enough to predict the way information is going to be processed; there are other cognitive functions that should also be contemplated. A useful model of those functions is provided by Gagne (1977). This author refers to the functions as "internal events", and the major hypothesis sustaining this analysis is

that information obtained from an analytical task can yield
insights for the arrangement of the external events, or events
of instruction. Gagne lists the following events, or processes:

- Motivation
- Attention
- Selective Perception
- Encoding
- Memory Storage
- Retrieval (Transfer)
- Response Generation
- Performance
- Feed-back

These various events that take place during the processing
of the information call 'for different phases in learning
materials, because it can be assumed that if some information is
presented to be processed and learned properly, it has to
somehow be organized so as to facilitate this sequence of
events. In this sense, a learning unit has to be structured
around the following phases (Gagne 1977):

- Motivation phase
- Apprehending phase
- Acquisition phase
- Retention phase
- Recall phase
- Generalization phase

- Performance phase

- Feed-back phase

The instructional events can then be arranged according to these learning phases. As an example, the instructional events suggested by Gagne which follow those phases are presented:

1. Activating motivation

2. Informing learner about the objectives

3. Directing attention

4. Stimulating recall

5. Providing learning guidance

6. Enhancing retention

7. Promoting transfer of learning

8. Eliciting performance / Providing Feed-back

The analysis of the functions or internal events in the viewer can provide useful information for making decisions on the strategies that should be followed by a TV program for simulating interactions between the material (stimulus) and the viewer (learner). This can aid the sequencing of the material and strategy selection. Important hypotheses on the structuring of TV messages to be explored through formative research can also be generated. The learning styles of learners are particularly important within this context.

It might seem that this analysis belongs to the content sub-component rather than to the audience; while this may be the

case, it is argued that the cognitive functions analyzed belong
to the viewer so as to aid in the organization of the content.
In either form, this analysis ¬ as well as the others- yields
information which is utilized in the design and production
stages without regard to its origin.

3.4 MENTAL SKILLS ANALYSIS

This aspect refers to the analysis of the mental skills
that the learner (viewer) must possess so to interact with the
TV message. It relates directly to the analysis of symbolic
codes stated earlier. The importance of this analysis follows
the findings in cognitive psychology that the proper decoding of
certain symbolic codes relates directly to the level of mastery
of specific learning skills (Salomon, 1974. Olson, 1974). For
Salomon (1979) the symbol systems (or codes) are isomorphic with
the internal modes we use for representing information. Hence,
it is important to analyze the level of mastery of specific
skills by an audience before deciding which elements to use or
emphasize in a TV production.

As already mentioned, there is no precise categorization of
mental skills that can be supplanted or activated by the
elements of a TV presentation. The experiments by Salomon,
however, give some insights to the process. The mental skills of
a learner are, as said before, varied. Guilford (1969), with his
schema of the structure of the intellect, divided human

abilities into three major dimensions: content, product and operation, explaining with this typifies the various operations that are part of our intellect. However accurate that explanation might be, it does not provide guidelines on the specific mental skills that constitute our mental repertoire. So, a "catalog" of the mental skills that can be affected with televised messages is not available. Nevertheless, following Salomon's ideas, the relationships between some mental skills and TV elements is possible to discern. What is needed is a classification of mental skills and accompanying TV message design strategies, but unfortunately it seems nonexistent yet.

Mental skills are needed to carry out mental operations. Mental operations in turn are all the mental activities performed by our intellect in responding to something. Levie (1978) gives the following as examples of mental operations:

- Figure-ground separation
- Third dimension discrimination
- Movement downward
- Continuity of action
- Changing viewpoints
- Relationships between elements
- Elevation of surface
- Movement of objects
- Simultaneous third dimensional imagery

and to this list it can be added numerous others, like:

- Internal labeling
- Internal rehearsal
- Comparison
- Analysis
- Calculation
- Relating parts to wholes
- Closing gaps
- Visual association
- Audio / visual association
- Selection
- Differentiating
- Comparing
- Contrasting
- Visualizing
- Hypothesis-generating
- Completing

The operations presented above does not constitute a full catalogue of all mental activities, or mental skills as Salomon (1974) prefers to name them. They are presented as examples to trigger hypotheses on the possible correlations between them and symbolic codes. The important idea is to analyze (think or examine) what skill the viewer must have, and what does he/she have to in order to properly process the symbolic codes used in an ETV production. Once the mental activities that a viewer must

perform to decode those particular elements are hypothesized, simple tests can be designed (or standarized tests found) to test the development of these skills. Developmental theories, such as Piaget's, have an important role here, especially when designing and producing materials, specially for children.

It is important to evaluate the impact of a program not only in terms of the increase in knowledge but also in the development of skills. The development of skills evaluation can be carried out by determining which of them are being affected by specific production elements.

As a final note, the ideas presented in this section have not been fully demonstrated by empirical evidence. Nevertheless they can constitute interesting points to have in mind when analysing aspects of ETV material's development activities.

3.5 CULTURAL PATTERNS ANALYSIS

Culture plays an important role in learning as well as in the decoding of TV messages. We learn how to see (Berger 1972). We give meaning to what we perceive visually through what we have learned beforehand, and that previous knowledge is part of our culture. "Members of a culture will fail to see things that are completely outside their cultural experience or will interpret what they see in terms of their usual cultural reference frames", writes Mangan (1978, p.246). Visual

perception, including the interpretation of pictures, is learned. The mode in which we learn to interpret those visual images depends on the culture to which we belong.

Any TV message that intends to affect the learning processes of an audience must consider their cultural patterns if it is to be effective. This is confirmed by numerous reports on the lack of proper interpretation of photographic media conventions by some cultures in Africa, South America, some aboriginal tribes and, in general, rural villages in developing countries (Fuglesang, 1973. Mangan, 1978).

For the development of ETV materials, it is useful to analyze the characteristics of a culture in terms of their communicational behaviour before deciding on strategies, methods of presentation and specific symbolic codes (elements or production variables) to be used. Obviously this analysis is needed more when the developers of the materials belong to a different culture than the viewing audience.

Assessing the cultural patterns of the target group of viewers is not an easy task to accomplish. There are various antropological theories or methodologies with very different strategies and procedures. One that can be helpful, because it is immersed in a communications framework is that proposed by Gross (1974). This author proposes that the modes of symbolic behaviour of an audience should be studied because those modes roughly characterize a culture. There are three types of modes:

1. Primary modes:

   a.- Linguistic

   b.- Socio-gestural

   c.- Iconic

   d.- Logico-Mathematical

   e.- Musical

These modes can be identified with a field of reference
or range of objects and events, with a distinctive memory
storage capacity, with a set of operations and
transformations, and with specific principles of ordering,
which govern the formulation and communication of meanings.
These codes are characterized by a non-transferability into
other modes.

2. Derived Modes

These modes are built upon one or more of the primary modes.
Among them are poetry, theatre, dance, painting.

3. Technical Modes

These modes involve structures that function as the basis
for skills which are not symbolic in nature and are involved
in the production of material goods and the execution of
complex symbolic performances. The various sciences,
technologies, architecture, etc. would be included in these
modes.

This schema provide some useful insights,for the study of cultural patterns of the viewers. It is a simplified method because the purpose is not to make a full anthropological description, but to explore information on the cultural patterns of viewers for taking certain production decisions. Depending on the level of cultural accuracy which the program attempts to reach, one can follow the analysis from the primary to the the derived and technical modes. Certainly the most important are the primary modes, i.e. with an analysis of the linguistic, gestural, iconic, logico-mathematical and musical patterns of the culture of a given audience an ETV designer can know a great deal of the characteristics that the TV messages should comtemplate. The derived modes, if available, are also useful to consider especially if some sophisticated dramatic forms are going to be used to encode the program.

If, as said before, our ways of seeing are mediated by our culture, then it is important to analyze the "ways of seeing" of other cultures so to adapt TV messages to those ways. First of all, it is necessary to explore those other "ways of seeing". One methodology that might bring about interesting results is to study the patterns of encoding of visual elements in a message; certainly this analysis is included in Gross's iconic primary mode but other authors have proposed more sophisticated methods. Following Chomsky's linguistic approach, Worth and Adair (1975) reported an experiment with Navajo Indians making films. The

study was guided by the hypothesis that there might be an innate pattern for interpreting images just as there is one for language; the authors intended to study the culturally-patterned images of films produced by native Navajos. Although the methodology with which the experiment was carried out leaves many doubts on its validity and reliability, it nevertheless points out an interesting possibility for analyzing the way in which a given culture can "encode" visual images (messages). Of course such a study is complicated, and an easier analysis can be executed on other types of visual patterns, such as paintings, drawings and photographs (Mangan, 1978), not only in the way these visuals are encoded or produced by the individuals within a culture, but also interpreted or decoded when the pictures shown are produced outside that culture (Arnheim, 1969). These type of studies -with photographs- have even been used to study reactions to different gestures of public figures, such as Presidents in campaigning.

The analysis of existing cultural manifestations contain the basic activities carried under this analytical aspect. The use of specially designed tests can also be a tool for analyzing cultural patterns.

3.6 COMMUNICATIONAL PATTERNS ANALYSIS

This area, closely related to the former, refers to the analysis of the communicational behaviour of the audience and

involves the regular patterns an audience uses for communicating and exposing themselves to information. Although...(there is always an "although" when speaking of methodologies)...a unique methodology does not exist, the communicational behaviour can be understood with the aid of basic models of communications, such as the ones used by Aristoteles ("Who says what to whom under what circumstances"), Shannon and Weaver (1949), Berlo (1965) and others. With an understanding of the types of modes of communication (face-face, gossips, etc.) that an audience uses most, how those modes are used, which media is prefered for what circumstances, which messages are preferred, etc., the new messages produced (ETV materials) can be better addressed to the communicational behaviour of the audience.

In the past numerous studies under the title "Uses and Functions of Communication" were carried out. The data obtained from that sort of research is sometimes useful for this type of analysis. The design of specific tests or surveys can be useful tools in other situations where information is nonexistent.

This aspect of analysis also refers to the examination of the leadership patterns (one-way, two-way, n-way flow of information), vernacular communication modes (priests, unions,parties,etc.) and any other communication behaviour that could be useful to analyze and obtain specific information (emerging from each partitular project) when designing and producing ETV materials to make important decisions on

communication strategies.

3.7 BEHAVIOUR ANALYSIS

Morris (1978) calls this "Manwatching" and it simply refers to the way we humans behave. An audience profile is best constructed when consideration is given to the way the audience is, the way they approach their everyday life. The best methodology for conducting this type of analysis is to observe a sample of individuals of an audience. These sessions can yield important information on the way people talk, the way they refer to each other, their overt attitudes, their personality, their expressions, etc.; information that may be vital. The best way to obtain it directly is to "have a feeling" of the individuals making up an audience. This is a practice that most producers do before developing materials, not only educational, but any type. Such practice is conducted regularly at BBC.

An observing mind can be guided by some anthropological catalogues of human behaviour that, although not exaustive, can orient in the type of manifestations that should be observed. One of such is the one presented by Morris (1980). Other suggestions can be obtained in studies of nonverbal-communication modes, such as that proposed by Hall (1972).

The analysis of behaviour is particularly useful when certain specific decisions have to be made in the design and

production stages, such as type of actors, type of acting, settings, language, interaction between actors, expressions, etc. The results of an aesthetical analysis of the form of a message can be related to this type of analysis before making final decisions on the elements and strategies to choose.

3.8 ENVIRONMENTAL ANALYSIS

Also an observation type of analysis. This refers to all the aspects of the context (physical, human, emotional, psychological) which might affect the reception of a TV message, such as conditions of viewing (at home, school, community center, etc.), leisure activities, season of year, working habits, socioeconomic structure, etc. These aspects are referred to broadly as environmental because they are various and difficult to categorize. The particular situation of a given ETV development task will dictate the factors that should be analyzed, depending on the specific information needed. What is important to have in mind is the inclusion of those "external" factors that might influence the reception of the ETV.

Again, the best methodology to conduct this analysis is by observation.

3.9 NEEDS ANALYSIS

This last identified aspect included here (I do not deny the existence of others) of audience analysis refers to the assessment of the informational and educational needs of an audience: What type of information and what type of education does the audience really need. This type of study can better be carried out with a marketing approach, through ascertainment studies, surveys and constant monitoring of the changing audience needs.

This marketing approach has been successfully used by important ETV organizations, like TV Ontario. Their approach has helped them to clarify the types of programs that their audiences need in terms of educational and informational needs. This assessment can help to decide on objectives of the presentations and strategies, that are vital for the success of any ETV project.

Marketing methodologies and strategies differ widely from case to case. It is not the purpose here to make a review of those methods; the important aspect to emphasize is the usefulness of a marketing approach to obtain information on the needs of an audience.

4. TV USAGE

This general subcomponent refers to the knowledge that has been accumulated through the practice of educational television on the uses that can be given to this medium. With an analysis of the types of previous experience in specific contexts information can be obtained for deciding on the use of TV within a given learning system. A very useful guide on the uses of TV has been made by the Open University; 24 uses of TV have been identified for their particular reasons (as cited in Schramm (1977) and certainly that list can be extended with the uses that had been given to television in other contexts. These 24 points are outlined here as a methodological suggestion for deciding upon the possible uses that can be alloted to TV within a given learning system.

- To demonstrate experiments.
- To bring to students primary resources material.
- To record events likely to disappear.
- To bring to students the views or knowledge of eminent people.
- To change student attitudes.
- To explain or demonstrate activities that are to be carried out.
- To feed-back to students results or surveys of activities.
- To illustrate principles involving dynamic movement or change.

- To illustrate abstract principles.

- To illustrate principles involving dimensional space.

- To use animated, speeded-up, or slow motion film to
  demonstrate changes over time.

- To bring works of the performing arts.

- Through performance, to demonstrate methods or techniques
  of dramatic production.

- To demonstrate methods of playing instruments.

- To demonstrate decision-making processes.

- To condense or synthesize into a coherent whole a wide
  range of information.

- To demonstrate how basic principles have been applied in
  the real world.

- To test students ability by requiring them
  to apply concepts to the material seen or by explaining
  and analyzing "real life" situations presented through TV.

- To demonstrate the use of tools or equipment.

- To increase students' sense of belonging

- To reduce the time required by students to master content.

- To pace students, to keep them working, to break the
  inertia of beginning to study in evening.

- To recruit or attract new students.

- To establish academic credibility.

Another useful source is the reviews of major ETV projects
that have been carried out in various countries ("We can always

learn from other's experience"). A good analysis of many projects is found in Schramm (1977),where some major ETV projects are grouped under four categories:

- National Educational Reform Projects.
- Media to Supplement the School.
- Extending the School.
- Nonformal Education.

and analysed comparatively.

This type of analysis is useful for the planning of long-range ETV projects. A careful examination of the uses identified by Open University or by the experience of other countries can help to orient the scope of ETV projects in particular contexts.

Outcomes of an Analysis Component

The outcomes of an Analysis component within an ETV development task are basically information to be used as inputs for decisions to be taken during the design of ETV materials within a given project. The specific information to be searched for in the analysis component emerges from the needs and requirements of planners and producers for developing particular ETV projects. So, the analysis outputs will vary from project to project both in nature and degree of specificity. The level or accuracy of the information gathered will largely depend upon

the methodological efforts assigned to each ETV project derived
from its magnitude. This information is focused in four areas,
that correspond to the sub-components of the Analysis component;

1. Formal aspects of the ETV program(s).

2. Content aspects of the ETV program(s).

3. Characteristics of the target audience.

4. Guidelines on the previous usage of TV in projects
   similar to the particular one being developed.

1. FORMAL ASPECTS

1.1 Production Variables: The information obtained with this
----
aspect will provide recommendations on the particular
production elements of possible use (for specific learning
purposes) in each ETV project according to their
effectiveness, either confirmed by previous experimental
studies or by formative research and evaluation within the
context of the ETV materials being developed.

1.2 Symbolic Codes: Will provide additional information on the
----
particular production elements to be used in the context of
the mental skills that are required or that can be modelled,
supplanted, activated or developed in the viewers with them.

1.3 Aesthetic Elements: Will provide recommendations on the
----
aesthetic qualitative properties of the elements of possible
use in the ETV materials, either for intensifying or -

clarifying some features of the programs so as to adapt
the 'formal elements of the ETV project to the viewers'
aesthetic preferences and so convey meanings in a
suitable form to the audience's psycho-cultural decoding
conventions (and to the developer's intentions too).

1.4 Structure of Content: Information for decisions regarding
the specific mode or semantic structure with which the
content of the TV materials should be structured to pursue
the educational goals set to them.

2. CONTENT ASPECTS

2.1 Instructional Approach: Will yield information for taking
design decisions on the objectives of the materials, types
of knowledge or skills categories to be delivered,
strategies, methods and tactics for presenting them,
instructional sequence, evaluation guidelines and other
content-related aspects.

2.2 TV Content Functions: Information on the particular
"teaching" functions that TV can cover so as to derive
methods and strategies for presenting the content according
to the nature of the ETV materials being developed.

2.3 Adaptation to TV Potential: Information, or suggestions, on
the adaptation of the content to the auditorial and visual
capabilities of the TV medium. It provides information for

the integration of the formal elements within the content in such a way as to take full advantage of the possibilities of television..

3. CHARACTERISTICS OF THE TARGET AUDIENCE

A profile of the audience will be the output of this analysis sub-component so as to provide the most information possible on characteristics of the receptor group to make design decisions on the "tailoring" of the ETV materials to them. This information will be clustered around the following aspects:

3.1 Demographic: Information on the configuration and basic characteristics of the audience.

3.2 Entry Behaviour: Knowledge or skills level prior to exposure to the ETV programmes; Language-utilization and visual literacy levels.

3.3 Cognitive Functions: Information on cognitive functions intervening in the processing of information as well as suggestions on the adaptation or arrangement of the content according to these processing functions.

3.4 Mental Skills: Information on the viewers' intellectual abilities for interacting with the formal elements (particularly to symbolic codes) of the ETV presentation.

3.5 Cultural Patterns: Information on the main cultural
   ----
   characteristics of an audience, as expressed by their modes

   of symbolic behaviour and image-interpretation (or encoding)

   trends. This information relates to formal elements, in

   their aesthetic dimension to provide a wider base for

   decisions on the formal configuration of ETV programs.

3.6 Communication-Patterns: Information output on
   ----
   communicational behaviors of the audience so as to tailor

   the ETV materials to the target group while considering ways

   in which the information will be received.

3.7 Observed Behaviour: Information on specific aspects of the
   ----
   ways an audience behaves (determined by needs of developers

   within a given project) so as to take specific decisions

   related to the ways of presenting the television materials.

3.8 Needs: Information on the educational needs of the audience.
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4. GUIDELINES ON PREVIOUS USAGE OF TV FOR SIMILAR EDUCATIONAL
   PURPOSES

   Information for taking decisions on alternative television

utilization strategies for educational purposes emerging from

previous experiences. This output can orient utilization

decisions.

As a final note on the Analysis component, when formative
evaluations have been conducted, the results are important not
only for checking the accuracy of the information provided by
the analysis efforts and the hypotheses emerging from them, but
also, and very importantly, because the characteristics of the
materials, formal and content-related, can be re-analyzed in
light of those results so as to identify particular failures or
achievements that were not thought of previously. This can be
the case of the ever-present side effects of televised
presentations that can sometimes be overcome or taken advantage
of when they are identified and corrected previous to a final
production stage. There are no established procedures for doing
this: an analytical and inquisitive mind are the only
requirements.

CHAPTER 4

DESIGN COMPONENT

The design of ETV materials is the first major decision making point in the process of development of educational television programees. It oan be conceived as a synthesis of the information gathered from the analysis stage and is the point where the hypotheses emerging from some analytical efforts can be tested through formative evaluation and research mechanisms. This stage receives the information and hypotheses coming from analysis as inputs and transforms them into outputs in the form of plans for production ("blueprints") or proposals for TV materials; these plans can also take the form of an initial script and a manual of policies and procedures. The design proposal of an ETV development system includes all the synthesized information regarding the form, content and structure of the ETV material.

Design Defined

Following the ideas of Starr (1964) used to define analysis, we can also explain "synthesis" with the principle of disassembly. Under this principle, analytic behavior has been explained as consisting of operations that involve division,

dissection and classification. Operations constituting the act
of synthesis are those of summation, integration,
classification, partitioning, and similar actions. Within the
context of systems, synthesis consists "of putting the parts
back together again into some kind of a whole" (Cook, 1969,
p.391).

Following this definition of synthesis we can conceive the
design of an educational material as the putting back of the
parts that make up the material that were separately analyzed in
a previous stage. The parts that are reunited are the form and
the content, together with a structure and all the aspects
belonging to each of these parts, i.e. aspects analyzed before.

In a sense the phrase "design of ETV material" is not a very
common one, because usually -that is in practice and not in
theoretical models- this component is considered as part of a
wide production stage. Sometimes the design stage is also
understood as a planning stage, which can be also an accurate
conception. Regardless of how it is understood or defined, the
design or planning or initial stages of production is
constituted by a synthesized operation of putting all the
information (or parts of a project) together into an organized
whole.

In the case of educational materials this putting back
together of the parts have to follow certain paths to achieve

its educational goals. These "paths" are the proper analysis of the ingredients in order to have information on the possible effects of each "ingredient" to make educated decisions aiming more consciously towards the achievement of the objectives set for the particular ETV material.

Traditionally the role of a designer of ETV has been to make plans about the utilization of the various components of a TV programme; in other words, to generate the "idea" of the program. Most of the efforts of instructional theorist have been to aid "designers" in their decisions, or conceptualization of "ideas" with information on the effects of certain choices. Such has been the case of the work by Fleming and Levie (1978) that will be discussed later.

More often that not the designer of the material has some role in the production stages, commonly even performing the role of producer or executive producer. The plans that he/she must make for the particular ETV project to follow, must be within the range of the educational effects that the material, form and content, can produce. This is where design constitutes a synthesis, when the information on the characteristics of the programme and their implications in learning can lead to adequate choices for integrating a product, an educational television product. Certainly a designer can work without information coming from an analysis of the ingredients of a presentation, but his decisions will not be based on a study of

the educational implications of certain choices and, probably,
the resulting material will be diffused in terms of its definite
orientation to the achievement of an educational goal. Any type
of visuals, more or less organized together and transmitted
through TV can constitute a television program, and even some
people can consider them educational; but the distance from that
to a deeply organized and produced program under rigorous
educational methodologies is substantial. The above comparison
is the same between a teacher that stands in front of a class
and speaks of whatever comes to his/her mind and an other that
prepares educational sessions with a class following precise
instructional analysis and design methodologies. Another factor
which comes into play here is the creativity of the individual
teacher or, in this case, designer; which is something not
considered here. Education needs less improvisation and more
rigorization.

Returning to the definition of design, some ideas presented
by Fleming and Levie (1978) can help to clarify the concept. For
these authors the explanation of design is the following:

> "Design refers to a deliberate process of analysis
> and synthesis that begins with a communications
> problem and concludes with a plan for an operational
> solution. The process of design is separate from the
> execution process. That is, message design is
> conceptually distinct from the eventual act or event

of communication or instruction" (p.ix).

In the ideas of the authors cited, the design of ETV material begins with a communication problem, that can be the need or mandate to make a programme on something, and concludes with a plan for an operational solution: a plan for a specific programme with specific characteristics -or arrangement of its elements- for a specific audience. For Gagne (1977) the role of an instructional designer is precisely that, the arrangement of the instructional events and the planning of the instruction, or in our case, the arrangement of the variables that constitute an ETV programme, the planning of instruction through television.

Then, the role of a designer is the arrangement or synthetization of the elements of ETV material into an organized whole that constitutes an operational solution to the educational problem. As Fleming and Levie (1978) put it, "what a designer can do...is the manipulation (choice and arrangement) of message variables" (p.xi). The choice of adequate message variables can be definitely aided with proper information gathered in an analysis stage and from information on the results of formative evaluations on questions concerning the use of specific elements, emerging also from analytical activities.

These processes of synthetising and manipulating information, or arranging message variables, is definitely a creative enterprise but it also can be helped by a scientific approach, that is, by an effort to apply appropriate research

findings from the behavioral sciences and practice of TV production, as is the basic assumption of Fleming and Levie (1978), on the use of science for the design of instructional materials.

The assumptions that the designers can follow certain research findings in their activities have lead a number of researchers in the field of learning from instructional materials to attempt to formulate "principles of message design" that, hopefully, can be used as methodological tools. The use of these types of principles is discussed in the following section.

The Search for Principles of Message Design

As expressed before, the search for principles for message design has been conducted by a number of researchers in the field, such as Gagne and Briggs (1965), Palmer (1974), Fleming and Levie (1978) and others. This activity is the result of an effort to apply scientific methods to the design of instructional materials and to adopt a certain theoretical-scientific background in this activity.

As is commonly recognized, the search for theories in the social sciences can not attempt to be as rigid as in the so called exact sciences. In exact sciences the search for absolute principles is feasible when in social studies, education being one of these, absolute theories and principles are quite rare.

The search for theories and principles in the realm of
instruction, then, should be guided more by the ideal of
applying science findings to the practice of instruction than to
the explanation and prediction of performance or to the
formulation of absolute principles. In any event, the use of
generalized research findings from the behavioral sciences to
the design of instruction (as Flemming and Levie refer to this
activity) is more suitably conceived as a guide for
practitioners than as an attempt to create definite
instructional theories.

One of the most comprehensive summaries of principles of
instructional design is given precisely by Flemming and Levie
(1978). The principles they present summarize the outcomes of
research on various fields, and the authors contend that

> "as summaries of numerous controlled 'experiences', such
> principles are likely to be more reliable than one
> designer's experience" (p.xi)

They also warn that

> "the complexity of practical instructional problems is
> far greater that can be adequately encompassed by
> present-day research-based principles of human behavior,
> and many of the instructional designer's problems have
> not been investigated scientifically. Adherence to the
> procedures and principles offered in this book will not,

automatically result in better learning, and these ideas
are not offfered as substitutes for experience and
creativity" (p. xii)

The principles are divided in four categories, and each
category in its turn comprises a number of subcategories that
respond to the trends of research in each category. It is useful
to review this categorization of principles because it can
inspire some procedures when designing ETV materials, bearing in
mind the warnings of the authors and the results of the analysis
and formative evaluation activities. The main categorization is
presented here for explanatory purposes:

1. Perception Principles

   - Basic principles

   - Attention and preattention

   - Perceptual elements and processing

   - Perceiving pictures: objects, pictures and words

   - Perceptual capacity

   - Perceptual distinguishing, grouping and organizing

   - Perception of size, depth, space, time and motion

   - Perception and cognition

2. Memory Principles

   - Basic principles

   - Acquisition of associative learning

   - Consolidation of associative learning

- Discrimination learning

- Observational and motor learning

3. Concept Learning Principles

- Types of concepts

- Selection of examples and non-examples

- Prerequisites and instructions

- Presentation of examples and definitions

- Sequencing of examples and definitions

- Consolidation and confirmation of concept learning

- Problem solving and creativity

4. Attitude Change Principles

- Source

- Message content

- Message structure

- Channel

- Receiver

The revision of the principles included in this summary can help a developer in the design stage to obtain some ideas and to contrast results of the previous analysis. They should not be contemplated as rules, but as practical suggestions when viewed under the constraints and characteristics of the specific situation of the material being developed.

As mentioned in the introduction of this thesis, the CTW model (Palmer 1974) attempts to formulate principles of program

design from the results of their own formative research
operations. This is a very sensible approach because it attempts
to formulate valid principles only within the particular
situation of children programees of the type of "Sesame Street"
without attempting to generalize to all kinds of educational
television material. This is an approach that should be followed
by ETV projects, if they have the resources to do so.

Because there is such a close relationships between the
characteristics of the learners (audience) and the form and the
content of the programs, it is very difficult to adopt
"universal principles" such as those proposed by Flemming and
Levie. Their principles can be used only under specific
settings. A better approach, if circumstances so permit, is to
develop particular principles under the specific situation of
the unique form, content and audience of the individual ETV
project being developed, while considering the general
principles as a posible source and perhaps even as a
corroboration of them within the context of the project with
further formative evaluation mechanisms. In this sense, instead
of attempting to propose universal formulae for program design,
the developers can attempt to integrate suitable formulas for
their particular projects.

Any specific program design formula, plan or "blueprint"
should consider the integration, or synthetization of the
aspects analyzed before. Those plans or blueprints can be

expressed in the sub-components: form, content and structure
that correspond to the main grouping of the elements of a TV
program.

The formulation of project-specific principles with the
information obtained from analysis and formative research and
the operationalization of them into a concrete plan of a TV
system are the basic functions of the design stage of an ETV
development process, or, in other words, they integrate the
elements of the particular program being developed (form and
content elements) into a meaningful whole for its audience so to
achieve its educational goals.

As these design processes are to a great extent a creative
task, it is difficult, perhaps even useless, to try to
establish algorithms or rigid step-by-step procedures to guide
the activities that should be followed during a design stage
because every design enterprise is immersed in a different
situation. It can be said that design is an heuristic rather
than an algorithmic activity. As a result it is more useful, as
a methodology, to suggest broad sub-components of a material to
be designed so as to allow ample room for action for each
individual designer. This is the reason why this chapter has
examined the following three broad aspects of form, content and
structure with no detailed methodological procedures.

The aspects that should be synthetized or integated into
design plans, strategies, principles, policies or formulas -all

refer to the same notion of "plans"- under the three
sub-components of design which follow.

Design or Planning of the Form of an ETV Material

The design of the form is a synthesis of the decisions
taken from the information emerging from the aspects of analysis
regarding the form of the program, such as production variables,
symbolic codes, aesthetical elements and structure of content,
and then relating them to aspects of the audience analysis, such
as entry behavior, cognitive functions, mental skills, cultural,
and communicational patterns. The decisions taken from this
information constitute the basic aspects of the form of a
message.

The plan for the form of an ETV material will dictate the
"video" portion of the scripts, that is, the way the content of
the program will be expressed visually and the way the
auditorial content will be presented. The plan of the form of a
program can take the approach advocated in Principles of Message
Design for the particular case of the ETV materials to be
developed for the given target audience. The decisions taken
concerning the form that the materials should make up the major
guidelines for the production strategies that are to be followed
when making the program.

Once the form is decided, there should be specific

guidelines on the use of the following elements of the form, in
the particular situation of the materials being developed:

1.1 PRODUCTION ELEMENTS

,The plan of the form of an ETV material should contain
guidelines on the specific production variables that should be
used during specific parts of the material, depending on the
specific learning functions (attention, perception, storage,
etc.) desired to be covered by the individual parts. At this
point the information coming from the analysis and formative
research on the cognitive functions of the viewer, production
variables and a revision of "principles" constitute particularly
useful information.

The plan should also contain guidelines on the elements,
that should not be used due to lack of adequacy to audience,
content or cognitive functions. •

1.2 SYMBOLIC CODES

Although in real terms the symbolic codes are somehow
contained within the production variables, they should be
planned as separate entities because they relate to the mental
skills of the viewer that are going to be either called upon to
interpret the material or attempted to be developed with it

(Salomon 1979). Basically the decisions on this point should be taken with the information coming from the analysis and formative evaluation on symbolic codes, mental skills of the viewer and entry behavior referred to level of visual literacy. These decisions are particularly important for adapting the form of the program to the viewers' schemata, when attempting to use TV for developing certain mental skills. The decisions taken under this category constitute guidelines on the symbolic codes, or elements, to be used in the program for relating them to the mental characteristics of the viewers.

1.3 AESTHETIC STRATEGIES

Although also deeply related to the production variables, it is useful to plan the use of the aesthetical elements differently so as to propose adequate strategies on which elements to use to "intensify or clarify" (Zettl 1973) specific parts of the content of the program. The information coming from the aesthetical analysis and formative research on the cultural and communicational patterns of the audience is of good use here for taking the decisions needed and planning the aesthetic strategy of the TV product. The information emerging from the analysis of the potentials of TV for delivering contents is also useful for proposing that "isomorphism" between what is said and how it is said (Arnheim 1969) with the capabilities of the television medium.

1.4 STRUCTURE OF CONTENT

The decisions on the specific structure given to the
content of the TV program being developed are taken with the
information from the research and analysis in the areas of
TV-content functions, TV-potential uses, aesthetical, structure
of content and TV strategies analysis. The decisions taken
integrate the plan for the structure of the material; that is,
the "genre" (drama, news type, etc) assigned to the material,
the aesthetical strategies used to "envelop" that structure and
the potentials of the TV medium to be emphasized with that
structure.

This sub-component refers to the "form of the content" as
Hjelmslev (1963) refers to it, meaning the semantic structure
that is added to the content of the material. This subcomponent,
understood as the "form of the content" should be differentiated
from the overall structure of the material, that is, the
integration of form and content that will be presented later.

1.5 AUDIENCE RELATED PRINCIPLES

This general category of design is concerned with the
decisions taken to plan the adaptation of the form of the
material to those characteristics of the audience that are not
contemplated in previous type of decisions. These
characteristics, like the ones analyzed in the aspects of

communication and cultural patterns, behaviour, and
environmental analysis have to be taken into consideration when
deciding on the plans that the form of the material should
follow.

Design or Planning of the Content of ETV Material

The design of the content synthesizes the information
yielded by the analyisis and research on areas related to the
content of the presentation. The plan of the content of the
material should contain the decisions taken regarding the
objectives, enabling objectives and sequence of the content
(sequence of the task or topic presented), the level of the
presentation and the adaptation of the content to the
capabilities and limitations of television.

This design or planning sub-component integrates the
subject matter of TV material. It usually takes the form of a
"literary script", that is, a script of the written content of
the programme.

2.1 INSTRUCTIONAL SEQUENCE

The design of this aspect integrates the objectives of the
material, the enabling objectives, the sequence of presentation
of the content, the strategies and the methods of presentation

of the content, the strategies and the methods of presentation subjects. For taking these decisions it uses the information from the analysis and research on the areas of instructional analysis, TV content functions analysis, structure of content, cognitive functions analysis, and audience needs analysis. As said before, it synthetizes the subject matter of the material, the "what is to be said", in a proper way according to the characteristics of its audience.

2.2 INSTRUCTIONAL LEVEL

This aspect relates the subject matter of the program to the level of knowledge and language development of the audience, in other words, to the entry behaviour of the viewers. In order to do so decisions based on the information obtained from the areas of entry behaviour analysis, cognitive functions, needs, and environmental analysis have to be taken into account. These are of vital importance to adapt the content to the level of the audience.

2.3 ADAPTATION OF CONTENT TO TV POTENTIALS

Once the subject matter, with a particular sequence and level, has been decided upon, it is important to have in the plan of development of the material considerations regarding its specific adaptation to the limitations and advantages of TV. In

order to make these decisions, special consideration should be given to the information obtained from the TV-potential uses analysis and from the aesthetical analysis, especially from the considerations on the effects of the "visualization" of the subject matter.

This design stage is usually carried on with a revision of the "literary script" and the decisions on the form of the program having in mind the task of "how would this be better said through television"; of course, economical and resource limitation factors have an important role here.

Design or Planning of the Structure of the ETV Material

The design of the structure of ETV materials is the final integration of all the elements of the form and content into a coherent, organized and concrete plan that can take the form of a proposal, scripts, manual of policies and procedures, or any other design "blueprints" useful to carry on the project during the production stages. In a sense this stage integrates all the information from analysis and research stages into the final plan of the project, and in doing so it reunites all the decisions taken during the design stage.

Following the suggestion of considering the ETV project as a system, this is the stage when "the study of the tree does not loose sight of the forest"; that is, the plan for the production

of a material should always consider its immersion into other systems, such as the broadcasting organization, other programs, political situation, educational oportunities, etc. In doing so all the pertinent information coming from the analysis of TV strategies or any other area of analysis (especially audience) should be considered.

This final design aspect integrates the "blueprint" of the educational material that is going to be built. Now, this might sound simple and straighforward when it is not. The decisions to be taken by a developer of ETV materials concerning the design of a program are not an easy task to perform, and no-matter how accurate the information obtained from analysis and research is, there are still many different approaches, or routes that can be taken in a design stage. The value of information is that it helps in the processes of decision making, it does not supplant those processes or eliminate the role of the decision-taker. The decision-taker, in our case the developer of the materials, has the final responsibility for the selection of alternatives.

The development of ETV materials is a human enterprise and a human being cannot be strictly confined to information when he is about to take a decision; there are other factors that take a part in the processes of deciding, such as previous experience, feelings, intuition and creativity. These four aspects should be part of the repertoire of attributes of an instructional designer.

It is not meant to say that those factors are more
important than the information obtained with a methodological
approach to the development of TV programs. The type of
information needed to be considered (as proposed in this thesis)
is definitely important especially in the case of educational
materials. What is meant is that information cannot supplant the
creative mind and the experience of a producer or developer. On
the other hand, the creativity and experience of the developer
can be deeply oriented with the information and procedures
gained from a methodological approach for making educational
television programs.

Outcomes of a Design Component

The output of this component is constituted, basically, by
detailed plans or "blueprints" for the production of ETV
materials. Such plans synthesize the information analyzed and
obtained from formative evaluation and research integrating the
elements of the programs being developed into ETV products
adapted to the characteristics of their audience and addressed
to achieve their educational goals. Depending on the level of
magnitude of each ETV project, the design plans will be more or
less accurate, detailed and specific. These plans can take the
final form of project-specific design principles, proposals,
integrated scripts, and/or manual of procedures and policies.
Any of these should be expressed in terms of, or include,

decisions on utilization strategies of the aspects integrating each of the sub-components identified:

1. Form

2. Content

3. Structure

1. FORM

The plans of the form should contain the details of the decisions taken with respect to the utilization of the formal elements of the TV material. They should include specific decisions on the use of particular Production Elements, Symbolic Codes, Aesthetic Strategies and Structure of Content Strategies.

2. CONTENT

Provides plans for the specific presentation strategies with which the content should be delivered. It usually takes the form of what is called a "literary script" that integrates the subject matter of the programs, with a particular sequence, level, presentation method and strategy and adapts them to the potential capabilities of the television medium.

3. STRUCTURE

Provides plans for the final integration of all the formal elements and content aspects to the characteristics of the

target audience. These outputs usually take the form of final proposals, scripts, manual of policies and procedures or any other design "blueprints" useful for carrying on the project during the production stages.

The design outputs constitute the educational and technological efforts of integrating scientific findings and procedures to the practice of ETV materials development. This goal was the initial spark that motivated the integration of the methodological approach towards ETV development presented in this thesis. It is the stage where Instructional Theory can aid in the development of ETV materials. The other decision-making component, production, will rely more on the skills of the production team than in "Instructional Science" as is the case of this design component.

The design component continuously synthesises information and takes decisions, according to the information inputs being recycled by formative research, evaluation and analysis so as to feed new plans and procedures to production.

CHAPTER 5

PRODUCTION COMPONENT

Production is the second main decision making component in the process of ETV development proposed in the model. It receives the design proposal or plans as an input and transforms it into an actual TV product. The decisions to be taken at this stage are oriented by the design variables and take a practical shape, because it translates proposals into images and sounds.

This translation of proposals into images and sounds to compose a television program is a very creative process that is heuristic rather than algorithmic. It can be futile to attempt to systematize all the procedures that should be followed when producing a televised material. Certainly many authors have attempted to do so and confine the processes of ETV production to strict rules; their failure has contributed to the famous "gap" between producers and theorists (researchers or educational techologists) in the the field of educational television. What a producer can benefit from in a methodological approach to ETV development is the analysis, design and evaluation tools that are used to orient the TV material to its educational function.

The production of TV materials, the actual "making" of a television programme, is much of a craft; that is, it has many accepted rules for proceeding that have to be learned by a practitioner before attempting to make a program and obtain a proficiency to allow him/her to actually break them. It is not the purpose of the model in this thesis to make a summary of all the techniques that make up the practice of TV program production but to insert this practice as a stage of a methodological procedure that conceives the development of TV materials as an educational process that can benefit from the application of science findings and techniques (basically analysis, research and evaluation). Experience and creativity are the tricks of the trade of a television producer, no matter what the intention of the product, e.g. educational, promotional, political, commercial. These "tricks" can be guided by information obtained from analysis, research and evaluation to aid the specific decisions that have to be taken, but can never be supplanted, nor can the "techniques", needed to be followed when making something (as is the case of the various techniques needed to record a television programme). Just as the physical processes of building a highrise are the same when it is going to be used as apartments or as a hotel, the procedures for production are the same in spite of the different purposes for what they are made. What does differ, both in buildings and in TV programs, are the plans, the designs, the "blueprints".

In the context of education the differences in the program
development process with respect to those of commercial programs
rely more in the analysis and design stages than in the
production ones. The actual making, the "recording-editing"
techniques are basically the same; the only difference being
that the educational implications should always be in mind when
recording and editing the materials.

Traditionnaly the production of a television program has
been conceived as the manipulation of the visual and aural
elements that make up a TV presentation. This manipulation
involves lighting, camera direction, graphics, sets, actors,
music, effects, etc. according to a previous plan. The
educationist has much to say in the stages of development of
those plans (analysis and design) but almost none in the
production process, in the creation of the images and sounds.
What is meant here is that educational technology can contribute
to integrate methodologies applying science to orient the
development of educational television materials to achieve
educational goals; what it cannot do is to say to a TV craftsman
how to move a camera, direct an actor, compose a set, etc.

The skills of the producer -managerial, technical, human-
assume large role in in this component and, as suggested
earlier, it is somewhat futile to systematize them because each
individual and organization has their own approaches. The
decisions to be taken during these stages usually are referred

to available resources and the use of them to fullfill the plans
integrated in the design proposals.

It is inuous to think that all the possible variables
that take place in the production of an ETV material can be
covered in the analysis and design stages; many new issues.
emerge (usually in the form of doubts) as the material is
actually being developed; this is one of the reasons why the
process of development of ETV materials is a dynamic one that
follows the stages over and over again making use of analysis
and evaluation approaches to make continuous decisions when
planning and producing programs. It is commonly the case that
specific information needed to take a precise decision is not
contained in the analysis proposal, nor contemplated in the
design plans; further analysis, research or evaluation can be
conducted to fulfill this information need, and take a new
decision to re-design and re-produce a specific part of a
material. A methodological approach to ETV development is a
cybernetic system that monitors and corrects itself through
continuous analysis and evaluation.

There are many valuable handbooks that describe the major
production activities. Those manuals constitute useful
consulting tools when a specific technique is desired to be used
in the production of a programme. There are various levels of
manuals, from the very technical to the introductory. The
middle-range are useful to both the beginner and experienced, to

the former because they describe the major techniques, to the latter because they can remind or give new insights. One such manuals is that one written by Millerson (1972) that provides considerations and practical techniques on the following aspects of TV production:

- Television cameras
- Picture control
- Television lighting
- Television sound
- Film reproduction
- Television settings
- Television make-up
- Productional organization
- Production treatment
- Productional imagery
- Camera control
- Picture composition
- Editing
- Aural composition
- Television production methods
- Graphics, titles, captions
- Visual and aural effects
- Color television

The manipulation of these and other factors constitute the activities of production. Other manuals, such as Combes and

Tiffin (1978) use a systems approach to systematize all the
activities of a production of a program. It has the value of
integrating many different areas and contemplate planning and
preparation stages within the production phase, but it might
be too structured for an experienced producer. These and
other manuals are useful references for the specific techniques
of television production.

The importance of including a production component in a
methodological approach to ETV development is not a description
of techniques for lighting, recording, editing or whatever (that
can be found in those manuals), but the use of the information
emerged from the analysis of aspects translated into decisions
on the design of programmes. These decisions guide the use of
the production techniques for specific educational purposes.
Major decisions during the production stages can be aided with
proper information obtained through analysis or formative-
research and evaluation.

As said already, the production techniques or procedures
vary from project to project and from individual or organization
to individual or organization. It is obvious that the procedures
followed when producing a documentary-type program with one film
camera are quite different to those of a drama-type program
recorded in a TV studio full of actors and technicians. The very
nature of each production dictates the specific procedures that
should be followed. Again, the intention of this thesis is not

to algorithmatize the various procedures followed in the different types of productions. Such an attempt is, again, out of the scope of this model. Attempts like those have been followed by authors like Adagala (1977) and Combes and Tiffin (1978), and the problem with those procedures is that, although they can result in very useful guides, they do not have sufficient variety to allow for the numerous particularities that each different production may have. Again, the production processes are heuristical rather than algorithmical. The approach of this thesis is that models for the development of materials can aid producers and developers to seek methods to obtain information in order to make proper decision according to the educational intentions adhered to their products, not to offer the precise steps that should be followed. Television programs are produced by creative human production teams that act upon the plans emerging from the analysis and design stages with their capacity, experience and knowledge within the limits imposed by the constraints of resources and budgets.

For the explanatory purposes of this thesis the production process has been broken in four separate phases:

Pre-production

Pilot production

Production (recording-shooting)

Post-production

It is not meant that all the productions should follow this same line; rather it is proposed because it is an useful approach for relating production to the information-gathering stages of analysis and formative evaluation and because it is a common separation of phases followed by many types of productions.

PRE-PRODUCTION

This phase refers to the planning stages of production. It is the time when the plans from the design stage are translated to physical procedures. The scripts become adapted to the circumstances of the production and the policies are integrated into procedures. The scripts are transformed into specific "blueprints" that contain the description of the specific treatment that is to be given to all the elements of a television program (visual and aural) that have been analysed with various viewpoints. The scripts, the guidelines of the further production phase, should include at this point all the form and content aspects of the program, but not necessarily in a technical fashion (that is with blocking of actors, camera comands, etc. that are technical decisions belonging more to the next production phase).

Production schedules are set and major decisions with the aid of information coming from analyis (and synthesized in design) such as type of sets, casting, wardrobe, graphics, etc.

are taken. Particularly useful at this stage is the information
gathered with the analysis of production variables (performer),
aesthetic elements, structure of content, instructional, TV
potential-uses, cultural patterns and behavior. Of course all
the other information emerging from the other type of analysis
is relevant because it is already included in the design
proposals, but the information coming from the analysis
mentioned above is useful to be reviewed again in this phase to
accomodate specific decisions on matters such as actors, sets,
etc. The information coming from formative research is
particularly useful here.

PILOT PRODUCTION

Refers to the experimental production of whole or part of
programs with the aim of testing them formatively before
actually engaging in a full scale production. This is a phase
that is not followed in all productions, nor in all ETV
organizations, mainly because of budget and time limitations. In
the organizations where it is used, such as TV Ontario, it is
used somehow as a safety valve to test the initial materials of
a series and see how effective they are on a sample of the
audience. This stage is actually the same as that following one,
with the exception that the materials are "produced" for testing
with the aim of correcting them or the rest of the programs in
the same series.

This phase is deeply interlinked with the formative research and evaluation subcomponents that are explained in the next chapter. It can be considered as a "first try" of the plans expressed in the design proposals to observe how they behave in the real situation, in other words, to determine the accuracy of the plans.

PRODUCTION (Recording-shooting)

This is the actual production phase when the information gathered from analysis, research and evaluation and synthesized in the design proposals is put to practice. It is the time when the plans of design and pre-production are translated to the "reality of celulloid or videotape". It is the final integration of the "pictures and words" that materialize the educational aims of an educational television material.

This phase relies heavily on the skills of the producers, directors and production teams (technicians, assistants, cameramen, etc.) in the handling of the various techniques that make up the practice of television or film production. Regardless of the type of program, this is the moment where the very important decisions of the "transformation of script lines to two-dimensional reality" are taken. In practical terms, the technical decisions to be taken can be grouped into six categories (Millerson 1972):

1. Lighting

2. Camera positions

3. Sound pick-up arrangements

4. Rehearsals

5. Scripts (technical)

6. Production control (organization, cueing, etc.)

The decisions, the choices taken by the producers during the technical putting-together of the television material, can be aided, or oriented towards the educational goals and characteristics of the target audience with the information gathered before. It is important to remember that the components of the model presented are not static stages but continuously-interactive components that provide information at the moment it is needed for taking decisions.

Of particular usefulness during this phase is the information obtained through the analysis of production variables, aesthetic analysis and symbolic codes, information that should be in the minds of the production team when recording or shooting the visual and aural stimulae. Other information to consider is that emerging from TV potential-uses, cultural and communicational patterns, as well as that coming from formative research.

POST-PRODUCTION

This phase refers to the final integration of the material recorded or shot (produced) into a final product. This phase can be considered as part of the previous one, and in fact it is, but is presented separately to indicate a final moment in the production of ETV materials when the advantages of the information gathered in previous components can still be used to shape the final aspect of the educational product. In this phase some aspects of the programs can still be changed according to information from research and evaluation (also from those activities in the context of pilot production) and from analysis, particularly from aesthetics (especially from montage and editing principles), cognitive functions, instructional, TV functions and potential uses.

This phase can be considered as the final stage of a production, that is, the editing, although in some cases there is no editing (live programs for example). This stage is also considered separately from the previous one because the actual organization or manipulation of the visual and aural material created in the production phase is very important for the educational orientation of the programme, and as such, this aspect should follow more closely the educational guidelines contained in the design proposals integrated with the information stemming from analysis. The phase is proposed separately because, in those cases when editing is available, it

is the time to reconsider many of the features of the program recently gathered technically and structure them with the educational aim in mind. Quite commonly, this can be put aside during the production phase due to pressures comming from the many aspects inserted in the technical "making" of a television programee.

The post-production phase can be considered as an analysis of the material produced to check if it conforms to the plans emerging from the design component. It should not be confused with evaluation because it is more like an examination of the program to see if all the elements analyzed and decided as being important in the design are included, "are present" in the ETV material, and, if there is still a chance, restructure the material towards those educational goals.

Outcomes of a Production Component

The outcomes of this component are the final goal of the ETV development process, the tangible television products that integrate the educational aims, objectives and characteristics appropriate to the circumstances in which they have been developed. That is, ETV programmes developed so as to be adequate for its audience and appropriate to the educational function to which they have been assigned.

Hopefully, after following a methodological approach in the development of ETV materials (Analysis, Design, Production and Evaluation in a continuous interaction) the final program fulfills a series of requirements that makes it an "educational product", emerging from an "educational process", that applies science to practical purposes. Such constitute the roles identified from an educational technology point of view for the development of TV materials.

CHAPTER 6

EVALUATION COMPONENT

Evaluation is the fourth component of the methodological
model presented. In real terms it is not the last component of
the ETV development process (except when summative as will be
explained later). It is not a task that follows the previous
three components or stages but is deeply embedded in each. It is
formulated as a separate component for organization and
clarification purposes but in practice it is integrated with the
previous three components.

When in the introduction of the thesis it was said that
this model follows an "integrative approach" towards evaluation
it was meant that the view of evaluation favored is that coming
from the standpoint of the developers and producers of ETV
materials, that is, a conception of the role of evaluation as a
component -an information-gathering component- that is there in
the developmental processes to respond to specific information
needs of developers and producers. This is fundamental in an ETV
development system where evaluation constitutes the major
feedback loops that reintroduce the information obtained from
"asking or testing the viewers" -in a broader sense, that is,
relying not only on their opinions but on all kinds of
information (such as performance in memory tests)- to obtain

clues on the possible effects of the materials, or parts of them
on the viewers.

Before going any further in the discussion on the role of
evaluation, it is useful to stop for a moment to define the term
evaluation.

Evaluation Defined

Traditionaly evaluation is understood as the assesment of
the value of something. A common and simple definition is that
provided by Scriven (1967) stating that evaluation is an
assesment of the merit of something. In terms of educational
television, it can be the assessment of the educational merits
of TV materials.

There are many other definitions of evaluation that attempt
to be more specific than the one just presented. Recently Berks
(1981) made a revision of various definitions of the term and
concluded that what is common in most of them is that
"evaluation is a process of providing information for decision
making" (p.11) with the use of scientific research methods. In
an attempt to formulate a core definition, he proposes the
following:

> "Evaluation is the process of applying scientific
> procedures to collect reliable and valid information
> to make decisions about an educational program" (p.12).

This definition is of wider scope than the first proposed and is congruent to the basic guidelines of the methodological approach to ETV development presented here that aims to propose tools for helping decision-making processes by producers and developers. It is also in line with the role of educational technology identified before of applying research principles and procedures to educational purposes; in our case, to the development of ETV materials.

Following Berk's definition and applying it to educational television, we can derive three major considerations on evaluation inserted in the ETV development process:

1. That it has to apply scientific procedures. In our case it implies the use of scientific methods of evaluation emerging from social sciences, particularly from educational psychology.

2. That it has to collect reliable and valid information. In other words, the information obtained from the audience or other sources should be reliable and valid regardless of the instruments with which it is collected, that in the case of television are varied.

3. That it is meant to make decisions about a program. That is, it should be oriented towards the information needs of producers and evaluators in making decisions on different aspects of progra (change parts, orient,

utilization, etc).

These three considerations should always be observed in the methods used to evaluate ETV materials. There is another factor of evaluation that is not clearly stated in the definition but certainly implied: the usefulness of keeping in mind that evaluation is also concerned with the "effectiveness" of the TV material; that constitutes vital information a developer needs to decide on the utilization of programs according to their major "merits", as Scriven has said. In this sense the definition provided by Scriven compliments that of Berks.

Once the term "evaluation" has been defined a consideration of the role it plays in the ETV development processes logically follows. It has already been said that it constitutes the feedback loops but this needs to be extended. The precise role of evaluation, of this "use of scientific procedures to provide reliable and valid information for decision-making on aspects of the programs", is identified differently by various authors. "Evaluation is emerging as a discipline in its own right" comments Scriven (1974), one of the leading authors in the field. This emergence of evaluation implies that it is a field that has been deeply explored, both by researchers and practitioners -that in this case are often the same people- and that the literature on the subject is vast and sometimes divergent. Authors like Stake (1967), Thorndike (1969), Scriven (1967,1974), Borich (1974), Popham (1974), Anderson and Ball

(1975), among others, have enriched the field of evaluation in numerous aspects, including the various roles that an evaluation effort should play within a development process. These and other authors have proposed different models, checklists, algorithms, etc. that, while attempting to guide the procedures and practices of practitioners, have also contributed to the confusion of the roles or approaches that should be favoured in the practice of evaluation.

One of the best ways of understanding the role of evaluation for its succesful use in an educational development task is to analyze the various existing methodologies in light of the major types of evaluation modes. This can be done by considering the contributions of the main models of evaluation and "translating" them to the particular case of educational television material evaluation. The selection of the evaluation approach depends on the information needs of the developers and producers and, although some approaches offer more possibilities for obtaining useful information than others (as will be seen in the next section), still the decision on which approach to follow relies on the particular information needs of the ETV project being developed. The multi-level concept applies also here in that the level of magnitude of the ETV project (and correspondingly, the resources allocated) determines the approach and level of the evaluation component of that development task. Evaluation is another of the useful tools that producers and developers can -and should- use to obtain

information for making specific decisions.

In the next section a review of the major models of evaluation, based on the ideas presented by Popham (1974), is presented giving some consideration to the usefulness of each at different levels of evaluation in ETV development efforts.

Major Models of Evaluation

According to Popham (1974) the models of evaluation can be grouped into four types of models:

Goal-attainment models

Judgemental models emphasizing intrinsic criteria

Judgemental models emphasizing extrinsic criteria

Decision-facilitation models

The four are useful for understanding different roles for the evaluation of educational television materials but differ in the utility of the evaluative information on different stages of the development process.

1. GOAL-ATTAINMENT MODELS

These type of models conceive evaluation basically as a determination of the degree to which the goals of the programs were achieved. These models were the most popular in the past. Tyler (1930) was one of the early advocates and he proposed a

general approach to evaluation that involved the careful
formulation of the goals of the educational programs so as to
translate them into measurable (behavioral) objectives. What
these models aim to measure is the performance of learners at
the end of an instructional program in order to see the degree
to which the previously set objectives of the program were
achieved.

This approach towards educational evaluation was the one
that prevailed in the days when television began to be used as
an educational medium. There is no wonder then that this was the
early approach to educational television evaluation. It still
prevails in the thinking of many people that view evaluation
only as a measure of the attainment of the objectives of the
materials. This conception of evaluation is only a part of the
range of usefulness of evaluation. In more recent approaches
towards evaluation this conception of goal-achievement has been
included as a part of the role of evaluation, renaming it as
summative evaluation. There are more models of this type other
than Tyler's. Hammond (1969), for example, proposed a model that
attempted to include institutional or instructional factors that
might be relevant when considering the degree to which the
objectives are achieved, keeping the basic notion of goal
achievement as the basic orientation of evaluation.

The important aspect of these models is the measurement of
the level of attainment of objectives. As said before, this

approach is useful but limited.

With respect to ETV development this role for evaluation of measuring the level of achievement of objectives is an important one, especially if the programs have specific objectives, expressed in behavior terms, that the learners must master for a particular reason (as the case of a training situation). This role of evaluation, however, does not cover all the help that evaluation can bring to a developer or producer of ETV. This type of evaluation can be understood as summative evaluation, and is included as a part of other models that will be explained later.

2. JUDGMENTAL MODELS EMPHASIZING INTRINSIC CRITERIA

These types of models are basically concerned with the professional judgment of the program, that is, with the evaluation of the educational programs by experts or professional practitioners. The evaluator and his/her opinions and experience, play a major role in the nature of the evaluation and it is his/her judgement that determines the evaluation.

These basic guidelines of the judgmental models apply both to the ones empasizing intrinsic criteria and those emphasizing extrinsic criteria. The basic difference is the aspects or factors that are going to be judged. In the case of intrinsic

criteria the factors judged are precisely those that are "intrinsic" to the object being evaluated, as for example, style, color, music, etc. of an educational material.

One important characteristic of the intrinsic models is that the factors to be evaluated can be categorized or specified in advance so that the expert evaluator can judge on specific factors that are of interest for the particular project being evaluated. A common example of the utilization of these models of evaluation is the "accreditation" style of educational evaluation where an evaluator or "inspector" evaluates schools according to specific criteria set in advance, such as professional level of teachers, instructional materials used, number of students per class, etc. Although it can be argued that this type of models leaves ample room to the subjectivity of the evaluators, they are nevertheless useful in particular instances depending on the level and accuracy of the evaluative information desired.

In the case of ETV this type of evaluation is quite useful in some situations because it takes advantage of the experience of expert producers, subject matter specialists or educators to judge the educational potential of parts or whole TV programmes. The subjectivity can be avoided somewhat by specifying in advance the intrinsic factors of the programme to be evaluated in every particular case -according to the doubts and/or information needs of the development project- as can be

aesthetical elements, language, graphics, etc., and ask more.
than one expert to judge the material separately. There have
been some cases where checklists are created with the specific
factors that are to be evaluated and distributed to a board of
experts asking them to rate with a scale (e.g. 1 to 5) the
particular merits of the TV programme in each of the factors
subject to evaluation. In this way the experience and opinions
of experts (producers, educators, trainers, subject-matter
specialists, etc.) can be quantified and incorporated in the
evaluation processes of an ETV development task, not only in the
final "merit or objectives assesment" phase, but in early stages
when some educational TV strategies or methods are to be tried
before including them in the final product. This certainly might
included in what is called "formative evaluation" which will be
explained later.

Very often an experienced educator or producer can judge
the merits or possible effects of a programme, just as an
experienced writer can judge the merits or possible acceptance
of a book by the public. The value of including this type of
evaluation in some ETV development projects is to allow the
experience of educational producers to take an evaluative part
in the whole process. Producers can also constitute evaluators
of the intrinsic merits of educational television programmes
because their experience have taught them very often what is
good and what isn't. These ideas should not be misinterpreted as
saying that the evaluation of intrinsic factors by professionals

is sufficient as all the evaluation needed in an ETV project; it
is meant that professional judgment of physical, maybe formal,
aspects of the materials is another valuable source of
evaluative information that can be used to take specific
decisions when developing ETV materials. Again, the nature of
each ETV project determines the types of evaluation needed.

It can be said also that, although useful, this evaluative
information is limited because it does not take into account
other types of evaluation, such as information coming from the
reactions of the audience to the material.

3. JUDGMENTAL MODELS EMPHASIZING EXTRINSIC CRITERIA

These types of models are quite useful in ETV evaluation
and are probably the ones most used. They follow the basic
guidelines of the previous (intrinsic) models with the
difference that they are concerned with the "extrinsic" factors
of the programs. Those extrinsic factors are the effects of the
educational programs, their educational impact upon a group of
learners or audience.

It can be argued that if the intention is to evaluate the
effects of a program then the judgment of professionals is not
the basic guideline. In real terms it is because the evaluation
is made by the professional(s) taking the role of evaluators
with the information obtained from viewers. The learners are not

evaluating the programs, it is the evaluator or developer who is evaluating the programs based on the information obtained from the learners.

According to Popham (1974) the most important models within this type are those by Scriven (1967) and by Stake (1967). Scriven, more than proposing a rigorous, algorithmic-style model, has developed over the years a series of recommendations for the practice of evaluation. His recommendations can be grouped under six headings (Popham 1974):

Formative-Summative distinction

Attention to the quality of goals

Pay-off evaluation

Comparative evaluation

Goal-free evaluation

Modus Operandi method

Each of the recommendations has something to suggest to ETV evaluation. They are reviewed briefly in the following lines:

a. Formative-Summative Distinction

Scriven was the first one to distinguish these two roles of evaluation to establish as separate evaluative activities those that "formatively" try to evaluate the materials while they are still-under-development so as to improve them, and those that "summatively" asses the merits of already completed materials or

sequences. These two roles will be explored more in depth later. For the time being it is enough to say that this distinction is used very much in ETV evaluation and is an integral part of the role of evaluation in the developmental processes.

b. Attention to the Quality of Goals

This refers to the consideration that although evaluation is concerned with the assessment of merit or goals, the goals should be revised and assessed as to their merits per se. This is so because the goals or objectives set for the materials are not always worth achieving. In other words, evaluation should consider both the quality of the goals and whether they have been achieved. With this recommendation Scriven suggests an analysis of the goals of the programs, being particularly careful not to be passive in accepting the goals set in advance by designers and simply assess them. This is particularly true in ETV where very often the goals or objectives of the materials are expressed in very diffuse terms that can easily be evaluated to say "the program achieved its objectives" (as an example the often used case of objectives that state that the goal is to "show to students...").

c. Pay-off Evaluation

Scriven refers to the extrinsic criteria of evaluation -the effects- as a pay-off situation. He suggests that the intrinsic criteria should be also considered in a combined approach

towards evaluation (extrinsic-intrinsic).

d. Comparative Evaluation

Scriven favours a comparative approach to evaluation; that is, to use evaluation as a decision involving choices among alternatives. He concedes that it is sometimes difficult to assess what it is exactly that makes the difference between choices but still affirms that decisions can be taken without understanding exactly what it is that accounts for the differences among programs. These decisions can constitute good alternatives because if one program makes more differences in learning than another a recommendation can be made to utilize the first program regardless of the lack of understanding of the real causes of the differences.

In the case of ETV evaluation this is particularly useful because if two similar materials can be evaluated comparatively in their effectiveness, and one results better than the other then the strategies of the first can be adopted in spite of the lack of real knowledge on the actual causes of the differences. This was the case of the evaluation of two pilot programs of the series "Calling All Safety Scouts" of TV Ontario where one program was found better than the other (Landa and Parsons, 1982). The differences can be analysed once the programs have been evaluated and the possible causes of the differences examined. Hypotheses can be tested to increase the knowledge on effective strategies of TV presentation and that information

used for developing the rest of the programees within a given series.

e. Goal-Free Evaluation

Often evaluators or developers performing evaluative functions can be so concerned with the goals or objectives of the material that, conciously or unconciously, are searching with tunnel-vision (Popham 1974) only for the stated possible effects expressed in the goals and hence are innatentive to other effects not forecasted in the original intentions. Evaluation is concerned not only with the forecasted effects but also, especially in TV, with the non-expected side-effects that the material conveys to an audience. To counteract this risk Scriven proposed a technique of goal-free evaluation as an alternative to goal-based evaluation for those instances when it is recommended.

Goal-free evaluation focuses on the effects of a program, unexpected as well as anticipated. As Popham puts it "the goalfree evaluator is not concerned with the rhetoric of the instructional designers regarding what they want to accomplish. The goal free evaluator attends to the results accomplished by the designer's programs." Goal-free does not replace, but supplements goal-based evaluation.

For ETV this is important because there are a myriad of side effects of television (induction of passivity, reduction of

attention span, changes in the perception of reality, etc. etc.)
that cannot be forecast and are not even completely known.

According to Scriven a well designed evaluation effort
should include both goal-free and goal-based activities. It is
important to note that goal-free evaluations can be conducted
"externally" to the staff involved in a ETV development project
to reduce the possible bias of evaluators being very involved
with goals or objectives. This also poses some obvious troubles,
such as financial, time consumtion, possible lack of involvement
of the external evaluator to the limitations imposed on the
development task, etc., but it is still an alternative to
consider in some specific cases.

f. Modus Operandi Method

Scriven also proposed a technique called "Modus Operandi"
which suggests that educational evaluation can still be carried
out when "scientific" approaches are impossible. (The scientific
approaches to evaluation will be discussed later under the
heading of methodology for conducting evaluation).

The method is an amalgam of the roles of a detective,
historian, anthropologist and electronics trouble shooter
(Popham 1974). It is used when it is desired to detect if
something is the cause of the effects of a program. Just as a
detective traces the "modus operandi" of a burglar, an
educational evaluator should trace the characteristics of any

given material, its audience and effects to detect possible
links. Obviously this technique can not be expressed in a
step-by-step fashion, and can loose objectivity but it still can
associate events, processes or properties connecting causes with
the effects.

In the evaluation of ETV materials this approach can help
to identify possible causes (usually a specific utilization of a
production element) with effects in the audience. It is not
always reliable, but certainly can be used in certain
situations.

Another judgemental model emphasing extrinsic criteria is
the "Countenance Model" proposed by Stake (1967). It is more
structured into a "model fashion" than Scriven's recommendations
but his ideas can also be taken as recommendations on the role
of evaluation in ETV development. The model basically
distinguishes between descriptive and judgmental acts of
evaluation according to three phases of an educational program:
antecedent, transaction and outcomes phase (antecedent are the
conditions prior to instruction, transactions are the processes
of instruction and outcomes the effects). Stake also provides a
subdivision of descriptive acts according to its reference from
intended to actually observed acts; and a subdivision of
judgmental acts into two categories, whether they refer to the
standards used in reaching judgments or to the actual judgments

themselves. These acts can be coded into matrices that can help the evaluator to engage continuously in descriptive and judgment acts in the three phases of evaluation identified.

In referring this model to ETV evaluation, it is important to consider the distinction between descriptive (intents -objectives or goals- and observations -actual effects-) and judgmental (standards -levels of achievement expected- and judgment-acts) conducted throughout the ETV development task, that is, (a) during the analysis stage, (b) during the process (design and production) and (c) at the end of the development process (summative evaluation and implementation).

4. DECISION FACILITATION MODELS

The basic purpose of these models is to help decision-making. According to Popham (1974) there is certain overlap between these and the previous three types of models. The difference that Popham finds in them is that these models' basic idea is to obtain the evaluative information and give it to the decision-makers to actually take the corrective decisions. This is the basic view of this thesis, that conceives of not only evaluation but also analysis as information-gathering components to aid developers and producers in the decisions to be taken when designing and producing ETV materials. The approach presented here also includes the utility of certain methods to carry out analysis and evaluation directly related to aspects

identified in the literature (of theoretical areas related to
educational technology) that should be considered when
developing ETV materials. This is one of the distinctions of the
model of this thesis and the decision facilitation evaluation
models; other difference, derived from the previous one, is that
the process of development is conceived not only from the point
of view offered by evaluation but also from the identification
of the aspects, emerging from the literature, that should be
considered in each of the components of an ETV development
process.

One of the most well known models in this
Decision-facilitation type is the "CIPP" model proposed by
Stufflebeam and Guba (1971). This approach to evaluation
includes four types of evaluation (hence the four-word acronym):
Context, Input, Process and Product evaluation. In order to
provide information to decision makers the model proposes a
systematic program for implementation that included three steps
when gathering the information:

1. Delineating, meaning focusing on the information
   requirements needed by the decision makers (specifying,
   defining, explaining the needs).

2. Obtaining, referring to the collection, organization and
   collection of the information (using methods for
   measurement, such as statistics).

3. Providing, referring to the synthetization of the
   information so that it will be optimally useful.

Those three steps dictate the procedure that the evaluation
should follow in each of the four types (context, input, etc.)
of evaluation. A brief explanation of each type follows:

a. Context Evaluation

Its purpose is to provide information for the decisions
regarding the objectives of the program. According to
Stufflebeam it includes an analytical effort to conceptualize
the relevant elements of an educational environment as well as
to gather empirical data to help identify the problems, needs,
etc. Context evaluation is used basically for decisions in the
planning stages of the program.

In the case of the ETV development approach of this thesis,
Context evaluation can be seen as the evaluation effort (feed-
back loops) related to the first stage of development: Analysis.

b. Input Evaluation

This type of evaluation yields information for deciding on
how to employ the elements or resources to achieve the
objectives of the program. The idea is to provide information

for structuring decisions to the design of the procedures to be followed, in other words, to provide evaluative information for the selection of specific strategies in the design of materials. The task of input evaluation is to delineate, obtain and provide information needed for decisions on the instructional elements and the specific manner in which they should be employed in a particular situation; in other terms, to provide information for decisions regarding the design of the materials.

As can be deduced, this input evaluation is the type of evaluative information needed in the second component of the ETV development process.

c. Process Evaluation

This type of evaluation is assumed to provide information on the actual instructional procedure in order to help the decision makers anticipate and overcome difficulties. It is there to identify any defects in the design so to anticipate and correct possible weaknesses. It also monitors the implementation (production) process to assure that the elements determined in design are being implemented the way they were originally conceived.

Process evaluation can be regarded as evaluation that can help decisions during the production component of an ETV development system. It has a dual function: (1) to monitor the implementation of the design plans into production and (2) to

identify defects in the program so as to correct them in time
(this can also be considered as formative evaluation).

d. Product evaluation

This refers to the measure and interpretation of the
achievements of a program. Its methods are similar to the goal
attainment models. It is not only concerned with conclusions, or
final effects of the programs, but also implementation. The main
focus is on evaluating the outcomes produced by a program to
decide whether to continue, terminate, modify or refocus an
instructional program.

In ETV development this type of evaluation can be
considered as the evaluative effort needed when evaluating the
effect of the materials either after final or pilot production.
It is important to note that pilot programme evaluation is not
the only case of formative evaluation, as will be seen later on.

The CIPP model is very useful for ETV development because
it conceives different roles for evaluation according to the
different components of the developmental process and assumes
the basic philosophy that the main function of evaluation is to
obtain and provide information for decision making. This model
has been used in some ETV projects evaluation, for example the
SITE project in India (Agrawal 1977).

Another common model under the Decision-facilititation
typification is the CSE, developed at the University of

California Center for the Study of Evaluation (Alkin 1974).
According to Popham the model is similar to the CIPP but
reconceptualizes the Process evaluation. Instead of considering
the evaluation of procedures during Process evaluation, as CIPP
does, the CSE model evaluates ongoing products as well as
processes. This is a slightly different perspective than that of
CIPP of identifying possible defects, but is still a form of
formative evaluation of the materials while they are being
produced.

Accordingly, instead of proposing four stages of
evaluation, it includes five:

a. Needs Assessment

The evaluative information for the assessment of the needs
of students, community and society. Needs are considered as the
difference between what presently exists compared to the desired
outcomes or stated needs of the project (Pastrana 1980).

b. Program Planning

Focuses on the evaluative information needed for planning
the programs, that is, for selecting suitable strategies to be
included in the program. In terms of the ETV development model
it refers to designing information needs.

c. Implementation Evaluation

Provides information on the degree to which the program is adequate for the plans set in the planning or design stages. It serves the same monitoring function as the first role of Process evaluation of the CIPP model.

d. Program Improvement

Evaluative information of the relative success of various components of the program with the intention of improving the program. The focus is to spot deficiencies to improve them while the program is being produced. It is also a form of formative evaluation similar to the second function of Progress evaluation in the CIPP model.

e. Outcome Evaluation

Evaluative information on the extent to which the objectives have been achieved. The final worth of the program that can determine utilization decisions.

As can be seen the CSE model is quite similar to the previous one. The important fact is the provision of information at various developmental stages.

Still another model representative of the Decision-facilitation kind is Provus' Discrepancy model (1971). It is based on the idea that evaluation involves the comparison between performance with standards. It includes five stages

where the characteristics or elements of the programs at each
stage of development are being constantly compared with the
standards set for them.

a. Design

This stage documents the nature of the program and should
include considerations on the objectives, students, resources
and instructional activities to be conducted. This stage sets
the standards to which the performance of the program is going
to be compared. In relation to our model it includes the
evaluative information needed in the analysis and design
components; a very important aspect is that the "nature of the
program", that is, the characteristics of the program in terms
of objectives, students (audience), strategies, etc. set the
standards that should be met and to which the actual performance
of the program is going to be compared. This suggestion
constitutes an interesting approach to the monitoring of the
implementation of the plans (emerging from a proper analysis of
the components or "ingredients" of the material) to the actual
implementation or production of those plans.

b. Installation

Monitors whether the installation of the program
(production) is congruent with the plans (design). The design
(plans) sets the standards to which the program is compared to

detect the presence or absence of discrepancies and decide

alternative actions according to identified discrepancies.

c. Process

The focus is to obtain information for deciding whether the

objectives are being achieved. This process evaluation is

congruent with the same type of evaluation identified in the two

previous models and constitute also a type of formative

evaluation.

d. Product

This is concerned with evaluative information on whether

the objectives of the program were actually achieved as

reflected in the performance of the learners. It can also be

regarded as summative evaluation.

e. Program Comparison

It is concerned with the cost-benefit analysis of the

completed program as compared with other competing programs.

This model provides an interesting perspective towards the

monitoring of the implementation of the plans (design) of the

ETV project as an integral role of the evaluation component.

There are many more models in each typology. Those

presented here are assumed by some leading authors to be

representatives of each type as well as the most common. They provide for sufficient recommendations for the development of ETV in terms of the evaluation component. Although some other models can provide other insights, it is not possible to review each and every single model.

There is still another type of evaluation model not identified by Popham, that is often refered to as the "Systems Approach Models". Representatives of this group can be "Alkin's approach", "Actual Component approach" and the "Organization as a Total System approach" (Pastrana 1980). This typology constitutes, more than models, a different approach to evaluation using systems thinking and techniques from areas like management and engineering, such as PPBS, linear programming, cost-benefit analysis, PERT, critical path method, flowgraphs, decision trees, etc. According to Pastrana (1980) these type of approaches, or models, assume that there are no disagreements about goals and that the problem of evaluation is to maximize the goals that already exist. This type of approach to evaluation is more related to managerial and utilization purposes of ETV materials. Although the managerial aspects of ETV development are important, it was said in the introduction to this thesis that they are not considered in this model, because it addresses a different problem, namely, How can a "good" educational programme be developed? Which aspects ASIDE FROM THE LOGISTICAL, TECHNICAL AND MANAGERIAL ASPECTS of TV

production, should be considered so as to develop educationally "good" and adequate-to-audience TV programees?

The systems approach was used as an aid in understanding the nature of a TV program as a whole with interrelated parts or elements. It was not conceived as an engineering technique to establish, quantify and optimize the elements and their interrelationship. On the other hand, as Pastrana (1980) suggests, these models have some similarity with Goal-attainment models but differ mainly in that they provide a holistic approach to program evaluation.

For these reasons, and because I consider that their usefulness lies outside the actual scope of this ETV developmental approach, they are not considered as possible sources of recommendations on the roles of evaluation within an ETV development project.

It can be said, as a summary of evaluation models, that all of them have something to contribute to the practice of evaluation in the processes of ETV development. The following is a list of practical suggestions emerging from the models reviewed. From the first models, or the goal-attainment:

1. The usefulness of an assessment of the degree to which the goals or objectives of the TV materials were reached (this can also be conceived of as summative evaluation).

From the second type, the Judgmental of Intrinsic criteria,

2. The usefulness of professional (producers, subject
matter specialists, educators) evaluation of the elements
or characteristics of the programmes (that can be
included as a type of formative evaluation).

From the third type, Judgmental of Extrinsic Criteria,

3. The usefulness of evaluating the effects (intended or
unintended) of the materials.

4. The (very, very) useful distinction between formative
and summative evaluation.

5. The importance of comparative evaluation when possible.

6. The considerations about goal-free evaluation.

7. The idea of the modus-operandi evaluation as an
alternative and complementary approach to evaluation.

8. The distinction between descriptive and judgmental type
of evaluative information.

Finally from the fourth type, Decision Facilitation,

9. The usefulness of inserting evaluation at all the stages
of materials development (Analysis, Design, Production
and evaluation -summative-).

10. The basic philosophy that evaluation is useful at

specific points for taking particular decisions at each stage.

11. The idea that the the evaluation component of an ETV system should delineate, obtain and then provide information for decision making purposes.

12. The idea that the processes and procedures of implementation (production) should be both evaluated.

13. The importance of monitoring the implementation of the plans (design) to the actual production of materials.

14. The idea that the elements identified (or analyzed) to be used in a production constitute a sort of standard against whom the performance of the program can also be compared.

These derived suggestions can be regarded as the roles of evaluation in the ETV development task. These roles, plus the important value of what is called formative research (explained later) and background research constitute the basic sub-components of the evaluation component of the methodological approach to ETV development presented in this model. The CIPP and CSE models, together with Scriven's recommendations, are the more useful guidelines found for evaluation. In some specific projects the developers might wish to adhere to these models without considering the suggestions from other types of evaluation models. Again, this depends on the needs of each

project.

Subcomponents of the Evaluation Component

The sub-components of Evaluation, as proposed in this model
are four:

Background Research

Formative Research

Formative Evaluation

Summative Evaluation

After the review of the roles of evaluation identified by
various models, and related to the actual practice of TV
development, it can be said that the most useful roles or
functions of evaluation are those of formative and summative,
because they somehow reunite the other identified roles. These
"other" roles, can also be integrated as recommendations to
conduct formative or summative evaluations. Most of the
recommendations identified come from the Extrinsic Criteria
models, and those refer basically to the formative-summative
distinction.

For clarification purposes in this thesis formative
research has been separated from formative evaluation so to
distinguish between two specific functions that information
plays in the processes of decision-making: formative research

"tries out" ideas or hypotheses emerging from analysis, and formative evaluation "assesses" the merits of design options selected. Both could be considered as a single formative evaluation loop but are separated to clarify the distinctions before investigating ideas and evaluating elements of a program.

It has to be said that the methods for conducting evaluations are varied. In most of the cases the accepted procedures are those of empirical research (research design, statistics, etc.). These procedures, as well as some others, will be adressed in a section after the explanation of the four types of research that make up the evaluation approach of this thesis.

BACKGROUND RESEARCH

This type of research is basically constituted by the bibliographical or historical types of research studies where the intention is to produce curriculum or utilization documents, based on the experience of individual specialists or through published reports both in the subject matter of the TV programmes being developed and in the educational trends for delivering it. This type of research has been succesfully conducted by many TV organizations in the early planning of series, where curriculum documents on the topics and methods of presentation recommended for certain series have constituted the

original stepping stones for the development of series; examples
can be the curriculum document for the TV Ontario's series
"Today's Special" (Parsons, 1981) or the one prepared by the CTW
for a series on safety, that was cancelled basically due to the
possible adverse effects found in the review of literature
synthetized in the document (CTW, undated). This type of
research assists decision making in the initial stages of
development by defining priorities for the ETV project and by
providing a base for deciding on the importance (or lack) of
developing such ETV materials.

FORMATIVE RESEARCH

More than often research and evaluation are confused as one
single activity when, in fact, they are not. They are
"variations under one theme" that share the same methodologies
but address the same purpose from different perspectives. In the
particular case of formative research and formative evaluation
the basic distinction is that, although both share the same
purpose of obtaining information for decision-making while a
program is still being produced, their perspective is slightly
different: as suggested before, formative research "tries out"
or investigate hypotheses or possibilities emerging from the
analysis or design components while formative evaluation
"asseses" the effects of options chosen. In this sense formative
research is not necessarily tied to testing the actual options

chosen in a particular ETV material, but is free to try possibilities not necessarily already included in the programs but which might have a potential for being utilized.

From an analysis component, as most of the knowledge about the potentials of television for education is not a proven body of facts and widely accepted theories, many hypotheses can emerge that can be tested in the context of the ETV projects being developed.

As noted before, the distinction between formative research and evaluation is usually not made because in fact they can constitute the very same function of obtaining information for making decisions when a program is still being developed. The Children's Television Workshop (CTW) does not make this distinction and include both activities under formative research. I prefer to establish the distinction so as to differentiate the activities of "trying out" hypotheses or guesses emerging from analysis, and "assessing" the possible effectiveness of design choices made so as to be reshape them. Of course formative research involves extra costs and time but can be worth-while in specific large projects.

Formative research adheres more to the "experimental" research idea in social sciences, specially psychology. When conducting formative research special attention should be paid to the external validity. Laboratory-type of studies should try to be reduced in an attempt to approximate actual -real-

conditions of TV viewing. The meticulous lab-type research in television has been criticized by Bates (1981).

Another very important role of formative research is the application of tests for obtaining specific information. Such can be the case of specially designed tests on visual literacy to assess the level of an audience and choose production variables accordingly, or the application of content-specific cognitive tests to determine entrance behaviour. It can be said, in general terms, that many characteristics of the audience can be explored with tests or other devices with a formative research approach.

Formative research should not be confused with overall television research; formative research does not aim to solve generic questions on the role of television in education, it addresses itself to fullfill specific information for decision makers in the context of specific ETV projects. What is found useful in a particular ETV situation can not be safely generalized to all ETV projects. The limits of formative research are the resources allocated to this activity and the ingenuity of the individuals assigned to the tasks.

FORMATIVE EVALUATION

This subcomponent of evaluation is the most widely accepted use of evaluation in the development of serious ETV materials.

The term formative evaluation was coined by Scriven in 1967 but, as Cambre (1981) demonstrated, the idea of a formative use of evaluation has been pursued for quite a while in the practice of ETV and Film. It has traditionally been advocated as a mean of exploring the possible effectiveness of a material before it is completely produced.

Formative evaluation is concerned with the assessment of the merits of features of the ETV materials being developed so to correct or modify them still while being produced. As Nickerson and Gillis (1979) put it

"Formative evaluation of the project enables the production staff to improve or modify the television programs or other system components while they are being produced. Scripts, pilot segments, support materials, and other pilot components are tested in the field with the target audience, and the findings are used to shape the project further" (p.7).

Formative evaluation provides a systematic link with the target audience. It is designed to provide diagnostic feed-back into the decision-making process for production, so that programming improvements, if needed, can be made before broadcast (Mielke 1978). Formative evaluation is a methodological tool that developers might use to obtain information about the material they are developing. One of its most important features is that

it is inserted in the early stages of the developmental process and, so, enables a reshaping of the material before completion.

This type of evaluation usually takes the form of field testing on the appeal, comprehension or educational effectiveness (concept retention, attitude change, skill development, transfer of information, etc.) of full or parts of TV programmes. These uses, although the most common in the practice of formative evaluation, do not, by all means, constitute all the possible functions of formative evaluation; the specific needs of producers and developers in each situation determine the information and the means with which it will be gathered. The needs of the producers (usually expressed in meetings with researchers or evaluators) dictate the form and method of evaluation.

. Formative evaluation is of a pragmatic nature (Palmer, 1974), and constitutes a more practical approach towards evaluation that sometimes departs from the rigour of research practices. Usually the immediacy with which the results of the evaluations are required determines a lack of consideration in absolute control practices. In general terms formative evaluation is less concerned with methodological rigour and more addressed to obtaining useful information. As Palmer (1974) suggests, "there is seldom anything to be gained by using tests of statistical significance. The creative producers often prefer

to work with information about means, dispersions and sample size" (p. 327).

In formative evaluation the inmediate concern is to improve the specific product and not to contribute to a general body of knowledge. With this concern on the practicality of results, and less with a rigorous approach certainly something is lost with respect to the generalizability of the results, but also much is gained in the utilization value of the results obtained. This approach is more suitable for ETV development than the actual finding of generalizable results.

The methodology for conducting formative evaluation is basically the same accepted for the practice of empirical research, with the two following differences:

(a) it is less rigorous

(b) the instruments for gathering the information are
   varied and quite ingenious.

It is important to note that formative evaluation is not only concerned with the evaluation of pilot programs; it can be used also to try out ideas, scripts, production strategies, etc. etc. It is equally valid, in formative evaluation terms, to test the acceptance of a graphic design device for a Math series (Gillis and Duggan, 1978) as to evaluate the adequateness of the amount of information presented in a program (Teachman, 1978).

Obviously, the information needs of producers and developers vary from project to project and are indefinite. The means with which information is gathered also vary from project to project and are also indefinite. The CTW and TV Ontario, world leaders in the use of formative evaluation in ETV, have devised many techniques, and instruments, for collecting information, like the distractor method (Palmer, 1974) or the Program Evaluation Analysis Computer (PEAC). Other indigenous techniques have been used besides the traditional paper-and-pencil ones, such as measuring eye fixations on specific shots, recording face expressions with TV cameras, etc.

Sanders and Cunningham (1974) identified three types of information that formative evaluation can provide. They are ample enough to include the possible needs of individual developers or producers involved in particular projects:

- Descriptive information, as the collection of information on the actual state of the material to be developed to revise its configuration. In terms of the model presented, it can be a revision of the inclusion of the plans devised in the design stage. As Islas (1980) suggests, the technique known as Content Analysis (Berelson 1954) is useful for this purposes.

- Critical appraisal, as the information that can emerge from the evaluation by experts or other professionals (intrinsic criteria models). This type of formative

evaluation can take the form of checklists, interviews, etc.

- Student Tryout, as the information coming from the evaluation conducted with a sample of the actual target audience (field testing).

The success of formative evaluation resides in the utilization value of the results found, that is, in the usefulness of the information obtained to solve the needs of the developers with respect to specific features of the materials being produced. Formative evaluation constitutes the positive feedback-loops of the ETV system through which the system can increase its effectiveness. Formative evaluation is the vital link between production and research that is central to a good development process of ETV materials.

Formative evaluation has been proved succesful in various ETV organizations, but unfortunately has not been included in all major ETV projects for various reasons. One common reason is that few producers and managers are familiar with it. As a mimeographed publication of the CTW (1981) states

> "Producers most frequently follow their
> intuition and experience in developing program
> content, even though it has been noted that
> their intuition can be wrong. Since producers
> have built their confidence on these factors

it can be difficult to convince them to

consider formative research (evaluation)

results as inputs for making decisions.

Moreover, for many producers formative .

research (evaluation) represents a new

field or discipline and a new language" (p.22-23).

These differences in view from producers and evaluators,
that have constituted the traditional "gap" between research and
production, between theory and practice, should be overcome in a
succesful ETV development task. This is easier said than done
but is quite important for a methodological approach to the
development of ETV materials.

Formative evaluation should be considered as a possible
methodological tool for obtaining information during all the
components or stages of an ETV development task, especially
during Design and Production, but also during Analysis and
Evaluation so as to also test formatively, when desirable, the
effectiveness of the very means or instruments used for
evaluating the materials. The particular modes of formative
evaluation used in each individual project should consider the
recommendations emerging from the revision of evaluation models,
particularly those referring to:

- The usefulness of "professionals" in the evaluation of the
  intrinsic criteria (or standards) of the programs.

- The need for evaluating, or exploring, the intended as well as the unintended effects of the production options being evaluated formatively.

- The importance of comparative evaluation when possible.

- The considerations of goal-free evaluation.

- The alternative methods to empirical research, as exemplified by the modus operandi method.

- The distinction between judgmental and descriptive type of evaluative information.

- The basic procedure in which the information should be delineated, obtained and provided in meaningful ways to the users of the information (producers or developers).

- The use of the design plans as standards or "blueprints".

SUMMATIVE EVALUATION

Summative evaluation is the other type of evaluation that has proven itself as a means for obtaining information about the effects or performance of ETV material to guide utilization policies. This type of evaluation corresponds to the more traditional conception of evaluation and is the one proposed by the Goal-Attainment models. Its major function is to asses the merits of already completed educational materials. As Mielke

(1977), vice-president for research at CTW, states: summative
evaluation "assesses the extent to which a program (or series)
has reached its objectives" (p. 22).

Usually summative evaluation is conducted once the
programme or series is completed. Some people can argue that
this type of evaluation is not really needed since the products
are already completed. This is not exactly the case. Nickerson
and Gillis (1979), at that time researchers at TV Ontario, wrote
in this respect: "Although some evaluators claim that summative
evaluation is redundant if the formative evaluation was
conducted properly, the claim falsely assumes that testing
techniques are infallible and that decisions incorporate all
available information" (p. 12).

Summative evaluation is helpful, as mentionned before, to
orient utilization and policies of distribution. It can also
help as a useful source of information for other ETV materials
to be developed within or outside an ETV organization.

The methodology used for conducting summative evaluations
follow more closely the paradigms of empirical research. Usually
summative evaluations are not so time-constrained as formative
ones, so, more attention can be paid to rigorous control
procedures.

The evaluation of the effects or "how well a particular
project has done the job it was intended to do" (Nickerson and

Gillis 1979, p.12) should also follow the recommendations
emerging from the revision of the major models of evaluation
expressed before, being particularly careful with respect to
goal-free evaluation, the quality of the goals set for the
materials and the exploration of the unintended effects.

An important distinction between the purposes of formative
and summative evaluation is the fact that, while the information
obtained with the formative is useful for producers and
developers when making the program, the summative is more
helpful for developers or policy makers. Usually formative
evaluators are "inhouse" within a particular ETV project and
summative evaluation is conducted "outside" by other educational
institutions. This is not a rule but a common practice followed
by many ETV organizations.

Another important aspect of summative evaluation is that it
should not only evaluate the impact of the product on its
audience (objectives of the program) but also should evaluate
the product itself according to the standards set for it in the
design stage. This way it can be evaluated to what extent all
the variables or aspects identified in the analysis, design and
formative research and evaluation components were integrated in
the final product. This way not only the product is evaluated
but also the process, the developmental process, that culminated
in the product. With this approach summative evaluation helps an
ETV organization to improve its methods of development and

increase its knowledge in the making and utilization of television for educational purposes. Scriven (1974) proposed for this purpose the use of checklists containing all the important factors identified previously. The checklist that Scriven proposed was intended to be a general guide to evaluate educational products, producers and proposals. It included 13 aspects to be evaluated, each to be rated with a five point scale. In the case of the model presented in this thesis, it should be evaluated when a particular ETV project favours its use (hopefully that will be accomplished in the near future!), and the checklist to evaluate it should include all the critical aspects included in each of the subcomponents of the four components. With this type of summative evaluation this, or any other model for the development of ETV materials, can be improved to serve better the guidance function of the ETV developemnt process.

The methodologies for conducting summative evaluation follow more closely the paradigms of empirical research procedures.

Finally, summative evaluation can be conceived as the negative feed-back loops of the system necessary for assesing the performance of the ETV development system and maintaining its function; it recycles information for decisions on the restructuration, expansion, termination or continuation of the whole system.

BASIC METHODOLOGY FOR CONDUCTING EVALUATION STUDIES

Educational evaluation has more or less followed the
traditional research procedures accepted in the empirical trend
in social sciences. The basic guideline of this type of
methodology is to obtain information from a sample of the
viewers through reliable and objective procedures. Evaluation is
a form of applied research; it differs from basic research in
many ways, some of those being that since hypotheses come from
the programees themselves, there is less posibility for exerting
control and that there is a different intention (Islas 1980).

Evaluation use the same research methods, the same designs
for the collection of data and analysis based on scientific
methodology. Gilbert et al (1975) provide a framework of the
methods accepted and used in social sciences, all of them used
in evaluation. The authors identified six types of methods:

a) Introspection, theory, analysis and simulation.

b) Anecdotes, casual observation and case studies.

c) Quantitative observational studies (sample surveys and
census).

d) Experimentation.

e) Non-randomized field trials.

f) Randomized controlled field trials.

The most favoured in evaluation are the last four, because
they pre-suppose a more objective base.

Evaluation studies usually follow the same scientific procedure that includes, roughly, four sections (McGuigan 1968). Quantitative observation, experiment and field test type of studies adapt more closely to the procedure but in one way or another it guides all types of evaluation studies (as well as research, in the case of formative research). The "scientific" procedure includes the following four sections:

1. Introduction (Problem, questions, hypotheses, variables and rationale.

2. Method; that includes four aspects:

    - Subjects
    - Instruments
    - Design
    - Procedures

3. Results, (Statistical analysis)

4. Discussion

1. Introduction

The introduction part varies quite a lot from evaluation to evaluation depending on the nature of each study. This part, when possible, defines the problem (in the case of evaluation the information needs of the producers or developers);

transforms the problem(s) into research questions and proposes, hypotheses to test those questions. Variables are defined and the whole procedure is related to existing theory or previous findings as a possible guidance for the testing of hypotheses. In evaluation, especially in formative evaluation, the questions or hypotheses can be very vague, the hypotheses sometimes even nonexistent usually because the purpose of evaluation is to investigate effects rather than testing hypotheses on the nature of these effects. Also in many evaluation studies the introductory part is almost nonexistent because there is usually no theory to guide the possible effects of the TV programees and the questions are to generic to be translated into hypotheses.

An important issue of this aspect is the formulation of variables. The independent variables are those that are manipulated to see what effects they have (Drew 1980); the dependent variables are what is being measured, the criterion measures. In evaluation studies usually the independent variables are the elements or the whole programme under evaluation while the dependent are the measures on the effects. In educational terms those effects are varied, because "learning" is not in itself a measurable factor. It is important to consider many different dependent variables to encompass the range of "educational effectiveness" of a given material; appeal, comprehension, retention, attitude change, skills development, etc. are all "educational effects" that can be

evaluated from a material. The actual "effects" to be evaluated
depend on the specific needs of the producers and the objectives
of the materials. Useful sources for levels of learning (levels
of dependent variables for evaluation studies) are taxonomies,
such as Bloom's (1956) or Gagne's (1977) Conditions of Learning.
Other variables to consider in an evaluation are the moderator,
control and intervening.

2. Method

The method section is the most important of the evaluation
studies. It determines how the data is going to be obtained. It
constitutes the backbone or "blueprint" that will guide the
realization of the evaluation.

SUBJECTS

This aspect refers to the individuals that are going to be
exposed to the materials, that is, the people that are going to
provide the information. The subjects have to be potential
members of the original target audience. A sample of the
population of viewers (target audience) should be obtained in
such a way as to be representative.

In formative evaluation usually it is difficult to obtain a
randomized representative sample; nevertheless efforts should be

made to make it as representative as possible so as to assure
the validity of the results.

INSTRUMENTS

This aspect includes the instruments with which the data
are going to be collected, the means through which the
information is going to be obtained from the subjects. In most
cases the instruments are the traditional questionnaires or
"paper-and-pencil" type of tests that are applied to subjects
after they've been exposed to the material being evaluated. In
evaluation, specially in formative, the instruments used to
obtain the information are varied; the only limit is the
ingenuity of the the evaluators. The following is a list of some
of the instruments commonly used for gathering data for
evaluation purposes:

1. Questionnaires (open or closed ended)

2. Tests

    . Essay type

    . Restricted essay

    . Short answer

    . Completition

    . True-false

    . Matching

    . Multiple choice

3. Attitude scales (semantic differential, likert, etc.)

4. Checklists

5. Ratings

6. Anecdotal qualitative records

7. Simulation

8. Observation techniques (participant or nonparticipant)

. Structured

. Unstructured

9. Interviews

. Structured

. Unstructured

10. Video-tape techniques (for further observation analysis)

11. Sequenced photographs (appeal, memory, etc.)

12. Drawings for projective techniques

13. Attention measuring by judges

14. Distractor method for measuring attention (CTW)

15. Program Evaluation Analysis Computer (PEAC)

16. Eye fixation

17. Biometric measurement (pulse, body temperature, etc.)

18. Psychological tests (skills)

19. Focus groups

Regardless of the instruments used special attention should be paid to their reliability and validity as measuring instruments. Reliability refers to the capacity of the instrument to measure well, and validity is the capacity for

measuring what it purports to measure (Anderson et al. 1975).
For the "paper-and-pencil" instruments, at least, there are
specific techniques for assesing the reliability, such as the
test-retest method, Split-half method or the Kuder-Richardson
technique (KR 21).

DESIGN

This aspect involves the actual "blueprint" of the study.
It includes the defined variables, the groups (and subjects)
that are going to be assigned to different conditions, the
techniques for control and the measures. It makes a plan for the
gathering of the data organizing the various elements of the
evaluation study. The design of an evaluation study must
adequate to the information needs of the producers and
developers and to the resources allocated to the evaluation
task.

Campbell and Stanley (1966) proposed four types of design,
each one comprising a number of specific designs. These designs
are the most used in research and evaluation, although the first
two categories are more frequently (and desirably) employed:

1. Pre-experimental Designs

    a) The One-shot case study

    b) The One-group pretest-postest design

    c) The Static-group comparison

2. True exprerimental designs

    a) The Pretest-postest control group design.

    b) The Solomon four-group design

    c) The Postest-only control group design

3. Quasi-experimental designs

    a) The Time-series experiment

    b) The Equivalent time-samples design

    c) The Equivalent materials design

    d) The Non-equivalent control group esign

    e) Counterbalanced designs

    f) The Separate-sample pretest-postest design

    g) The Separate-sample pretest-postest control group design

    h) The Multiple time-series design

    i) The Recurrent Institutional cycle design

    j) Regression-discontinuity analysis

4. Correlational and ex-post-facto designs

    a) Panel studies

    b) Lazarsfeld sixteenfold table

    c) Ex-post-facto analysis

The specific design chosen and adopted to the conditions of the evaluation being conducted must consider always the issues concerning the external and internal validity of the study. Internal validity refers to the succesful control (or

consideration) of all systematic influences affecting except the
one under study (Drew 1980). Campbell and Stanley (1966)
identified nine threats to internal validity: History,
Maturation, Testing, Instrumentation, Statistical Regression,
Selection of Respondents, Experimental Mortality, Selection-
Maturation Interaction and Instability. External validity refers
to the generalizability of the results of the evaluation. This
is usually of less importance in evaluation studies since the
intention is to provide information to developers rather than to
generalize results to a population and create theory.

PROCEDURES

This aspect refers to the particular ways in which the
evaluation study should be carried out or the directions
followed by the evaluators for obtaining the desired
information.

3. Results

This third section constitutes the actual findings of the
evaluation. When possible, statistical analysis should be
conducted so as to establish the confidence of the results and a
certain objectivity. In evaluation careful attention should be
paid to obtain and provide meaningful results to the producers

and developers; that is, to provide information that is adequate
for answering the decision-making needs rather than the
traditional research results (statistical significance, main
interactions, correlation level, etc.). Sometimes the
quantitative results of an evaluation study are not meaningful
per se to the producers and developers; they should be expressed
in terms of the ETV material and target audience in question and
not claiming anything that was not found. Qualitative results
(verbatim comments, opinions, attitudes, etc.) should be
presented also so to enrich the quantitative results. Results
should be sharp and "to the point".

4. Discussion

This last section, although not necessary always, relates
the findings to the results or other studies or to more general
theories. It interprets the results in light of the needs of the
project at hand expressed by the decision-makers. Some ETV
organizations, like TV Ontario, include a recommendations
section that proposé changes or modifications (when formative
evaluations) to the programmes according to the results.

This final section also discusses the study signaling
pitfalls that might have affected the results and, generically,
the confidence with which the results can be used. When
required, considerations on the generalizability of the findings

can be included here.

The methodology outlined above is the most used and traditionally accepted in evaluation. As said before not all type of evaluation studies are appropriate to this schema. The ones that adapt more readily are quantitative observational studies, experiments and field tests, that happen to be the more favored approaches in evaluation. This methodology has been subject of many criticisms because it has fallen very often into a rigid quantitative nature and some practitioners have confused the actual purpose of evaluation of providing meaningful information to decision makers into a type of "measuring" of performance where the numbers themselves have gained more importance than the actual needs of the developers, which are the real objectives of any evaluation. One of the major critics of such rigid approach towards evaluation (mainly to laboratory experimental studies) in ETV has come from the evaluation team of the Open University. Gallagher (1977), a research officer at OU wrote the following with regard to the "usefulness" of the strict quantitative studies:

> "Concentration on the collection of `hard'
> quantitative data obtained by objective
> measurement has led to two severe limitations
> ...In the first place, information of a
> more subjective, anecdotal or impressionistic

nature has tended to be disregarded on the
grounds that it is difficult to measure or to
compare...But if evaluation is to be usable, it
surely must attempt to explain its findings,
weight their importance and place them in context.
To do so, it is almost inevitably forced to wrestle
with whatever `soft' qualitative and subjective
information is available. The second limitation is
...that evaluation of this kind is generally
insensitive to unusual effects or atypical results.
Often they might be fundamental to a complete
interpretation of findings...They rarely come to
light for discussion, lying buried beneath thee
more solid means and medians of the final
tabulations" (p. 173).

This quotation speaks for itself against that strict
"measurable" current in educational evaluation. What is needed
is a practical approach towards evaluation studies putting
attention to the needs of the decision-makers rather than on the
strict quantitative (and statistical) evidence. Bates (1981),
head of the evaluation team at OU suggests:

"While evaluative research needs to be as precise
and reliable as possible, what is possible in
evaluative research is not determined solely or
even mainly by the scientific requirements of

establishing proof, but by the real operational constraints which affect the way decisions get made. The level of certainty then that can be tolerated in information collected by evaluative researchers will vary accordingly to the circumstances in which decisions has to be made. `Quick and dirty' information will usually be more useful than precise data that come too late to influence a decision...Evaluative research then is a constant battle between trying to hang on to the essentials of a scientific approach... against the pressure of time, lack of resources, and political and operational constraints on the decision-making process" (p. 226).

The two long quotations presented above suffice to summarize the criticisms to a strict "scientific" approach to evaluation as well as practical suggestions against it. Scientific rigor is not denied by the critics, but definitely subject it to other, more practical considerations of evaluation. Such a practical approach should definitely be favored in the evaluation component of an ETV development task. Again the multi-level concept is applicable to evaluation: different levels of decision in fact demand different kinds of research (Bates 1981).

Finally, evaluation is the other information-gathering
component of an ETV development system that gives to the process
of development a dynamic structure, that continuously recycles
information to approximate more faithfully to the goals in the
development of television materials for educational purposes.

Outcomes of an Evaluation Component

The evaluation component yields as outputs evaluative
information for taking decisions during the other three
components of the ETV development process, specifically during
the two decision-making components: Design and Production. The
information provided is that coming from research studies
carried out in the context of the specific project being
developed and from the evaluation of the alternatives chosen for
integrating the television programmes. Two types of
research-originated information can be provided:

Background Research: Useful information for evaluating what is
----
known about the subject matter and ways of presenting the TV
materials at hand. This information can be used to make initial
decisions on the dimensions of the project. Background
information can be fed into the Analysis component to orient the
analysis activities to be carried out prior to the design of the
ETV materials.

Formative Research: Information coming from experimental
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studies testing hypotheses emerging from the Analysis component and from experimental use of design and production choices in the context of the project being developed. Formative research also obtains and provides information coming from the application of various types of tests on samples of the audience in order to decide on matters specific to the ingredients chosen for design and production (as could be the case of entry behaviour tests).

Two other outputs emerge from the Evaluation Component, namely, the outcomes of the two types of evaluation studies conducted:

Formative Evaluation: Provides evaluative information on the potential effectiveness of design and production choices selected for inclusion in the ETV programmes. This information is fed-back into Design and Production before these choices become final constituents of the TV products. In other words, formative evaluation provides information for changing or modifying production choices before the final production of the ETV programmes.

Summative Evaluation: Provides final information on the effectiveness of the completed ETV materials and/or information on the degree to which the goals set for the programmes were achieved. This information can be recycled into the initial stages of the project, where utilization and/or continuation decisions are taken.

CHAPTER 7

CONCLUSIONS

Although the model of ETV materials development presented
in the thesis has not yet been implemented in a particular task
and evaluated accordingly, its theoretical proposition can yield
some conclusions.

The process of development of educational materials for
television presented included four main components, two
information-gathering: Analysis and Evaluation, and two
decision-taking: Design and Production. Each component contained
a number of subcomponents and aspects that, conceived from an
educational technology perspective, are practical applications
of science for approaching educational tasks. These practical
applications suggest methodologies for obtaining information for
proper decision making in the process of development of ETV
materials. The subcomponents and aspects identified, as well as
the methodologies suggested, are not intended by any means to be
the only ones possible. Their inclusion in the present thesis
follow a logical (and correlatedly, personal) approach that has
been nurtured by reading the literature on the subject of
television and education and by experience (theoretical as well
as practical) in the field. It attempted to produce a coherent
framework of the variables that should be considered, studied,

and decided-upon when developing television materials with an educational intention and with a methodological approach proper to an educational technologist.

Perhaps the most interesting proposal is the approach towards ETV development itself, a practical approach that suggests that the process should be broken into components that are not static but continuously interrelated. This approach is certainly not entirely new. Rather it proposes a new component (analysis) that integrates what has been found relevant in the literature of education and television with the aim to bring research and practicum in the field within more closer perspective. The model presented also proposes a multi-level approach to the rigor with which information is obtained in the two information-gathering components so as to allow enough latitude for the wide range of magnitude and sophistication with which different ETV projects are approached depending on the circumstances and resources allocated to them by developers or producers.

The components of the model presented were contrasted with those of other known models for emphasizing the importance of the inclusion of the analysis component as a vital link between the practical requirements of the process of ETV development and the scientific findings in the field of education (basically learning) and television. The value of Analysis has been widely accepted within instruction but has not been emphasized

methodologically in ETV development models.

The whole thesis followed a basic idea that an educational technologist's methodological approach to ETV development should never attempt to dictate specific and strict rules to the actual producers of the materials (in the case that producers and educational technologists are not the same people, which is often the case). The production, or making, of a television programme has much of an art and the skills and insights of the producers are vital ingredients. Those insights (or experience) can be oriented with an educational-methodological approach, but can never be supplanted. On the other hand it is considered that the development of educational TV programmes is not only a creative enterprise guided solely by the intuitions of the producers of the materials. These intuitions should be based as much as possible on actual knowledge (emerging from science or evaluated experience) of the possible educational effects of the choices and strategies contemplated in an educational product. This is where an educational technology perspective towards ETV development comes into play; after all, the basic intention of educational television material is not to produce a personal (in terms of the producer) expressive-artistic product, but material that might help viewers educate themselves in some area.

The thesis contemplated an evaluation component as the most interactive of all, because it helps in each of the other

stages or components. An integrative perspective, i.e. one that assumes the usefulness of various forms of evaluation for obtaining information for decision-making was pursued. The role of evaluation within an ETV development task was derived from the most accepted models and theories of evaluation so as to insert this practice as a practical application of knowledge emerging from science or quasi-scientific theories.

The model presented does not constitute a step-by-step algorithm on how to develop educational TV programees. It was intended to be ample enough to allow room for the almost indefinite educational TV projects that can be executed. This amplitude might substract specificity from the model. This is -in my opinion- not a pitfall but an advantage, because models are interpretations of phenomena and never a microdissection of reality. The modelling methodology was utilized with the aim of inserting various components into the same process, into the same system, and not with the idea of presenting an "ideal" approach to the question of how to develop ETV materials.

The model could be criticized because of its lack of consideration of issues of a cost-effectiveness nature. While this might be true to a certain extent, cost-effectiveness is a matter that is not easily considered realistically in any wide methodological approach. On the other hand, the model pursued a multi-level approach, that is, an approach based on the idea that depending on the level of magnitude of the project the

development efforts will respond with differential depth levels
of specificity. In other words, a very important project should
pay detailed attention to all the aspects and methodologies to
obtain information and take decisions, while a low-key project
should at least simply consider or have in mind while developing
the programmes, the subcomponents and aspects. Besides, a
wide-range project usually has the time and resources for
research and development and a simple project usually does not.
The resources for development in a large scale project are
better allocated if a global, integrated methodology can be used
as a base line. It is obvious that an ETV development task as
simple as making a fifteen-minute programme for a closed-circuit
TV system in a factory can not follow a very detailed and
expensive developmental process utilizing the full potential of
information-gathering mechanisms such as Methodological Analysis
and Formative Evaluation. A project of such small magnitude can
profit from a methodological approach towards ETV development by
simply considering the various aspects and possible educational
implications of the production choices made. Such considerations
can be made with a revision of the components in the model and
then relying on experience and common sense in the actual
decision-taking points.

My most important conclusion is that I'm satisfied at this
point with the schema developed as an integration of an
educational technology perspective in the development of TV
programmes. It might not be still a proven approach but yes an

initial attempt, a "steppingstone", for an educational technologist's approach to the development of concrete, educationally sound, TV materials. It is an approach that places one foot in the "scientific" ground of learning and other theories and the other in the practical constraints of any education-related situation, that, in my view, is the balance that an educational technologist must keep when trying to solve educational problems. It is this task that constitutes the essence of his/her professional existence.

- Unfortunately the "scientific" advances or findings in terms of the utilization of television for educational purposes have not contributed all that much to the actual practice of the making of TV. This might have been so because of the traditional distance (in aims and in methods) of researchers and producers. It is my belief that science -solid knowledge- should definitely be married to the practice of ETV development. A practically oriented educational technology point of view -as said before- might help in this task.

Much is still to be learned in the areas of effects and possible utilization of the television medium for education. This thirst for knowledge can be increasingly satisfied if the efforts of theorists and practitioners are joined together in an integrated and practical perspective aimed to produce knowledge that can be put to work in solving real doubts emerging from the practice of ETV development, and not from the very often

sterile, purely- academic, theoretical wandering. Theory and practice are poles in the same dimension. Rather, in ETV development, let's explore that dimension not from an antagonistic approach of opposites but from an integrative perspective. The learners, the actual destination of educational television programees, will be the real beneficiaries.

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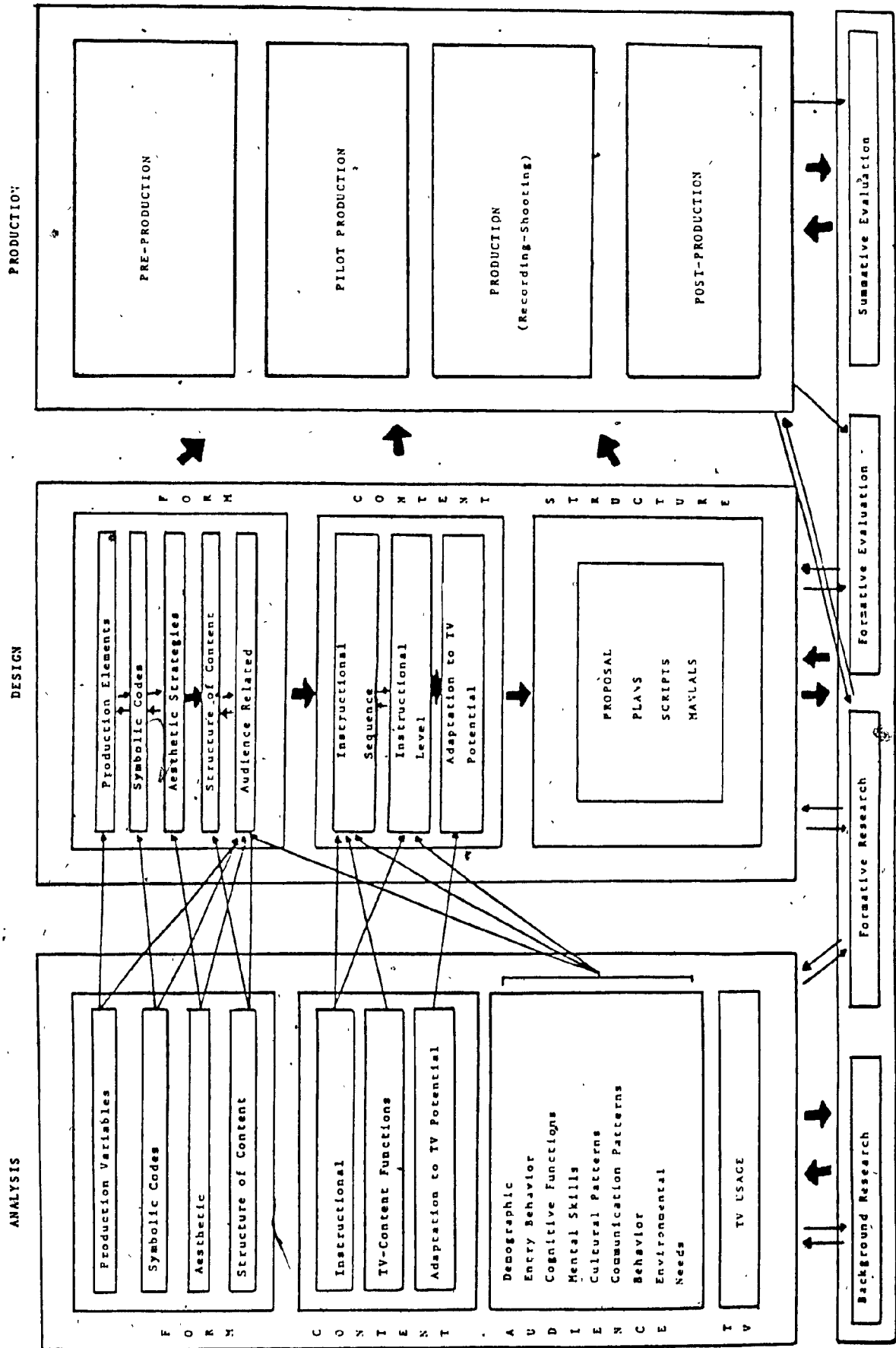
Appendix B: Graphic Representation of the Information Flow from the Analysis to the Design and the Production components.

PRODUCTION

- PRE-PRODUCTION
- PILOT PRODUCTION
- PRODUCTION (Recording-Shooting)
- POST-PRODUCTION

DESIGN

FORM / CONTENT / STRUCTURE

- Production Elements
- Symbolic Codes
- Aesthetic Strategies
- Structure of Content
- Audience Related
- Instructional Sequence
- Instructional Level
- Adaptation to TV Potential
- PROPOSAL / PLANS / SCRIPTS / MANUALS

ANALYSIS

FORM
- Production Variables
- Symbolic Codes
- Aesthetic
- Structure of Content

CONTENT
- Instructional
- TV-Content Functions
- Adaptation to TV Potential

AUDIENCE
- Demographic
- Entry Behavior
- Cognitive Functions
- Mental Skills
- Cultural Patterns
- Communication Patterns
- Behavior
- Environmental
- Needs

TV
- TV USAGE

EVALUATION
- Summative Evaluation
- Formative Evaluation
- Formative Research
- Background Research