World Applied Sciences Journal 13 (8): 1878-1885, 2011
ISSN 1818-4952

Television Teaching and Learning: An Assessment Alternative Approach

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Abstract: The educational potential of television is universally recognised. A considerable slot of TV broadcast time has been allocated for education purposes. Continuous efforts are being made for further improvement of the tele-mediated teaching-learning process. In almost all types of educational television (ETV) research studies, they frequently utilize the taxonomic achievement categories as the index of students' learning as well as to assess effectiveness of ETV programmes in inducing learning. However, to assess effectiveness of ETV, this approach is found to be inadequate and inefficient. This research paper expresses problems and issues associated with this method of assessing televised teaching and learning and finally introduce an alternative approach, namely, cognitive map analysis which has been founded on the cognitive information processing view of television teaching and learning. We have come to the conclusion that appropriate criteria needs to be developed to determine the efficiency, effectiveness and relevance of the ETV programmes. We don't claim that cognitive map analysis to be the all purpose. It is rather a more appropriate assessment procedure for knowing effectiveness of televised teaching and learning.

Key words: Teaching · Learning · Television · Educational Television · Cognitive Map Analysis

INTRODUCTION

Depending on how one looks at the status of educational television in the world today, one sees either a glass half full or a glass half empty. Great advances have been made worldwide in forging inventive applications. Many different program genres have been used to address diverse audiences for a variety of formal and non-formal learning purposes, with scientifically measured results. The record of accomplishments is impressive, yet TV is drastically underutilized as a teaching tool in countries that have the highest prevalence of urgent and otherwise unmet education needs. The large gap that exists between the state of the art and the state of practice in the use of television for development has many causes, including a major lapse of international attention to national capacity building and application [1].

Broadcasting can fill many of the existing gaps in teaching and learning; it can widen the field from which students are drawn; it can put listeners in touch with the leaders of thought and the chief experts in many subjects; and it can lead on to more formal or more intensive study. There is little danger that it will supplant other educational facilities, especially if the educational bodies take their share in its development [2].

Over the years there have been some considerable successes in harnessing the more formal educational role of television and radio. However, a focus on the formal contribution can lead us to overlook just what a powerful tool television and radio has been to those wanting to deepen their understanding of themselves and the world through more informal means. Sometimes this may take the form of 'learning projects' where people look out for programmes that might help them explore an interest or enthusiasm. At other times, learning may be rather more incidental.

The educational potential of television is universally recognised. A considerable slot of TV broadcast time has been allocated for education purposes. Continuous efforts are being made for further improvement of the

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tele-mediated teaching-learning process [3], [4]. The advent of TV allied technology and gadgets such as VCP, VCR, Cable TV, FAX, STD, Computer and Satellite Communication Technology, has not only liquidated the inherent issues of learner control, interaction and reinforcement but also given rise to new dimensions of ETV research. In almost all types of ETV research studies on content analysis, pedagogic analysis, achievement analysis and learning analysis, the ultimate intent is to gauge how much a viewer learns through an ETV programme. Educational research studies in other areas which involve evaluation of students' learning, frequently utilize the taxonomic achievement categories [5] as the index of students' learning. The common practice, more or less has been

- to measure learning as students' achievement on some researcher made objective type achievement tests covering the content area of the learning task
- to score students' responses in terms of the right and the wrong responses and
- to evaluate learning effectiveness through some statistical analysis.

Also in educational television researches, particularly, those which attempt to assess effectiveness of ETV programmes in inducing learning, the same criteria has been adopted to analyse the quality of learning and to judge their effectiveness. However, to assess effectiveness of ETV, this approach is found to be inadequate and inefficient [6], [7]. Before we go into the details of the problems and issues associated with this method of assessing televised teaching and learning, let us have a cognitive view of the television teaching-learning process.

MATERIALS AND METHODS

Television Teaching and Learning: A Cognitive Approach: Television teaching is basically a controlled communication. Instructional communication between a student and a teacher is mediated through an ETV programme, which is a configuration of audio, visual, textual and graphic electronic images, prepared through a mediagenic transformation of the instructional message in content area of learning [8]. These instructional message items and their underlying structure make the ideal cognitive structure of the learning task which is to be learnt by a viewer learner. The teacher, not being at a close proximity to the learner, cannot guide the learner to attain the intended learning effects. Thus, the learner is left with himself to browse over the software and thereby, to learn on his own [9].

Absence of the teacher-taught interaction cannot make the learner feed-back possible which is an important element of an instructional process. Since the rate of the flow of information signals are pre-determined at the time of production, the learner does not have any control over the instruction delivery [10]. In such an environment how do the tele-learners learn from the televised programmes? Learning from a televised programme is more a case of cognitive perceptual learning than a case of molecular one. A viewer-learner selectively attends the emanating electronic images on a TV screen and processes them. According to Bruner [11], "It can be seen as a process of establishing the nature of relationship between items of sense data as learning to code sense data into appropriate mental model or model systems". A viewer-learner learns an ETV programme in the way, he perceives the electronic images and processes them to build an organised structure or a mental map of them. What does learning of a televised programme result in? Many cognitive psychologists and one among them Tolman [12], emphasize that learning occurs through development of cognitive map(s) and accompanies modifications in the existing cognitive structure in the mind of a learner. Then, to learn a televised programme means to form in one's mind a cognitive map of the instructional message carried by the content area of learning and their underlying structure.

Information processing of the televised message takes place among a number of internal and external factors that may facilitate or hinder it. Hisa [13], concluded the following fundamental laws of information processing which are derived from information theory.

Capacity Principle: Any information processing organism, modality, channel or medium is subject to the limit of capacity.

Redundancy Principle: The redundancy law specifies the optimum rate of redundancy for any information processing organism, modality, channel, medium and content with all its semiotic proprieties.

Equivocation Principle: There is information loss in any information processing channel.

Ambiguity Principle: There exists noise in any information processing and it can be self generated or caused by some outside sources.

Cost Principle: The cost principle specifies the effort and time that are needed for information processing.

Fantasiation in a viewer's thought process remains a dominant determiner in the information processing from a television. Such a process operates with cases of emotive message, particularly, those which cannot be easily interpreted and have scope for creative interpretation. This temporarily sweeps a learner's attention from the successively flowing signals from a TV. This explains why the actual information reaching the STM (Short Term Memory) of a viewer learner is not the same as what he actually learns.

The process of meaning construction (decoding, elaboration and assimilation of a message that enters a learner's brain) is a direct function of the learner's background, his current mood, values and attitudes. Coomb [14], in his mental model approach to television learning, writes that "learning from television can take place in the absence of external reinforcement. However, as this will be entirely dependent upon a previously developed system of models, it will tend to be of a conservative nature. In other words, we may expect a dynamic relationship between the background knowledge and a learner's objectives in viewing a programme. There may be occasions, therefore, when a learner is systematically misled in terms of the producer's objectives". Thus, in a tele-learning process perceptual variance between the communicated message and the message actually learnt cannot be ruled out. That means, there may be learning misconceptions/deviations in terms of the actual intended message.

Instructional effectiveness of an ETV then, would refer to the strength of the mediated software to create an appropriate cognitive map of the formal structure of the learning task in the mind of a learner. The more is the similarity between the intended message (the formal cognitive structure or map) and the learner transacted message or the learner's cognitive map (that is, the way a learner actually represents the formal cognitive map), the greater is the effectiveness of the ETV. Efficiency of an ETV programme in creating learning would refer to the time and effort required to extract and interpret the formal cognitive map out of the mediating software. Efficiency of an ETV is largely determined by production variables, such as sequencing and organization of the mediated text, visuals, sound and graphics. This sequencing and organization is not only important for programme eficiency, but also for programme effectiveness. Relevance of the mediating electronic images to a learner is the third important characteristic of an ETV. Relevance is associated with interest value for a learner. This is necessary for long term retention of learning.

DISCUSSION

Objective Type Achievement Test for Assessing Televised Instruction: Some Issues: Evaluating pupils' learning in terms of taxonomic categories and measuring them by objective type achievement tests have proved very useful in actual classroom instruction purposes. However, the appropriateness of such assessment procedure for evaluating televised instructions, if analysed on background of the previously discussed features of the television teaching-learning process, seems doubtful as follows:

- Learning from an ETV programme projects itself in many perspectives, such as, the students' perception of the key concepts, the propositional relations among them and the structure of these concepts and relations as mapped cognitively by them. Students' learning in terms of achievement as measured by objective type test items, especially, through forced choice items cannot reveal all perspectives of the televisual learning. Unstructured extractions of the memory, possibly, would speak better about a student's perception and cognitive organization of the ETV programme. A case on point is the question, namely, does the televisual learning occur at an isolated concept level or at a propositional level or still at a complete structural level?
- Assessing learning through achievement testing is mainly based on recall/memory, mostly using recognition/free-recall/guided- recall questions. Vernon [15] argues that "these measure chiefly the knowledge in details rather than comprehension. Not simple recall of the information rather meaningful comprehension of a programme message is the major concern in television teaching and learning". Again, "recall and understanding are not necessarily related. Recall of specifics is relatively unimportant. Much more important is the way understanding occurs", Laurillard [16] reiterates.

- Learning may be right and wrong. An effective index of learning should speak about both the dimensions. However, in the process of scoring a students' response marks are awarded only to the right responses. Therefore, an achievement score stands for the amount of right learning. It reports nothing about the wrong learning and the unlearning. In many cases, knowledge about the wrong learning and the unlearning becomes very instrumental. An ETV is instructionally efficient upto the extent, to which, it can optimize the quantum of right concepts and propositions and minimize the quantum of wrong ones in the learner transacted cognitive map. Moreover, knowledge of the characteristic features of the learned and the unlearned instructional message items are often required for subsequent revision for further improvement of the ETV programme. Thus, mere achievement analysis in terms of wrong and right responses cannot be adequate in some research studies, particularly, of the design and development of ETV type. Some other approach which can present a comprehensive view of the content attributes of both learned and unlearned contents and the typical characteristics of wrong learnings seems imperative in the said context.
- Learning from ETV occurs through active construction of meaning which depends on background knowledge and intentions of the learner. There may be learning misconceptions/deviations in terms of the intended message. However, "In most cases achievement analysis does not show the possible outcomes other than the intended. A complete knowledge of the intended versus the possible outcomes seems more vital for establishing the relation of programme variables with the learner variables" [14].
- The meaningfulness of any learning can be better known in terms of the presence of an appropriate cognitive structure. Fenker [17] quoting Ausubel [18] writes that, "(a) By non-arbitrarily relating potentially meaningful material to established ideas in his cognitive structure, the learner can effectively exploit his existing knowledge as an ideational and organizational matrix for incorporating new ideas, (b) Meaningful learning must be defined in terms of the cognitive structures of individuals because, learning becomes meaningful only, in context of a particular learner's structure of knowledge and despite the richness of the learners interpretive framework for a particular area of knowledge, as long as the learning task consists of forming arbitrary associations, it must be regarded as non-meaningful learning". Thus, analysis of learning needs to explore the different content constructs, their organizational relation in relation to the formal structure of the television/video lessons.
- Achievement analysis frequently goes for statistical analysis to deduce conclusions. Besides the case of mis-utilization, statistical masking of the reality limits our vision into the televisual learning. Final conclusions about the effectiveness of an ETV are formed basing upon the significance of achievement difference. A significant difference in achievement except telling if a tool is effective or not effective conveys nothing more as if the ultimate aim is achievement. But, in fact, achievement serves just as a means to analysis of learning. Where does lie the main interest of a researcher, achievement/ tool/ learning? Thus, it becomes less helpful in exploring the different facets of televisual learning. For illustration, say by innovation X there occures 10% gain in achievement; by innovation Y, there occurs 30% gain. This difference in achievement gain, if significant, would say that innovation Y is comparatively more effective than innovation X, although innovation Y is very much unsatisfactory in terms of its actual capacity to induce learning to an expected level. Beyond this it throws no light for improving innovation Y.
- On the contrary, no significant achievement difference shuts all doors to further speculations and investigations and for the poor researcher every thing is lost. Such an analysis does not permit him to know how the innovation fails ultimately. The researcher, in such a case, goes to manipulate for a forced significance. Instances that an innovation reported to be very much effective but on replication studies are found not so, are not rare.

Inadequacy of Achievement Analysis: an Experience: In an experiment [19], they were testing the effectiveness of three telemodes viz: Direct, Interactive and Talk back modes of Indira Gandhi National Open University (IGNOU) ETV. The experiment utilized a pre-test - post-test design and researcher made achievement tests in the content area of the sample ETV programmes. The following two interesting findings were obtained.

- No significant difference between Direct and Talk back mode.
- No significant gain from pre-test to post-test in the ETV programme, namely, 'Figures of Speech'.

The group of Direct viewers of the ETV 'Figures of Speech' were at a higher status in their initial mean achievement (mean pre-test score = 6.111) against the maximum achievement of 10 in that test. Thus scope for further learning was of only 3.889 units of achievement score on that scale. Since even a small increment in achievement at the upper extreme end of the scale is difficult and hence may be impressive although a smaller mean gain from pre-test to post-test is very likely to occur not significant statistically. In such situation, it was difficult to conclude the efficiency of IGNOU ETV 'Figures of Speech'.

The no significant difference between direct and Talk back mode may lead to conclude inefficiency of the Talk-back interaction, that is, no advantage of Talk-back over the one-way Direct viewing. In many ETVs the initial position was higher. Thus the scope for further learning after Direct viewing in Talk-back session was very limited. However, the upper extreme gap on the achievement scale was filled partly but impressively though not statistically significant. Further, Talk-back was quite potent to improve the gain in learning in case of other ETVs even with directional changes in the differences. Hence without further empirical evidences with viewers at low initial position it would not be wise to conclude on superiority of the Talk-back over the Direct mode.

Cognitive Map Analysis for Assessing Televised Instructions: In the context of the said issues and problems associated with analysis of achievement in terms of taxonomic categories and ensuing inadequacy of the method to conclude ETV effectiveness, the authors have discussed an alternative approach, namely, Cognitive Map Analysis which is founded on the congnitive information processing view of television teaching and learning. This section deals with the idea of a cognitive map as applied to a learning task and that which a learner develops as and when he watches an ETV programme alongwith the procedure as to how to explore the effectiveness of a televised instruction. Finally, a few methods of cognitive map analysis have been presented for operational purposes.

The content area of learning in each learning task carries some concepts which Reigeluth [20] termed as "content construct", the propositional relations among them and their overall organization the schema. Context constructs are self-contained or independent information nods/units. According to Winne [21], "concepts may be concrete (e.g. a ruler), abstract (e.g. energy), static (say, the number 2), dynamic (e.g. solving equations). Propositions are relational links joining two or more concepts. All cats are animals', 'when he gets angry, she goes away', 'I was lucky to do so well', 'I hate puzzles' and 'Two and one make three' are examples of propositions. Schemata are collections of propositions organized into prototype forms for procedural, declarative knowledge. Schema provides organizational structure for representing knowledge". The underlying concepts, propositions and the schema(s) constitute the formal cognitive map (also called as the ideal cognitive structure) of the learning task. As previously explained, to learn an ETV programme means to learn this ideal cognitive map/structure which underlies the ETV programme.

In a television teaching-learning encounter, a viewer-learner develops cognitive map(s) in the content area of learning. That means, as he learns the TV programme, he maps the concepts, their propositional relations and their configuration in his mind in his own style. As mentioned earlier, this is the learner transacted cognitive map. The congruence between the ideal cognitive map of the learning task and the learner transacted cognitive map is an index of the success of the tele-learning. By measuring the ideal cognitive map/formal cognitive structure of the ETV programme and the viewer-learner's cognitive map someway, a clear picture of a student's learning, learning misconceptions, the non-learning items and his mental representation of the instructional message can be obtained. Fortunately, it has been demonstrated by Fenker [8] that "(i) with the help of experts it is possible to define the formal structure for the concepts in a topic area. (ii) it is possible to measure in a class room setting, the cognitive maps that both the students and the instructor have for a topic area (iii) By comparing individual student's cognitive maps to the instructor's or to the formal structure of the context, students' understanding of the system of concepts defining the topic area can be evaluated".

Methods of Cognitive Map Analysis: For practical purposes, some methods of cognitive map analysis are also available. Mahler [22] suggested concept mapping which can explore the learner acquired context constructs, their propositional relations and their overall schematic

representation as perceived by a tele- learner. He explained that "A concept map is a map constructed by experts in the context area of learning, but a cognitive map is a map constructed by a non-expert individual, say a student". By contrast analysis of the concept map (which shows the spatial arrangement of the concepts, their links and the organization defining the content area of an ETV programme) and the cognitive map constructed by a viewer learner, his understanding of the ETV programme can be evaluated and the instructional effectiveness of the ETV can be judged.

Fenker [17] has advocated Multi-Dimensional Scaling (MDS) analysis to explore the organizational relation of information about a topic area. MDS procedure is based on the following assumptions:

- It is assumed that information about a topic area is organised and interpreted on the basis of a set of dimensions. The dimensions represent attributes or organizational features which order the topic area concepts in some manner.
- The collection of dimensions which constitute a cognitive map or formal structure can be represented as an N-dimensional geometric space. Each concept is defined by the values of its projection on the axes of the space.
- There are a variety of possible relationships which can exist among the concepts defining a cognitive map and between these concepts and new material. Similarity or degree of association and the extent to which one concept implies another are only a few of the many potential relationships.

Another method, called as INDSCAL developed by Carrol and Chang [23] is specially useful for the purpose of cognitive map analysis. It not only defines the underlying dimensional frame work for a set of relation data but also determines weights indicating the importance of each dimension for the different individual learners.

Kelly's [24] Repertory Grid method can be used as a means of observing a subject's perceptions of relationship between sets of ideas objects or names. Hence subjects are first presented with or required to generate a list of elements ideas or objects or names which are placed on the X-axis of a grid. Using this reference subjects are then asked to generate a list of ideas termed constructs for the Y-axis. The constructs are conceptualized as bipolar with a pole of affirmation and a negative pole. The subjects then rate the elements against the constructs for perceived relationship according to some given scale. A correlation matrix is then drawn up which can be analyzed to give a hierarchical picture of the way constructs are grouped together.

A non-standard approach which is based on qualitative analysis of student summaries of ETV programmes, has been suggested by Laurillard [16] to explore students' understanding of televised programmes.

Cognitive map reflects the different contours of learning -examples, concepts, principles/ laws, beliefs, facts, propositions, thesis, anti-thesis, schemata and theories. Taxonomic Achievement Analysis has its own intent, but it does not give indices of comprehensive learning. Reproduction and evaluation of learning scenario demands complex compatible tools, techniques and procedures. Assessment of wrong learning and unlearning has its own significance in addition to assessment of right learning. Schemata level learning assessment is as important as assessment of learning at concept, fact, belief and propositional levels. Recall of specifics is not so important as mapping comprehensive understanding. Programme variables and learners variables need to be congruent, significantly. Assessment should be so as to differentiate meaningful against non-meaningful learning. Statistical techniques need to be applied very carefully.

The scriptor, producer, presenter and viewers all should be in resonance. No doubt perceptual deviation is a reality but there should be maximum congruence between the physical formal cognitive map design and the learner logical cognitive map attained/formed. Ultimate criteria for comprehensive evaluation of the learner learnings should be in tune with the objectives of the ETV. It is observed that very often the objectives of an ETV programme are not comprehensively enunciated. There is a wider scope of learning through ETV in terms of the ETV subject, main and nurturant effects. ETV programme needs to have multidimensional objectives [25]. Appropriate criteria need to be developed to determine the efficiency, effectiveness and relevance of the ETV programmes [26]. The authors do not claim cognitive map analysis to be the all purpose. It is rather a more appropriate assessment procedure for knowing effectiveness of televised teaching and learning. There is a need to evolve methods for cognitive map construction and analysis to assess television teaching and learning.

RESULT AND CONCLUSION

We have come to the conclusion that using the taxonomic achievement categories to assess effectiveness of ETV is inadequate and inefficient, since there are some problems and issues associated with this method of assessing televised teaching and learning. Using cognitive map analysis as an alternative approach will determine the efficiency, effectiveness and relevance of the ETV programmes. It is found that this approach is a more appropriate assessment procedure for knowing effectiveness of televised teaching and learning. There is a need to evolve methods for cognitive map construction and analysis to assess television teaching and learning.

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