ANATOMY OF INNOVATIONS, A CONCEPTUAL FRAMEWORK

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1. INTRODUCTION:

A teacher who visits another classroom to observe some
innovative programme or teaching technique and then returns to
his room to try out what he has just seen often gets discouraged
and disillusioned. It just doesn't seem to work. A reason for
the apparent failure lies in the fact that he has seen only the
end product and has not been part of the process of growth that
preceded it. He has not internalised the understandings and
frustrations which the observed teacher had experienced during
the development of innovation. Often for legitimate reasons,
only those findings that were statistically significant or those
change - promoting techniques that proved successful are presented
to the reader. He is screened from methodological blunders and
intervention failures. Even in reports of successes, the reader
may not be given an account of the process of research or development

which took place. "Only through sharing of both the
successes and failures which were part of the processes
can it be insured that each new group of educational
researches or interventionists does not have to rediscover
the wheel." (Gross et al, 1971.)

2. DEFINITION OF INNOVATION:

Innovation is defined by the Random Home Dictionary
(1967) as "something new or different introduced", while
Webster's Third International Dictionary (1974) defines
innovation as "something that deviates from established
doctrine or practice; something that differs from existing
forms".

Innovation as defined above is based on the concept
of newness of the practice. Schon gives the criteria that
an act is an innovation only if it adds to the sum of known
innovations (Schon, 1967). In Education, however, the stress
is more on the utilisation and dissemination of an idea.
Rogers and Shoemaker (1971) defines innovation as "an idea,
practice, or object perceived as new by an individual". It
matters little, so far as human behaviour is concerned, whether
or not an idea is "objectively" new as measured by the lapse
of time since its first use or discovery. It is the perceived
or subjective newness of the idea for the individual that
determines his reaction to it. If the idea seems new to the
individual, it is an innovation.

"New"

"New" in an innovative idea need not be simply new knowledge. An innovation might be known to an individual for some time, but he has not yet developed a favourable or unfavourable attitude towards it, nor has he adopted or rejected it. The "newness" aspect of an innovation may be expressed in knowledge, in attitude; or regarding a decision to use it (Rogers and Shoemaker, 1971). The Rogerian definition of innovation is adopted in the present study.

Every idea has been an innovation sometime. An innovation may have two components (1) an _idea_ component, and (2) an _object_ component (that is material or physical product aspect of the idea.). All innovations must have the ideational component, of course, but many do not have a physical referent. One criterion for classifying innovations is whether or not the innovation has an object component associated with it. Innovations with only an idea component cannot be adopted in a sense that can be physically observed and adoption is therefore a symbolic decision. In contrast, innovations that also have an object component _invoke_ an _action_ adoption.

Though a distinction is also made between change and innovation, the latter being somehow more deliberate, willed and planned, both terms are used more or less as synonyms in the present study.

(a) <u>Types of Changes</u>:

Innovations are classified according to (1) the quantum of change and (2) the nature of change. Havelock divides the first category into four types and the second into six sorts. (Havelock, 1971).

<u>Classification of innovations according to how much change is required</u>:

1. Change in size and scope of operations-requiring outlays of capital, labour space and equipment.

2. Acquiring new skills.

3. Changing goals.

4. Changing values or orientation.

<u>Classification of innovations according to what kind of changes are involved</u>:

1. Substitution, in which one item is substituted for another previously in use.

2. Alteration, involving changes in existing structures rather than a complete substitution of parts or elements.

3. Addition without changing old elements or patterns – those which can be added to an existing programme without seriously disturbing other parts of it.

4. Restructuring

5. Elimination of old behavioural patterns.

6. Reinforcing of old behaviour

Miller (1967) classifies innovations into three types

(1) Organisational (2) Instructional and (3) Methodological and

has provided a 'resume' of the sort of correlation one
discovers between the length of time required to implement
an innovation and its complexity. This is given in Figure 1.

NUMBER OF PARTICIPANTS REQUIRED	TYPES OF INNOVATION	LENGTH OF TIME REQUIRED TO IMPLEMENT THE IDEA OR PROGRAMME
-----------------------------	ORGANISATIONAL	-----------------------------
--------------------------	INSTRUCTIONAL	---------------------
----------------	METHODOLOGICAL	----------

Fig.1 : Length of Complexity of Different Types of
Innovations.

(b) Origins of Change:

A report of the Centre for Educational Research and
Innovation (CERI) identifies three processes at work which
originate educational innovations. (1) Innovations tend to
occur through the accretion of a variety of changes, varying
in their size and spread. Though each of the changes is
usually developed slowly, the total effect is a continual
improvement in the educational system as a whole. (2) The
'grass roots' theory of the development of change says that
the system as a whole is perpetually being infused with new
ideas and it is transforming those which it is prepared to
assimilate into some newly conceived form more consonant with
its own norms and practice. (3) Changes occur through policy
decisions of an authority (Westley, 1969).

Another way of classifying the origins of change is by identifying who originated the innovation. These agencies originating innovation may be divided into two classes. (1) Internal; (e.g.) Headmaster, Teachers, Students etc., and (2) External; (e.g.) Research Institutions, NCERT, SCERT, State Department of Education etc.

Often times, innovations pass through several persons or agencies to reach a person or institution. The person or institution who takes up the idea may not be aware of the origin of change. To him, the source of change is just the person or agency from who he got the idea.

3. THE SYSTEM AND PROCESS OF CHANGE:

The Education system and change:

Education systems have been noted to be more resistant to innovation than industrial or business enterprises and teachers are more problematic to change than farmers or physicians although in every profession or trade may be found progressive as well as conservative dements. M.B.Milles(1964) argues that permanent systems - whether individuals, groups or organisations and institutions - find it difficult to change themselves. Some behavioural scientists who have applied systems theory to educational institutions claim that schools are by nature stable or homeostatic and are therefore unable to innovate. It is argued that there are certain genotypical and phenotypical characteristics that inhibit change.

R.G. Havelock (1973) divides these characteristics into
(1) input factors, which inhibit change from entering into
the school system (2) Output factors, which prevent the
genesis of change from within and (3) throughput factors,
which limit the spread of new ideas and practices through
the school system.

The input factors are (1) Resistance to change from
the environment, the community not encouraging changes in
the school system and suspecting the effects of experimentation
(2) Incompetence of outside agents (3) overcentralisation
(4) teacher defensiveness (5) absence of change agent or
'linking-pin' (6) incomplete linkage between theory and
practice (7) underdeveloped scientific base (8) conservatism
of the school and (9) professional invisibility.

The output factors are (1) confused goals, (2) absence
of awards for innovating (3) uniformity of approach (4) mono-
polistic nature of the school (5) low knowledge component
and low investment in R & D (6) low technological and financial
investment (7) difficulty in diagonosing weaknesses (8) product
measurement problems (9) focus on present commitments and
accountability therefor (10) low personnel development investment
(11) lack of entrepreneurial models and (12) passivity and
resigned acceptance.

The throughput factors are (1) low level of co-ordination
among the different parts, members and units of the school system
(2) hierarchy and differential status (3) lack of procedure and
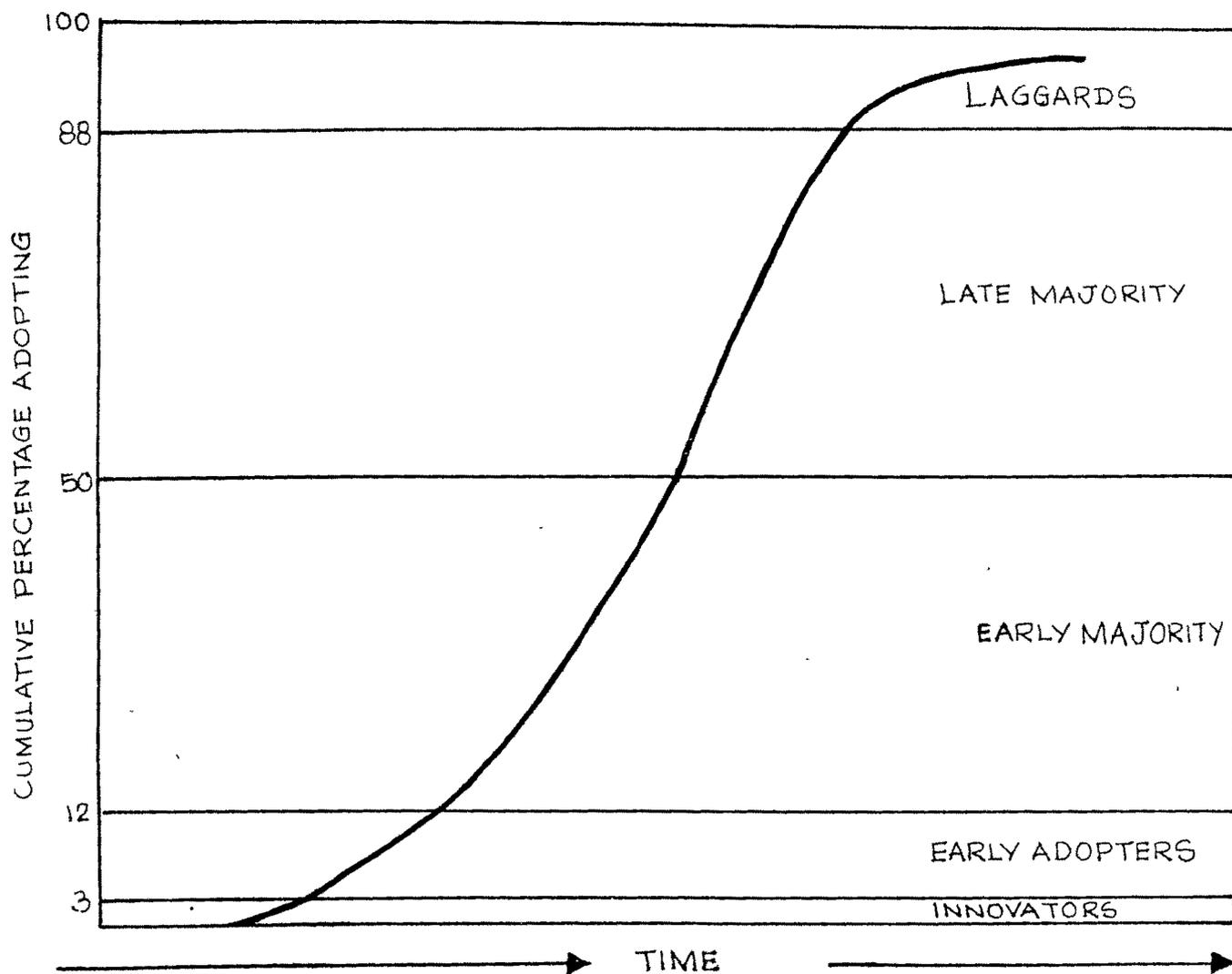training for change.

FIGURE.2.2.ADOPTION AS A CUMULATIVE CURVE

Rates of Diffusion:

In educational systems, the rates of implementation of ideas and innovations still lag far behind the rates of diffusion of innovations in the medical, agricultural and industrial systems. M.B.Miles (1964) delineates three reasons in particular for the slow rate of implementation in education. (1) There is an absence in education of any body of valid scientific research finding. (2) There is a lack of change agents in order to promote new educational ideas. (3) Very little economic incentive exists to adopt even those ideas and innovations which have been explored and which on the face of it appear to have some logical validity. The adoption process is divided into five stages. (1) The very early stage when a small number of innovators decide that they will introduce their new ideas. (2) The second stage in which the early adopters decide that they will become involved because they have not observed any completely disastrous results. (3) The middle stage in which the majority adopts comparatively quickly, influenced primarily by the innovators themselves. (4) The late stage when the small residue of resisters or laggards at last succumbs. (5) Finally there remains a small group of resisters who will never give in.

Figure 2.2: Illustrates the adoption process as a cumulative curve. The progression from awareness to integration of a single adopter is depicted by a similar S-Curve in Figure 2.3.
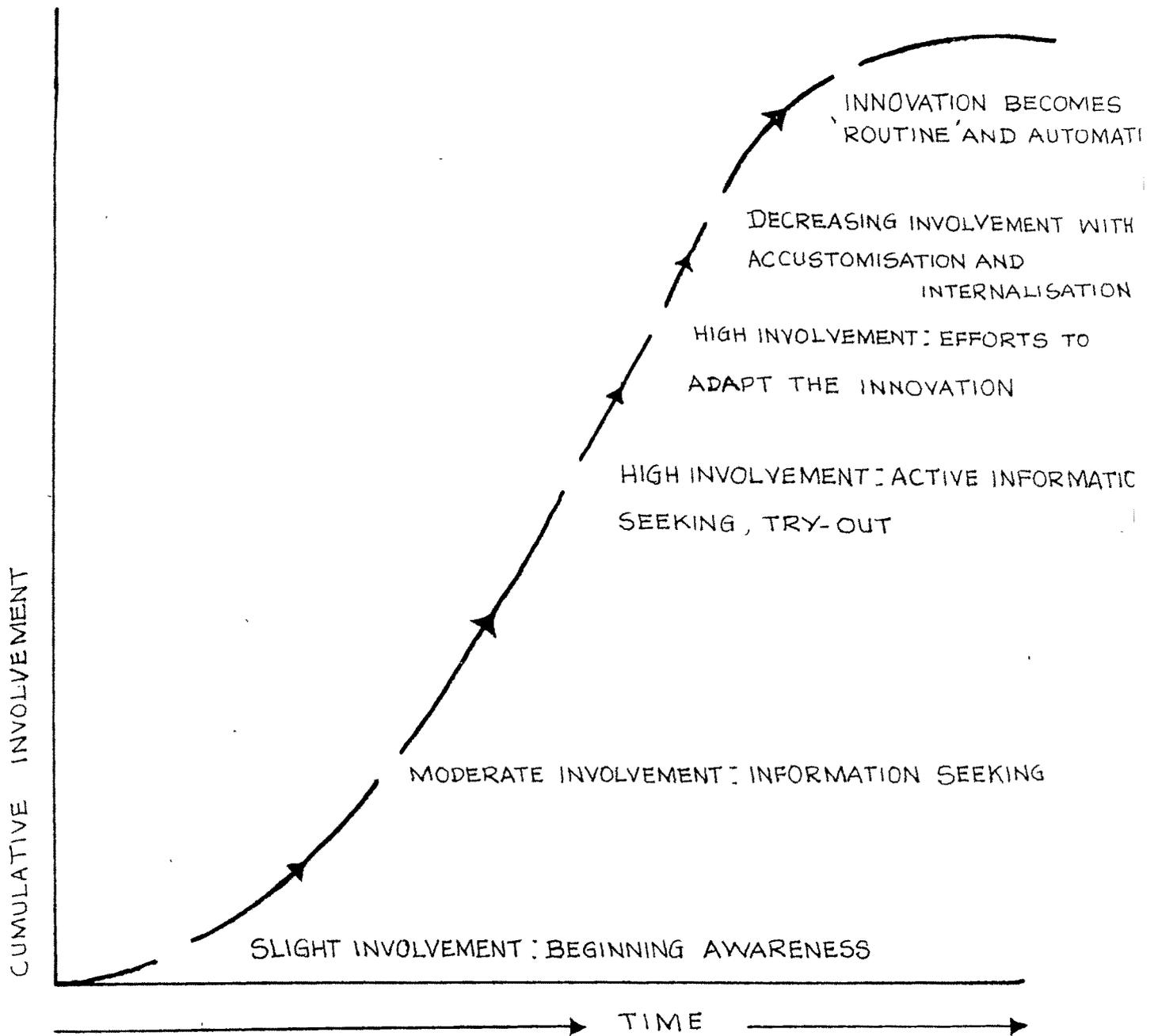
INNOVATION BECOMES
'ROUTINE' AND AUTOMATI

DECREASING INVOLVEMENT WITH
ACCUSTOMISATION AND
INTERNALISATION

HIGH INVOLVEMENT: EFFORTS TO
ADAPT THE INNOVATION

HIGH INVOLVEMENT: ACTIVE INFORMATIC
SEEKING, TRY-OUT

MODERATE INVOLVEMENT: INFORMATION SEEKING

SLIGHT INVOLVEMENT: BEGINNING AWARENESS

CUMULATIVE INVOLVEMENT

TIME

FIGURE 2·3. INVOLVEMENT OF AN INDIVIDUAL DURING THE ADOPTION PROCESS.

Process Variables:

The process variables are the factors which operate
when any given innovation is introduced into the education
or school system. Some of them are inherent in the innovation
itself. Some are situational or connected with the school
system and its personnel. Some others are environmental
factors. A.M. Huberman (1973) has provided a general check
list of such process variables.

(a) Inherent or Intrinsic variables:

The inherent or intrinsic variables are variables
which are part and parcel of the innovation itself. They
are (1) The proven quality of the innovation as indicated by
the reliability, validity, generality, internal consistency,
congruence with other scientific theories, actual utility of
the innovator, its precision and durability. (2) Cost including
initial or capital costs and the continuing or recurring costs.
(3) Divisibility which is the degree to which an innovation
may be tried on a limited basis, that is, its trialability
(4) Complexity relating to three elements in particular,
namely (a) the number of parts of the innovation. (b) the
number of behaviour or skills to be learned or understood
before adoption is possible. (c) the number of procedures
required for effective maintenance over a period of time.
(5) Communicability - the ease with which an innovation
can be explained or demonstrated.

(b) Situational Variables:

There are certain variables which are inherent in the situation in which the innovation is to be adopted. They are (1) Structure of the instructional system like size of the school hierarchy of management, number of innovations adopted, resources available etc. (2) Leadership and sponsorship qualities. (3) School environment. (4) Group norms (5) Personal characteristics of adopters and (6) Rewards and punishments provided in the system.

(c) Environmental Variables:

The environmental variables which prepare the general climate for adoption of innovations are (1) The culture of the society, its traditionality or modernness and (2) Readiness.

Resistance:

Watson (1967) has set out a five stage theory of resistance to typical innovations. (1) There are massive and undifferentiated innovations; few individuals take such changes seriously. (2) The pro and con sides for change are clearly identifiable; here resistance can be defined and its power fully appraised. (3) There is direct conflict as a result of the proposed innovations. Here resistance is mobilised and becomes the really crucial stage. (4) Those who are effecting change i.e. the changers are in power. Here considerable wisdom is required in order to keep latent opposition from mobilising. Resisters at this stage are usually regarded as cranks, as cranks, obscurantists and obstructionists. (5) The first cyle
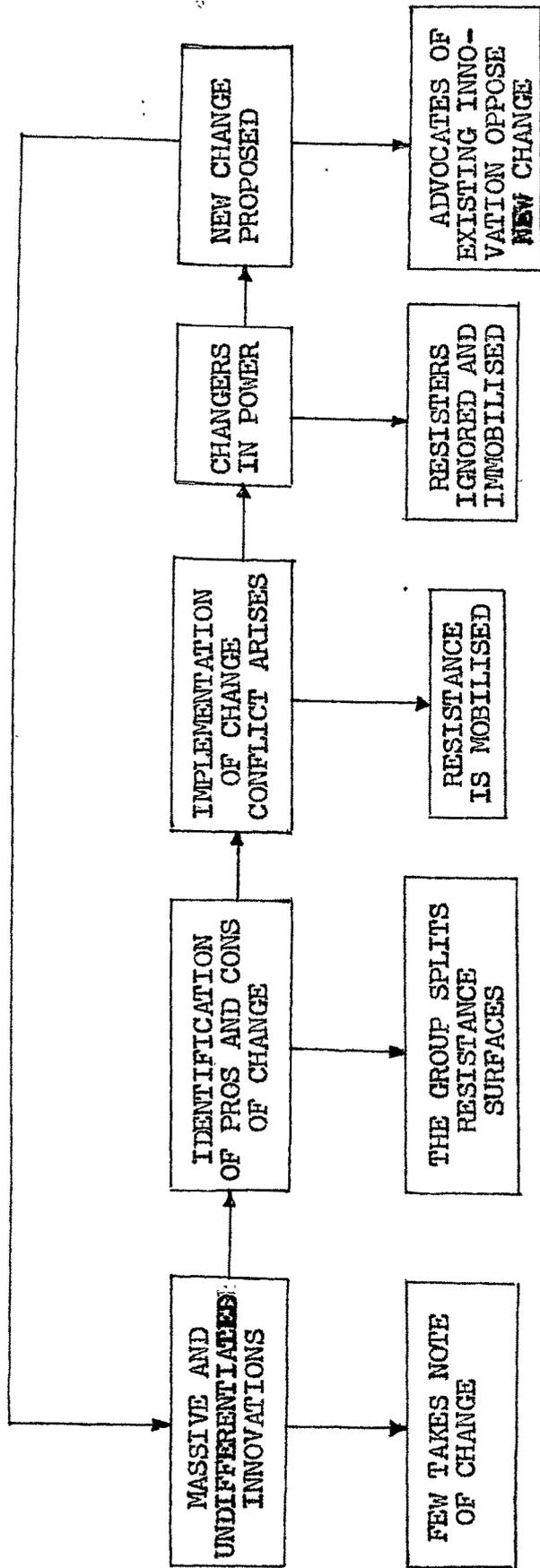
Fig. 2.4   THE CYCLE OF CHANGE PROCESS AND THE RESISTERS.

is completed. Old adversaries are now as few and as
alienated as advocates were in the first stage. The advocates
of existing innovation now becomes the resisters to new change.

Figure 2.4 gives a diagrammatic presentation of the
five stages.

Resistance in Personality:

Three taxonomies of resistance have been preferred
in the literature on the process of innovation.

1. Watson has identified eight forces of resistance: (Watson,
(1967). (i) Homoeostasis: The organic desire to maintain
balance. (ii) Habit: Preference to the familiar over the
unfamiliar. (iii) Primacy: Imprint of the first experiences
and impressions. (iv) Selective perception and retention.
(v) Dependance on peers (vi) Superego: The tendency to
maintain moral standards which have been absorbed in childhood
from authoritarian adults. (vii) Self-distrust (viii) Insecurity
and regression.

2. Guskin finds the following four individual variables to
play active part in knowledge utilisation (Havelock, 1973).
(i) Sense of competence and self-esteem. (ii) Authoritarianism
and dogmatism. (iii) Feelings of threat and fear. (iv) Self-
fulfilling prophecies.

3. Harvey (1967) has proposed a conceptual system approach.
He argues that different people have different learning
and cognitive styles. In the conceptual systems that they
develop individuals will vary from the highly concrete to

Figure 2.5   A FRAMEWORK FOR THE IDENTIFICATION OF FORMS OF REJECTION

	Form of Rejection	Cause of Rejection	State of Subject	Anticipated Rejection Responses
1.	Ignorance	Lack of dissemination	Uninformed	'The information is not easily available'.
2.	Suspended judgement	Data not logically compelling	Doubtful	'I want to see how good it is before I try.'
3.	Situational	Data not materially compelling	(a) Comparing (b) Defensive (c) Deprived	'Other things are equally good.' 'The school regulations will not permit it' 'It costs too much to use in time and/or money'
4.	Personal	Data not psychologically compelling	(a) Anxious (b) Guilty (c) Alienated	'I don't know if I can operate equipment' 'I know I should use them, but I don't have time'. 'These gadgets will never replace a teacher.' 'If we use these gadgets they might replace us'.
5.	Experimental	Present or past trials	Convinced	'I tried them once and they proved to be absolutely no good'.

the highly abstract. The highly concrete self-system have
the following main characteristics. (i) Tendency towards
more polarised evaluation (ii) Greater dependence on
status and authority as guidelines to belief and action.
(iii) Intolerance of uncertainty, with a tendency to form
judgements of novel situations more quickly. (iv) Poorer
capacity to act 'as if' to place himself in the position
of another person, to visualise a hypothetical situation.
(v) The holding of opinions with greater strength and
greater certainty that opinions will not change with time.
(vi) High score in dictatorialness (high need for structure,
low flexibility, low encouragement of individual responsi-
bility, high punitiveness, low diversity of activities.)

Resistance in Action:

Eichholz and Rogers (1964) carried out an attitude
survey of resistance to new educational media on the part of
elementary school teachers and found eight types of rejection
responses. (i) Rejection through ignorance. (ii) Rejection
through default. (iii) Rejection by maintaining status quo
(iv) Rejection through social mores (v) Rejection through
interpersonnel relationships. (vi) Rejection through
substitution. (viii) Rejection through fulfilment (viii)
Rejection through experience. Figure 2.5 presents a framework
proposed by them for the identification of rejection responses,
with distinction being made between 'real' and 'stated' reasons
for rejection.

Another study concerning seven contested innovations in America has been reported by Huberman (1975) and it has revealed four types of opponents to innovations. (i) Those who favoured the innovation, but disagreed with the particular form it should take. (ii) Those who created independent groups of their own in order to defeat the innovation. (iii) Those who were inspired or coerced into opposition by the second group. (iv) Those whose resistance was only incidental or situational but whose interest lay elsewhere.

Innovators:

Innovator is one who takes to change earlier than any other person. What distinguished an innovator from others have been studied by many researchers. A few characteristics of innovators have been identified and generalised (Rogers, 1965). (1) Innovators are generally young. 'The older teachers proved to be more potential adopters of innovations than the young', whereas the younger teachers tended to be more potential innovators.' (2) Innovators have relatively high social status. (3) Impersonal and cosmopolite sources of information are important to innovators. (4) Innovators are cosmopolite. (5) Innovators exercise opinion leadership. (6) Innovators are likely to be viewed as deviants by their peers and by themselves.

Barnett (1953) has described four orders or categories of acceptors, defined in terms of their attitudes toward the novelty equivalents traditional with their group.

(1) The dissident who consistently refuse to identify
themselves with some of the conventions of their group
and just give lip service to certain customs. The more
independent and courageous these dissenters are, the more
openly they rebel and withdraw from participating in the
customs that offend them. (2) The indifferent who are
prepared to accept new ideas because they have not
irretrievably committed themselves to a custom or to
an ideal of their society. They are more open-minded and
objective than are their opposites, those who have committed
themselves. (3) The disaffected who begin as active
participants in particular aspects of their culture, but
acquire a distaste for those aspects in course of time,
changing from a positive to a negative attitude as a result
of some personalised event. The disaffected person becomes
at odds with society as a result of such variables as marginal
status, disillusionment, frustration generalised social
anxiety, guilt depression or circumvention by specified
enemies. (4) The resentful who are the have-nots rather than
the care-nots. They are negativistic towards their own roles,
but enamoured of the roles of the more favoured individuals,
The resentful is susceptible to a suggestion of change because
he has little and often nothing to lose by acceptance.

4. MANAGEMENT OF CHANGE:

Overview of Models:

An aspect of the literature on innovation is that much
of it analyses changes that have already taken place. The studies

are based on histories of more or less upplanned change from
which models are made of how in fact the process took place
and strategies are drawn up to show how the process might
have been accelerated. The literature contains three
principal types of models illustrating how change takes place.

(a) The Research and Development Model:

The Research and Development Model, also called the
'Theory-into-Practice' model, views the process of change
as a rational sequence of phases, by which an innovation is
invented or discovered, developed, produced and disseminated
to the user. The innovation is not analysed from the viewpoint
of the user, who is presumably passive. Nor does research
begin as a set of answers to specific human problems, but
rather as a set of facts and theories which are then turned
into ideas for useful products and services in the development
phase. The knowledge is then mass produced and diffused to
those for whom it might be useful. The emphasis is on the
translation of basic research into applied knowledge. "While
there is usually a dim understanding of how the knowledge gets
transformed into something useful, it is firmly believed that
somehow it filters down". (Havelock, 1971). The interface of
research and practice is illustrated in diagrammatic form in
Figure 2.6.

(b) The Social Interaction Model:

The Social interaction model emphasises the aspects of
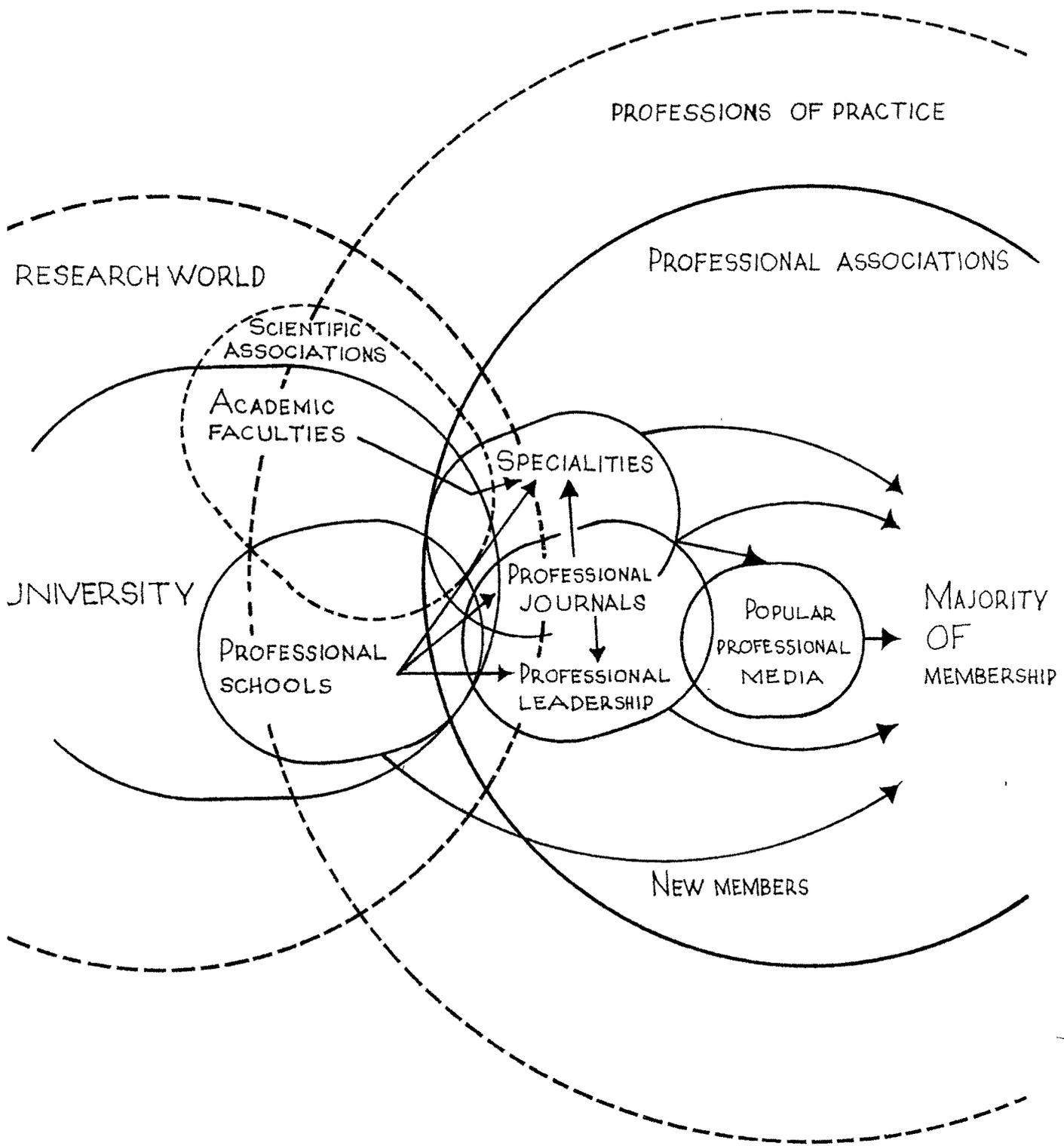diffusion, the movement of messages from person to person and

FIGURE 2.6   THE INTERFACE OF RESEARCH AND PRACTICE

system to system. Widely used in medicine and agriculture, it stresses the importance of inter-personal networks of information, of opinion leadership, personal contact and social integration. The idea is that each member in the system will proceed through the awareness-adoption cycle through a process of social communication with his colleagues. This strategy takes the form of convincing a respected administrator or teacher of the usefulness of a new device or practice and then facilitating the processs whereby colleagues come into contact with the new practitioner while he is using the innovation.

(c) The Problem-solving Model:

The Problem-solving model is built around the user of the innovation. It assumes that the user has a definite need and that the innovation satisfies the need. Thus the process is from problem to diagnosis of a need, then to trial and adoption. An external change agent is very often required to counsel individuals on possible solutions and implementation strategies, but the emphasis is on client-centred collaboration rather than on manipulation from without.

The way in which the process of change is conceived in the three models is reconstituted in Figure 2.7.

Research and Development	Problem Solving	Social Interaction
1. Invention or discovery of Innovation	1. Translation of need to problem	1. Awareness of innovation
2. Development (Working out problems)	2. Diagonosis of the problem	2. Interest in it.
3. Production and packing	3. Search and retrieval of information	3. Evaluation of its appropriateness
4. Dissemination to mass audience	4. Adaptation of innovation	4. Trial
	5. Trial	5. Adoption for permanent use.
	6. Evaluation of trial in terms of need satisfaction.	

FIGURE 2.7 : : TYPICAL STAGES IN THE MODELS OF CHANGE.

These models differ on the source of initiative in the change process. The R & D model stresses the developer, the social interaction model stresses the communicator and the problem-solving model emphasises the receiver.
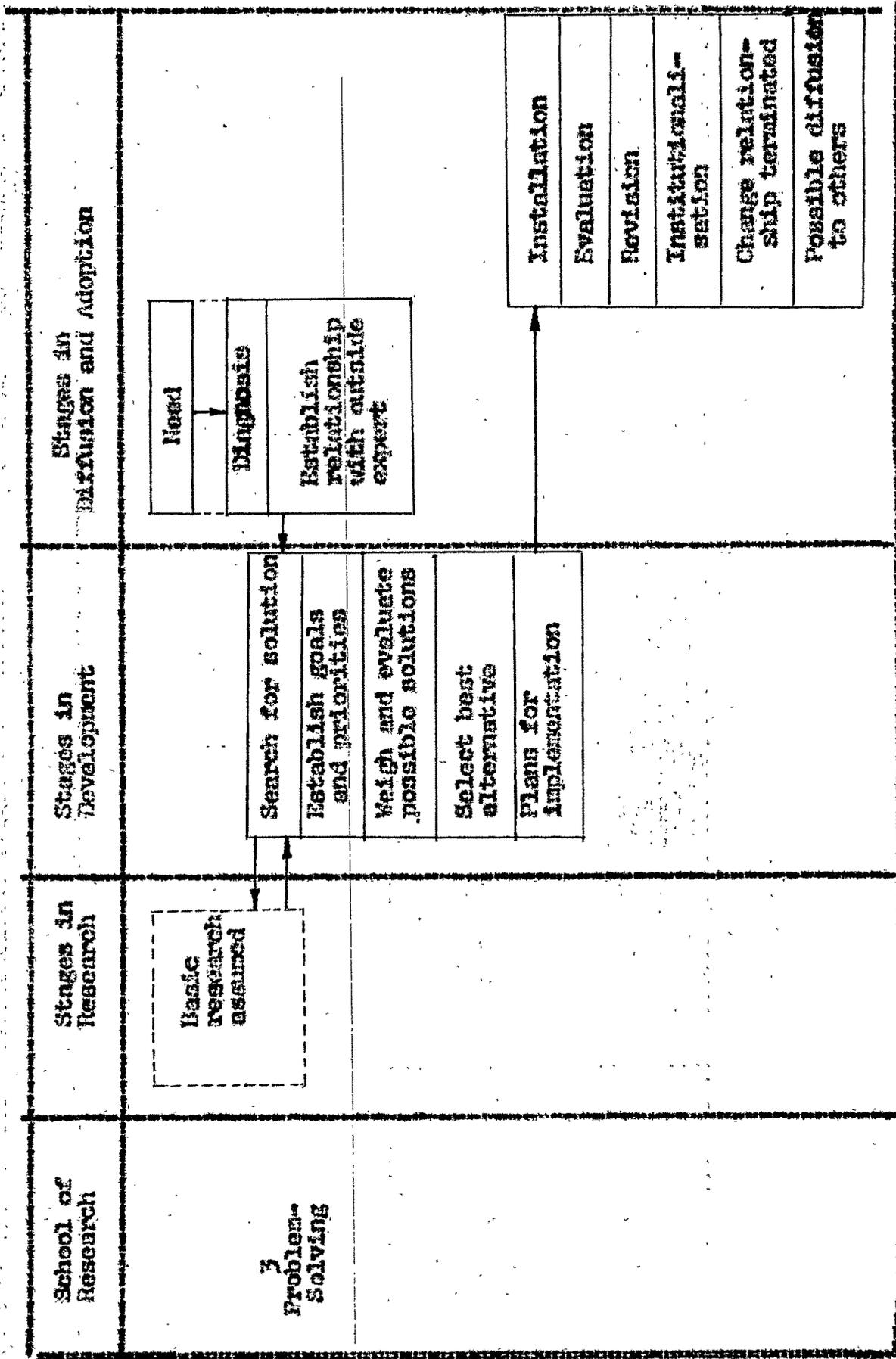
The Social Interaction model is highly natural while the R & D model is closely planned. The R & D model studies in particular the activities of the resource person or system, whereas the Social Interaction Model focuses the user person and the problem solving model on the change agent in interatio-n-w relation with

School of Research	Stages in Research	Stages in Development	Stages in Diffusion and Adoption	
1 Research Development and Diffusion (R.D & D)	RESEARCH Basic scientific Inquiry. Investigate problems Gather data	DEVELOPMENT invent and design Engineer and package Test and evaluate	DIFFUSION Promote Inform Demonstrate Train Help Service & nurture	ADOPTION Awareness Interest Evaluation Trial Installation Adoption Institution- alisation
2 Social-Interaction (S-I)	Research assumed	Development assumed	Some diffusion activity assumed	Awareness Interest Evaluation Trial Adoption

Figure 2.7   STAGES IN MODELS OF CHANGE WITHIN THREE SCHOOLS OF RESEARCH.

Fig. 2.8 Stages in Models of Change within Three Schools of Research Contd.

School of Research	Stages in Research	Stages in Development	Stages in Diffusion and Adoption
3 Problem-Solving	Basic research assumed	Search for solution Establish goals and priorities Weigh and evaluate possible solutions Select best alternative Plans for implementation	Need → Diagnosis Establish relationship with outside expert Installation Evaluation Revision Institutionali-sation Change relation-ship terminated Possible diffusion to others

the user. Havelock (1971) also points out that the
dissemination strategies in each model are different:

R & D   : One-way media for information and
                  training.

Problem $\begin{matrix}\\+\\\end{matrix}$ Two-way involvement between sender and
solving   receiver.

Social $\begin{matrix}\\\\\end{matrix}$ A variety of transmission media.
Interaction

Figure 2.8 gives a comparative study of themodels and the
sequence of events within each model.

Overview of Strategies:

A strategy in operational terms, means a set of
policies underlying specific action steps or tactics expected
to be useful in bringing about the lasting installation of a
particular innovation.

G. Watson (1967) suggests that all strategies should
take as much account of resisting forces in the adopter as
tactics for bringing about adoption. He lists five preconditions
for any successful attempt at institutional change. (1) Partici-
pants must feel that the project is their own and not wholly
devised by outsiders. (2) The project must have the whole-
hearted support of the senior officials of the system. (3) The
project must be in fairly close accord with the value and
ideals of participants. (4) The participants should experience
support, trust, acceptance and confidence in their relations
with one another. (5) Participants must feel that their
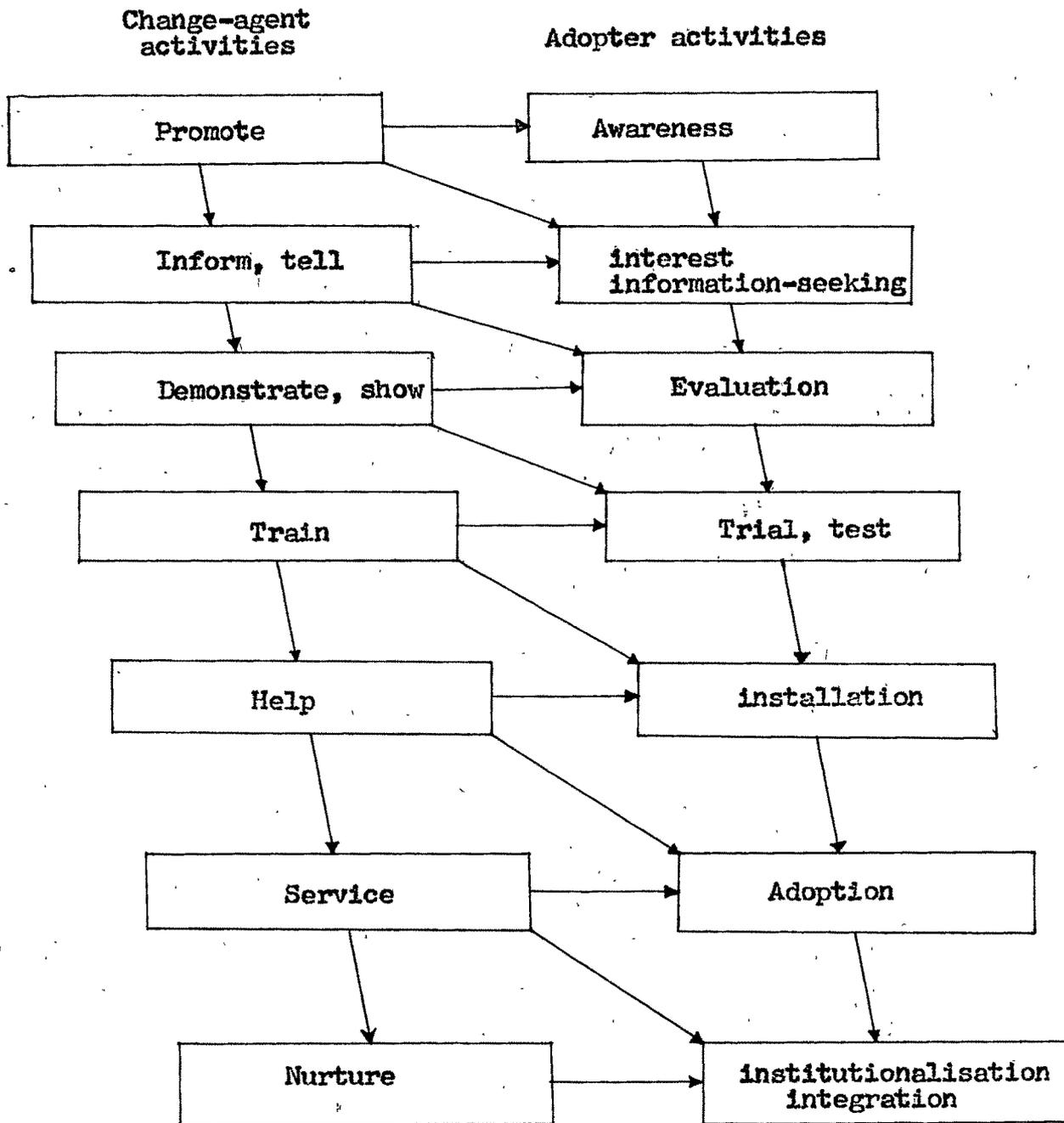autonomy and security are not threatened.

Change-agent
activities

Adopter activities

Promote	→	Awareness
Inform, tell	→	interest information-seeking
Demonstrate, show	→	Evaluation
Train	→	Trial, test
Help	→	installation
Service	→	Adoption
Nurture	→	institutionalisation integration

Figure 2.9

Relationship between Change-Agent Activities and Adopter-
Activities.

E.G. Guba (1967) gives a typology of strategies which depend on the nature of the adopter. (1) <u>Value strategy</u>: The adopter is viewed as a professional to whom an appeal might be made in terms of value priorities. (2) <u>Rational Strategy</u>: The adopter can be convinced on the basis of reasoned and logical arguments, as well as of hard data, of the feasibility, utility and effectiveness of the innovation. (3) <u>Didactic Strategy</u>: The adopter is willing to try the innovation although he is untrained in the process of implementation of the innovation. (4) <u>Psychological Strategy</u>: The adopter has needs for acceptance, involvement and inclusion which may be used to influence him. (5) <u>Economic Strategy</u>: The adopter is compensated for agreeing to adopt or is deprived of resources if he refuses. (6) <u>Authority Strategy</u>: The adopter can be compelled by orders which emanate from hierarchical superiors.

Each of the above strategies are linked to six diffusion techniques, namely, telling, showing helping, involving, training and intervening. Guba concludes techniques should be consistent with the strategy they employ. The linkage between the techniques of intervention and the various phases of the change process is given in Figure 2.9.

These strategies may be regrouped into three distinct approaches that may be adopted for introduction of innovations. (Chin and Benne, 1961).

(1) <u>Empirical-rational approach</u>: The implication here is
that men are rational, and that they will follow their
rational self-interest once it is shown them. The innovation
will be adopted if it can be rationally justified and if it
can be shown that the adopter will benefit by the change.
The assumption is also that reason determines the process
of initiating innovations. Scientific investigation is the
best way of extending knowledge, from basic research to
practical application. Such a strategy has its best results
when the public is ready to accept a new invention. When
there are difficulties, a public information campaign is
often used. The approach is least successful when there is
strong resistance among potential adopters.

(2) <u>Normative-reeducative Approach</u>: The assumption is that
the adopter is active, not passive; he is not waiting for
solutions from outside but rather he is himself actively
searching for a solution to his problems. The strategy
itself is based upon a psycho-therapeutic model of change
agent (or counsellor) and adopter (or client) in which,
with the agent's collaboration, the client is enabled to
work out changes for himself. The aim is less in the nature
of technical training, than the changing of values and
attitudes. In such a change there are two principal objectives:
(a) to improve the problem-solving potential of the client
or adopting system, in particular the human relationships as
these bear on the functioning of the system and (b) to
bring self-clarity and personal development to individuals

within the system, on the assumption that personal changes
will eventually lead to the changes in organisation.

(3) Bower-coercive Approach: The strategy here is to use
political and economic sanctions to enforce change. This
approach is necessary when legislation is involved, but is
also the common manner of bringing about less sweeping reforms
in countries where the teaching and administrative staff are
expressly appointed as civil servants or under the control of
Governmental authority. The making of an order, of course,
does not mean that the decision can be carried out. To be
adopted at the personal level, most innovations require new
knowledge, skills, attitudes, often new value orientations.
At the social level, there must be changes in norms, roles
and relationships.

A Descriptive Analysis of the Three Models of Change:

Most of the models and strategies in education are based
upon the transfer from theory to practice. The actual process
of change is viewed as an orderly and logical sequence which
begins with the identification of particular problem or the
conception of a specific idea, proceeds through the development
of possible solutions and prototypes, and ends with the
diffusion of the product to a selected target group. The major
emphasis in the model is upon the planning of change on a large
scale, for which specialised agencies such as laboratories,
experimental units and research institutions are required for

scientific research, development and rigourous testing and
evaluation. For the distribution and installation of the
innovation in a target system, mechanisms must also be
included.

The major characteristics of the model are as follows:
(1) The model assumes that development and diffusion should be
a rational process, that there should be a rational sequence
of activities which moves from research to development to
packaging before dissemination takes place. (2) The model
implies that there has to be planning on a really massive
scale. (3) There must be a division of labour and a careful
selection of roles and functions. (4) A more or less clearly
defined audience is assumed, a specified passive consumer
willing to accept the innovation if it is delivered on the
right channel, in the correct manner, at the tight time.
The model accepts high initial development costs prior to
any dissemination activity for it foresees an even greater
gain inthe longer run in terms of efficiency, quality and
capacity to reach a mass audience.

The model suffers from two major limitations: (1) The
model tends to underestimate the stages of diffusion and
adoption through its assumption that the enlightened self-
interest of the practitioner will lead to the eventual
incorporation of the innovation. (2) Design, evaluation and
dissemination are three different processes which are distinct
and irreconciliable. The place of design flourishes in
'enriched and free' circumstances. The phase of evaluation

however requires a controlled and closely observed 'unfree'
environment in order to determine what might be accomplished
by the innovation under specific conditions. The ideal
conditions for dissemination by demonstration are, of course,
ordinary, unenriched and normal everyday situations. (Brickell,
1964).

(b) Social Interaction Model:

The unit of analysis in this model is the individual
receiver and the focus is onthe receiver's perception of and
response to knowledge emanating from outside. The most
effective means of disseminating information about innovations
have been found to be personal conflict. The key to adoption
is therefore the social interaction among members of the
group.

The adoption sequence in the Social Interaction Model
consists of five stages, namely;
(1) Awareness: In this initial stage, the individual is
exposed to the innovation, but he is lacking complete information
about it, or he may not be motivated to seek any further
information. He is generally passive in that awareness does
not usually come about as the result of a need, but rather it
creates a need for the innovation. An individual may develop
a need when he learns that an improved method or innovation
exists, so that innovations do lead to needs as well as vice vers
(2) Interest: During the interest stage, the individual seeks
information concerning the innovation, but has not yet judged

its utility in terms of his own situation. The function of this stage is mainly to increase the individual's information concerning the innovation. As the individual's behaviour becomes purposive in seeking information, his psychological involvement increases. This active search for information implies some degree of personal commitment, however small, and may well presage later phases more likely to result in adoption. (3) Evaluation: This stage may be referred to as one of 'mental trial' in which the individual applies the innovation to his present and anticipated situation, and then decides whether or not he will try the same. (4) Trial: If the individual finds that his 'mental trial' is favourable, he may decide to move on to the trial stage and use of the innovation on a limited scale in order to discover whether, in his own restricted situation, it has any real utility. The main function of this stage is to demonstrate the new idea in the person's own situation and further to determine its usefulness for possible complete adoption. (5) Adoption: The results of the trial of the innovation, or of some modification of it, are then considered in some detail, after which the decision is finally made whether to adopt or reject the innovation. If the innovation is adopted, it becomes increasingly internalised and routinised, in fact, an accepted and automatic part of the adopter's behaviour.

At each stage of the innovation, the potential adopter will usually turn to different sources of information. The print and non-print media tend to play a major role during the stages o

FIGURE 2.10   A CLASSIFICATION

	RESEARCH	DEVELOPMENT		DIFFUSION
		Innovation	Design	Dissemination
OBJECTIVE	To advance knowledge	To formulate a new solution to some operating problem(s) i.e. to innovate	To order and to systematise the components of the invented solution; to construct an innovation package for institutional use, i.e. to engineer.	To create widespread awareness of the innovation among practitioners i.e. to inform
CRITERIA	Validity (Internal and External)	Face validity (appropriateness) ——— Estimated viability ——— Impact(relative contribution)	Institutional feasibility ——— Generalisability ——— Impact (extent to which it affects key targets)	Intelligibility Fidelity ——— Pervasiveness ——— Impact (extent to which it affects key targets)
RELATION TO CHANGE		Provides basis for Innovation	Engineers and packages the innovation	Informs about the innovation

SCHEMA OF CHANGE PROCESS

	ADOPTION		
Demonstration	Trial	Installation	Institutionalisation
To afford an opportunity to examine and assess operating qualities of the innovation i.e. to build conviction	To build familiarity with the innovation and provide a basis for assessing the quality, value, fit and utility of the innovation in a particular institution ie. to test	To fit the characteristics of the innovation to the characteristics of the adopting institution, i.e. to operationalise	To assimilate the innovation as an integral and accepted component of the system, i.e. to establish
Creditability Convenience ——— Evidential assessment	Adaptability Feasibility ——— Action	Effectiveness Efficiency ———	Continuity Valuation ——— Support
Builds conviction about the innovation	Tries out the innovation in the context of a particular situation	Operationalises the innovation for use in a specific institution	Establishes the innovation as a part of an ongoing programme; converts it to a 'non-innovation'

awareness and interest, whilst during the final stages of
evaluation, trial and adoption, personal sources tend to
dominate.

Some of the characteristics of adopters have been
found to be as follows (Rogers 1965). (1) Early adopters
greatly affect and influence later adopters. (2) The early
adopters may be cosmopolites who have read more widely,
travelled extensively, had more contact with experts and
innovators and are generally educatēd at a higher level.
(3) Some early adopters may be senior administrators who are
in a position to enforce compliance through formal leadership,
while others may be opinion leaders whose advice is valued,
or gate keepers who are the informal leaders in a system and
who are in a position to help or hinder the adoption of a
new idea or practice.

A strategy to introduce a given change to members of
a social system is depicted in Figure 2.10.

(c) Problem solving Model:

This model stresses the importance of the receiver
who has to resolve the problems. Either the change agent
or the receiver may initiate the change process, but in
either case the receiver must desire to change and participate
fully in effecting the change. The cycle of problem solving
is illustrated in Figure 2.11. Where an outside agent, that is
an external consultant, is required, the diagram is extended
as in Figure 2.12. The user's need is of paramount importance
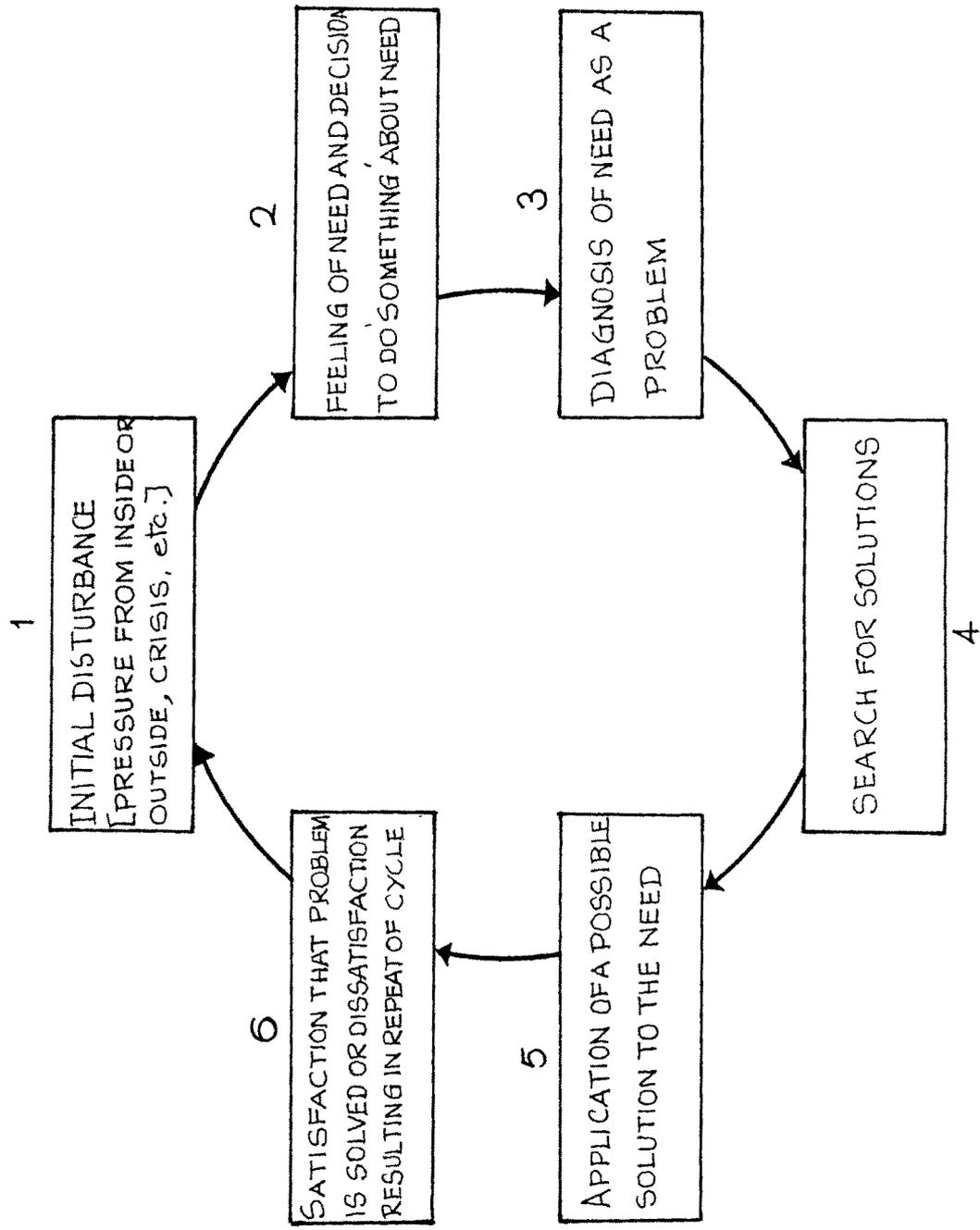and diagnosis is part of the process. The outsider is a
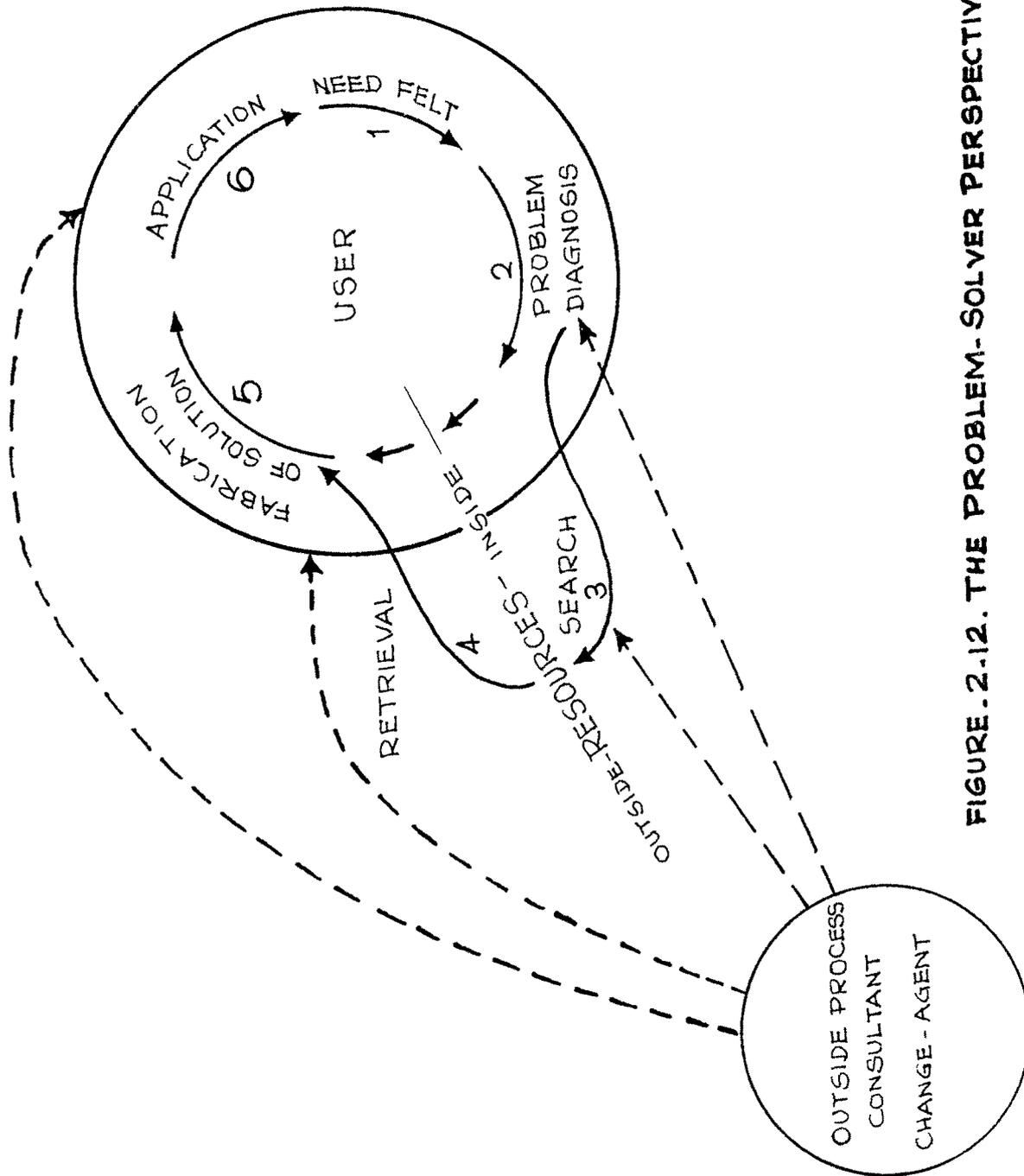
FIGURE 2-II. CYCLE OF PROBLEM-SOLVING.

1 — INITIAL DISTURBANCE [PRESSURE FROM INSIDE OR OUTSIDE, CRISIS, etc.]

2 — FEELING OF NEED AND DECISION TO DO SOMETHING ABOUT NEED

3 — DIAGNOSIS OF NEED AS A PROBLEM

4 — SEARCH FOR SOLUTIONS

5 — APPLICATION OF A POSSIBLE SOLUTION TO THE NEED

6 — SATISFACTION THAT PROBLEM IS SOLVED OR DISSATISFACTION RESULTING IN REPEAT OF CYCLE

FIGURE. 2.12. THE PROBLEM-SOLVER PERSPECTIVE

The diagram contains the following labels:

USER

NEED FELT — 1
PROBLEM DIAGNOSIS — 2
SEARCH — 3
RETRIEVAL — 4
FABRICATION OF SOLUTION — 5
APPLICATION — 6

OUTSIDE-RESOURCES-INSIDE

OUTSIDE PROCESS
CONSULTANT
CHANGE-AGENT

catalyst consultant or collaborator, but the user must
find the solution himself or at least see it as his own
and must utilise all internal resources before searching
outside.

The basic properties of the problem-solving approach
may be synthesised into the following five points. (1) The
model is both inconclusive and potentially irresponsible,
since researchers in this field are usually indifferent to
the ultimate fate of an innovation. For them, the process
ends when the target group has accepted or 'bought' the
innovation, without further investigating the durability
or depth of the adoption. The social interaction model is
manipulative with little concern for the consumer's real
needs or circumstances. (2) Diagnosis proceeds the identifica-
tion of solutions. The model is highly clinical, emphasising
the user and his world. (3) The outside helping role is
non-directive. The change agent or the outside helper just
provides the client system with guidance and training in
how to do its own problem solving and does not take over
the function on himself for the client. He advises and
helps on the process more than on the content, encouraging
the user to perform his own diagnosis, retrievel and application
work for himself. (4) The importance of internal resources is
recognised. "The home-grown and home-stored knowledge is
going to be more relevant and more suitable for the solution
of the problem at hand than the imported knowledge would be"
(Havelock, 1973). (5) User-initiated change is the strongest.

The user is "more likely to internalise an innovation that
he sees as his own, something that he has accepted by his
own free and deliberate choice to meet his own specific
need, and something that he has worked on himself to
adapt his own specific need" (Havelock, 1973).

Techniques of implementation of innovations:

The objective of the techniques involved within the
user system is two fold: (1) to 'unleran' or re-educate the
individual and group attitudes which were responsible for
the appearance of the problem and (2) to 'educate' or add
new knowledge, skills, attitudes and practices.

M.B.Miles (1955) has singled out interaction techniques
appropriate to the field of education. Some of them are:
(1) Team Training: The members with the help of consultants
analyse their own effectiveness as a problem-solving team,
the role of each individual within the group and the way in
which it affects both the group and the individual himself
and the operations of the group in relation to its organisational
environment. This increases skills of communication and
management of conflicts. (2) Survey Feed Back: Each work group,
assisted by the consultant, examines its own summarised data
of beliefs, opinions and attitudes of the members of the system
collected through questionnaires, and compare its results with
those from the organisation as a whole. This improves teacher-
administrator relations. (3) Role workshop: This intervention,
referred to as 'horizontal slice' meeting, involves all the

people in a particular role. The main emphasis is upon role
clarity, effectiveness and the improvement of the 'fit' between
the person and the role. (4) Target setting and supporting
activities: These are periodic meetings between a superior
and each of his subordinates separately. The work of each
subordinate is reviewed in relation to individual and
organisational goals and an agreement is reached on targets
for the subordinate's personal work and development. There
is constant periodical review and revision of targets. This
developes a working relationship between the superior and the
subordinate. (5) Organisational diagnosis and problem solving:
Here the entire adult population of a school will meet for
several days to identify problems, discuss causes, decide on
requisite changes and then implementation of changes. This
strengthens communication, group cohesiveness and problem
solving activity. (6) Organisational Experiment: This is
a variation of the previous model in which the members carry
out a controlled experiment, complete with 'before' and 'after'
testing and the use of control groups.

Choice of Models and Strategires:

The research and development model concentrates more
specially upon the origins of the innovation, the problem
solving model upon the dynamics of individual adoption, and
the social interaction model upon wide diffusion throughout
an educational system. The R. & D model reveals the fact
that there is a lack of institutional structures for the

design and development of new ideals and materials. The
problem solving model demonstrates the paucity of processes
for implementing changes decided to be undertaken. The
social interaction model displays the insufficiency of the
vehicles for the dissemination of any particular innovation
to a larger public. Since none of the three models has been
fully developed in practice nor a general paradigm of fusion
of all three approaches has been attempted at, it is not
possible to lay down specifically which model will be suitable
in a particular area. However, in any strategy of change,
provision shall be made for all the three operations of
(a) Research and Development (b) Vehicles for the introduction
of change within a single institution and (c) Mechanisms for
spreading innovations throughout the system. The particular
techniques and their sequence of adoption will inevitably
vary from situation to situation.

Types of Innovative Decisions:

Innovations can be adopted or rejected by individual
members of system or by the entire social system. The
relationship between the social system and the decision to
adopt innovations have been classified into four types (Rogers
and Shoemaker, 1971).

(1) Optional Decisions: are made by an individual regardless
of the decisions of other members of the system. The
individual's decision is undoubtedly influenced to an extent
by the norms of his social system and his need to conform
to group pressures.

(2) Collective Decisions: are those which individuals in the social system agree to make by concensus. Once the decision is made, all are bound to conform to the system's decision.

(3) Authority Decisions are those forced upon an individual by someone in a superordinate power position, such as the Director of School Education. The individual's attitude toward the innovation is not the prime factor in his adoption or rejection, he is simply told of, and expected to comply with the innovation-decision which was made by an authority.

(4) Contingent Decisions are essentially a sequential combination of two or more of the three types discussed earlier. They are a choice to adopt or reject which can be made only after a prior innovation-decision. An individual member of a system is free to adopt or not to adopt a new idea only after the system's innovation-decision. The distinctive aspect of contingent decision making is that two (or more) tandem decisions are required; either of the decisions may be optional, collective, or authority.

In all authority decisions, two distinct sets of persons are easily identifiable. (1) the decision maker, who is one (or more) individual(s), and (2) the adopter or the adopters, who carry out the decision. In the case of optional and collective decisions, these two roles of deciding and adopting are performed by the same individual(s).

The first three types, namely optional, collective
and authority decisions, range on a continuum from optional
decisions, where the adopting individual has almost complete
responsibility for a decision, through collective decisions,
where the adopter has some influence in the decision, to
authority decisions, where the adopting individual has no
influence in the innovation decision. Formal organisations
like schools are more likely to adopt collective and authority
decisions than optional decisions.

The fastest rate of adoption of innovations results
from authority decisions, depending, of course, on whether
the authorities are traditional or modern. In turn, optional
decisions can be made more rapidly than the collective type.
Although made most rapidly, authority decisions are more likely
to be circumvented and may eventually lead to a high rate of
discontinuance of the innovation. Where change depends upon
compliance under surveillance, it is not likely to continue
once the surveillance is removed.

The type of innovation-decision for a given idea may
change or be changed over time. For example optional innovation-
decision may become a collective decision in the course of time.

Role of Change Agent:

A Change agent is a "professional who influences innovation
decision in a direction deemed desirable by a change agency"
(Rogers and Shoemaker, 1971). The Change agent functions as a

communication link between two or more social systems. There
is often a social chasm, between the system represented by
agents of change and the Client's system, such as socio-
economic status, technical competence, beliefs and attitudes.
The change agent acts as a bridge and is the linking pin.

Some roles have been isolated in the process by which
a change agent introduces an innovation to his clients (Lippitt
et al., 1958). (1) The change agent develops a need for
change. He is often initially required to help his clients
become aware of the need to alter their behaviour. He not
only assesses client's needs at this stage, but also helps to
create these needs in a consultive and persuasive manner.
(2) The change agent establishes a change relationship. Once
a need for change is created, a change agent must develop
rapport
report with his clients by creating an impression of credibi-
lity, trustworthiness, and empathy with their needs and
problems. Clients must accept the change agent before they
will accept the innovations he promotes. (3) The change
agent diagnoses the problem. The change agent is responsible
for analysing his client's problem situation in order to
determine why existing alternatives do not meet their needs.
In arriving at his diagnostic conclusions, the change agent
must view the situation empathically from his client's
prospective, not his own. "He must psychologically zip
himself into their skins, put himself in their shoes, see
their situation through their eyes".

(4) The change agent creates an intent to change in the
client. After a change agent explores various avenues of
action that his clients might take to achieve their goals,
he should encourage an intent to change, a motivation to
innovate. But the change must be client-centred, rather than
change for change's ake. The change agent's role here is to
motivate. (5) The change agent translates the intent into
action. A change agent seeks to influence his client's
behaviour in accordance with the recommendations which are
based on the client's needs. In essence, the agent works
to promote compliance with the programme he advocates.
This means more than simply arrangement or intent, it means
action or behavioural change. (6) The change agent stabilises
change and prevents discontinuance. Change agents may effect-
ively stabilise new behaviour by directing reinforcing messages
to those clients who have adopted thus "freezing" the new
behaviour. This assistance frequently is given when the
client is at the trial-decision or confirmation function
in the innovation-decision process. (7) The change agent
achieves a terminal relationship. The end goal for any change
agent is development of self-renewing behaviour on the part
of his clients. The change agent should seek to put himself
out of business by developing his client's ability to be
their own change-agents. In other words, the change agent
must seek to shift the clients from a position of reliance
on the change agent to reliance on themselves.

Change Agent and Opinion Leaders:

Opinion leadership is the degree to which an individual
is able to influence informally other individual's attitudes
or overt behaviour in a desired way with relative frequency.
Diffusion campaign are more likely to be successful if change
agents identify and mobilise opinion leaders.

The time and energy of the change agents are scarce
resources. By focussing his communication activities upon
opinion leader in a social system, he can hasten the rate
of diffusion. Economy of effort is achieved because the time
and resources involved in meeting with opinion leaders is
far less than if each member of the client system were to
be consulted. Essentially, the leader approach magnifies
the change agent's efforts. He can communicate the innovation
to a few opinion leaders and then let word-of-mouth communica-
tion channels spread the new idea from there.

Furthermore, by enlisting the aid of leaders, the change
agent provides the aegis of local sponsorship and sanction for
his ideas. Directed change takes on the guise of spontaneous
change. Working through leaders improves the credibality
of the innovation, thereby increasing its probability of
adoption. In fact, after the opinion leaders in a social
system have adopted an innovation, it may be impossible to
stop its further spread.

Change agent sometimes mistakes innovators for opinion
leaders. They may be the same individuals, especially in systems

with very modern norms, but often they are not. Opinion
leaders possess a following, whereas innovators excell at
being the first to adopt new ideas. When the change agent
concentrates his communication efforts on innovations,
rather than on opinion leaders, the results may help to
increase awareness - knowledge of the innovations, but
few clients will be persuaded to adopt. The innovator's
behaviour is not likely to convince the average client to
follow suit. A related difficulty occurs when a change
agent correctly identifies the opinion leaders in a system
but then proceeds to concentrate his attention so much
on the few leaders that they may become too innovative in
the eys of their followers, or become perceived as too
friendly and overly identified with the change agent (Rogers
and Spemaker 1971).

Consequences of Innovations:

Consequences are defined as the changes that occur
within a social system as a result of the adoption or
rejection of an innovation. (Rogers and Shoemaker, 1971).
An innovation is of better use when it is disseminated to
others and put to use by them. Invention and diffusion
are but immediate means to an ultimate end, namely the
consequences from adoption of an innovation.

Very little evidence is reported of the availability
of the desirable and undesirable results actually achieved
by educational innovations diffused throughout school system and

that, as a result, new education ideas must be adopted largely
on faith, rather than on a more rational basis in which expected
consequences are considered.

Carlson (1963) found that due to misuse of an innovation
in a school system, the consequences where not what change agent
expected and the potential desirable effects of the innovation
were not achieved.

Classification of Consequences:

The consequences may be classified as (1) Functional
and dysfunctional (2) Direct and indirect (3) Manifest and
latent.

Functional consequences are desirable effects of an
innovation in a social system. On the contrary, dysfunctional
consequences are undesirable effects of an innovation in a
social system. The determination of whether the consequence
are functional or dysfunctional depends on how the innovations
affect the adopters. The functionability of consequences also
depends on the individuals of the system, that is functional
for the system, but not for certain individuals or functional
for some and not for others in a system. It also depends on
the time, that is, the long range and short range effects
may be quite different.

Direct consequences are those changes in a system that
occur in immediate response to an innovation. Indirect conse-
quences are changes in a social system that occur as a result
of direct consequences of an innovation.

Manifest consequences are changes that are recognised and
intended by the members of a social system. Latent consequences

CORRELATES OR ANTECEDENTS
OF INNOVATIVENESS

(INDEPENDENT VARIABLES)

1. In Education

   A. Wealth
   B. Cosmopoliteness
   C. Communication channels
   D. Miscellaneous

2. Among Peasants

   A. Literacy
   B. Social status
   C. Mass media exposure
   D. Miscellaneous

INDICATES OF
INNOVATIVENESS

(OLD DEPENDENT
VARIABLES)

Relative earliness
in adopting new educa-
tional ideas

Relative earliness
in adopting new agri-
cultural, health or
family planning ideas

CONSEQUENCES OF INNOVATIVENESS

(NEW DEPENDENT VARIABLES)

Functional, Direct or   Dysfunctional,
Manifest consequences: Indirect or
                             Latent conse-
                             quences:

A. Increased educational   A. Greater expense
   achievement   B. Teacher anxiety
B. More teaching   C. Increased
   efficiency   teacher work
C. Miscellaneous   loads
                             D. Miscellaneous

A. Increased agricul-   A. Greater pressure
   tural production   on the land
B. Higher income   B. Need for more
C. Fewer days of   Capital
   family sickness   C. Conflict with
D. Lower birth rates   cultural norms
E. Miscellaneous   D. Miscellaneous

NOTE: The area outlined in dotted lines
represents the additional element of
consequences that should be considered
in diffusion research.

FIG.2·1₃ A NEW MODEL FOR STUDYING CHANGE IN EDUCATION.

are changes that are neither intended nor recognised by the
members of a social system.

Figure 2.13 shows a model developed by Rogers and
Shoemaker for studying consequences of innovations in
education.

5. TIME DIMENSION:

Diffusion is set off from the broader field of communica-
tion by the nature of the message that is studied. The message
objects are innovations-ideas, practices and objects perceived
as new by the individual. Time is therefore an essential
element of diffusion.

Carlson (1965) criticises most studies of change for
being inappropriately "timeless". "Change is usually a∮
time-consuming process, and its time or speed constants
are therefore something we ought to study in a much more
systematic way than has so far been done" (Carlson, 1965).
A process occurs over time and, in a strict sense, has no
discernible beginning or end, In the process of diffusion
of innovations the time dimension is involved (1) in the
innovation-decision process by which an individual passes
first knowledge of the innovation through its adoption or
rejection, (2) in the innovativeness of the individual that is,
the relative earliness-lateness with which an individual adopts
an innovation when compared with other members of his social
system, and (3) in the innovation's rate of adoption in the
system, usually measured as the number of members of the
system that adopt the innovation in a given time period. Rogers
and Shoemaker (1971) identifies four main functions or steps in

the process of innovation, namely (1) knowledge (2) persuasion
(3) decision and (4) confirmation. The knowledge function
occurs when the individual is exposed to the innovation's
existence and gains some understanding of how it functions.
The persuasion function occurs when the individual forms a
favourable or unfavourable attitude toward the innovation.
The decision function occurs when the individual engages in
activities which lead to a choice to adopt or reject the
innovation. The confirmation function occurs when the
individual seeks reinforcement for the innovation decision
he has made, but he may reverse his previous decision if
exposed to conflicting messages about the innovation.

6. CONCLUSION:

In the light of the theoretical frame of reference
elaborated in the earlier pages of this chapter, a conceptual
model of the innovation is evolved by the investigator. It
consists of the following features (1) The objective, design
and type of the innovation (2) Awareness of the innovation
(3) Adoption of the innovation (4) The adopter continuum-their
distribution and characteristics (5) The change agent and
his role (6) The opinion leader and his role (7) Process
of dissemination of the innovation (8) Causes and effects
of resistance to innovation (9) Factors for discontinuance
of innovation (10) The model of change-the process model,
the strategy, innovation-decision type and innovation-decision
period (11) Evaluation of innovation with regard to six

factors-relative advantage, compatability, complexity, divisibility, communicability and observability (12)Consequences of innovation (13) time dimension. This conceptual model forms the basic frame of reference for studying the several aspects of innovations in education.

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