State Curriculum Framework-2011

Position Paper

on

Educational Technology

School Education Department
Telangana, Hyderabad.

State Council of Educational Research & Training
Telangana, Hyderabad.

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Vision of the State

The vision of the State is that ALL children should receive high quality education and become responsible citizens with an acute sense of the other. They should be aware of their environment and think about it critically. They should listen carefully and speak fearlessly. They should be able to understand what they hear and read; but they should also be able to question it. Teachers should promote these skills, provide meaningful teaching learning processes in natural and friendly environment that enable children to express themselves freely and ask questions. Teachers are collaborative learners and reflective practitioners. Parents and community should have a sense of ownership and participate in the life of the school. In a world which is becoming increasingly instrumental, materialistic and competitive, school should become a space for reflection, cooperation and promotion of human and ethical values.

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Executive Summary

Several of the current challenges related to Educational Technology stem from an incorrect or inadequate understanding of the term. It is generally assumed that ET refers to the use of sophisticated technology such as computers and electronic gadgets in education. While this can be an aspect of ET in favourable situations, the essence of ET is far more inclusive than this. In simple terms, ET refers to the idea and practice of facilitating learning through the use of appropriate objects and devices which are particularly suited for the purpose of understanding. Hence, these devices can be anything, ranging from objects found in the environment to high-tech gadgets. They can be made available through policy intervention, as well as prepared locally by teachers to suit their particular needs and to be relevant for their context.

The use of ET can be advantageous for the teaching-learning process. If appropriate material is used with understanding, it can deepen and clarify children's understanding of various topics. It can elicit active participation of children in the learning process and thus engage them in construction of knowledge, which is not always possible through lecture type instruction. The concrete models, examples and devices can help children attain a clearer understanding of the abstract concepts. Moreover, it is possible to incorporate such material in the teaching of almost any topic under any subject. The specific requirements of the subject need to be taken into account while doing so. Also, the materials and devices can be used individually as well as collectively. They can be a catalyst to improve group interaction and promote exchange of ideas.

For the development of teachers as well, ET can be very useful. Apart from helping them to elicit the engagement of student in the classroom, ICT can improve access to information and exchange of ideas through facilitating networking with others of their profession. This helps them to address specific problems as well as to develop professionally. At the same time it must be remembered that ET is intended for aiding the teacher and not for replacing him/ her. Also, while ET can in the long run turn out to be economically beneficial, cost cutting cannot be the aim of ET. It always has to be considered from the perspective of the teacher and the child.

ET has several aspects and can take many forms. ET includes use of Teaching Learning Material, which is used by children in an interactive manner in order to engage in knowledge construction. TLM can include material available in the surroundings as well as that specifically designed for the purpose of teaching and learning. Specific subjects have specific requirements, and the TLM must be selected accordingly. Another aspect of ET is the use of technical gadgets which can help both teachers and children to gain new information as well as to introduce new issues and perspectives. However, both TLM and gadgets must be used with a clear understanding of the purpose they are intended to serve. There is always the danger of the gadgets and materials shifting the focus away from the learning. In order to avoid this, the methods and strategies of use must be appropriately designed. The forms in which ET can be effectively employed by teachers include use during explaining, group work, providing audio-visual input, and for exploration and experimentation.

However, for the effective use of technology, certain things must be taken into account. The technology should serve the purpose for which it was intended. The material should be accessible for the use of each and every child. Teachers should be proficient in the use of the relevant technology. The specific devices used should not be far removed from the daily experience of the child in order to be effective. Teachers should have the right attitude towards the use of this material. They should

use it to supplement their efforts in the classroom and not to replace them; and should not lose sight of the larger picture of learning. Collaborative learning should be encouraged.

Several initiatives have already been taken in the State of Andhra Pradesh in to provide an impetus to the use of ET in classrooms. These include the efforts of Operation Black Board, Andhra Pradesh Primary Education Programme, District Primary Education Programme, Sarva Shiksha Abhiyan, etc. Other initiatives include making the use of radio, television, etc. to broadcast material of educational import for students as well as teachers with help of agencies like APAPSIET and APSCERT. However, the inroads made by such efforts have been limited due to reasons such as lack of internalisation of material into the curriculum and the learning process, lack of relevance of the technology to the immediate context of the child, inadequate teacher preparation, etc. These reasons and challenges need to be kept in mind for further development if we are to make use of ET in its true spirit. These problems are related to

1. Availability – Materials and resources are often not available in adequate quantity to enable all children to interact with them
2. Accessibility – Sometimes the nature of the material is such that children are intentionally kept from interacting with them physically. This is especially true in case of fragile or expensive equipment. Also, making materials uniformly accessible to all children is difficult.
3. Lack of clarity – Sometimes the teachers themselves are unsure about the purpose of the use of some devices and are incompetent to deal with them
4. Stock use fears – It has been seen in the past that the materials intended for use by children were stored because of fear of damage or inadequate understanding.
5. Relevance problems – Material provided is often irrelevant to the context of the child. This is because much of it devised at the State level, and not at the local level where it can be more relevant.
6. Nature of devices – some devices are such that they require resources like electricity, which are not adequately available everywhere, and expertise. In addition to this, alternate resources are often not used by teachers. In some cases, use of gadgets leads to additional technical hassles, which detracts from the process of learning. This makes the process of learning time consuming, since students must first learn to deal effectively with the devices.
7. Curriculum structure – Because of constraints of the curriculum, material cannot be used to an adequate extent.
8. Teacher preparation – Because of lack of training, teachers have neither the capability nor the inclination to use the materials constructively in classes.
9. Teacher –centred system – Because the system is not child centred, the devices are not as useful as they can be in promoting learning among children.
10. Lack of monitoring of the use of ET – This makes it difficult to identify areas in which change is required.

In view of these issues, certain recommendations are made in the present paper to ensure more effective use of ET in the State in the future. Broadly, these involve

1. Revitalisation and reorientation of available resources, such as institutions and ICT. Improvement in the networking of institutions and pooling of resources will help techers to incorporate ET in classrooms better. Teacher training should be undertaken to inculcate the right attitudes in teachers and to make them competent.
2. Systemic reforms, which include decentralisation, promoting equitable distribution, developing openness in curriculum, promotion of autonomous generation of material, and developing ICT in institutions.
3. Teacher preparation and support, including enhancing competence in dealing with technology of various types, promotion of networking, promoting access to knowledge, encouraging creation of knowledge and creativity, etc.
4. School level changes, including promotion of individual learning styles, providing space to teachers in the curriculum, and promoting student initiatives
5. Research, including collection of information regarding the use of ET in the state, information required for the upkeep of the gadgets and material, availability of experts in case of problems, information about the possible effects of use of technology, etc.

1. Educational Technology: Meaning & Scope

1.1 What is Educational Technology?

The term "Educational Technology" is often misinterpreted,the use of ET in teaching is often considered to be restricted to the use of the devices such as Films, Radio, Television, Computers etc. We can simply and comfortably define it as an array of tools that might prove helpful in advancing student learning and in measured in how and why individuals behave. Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources. It includes the means and mechanisms that can enhance the possibility of giving children a greater opportunity to learn. It may also enable the teacher to present children with exposure to ideas and experiences that would enrich the base on which they analyze, generalize and form concepts. Educational Technology thus is a mechanism or an aid that supports teaching, enhances performance of the teachers, increases possibilities and opportunities for children to engage with the concepts and gives them greater scope for honing their skills, developing their imagination, creativity or sharpening their curiosity. Educational Technology includes, but is not limited to, software, hardware, as well as Internet applications and other easily available materials.

We can also define Educational Technology as using of all available resources (human and non-human) in a manner to support learner and the teacher to create maximum possibilities for the child to construct her ideas and become an independent learner. The term educational technology has undergone many transformations in role and its conceptualization. Starting from being considered only as a supplement to the process of education and as additional equipments for the teachers to display to the students. It meant blackboard, charts and some other display materials. In some situations projectors of films and slides were also available.

1.2 Why Educational Technology

The use of Educational Technology in the field of education should help the learner's actively participate in teaching learning process and enhance learning capabilities of the learner. Apart from this, E.T. can help the teacher teach effectively. We should keep in mind that Educational Technology must support the teacher and enhance his

teaching capabilities, but cannot replace the teacher, i.e., it is not an substitute to teacher in classroom. Teacher has to be there in the classroom to facilitate the teaching learning process. Arguments being made these days suggest that investments in Educational Technology are required for saving cost and for the replacement of the human teacher by technological equipments. This has also led to the misconception that education technology is largely about electronic technology and something that has to be for display and at best for use of the teacher. In the context of elementary schools it must be recognized that Educational Technology for the child is to encourage her to work herself and to construct her concepts and not be a passive observer or recipient be it an electronic device or a simple chart. Some of the claimed benefits of Educational technology are:

1.3 Aspects of Educational Technology

While talking about Educational Technology, we should keep in mind the following aspects of Educational Technology.

1.3.1 Teaching learning material (TLM) – This includes understanding questions like, What are they, how they are different from only teaching aids, how TLM also surrounds us, TLM and its subject specific nature]

1.3.2 Technological gadget used in teaching; Simple ones like blackboard, chart, slides, Radio, Tape, TV, Film, Computer, Web and others

1.3.3 Teaching learning strategies and methods. The manner of use of these, purposes, participation and mechanism, for them

1.3.1 Teaching Learning Material

In simple terms Teaching learning Materials can be defined as the resources which facilitate the process of learning and help children in the efforts of growing their knowledge. TLM is something which children can touch, make use of it and do activities with it and which provides the children with the opportunities to construct knowledge at their own. This whole process of getting engaged with the materials, analysis of what happens during this engagement, replication and repetition of the activities etc. helps children a lot in their learning process.

When we contextualize teaching learning materials for classrooms we can look at them in two distinct ways. One is which teachers make use of for delivering the

concepts to the children for example slides, presentations, models; things made up of thermocol, charts, and posters and may be the textbooks. These kinds of materials are mostly teacher centred and information based. They have less scope for children to engage with them and construct knowledge on their own. Such materials are called teaching aids since they help in teaching but not in the learning process. The materials largely remain with the teachers and the children only see them briefly.

Another way of looking at teaching learning materials is to visualise them as intended for active use by the children. These materials are with children and they can use them to explore ideas or as intermediates for abstractions that they need to grasp. These materials provide the learner with concrete experiences and give her the opportunity to engage with ideas. The materials could be anything, depending on the circumstances and the demand of the topic going on in the classroom i.e. dice, snake leader, cross word puzzles, matchsticks, library books, activity cards etc.

For example, in a mathematics classroom beads or stones could be good material to learn counting and expose children to place value; in a language classroom pictures are materials that can be used to give children the opportunity to express themselves. Their use can be at different levels. For example, children can be given the task of making stories on the basis of those pictures or just talk about what they see in the picture in the beginning. They can later be asked work on a series of pictures and tell or write stories. In this process children make use of it, work with it, observe & explore its properties, take up challenges and find ways to overcome them and struggle to develop the abstract concepts with these concrete materials. Such materials which we call Teaching Learning Materials are more important in the elementary schools. It is important that children have access to these and the class-room processes are so organised that children can work them in an open-ended exploratory manner.

The key issues to address when we consider what would be appropriate Teaching Learning Materials and what they should be used for are:

- Do these materials enable children to think or do they just provide information and are mere exhibits?
- Do children engage with these materials, touch them, and work with them, or are they kept at a distance because they are fragile and children are not trusted to handle them?

- Can every child make use of these materials and keep them with them for long or are they unavailable for use by children because of constraints of time and money?

In terms of learning, our concern and emphasis is not on the materials that can only be used as display items for visitors or office rooms and are not available for children to touch, use and manipulate. Some of their aspects may be used for facilitating learning but most of these things are teacher centred and information based and hence do not provide children with the opportunity to construct knowledge on their own. The real purpose of materials in classrooms is to enable the child to touch the material, to manipulate it, to observe it, to think and discuss with peer group and formulate new concepts.

Teaching Learning Materials available in our surroundings

The idea of providing material to children has many aspects which need to be considered. First of all, as mentioned above it should be easily accessible to the children. The material should match the cognitive level of the children and provide sufficient challenge for future growth. Information based materials encourage rote learning and hamper rather than facilitate the learning process. Material should be designed sensitively enough to be appropriate for the children's environment and for their history and culture. The interest and exposure of children of different areas may vary considerably and the material should be adaptable to this variability. The world of fantasy, humour and word play is important in learning and it should not be disregarded in the process of creating learning materials. It is necessary to use naturally available materials such as pebbles, seeds, twigs, sand, water, etc. Similarly, poems, stories, puzzles, and proverbs etc. always peculiar to a particular community, can also be used.

We have lots of material around us. Some examples are animals and plants, seeds, water, soil, stones, matchsticks, broomsticks, beads, bottles, chart-papers, tins, cloth and plastic sheets and many more. Other things such as games, puzzles, dice, snake leader, activity sheets, workbooks, maps, graphs, charts, number cards etc. can also be considered as material resources. We can also have real objects. For example, showing a stone, a car, a leaf or a goat during language teaching when these form part of the topic for discussion.

Sometimes it may be difficult to use materials in the classroom. For instance, some of them may be dangerous to handle such as live snakes, bees or crocodiles. Other things or objects may be too large to be brought into the classroom or too small to be seen with the naked eye. In such circumstances it is convenient to use a model.

Whatever new materials are introduced they should be inexpensive, easily accessible, flexible and reusable. The potential of a given set of material should be carefully explored. A variety of objectives can be achieved through the same set of materials. Materials should have considerable inbuilt flexibility providing multiple entry points for children.

Subject specific nature of teaching learning material

Teaching-learning materials are essential to learning. They need to engage students and as has been said previously are more useful if they are easily accessible for teachers and for children. There can be few purposes for which these have to be specially procured but largely they should be easy to obtain without much experience. In conceptualization of what should be done in the classroom, it is important to think of materials that are robust, easily available and can be also acquired at home. This is to encourage children to carry out tasks if she wants to do them on her own. In fact, anything in the environment can be useful for the purposes of engaging children in exploration and in organizing the results of the explorations.

Different subjects have different purposes for the materials depending upon the nature of the subject and the pedagogy that is appropriate for it. The nature of materials also depends upon the stage at which the children are.

(a) Mathematics

Mathematics is a discipline that is abstract and deals with idealizations and logic. It has a lot of applications in our daily life but the concepts of mathematics are not linked to the objects or beings in any direct way. Materials in mathematics, therefore, are only needed for introduction to ideas. They form concrete representations of concepts that are not easy to visualize otherwise. For example, to count or to learn place value and to get a sense of fractions, concrete materials that are countable are extremely helpful as temporary scaffolds. Materials in mathematics are not required for very long but while building concepts as they are being introduced, they are essential. They have to be looked at as scaffolds in different ways. For

example, to visualise 2-D shapes including angles, squares, circles, etc. We may use corners, blackboard, table top, coin, bangle, etc. to represent these ideas to the children. For tens and units or decimals, an abacus or any symbolic material may be used to depict value at the place.

(b) Science

Science as a discipline has many facets. It is in many ways abstract and deals with ideas and theories that are constructed on principles arising out of logical conceptualization and formulations. It yet has always had an element of verifiability and is knowledge about the objects around us and the interactions between them. It also deals with the living word, what constitutes them and to understand them. Science, therefore, has to do with materials and concreteness. The obvious materials are the members of the living world like plants and their parts namely, leaves, flowers, seeds etc.; insects, birds, land animals, fishes and many others categories. Students need them so they can observe and understand. They also need many different materials including kit and equipment that they can study and experiment with to discover new ideas and to test existing ones. Teaching and learning material in science, therefore, would comprise of kit items that can help the students interact with, explore and understand what is seen around us, apart from what is available naturally. These materials would be needed for each child or each group of children and could include chemicals, glass ware items, measuring instruments, electric and magnetic equipment, etc. The purpose of using these materials would be to conduct experiments and to make generalisation based on the observations and discussions.

(c) Language

Given the fact that language learning is a complex process, it needs to be understood and appropriate processes identified to give children opportunities to learn and become more proficient users.

The emphasis in language learning has to be on use of the available meaningful content. Language is not just a medium of communication or even vehicle of thought but is constitutive of the person. This has also been said in the position paper on language. Language classroom must provide opportunity for the child to describe, formulate views, imagine, dream, fantasise, logically argue, talk about experiences and participate in other activities that require her to express herself. It would also require her to be exposed to rich sources of language, both written as well as oral. One

set of language materials can, therefore be, story books, picture books, novels, poems, descriptions, plays and all other interesting reading materials. On the other hand it also would include recorded or filmed materials that can be used by children. These can be through assets, CD's, film strips and other forms to give children access to well voiced poems, songs, stories and even drama so that they are immersed in language.

For first and second language learning the nature and amount of materials needed can be very different. For example, it is extremely important for the second language teaching to have access oral rendering of different forms and written books that have a lot of pictures and texts that are small and simple. For the first language it is very important to have a variety of materials for the child to read and also have interesting stories that can be fairly long for children to stretch their ability to listen (or read) and comprehend. The materials in the language class can be used individually or in groups.

A crucial element of learning language, at school is learning to read. To build this ability there are two mechanical aspects that are critical. These are decoding and be aware of the basic structure of language. There have to be tasks that help child learn to decode the written text. The second implies tasks that help child to uncover the language rules she uses. Both these are elements required to carry forward reading. It has also been stressed that we should give children opportunity to play around with language and to explore its structure in some manner. For both of these purposes, flash cards, word and letter cards, story, poem, word etc, charts are extremely important. There should be some mechanism by which these materials can be available to teachers, but in addition some of them must be constructed at the school level by the teacher herself. All of it cannot be left to the centralized production because the context of the class and the background of school and children need to be kept in mind. This would decide what kind of items should be included and what should be done with them. The context of the school and children should be known including materials available for use so that appropriate choices can be made to help the child explore language and its structure. It may be pointed out that the ideas of using materials in language emerged from the need to give the child varied opportunities for engaging with all aspects of it. Worksheets and such materials are very useful for learning language and apart from that a space for expression for

children can be created on a large low blackboard around the class. This would give the children opportunity to scribble, write or draw whatever they want to do.

(d) Social Science

Social Studies have many elements. A large part of this group of subjects is devoted to people and structures around us and far away from us. There are two kinds of materials that are necessary for Social Studies. One set of possible materials is, of course, the structures that exist around us including artisans and their work place, governance structures and economic structures. Observations of these, conversations with the people engaged in these can be essential materials for learning. Another set of materials needed for social studies can be old buildings and sites available around child. These would be aids to understanding of sources of knowledge and of what can be derived from interacting with these materials.

Social Studies also deal with many abstract concepts. These are, particularly, relevant for physical geography and even economic geography. The idea of globe and how different kinds of land forms and spheres exist on it, understanding the reason why we have seasons, requires the use of models that help the child visualize how these work. Models of market, of government institutions and other such aspects also help in having children understand the ideas in abstract.

Written materials and books, however, are very important for Social Studies. They help in providing children with concrete presentation of different historical times, different societies, different geographical locations and how people lived there. Being exposed to such concrete materials that reflect the reality helps learner to engage with underlying concepts and build an understanding. Tasks should be designed around these materials in such a way that they make the learners attempt to construct their own picture of how the structures work. In history, these tasks can help in visualising what must have happened. This can be done by a child individual or in group and would provide the exercises necessary for the child to learn social studies.

It is clear, therefore, that materials are necessary for providing learning with scaffolds or providing children with data that cannot be accessed easily or helping them to explore and experiment. The important thing is to use materials in a manner that encourages learning to learn and exercise their mind in an open ended manner. It cannot be used well for delivering something or pouring something into the child.

1.3.2. Technology gadgets used in Teaching – Learning Process

Educational Technology is an aid to the teacher and the child. It supports the effort and the role of the teacher. Its use is not only for helping teacher make some ideas more concrete for the child but also as a tool that helps her learn more and gives to her a way of accessing data and clarifications that may not be available otherwise. It must be recognised that use of ET is made to enable the child to use all types of materials both technical and non-technical on his own to achieve predetermined objectives of learning. The growth of electronics and other form of technology has lead to the development of devices that may be used as a tool for teaching and learning. Examples of these are radio, television, computers, radio, OHP slides, LCD projectors, RCCP, VCP, DVD player, Internet, mobile phone, E-books etc.

The use of these technological devices has to be in the context of the discipline and the ages and needs of children.

Technological Educational Gadgets:

These are used for various purposes. They can be helpful for learning by children in some cases, but sometimes are not really purposeful and effective. It is therefore, important to think about (i) the materials to be used and how easily they are accessible to schools in the rural country side, (ii) how they will be maintained and also (iii) how they will be used.

In the current context, computer and internet have become important technological devices which are accessible at a few places and at same levels of the school education system. We also have the television and radios as broadcast services. We also have slides and films that have been made for educational purposes and can be used in the classrooms by teachers.

As has been pointed out, most of these technologies require electricity and maintenance. Some of them require technological expertise and others are merely receivers and therefore do not require such expertise.

In recent times, many materials have been developed which can be used with the computer and happen to be interactive. This implies that these materials allow children to interact. Based on the responses of the child, the particular software being used in the computer also directs her in different ways. Similarly, the internet has great potential to allow learners to access information and take up tasks that they are

interested in. It has the additional advantage of speed, since it can bring the desired knowledge to the recipient relatively fast.

Films have always been a form of presentation that increases interest and is able to depict ideas that are not easy to depict through written materials or pictures. For example, the way earth revolves around the sun or the way eclipses occur, the way in which an egg develops into chicken or how a factory works etc. can be shown far more comprehensively and conveniently through films. The films can be shown through projectors or through television as well. In addition to projectors there are slides and transparencies that the teacher can use to put forward representations for children, which can help them to understand processes. To a limited extent, a slide show also gives the impression which a film is capable of giving.

The medium of broadcasts has expanded in its reach and scope. We have the possibility of not just broadcasting spoken creations but also complete audio visual experiences. Out of these, radio is very cheap and easily accessible technology but for very young children it has limited purposes compared to the television. The lack of animation and visual images can be restrictive for the young child's interest. There are, however, effective ways of using radio for stories, poems and developing listening comprehension in various ways apart from exposing children to knowledge that may not be available around them and to different ways of speaking and thinking.

For the elementary school it is not easy to make many gadgets like computers accessible to children. In particular, it is very difficult to organise and provide interactive time on the computer for all children in a reasonably periodic manner. Given the lack of exposure of children to such technologies it also takes them more time to absorb the method of functioning of the equipment and of manipulating it for their purposes. Their hesitation in dealing with this equipment and the reluctance of the teachers to allow them access, particularly because of the teachers' own inhibition, accentuates the problem. There are very few occasions where films and film scripts can be shown to children. There are no projectors and the electrical system is uncertain. There is also lack of appropriate materials that can be used by the teacher for her purposes.

It is obvious that these equipments can be used individually or collectively. They can also be used in a manner where the child is a receiver of information or in a manner

where she can engage with whatever is presented and has a way of putting forward her point of view and her understanding. In these materials, it is difficult to give children choice. At least in Indian context, it is not possible for all children to have the possibility of choosing what they want to do.

There is, however, the possibility that teachers will make use of this to access new learning and be exposed to other kinds of possibilities in the classroom. The use of all these multimedia equipments at the cluster and the block cluster can make it possible for teachers to access content that is available on the net which they can modify and use with the children in their classrooms. Wherever there is an uncertainty in their mind, it is possible for them to access sources that they would not have been able to access in the absence of this technology. In many States and areas a system of using mobile phones is being tried for this purpose in addition to the possibility of use of internet by the teacher. Films of classrooms of other teachers as well as of presentation of different concepts can make it possible for the teacher to reflect on her own understanding of the concepts as well as her approach in the classrooms.

Broadcast material, if available, can also be a teaching aid to be used at specific points in the classroom and can also help them improve their own skills as storytellers, play presenters or poetry readers. It is clear that these materials have immense potential to help us in our endeavour to provide teachers with wider access.

These technological gadgets can be use individually or in combination depending upon the topic to be dealt with. However, one should always take care that these materials are not supposed to replace the teacher. Such technology can enable better, easy and quick access to the materials but can't substitute the teacher.

An important aspect of these technological gadgets may be that they can help children with special needs. For example those with hearing disability can see the details they cannot hear the teacher talk about and those having visual problems can hear the book being read out. Special sessions on TV can be telecast for students having speech & hearing disability and radio or recorders used effectively for those who cannot see. Taking help of these technology special children can keep on with their learning with confidence.

1.3.3. Teaching learning strategies and methods

Till now we have discussed how Educational Technology, i.e. the locally available materials as well as technological materials, can facilitate teaching learning process and enable the child construct knowledge on her own. But it is also very important to think about how these teaching learning materials should be used in the class-room to help children learn. While it is possible that charts, graphs, textual materials, experimental kits, projected electronic aids, audio materials, computers, films, videos, the Internet, etc. can usefully serve the purposes of education in their own special ways and can together make learning an enriching experience, they can also be restrictive and used for limited purposes. The principles of use of these remain

To help children access more data or analysis than they could have in the absence of these devices

To be temporary scaffolds for abstractions that they have to grasp

To be concrete objects that can be manipulated for children to explore and experiment

To help children visualise what they cannot without concrete scaffolds

To encourage collaborative learning

To open the space for thinking and analysis

To learn to handle equipment and construct ways of using it for different purposes as and when they want

To help children acquire experience in different ways that suit their interest and ability in that area

The materials used should be accessible to all children

1.4 The form of use of technology

In addition to this we need to think about the forms in which the materials may be used. These ways do not follow these principles strictly yet the use of materials may be essential.

Explaining

This happens in the context of giving a discourse on a specific subject. The subject at hand may require modelling. As the concept may not be obvious modelling is used as a visual aid to learning. Students can visualize an object or problem, then use reasoning and hypothesizing to determine an answer. In this method we have the opportunity to tackle two types of learning. Not only can explaining (lecture) help the auditory learner through the speech of the teacher, but if the teacher is to include visuals in the form of overheads or slide shows, his/her lecture can be more effective on account of dual input of the same knowledge.

A similar use of materials is for demonstrating something or showing how something works. This could include working models of different kind of systems or experiments that cannot be done by children for various reasons.

The major concern is that these should allow children to discuss the way the model or the experiment functions and not passively observe something happening from far as if it is a magic show.

Children working with materials in groups

This is the most important use of materials and has the potential of all the features that we have mentioned with respect to their use. Collaborating exploration and experimentation would allow students to talk with each other and listen to the different points of view that the colleagues have. It helps students to appreciate plurality and open their mind to other forms of observation. It builds on the ability of the students to work as a team, their leadership skills, presentation abilities and many other capabilities.

Discussions in the group also help develop the patience to listen and build arguments. The feedback from the teacher needs to be short and encouraging. It should open doors for use of materials and more participation in the learning process.

Using audio-visual material

While it is clearly not easy to ensure that advanced technology equipment reaches the classroom in the real context at the moment, it still must be recognized that even comparatively simpler gadgets like transistor, radios, cassettes recorders, televisions can be extremely useful for specific things. In this the class as a whole can be exposed to an audio recording or to an audio-visual presentation. They can then talk about and analyse the materials that they have been exposed to. Once the presentation is over

they can break up into groups and discuss presentation and what they have understood from it. They could be ask to prepare for and enact the presentation in the classroom or just merely enjoy the presentation as a means to enrich their experience base.

Films of different societies and culture and of different geographical locales on television can help widen visual exposure the children can have. Similarly, tapes and cassettes can widen the package of poems, stories that the teacher has. These resources also help in case of a teacher who does not know how to read aloud stories or recite poems with fervour. There is, therefore, a clear opportunity of using these gadgets. It must be however, kept in mind that these gadgets and these presentations are not an end in themselves. They are means to achieve certain purposes and unless those purposes are clear in the mind of the teacher and she is able to build link with those purposes, the presentation would not be useful. This would have to link also with what she is doing in the classrooms otherwise. The use of these gadgets cannot be merely as fillers of time, and they cannot be thrust upon the schools just because they have become available. They also cannot be made to serve as distractions for the children while the teacher is away or to compensate for an insufficient number of teachers. The use of these gadgets has to be as a part of the programme where the teachers understand their use and mesh them intimately with their teaching.

Experiments and exploration

The other form of use of materials is their use by children to explore ideas and to conduct experiments. These can be done both individually and in small groups. This difference of demonstration and experiment done by the child is crucial to the purpose and process of learning. The child does not know the expected result but would conduct the experiment reading the instructions given. She would then, on basis of the observations made, organise them and see what they imply. Conducting experiments in groups helps in sharing observations and interpreting them. It also helps in managing a fairly complex kit. Students cannot conduct experiments alone. There has to be a mechanism enabling the teacher to provide children with kit materials and space to conduct experiments and to organise their ideas and try and extract conclusions that their observations seem to suggest. Similarly, children could explore with blocks, different shapes and arrangement. This makes it possible for them to see how they can change the shape of different things and construct new patterns or represent a variety objects.

2. Educational Technology - Present status, Issues, Challenges and Concerns of Andhra Pradesh

2.1 Present status

Educational Technology plays an important role in providing learning opportunities and optimizing learning. The efforts of universalization of elementary education programmes like Operation Black Board (OBB), Andhra Pradesh Primary Education Programme (APPEP), District Primary Education Programme (DPEP), and the present Sarva Shiksha Abhiyan (SSA) with all ET inputs made significant impact on the Teaching –Learning Process. Lot of Teaching Learning Materials (TLM), Teaching Learning Equipment (TLE), Children literature , library books, Science kits, mathematic Kits etc, were made available to the teachers and students. Continuous teacher training programmes have been organized in Andhra Pradesh to enable teachers for effective use of ET inputs.

Operation Black Board (OBB)

Basic infrastructure i.e. at least two class rooms with one corridor and toilets to each school were provided under OBB scheme in 1986. Single teacher schools were supported with one more teacher in the schools. In addition to this, basic TLM like black boards, maps, charts, library books, sports kits and tool kits for work experience activities were also provided. Maths kits and science kits were very popular inputs of this scheme. Later in1992 it is extended up to upper primary schools. These schools were also provided with Teaching Learning equipments.

Andhra Pradesh Primary Education Programme (APPEP)

Andhra Pradesh Primary Education Programme (APPEP) was implemented in two phases i.e. 1984-87 and 1989-95 in all schools of Andhra Pradesh with the support of Overseas Development Authority (ODA). This programme was mainly focused on classroom transaction with activity based instruction. Under this program, development of Teaching Learning Material and joyful learning through innovative pedagogic process came into focus. Use of local environment in developing Teaching Learning Material and demonstrating individual and group work of the children were given more emphasis. Teacher training programmes were organized by the DIETs for the teachers for the development of TLM. Based on this, TLM learning experiences were organized for the students. Learning took place through work experience and interaction with local environment. Lot of TLM was developed by the teachers and

they demonstrated in Teacher Centre meetings. Models of thermocol, clay etc. were prepared by the teachers.

District Primary Education Programme (DPEP)

DPEP was implemented in Andhra Pradesh during 1996-2001. For the first time school grants of Rs 2,000/- and teacher grants of Rs 500/- were made available to develop their own TLM for every school and every teacher. These grants were very useful as they gave the school some opportunity to access materials. The grant was however, largely used for materials that were teacher centred and were for display. They were often complex models made from materials that were both fragile as well as environmentally unsuitable. They also were used for what teacher felt were the needs, but since the teachers lacked sufficient understanding of the learning process and the nature of disciplines; they were unable to choose appropriately. Since this was the first time that the school got funds for purchases, the market did not have much choice for them and the teachers were also not able to see if some available simple material can be used in the classroom meaningfully.

The other constraint was in the purchase rules and the rules for stock-keeping. The teachers were not clear how these would be accounted for. Because of the traditional reluctance to allow children the use of materials, the materials here were also sought to be protected. The problem of the responsibility and authority of purchasing also emerged as a concern as the teachers found the Headmasters who had to bear the ultimate responsibility for all this hesitant to buy materials and to allow even teachers free access.

The teaching learning materials were supposed to be an important aspect of the Mandal Resource Centres and the Cluster Resource Centres. One of the reasons why these centres were set up was to make available to teachers the possibility of using them as well as to function as sites where materials to learn would be available for teachers. Mandal Resource Persons were to give academic support to the teachers and help them build more engaging classrooms with concrete ideas and suggestions for the use of TLM. These MRCs and CRCs/ school complexes are meant to be the academic resource centres for the teachers and place where ideas on materials are shared. The centre also has been supplied materials like library books, charts, kits (science and mathematics), public addressing systems, OHPs, cyclostyling machines

and computers for the use of those who facilitate interaction among teachers and also for teachers.

Sarva Shiksha Abhiyan (SSA)

As DPEP implemented for primary level, SSA was for the entire elementary level (up to class VIII). Unlike in DPEP teacher grants and school grants were also provided in this program. The rules and procedures were relaxed and there was a greater effort in AP to explain to the teachers the capability of the child, the need for materials that children would use and materials that would give them concrete ways to engage with the concepts and sometimes just manipulate objects. The increased budget for this meant having it wider in the State in an attempt to cover more no. of teachers and schools. Teacher training became mandatory for all the teachers, in which they develop TLM and share teaching learning strategies. TLM grants were given to MRCs and CRCs for procurement and development of materials.

In terms of other technologies "Receiving Only terminals" (ROTs) in all CRCs and MRCs were established. Besides this various CDs were developed and distributed to the schools. Computer Aided Learning (CAL) - ICT based programme are being implemented with the support of Azim Premji Foundation. However, at present, these programmes lack focus and clarity about even what has to be done.

2.2 Analysis of use of materials in the programmes

During APPEP the kits, charts and other materials were supplied by the external agencies and were found lacking in local references. Also, there was no ownership of supplied TLM. Due to lack of proper training on the kits and other supplied materials, the kits remained in show cases and almirahs in many schools. These efforts did address the need for TLM but the materials provided were not internalized into the teaching – learning process. Till today TLM is separate and not integrated with the teaching learning process.

DPEP sensitized the teachers to the Low cost and No cost TLM and to the possibility of use of locally available resources s as TLM. DPEP trainings also propagated the idea that everything can be used as TLM if it is appropriate for the class room process. The concept of activity based instruction and joyful learning made use of TLM necessary in the teaching –learning process. Interactive materials, context specific materials and teaching made TLM came into existence. In some schools TLM

was made available to the students for interaction by working in groups or individually in the activities of various subjects.

SSA created awareness to organize Teaching-Learning Melas in Andhra Pradesh to share the TLM with the teachers and the community. MRCs and CRCs became the resource centres for development and sharing of TLM. There was a slight shift in the visualisation of the nature of TLM to something that helps in the construction of knowledge by exploring, experiencing and analyzing the TLM. In SSA, ICT components were also added in the form of computer Aided Learning (CAL).The problems of use of materials remained to some extent under SSA. The administrative constraints about responsibility of purchase, stock maintenance and writing off used things were considerably modified and simplified. Teachers had access to the money directly and it did not require them to follow complicated purchase rules. However, the issue of their understanding of what these materials can be for and therefore what materials to obtain was still comparatively untouched. The preparation necessary to understand the nature of learning, capability of the child, nature of the learning process and what is to be learnt, could not be done adequately for most teachers. There were attempts in the workshops to talk about capacity of the child, about what is an engaging classroom and how to use materials in engaging classrooms. This was, however, inadequate for various reasons. Even under SSA, the money provided continues to be only partly useful as many teachers do not extend its use for helping children construct their ideas.

2.3 Other initiatives in Andhra Pradesh

As has been said before, Education Technology can play vital role in classroom teaching learning process. Many types of technological gadgets have been used in educational institutions of the State. Many efforts to use the broadcast medium and to make the use of computers possible for elementary school children even in the rural schools have been done. These have been wide ranging and have involved many schools. The fact that there is insufficient time for the teacher to interact with peers as it may require travel to another place suggests that mechanisms of electronic networking and communication can be extremely useful.

Various technological gadgets are being used in schools of Andhra Pradesh. In collaboration with APSIET and APSCERT, Andhra Pradesh Sarva Sikhsa Abhiyan started broadcasting radio lessons i.e., Vindam Nerchukundam (let us listen and let us learn) in 2002. These radio lessons are broadcasted from AIR for Telugu and Urdu

medium students of class I to VII. One programme for teacher enrichment is being broadcasted every week. During the academic year 2009-10 Interactive Radio Instruction (IRI) was also started in the state. These IRI programmes are broadcasted on two days per week. Society for Andhra Pradesh Network (SAPNET), a major communication infrastructure initiative of Department of IT&C, Government of Andhra Pradesh, runs 5 television channels, of which 2 are being used for school education. A total of 2013 state level, district level, block level and cluster level institutions and persons are now connected with the wide network. Andhra Pradesh is one of the states making extensive use of teleconferencing technology for professional development of teachers and field functionaries of project by providing them with academic input by organizing about 25-30 teleconferencing programmers every year for different target groups.

A project called Computer Literacy and Studies (CLASS) was implemented in 256 schools of Andhra Pradesh during 1993-2004. This was the first attempt in the state to provide computer literacy to teachers and students. During 2002-2009, one thousand high schools of the state were provided with 10 desktop computers with each accessories and Internet with the aim to develop computer skills in students. Based on the experiences of previous programmes of computer education it was extended up to 6300 high schools by July, 2010. Two periods (one theory, one practical) per week for each class and each student have been allotted in the school timetable.

Although the use of these materials has increased under mission projects, it still has not been able to change the way teachers and educators look at materials and technology. There is a feeling that technology is panacea that can cure many things or everything. There is no realisation that it can only be a means for a purposeful educator or a teacher to enable the learners in her class to engage with the concepts better.

2.4 Emerging Lessons from Past Experiences

It is a very encouraging aspect of Educational Technology that governmental support has helped in overcoming the resource scarcity and it has somehow reached almost each and every school of the state. This could be considered as a first step towards developing engaging classrooms with proper utilization of teaching learning material. But the matter of concern here is that all the above mentioned efforts are mainly

equipment-driven and could not be reached at the desired level. These experiences can be listed as follows:

- The utilization of the tools of educational technology is not in accordance with expected standards.
- There is helpless dependence on electricity and non-utilization of alternative resources.
- System is teacher centred instead of being child centred.
- Lack of local references in the educational materials resulted in teachers regarding ET as an alien in the classroom.
- An attitude of utilization of teaching learning material in the classroom has not been developed among the teachers.
- Teaching learning material and teaching learning equipment have not been integrated the process of learning till now.
- Teachers are not sensitized enough to make effective use of teaching learning material in classroom processes.
- Lack of training and orientation programmes has resulted in incompetence of teachers as regards utilizing locally available resources as teaching learning materials.
- Curriculum structure and evaluation system do not provide scope for the use of teaching learning material in the classrooms.
- There is little monitoring of the use of various types of educational technology i.e. teaching learning material, technological gadgets, and teaching learning methods and strategies. Proper utilization of ET in the classroom demands for intensive training of teachers in relating the educational technology with the regular classroom processes and curriculum.

2.5 Issues, Concerns and Challenges

Providing educational technology in the schools would not be fruitful unless we emphasize its proper utilization in the schools especially by the child. Sometimes teachers also not use it because of fear of material getting damaged and may be their incompetence of working with it.

Teachers cannot make any suggestions about the system of production of materials. Materials tend to be produced at a level where most of the teachers cannot be engaged. There is a need for decentralization of production of materials and for workshops where teachers are encouraged to create their own teaching-learning materials and methods of using them. Decentralised production of not just written materials but also of audio and audio-visual materials should be taken up.

In electronic technology the production and transmission of content has to be for use over a large area. It is not possible to produce many electronic materials that take adequate elements of the context in them. Apart from this broadcast of materials can only be done at specific time and cannot be governed by the school leave alone by the teacher. The teachers cannot take an initiative and decide when she wants to show or use some program. This limitation has to be kept into mind while relying on broadcast materials as a way of helping teachers and children in the teaching learning process. Other materials like computers are alien and cannot be available in such numbers that many children can have access to them. Given the fact that children would be at different levels, it is difficult to devise tasks on computer that can engage all of them meaningfully.

The point is that teaching-learning materials are essential for learning but they must be accessible to each child. Moreover, they should be used in the context of what the teacher is transacting and the manner of se aligned to making children active. There must be a process of on helping each teacher develop an appreciation of what is a good teaching-learning material, and how to use in a classroom. We also need to help teachers and educators understand that the purpose of the teaching-learning material must be to empower the child and to engage her. The choice of the use of teaching-learning material governed by the purposes that the teacher has in the classroom at that point of time.

"Learning without Burden", the report of the Yash Pal Committee of 1993, has extensively reported the ills of the present education system. Briefly, it has shown how the education system has become highly centralized, examination driven, joyless, impersonal, and utterly irrelevant to the child's world. The centralization deprives teachers of the freedom to organize teaching learning and meaningfully participate in the preparation of syllabi or textbooks, and the same thing is true with ET.

Educational technology is designed and structured at a central level and using it in diversifying situations with children of varying needs is no doubt a complicated task. Therefore association of educational technology to real classroom situation at one end and to the rapidly changing world at another end is a big challenge before us.

The other challenge is to prepare the teachers who can make effective use of educational technology both for themselves as well for the students. How to link teachers with the process of design and development of ET inputs is also an important challenge before us. Though ET has reached to almost all the schools in the state but to make it reach to each and every student is also very important. And last but not the least proper research and documentation of this work is needed.

Efficacy and efficiency aspect of TLM is also not very clear till now. It depends mostly on how it is being handled by a teacher in the classroom and how far children are feeling comfortable with it. Having lots of material available, does not at all result in occurrence of effective teaching learning process in the classroom. Lack of proper training on part of teachers, limited access to sufficient quantities of a material, and the extra time required for many implementations of technology are just a few of the reasons that Teaching learning materials are often not used extensively in the classroom. Similar to learning a new task or trade, special training is vital to ensuring the effective integration of classroom technology. Since technology is not the end goal of education, but rather a means by which it can be accomplished, educators must have a good grasp of the technology being used and its advantages over more traditional methods. If there is a lack in either of these areas, technology will be seen as a hindrance and not a benefit to the goals of teaching. To understand educational technology one must also understand theories in human behavior as behavior is affected by technology.

Another difficulty is introduced when access to a sufficient quantity of a resource is limited. This is often seen when the quantity of computers or digital cameras for classroom use is not enough to meet the needs of an entire classroom. It also occurs in less noticed forms such as limited access for technology exploration because of the high cost of technology and the fear of damages. In other cases, the inconvenience of resource placement is a hindrance, such as having to transport a classroom to a computer lab instead of having in-classroom computer access by means of technology such as laptop carts.

Using TLM can also be time consuming. There may be an initial setup or training time cost inherent in the use of certain things. Even with these tasks accomplished, technology failure may occur during the activity and as a result teachers must have an alternative lesson ready. Another major issue arises because of the evolving nature of technology. New resources have to be designed and distributed whenever the technological platform has been changed. Finding quality materials to support classroom objectives after such changes is often difficult even when they exist in sufficient quantity and teachers must design these resources on their own. The efficacy and efficiency of ET can be assured only after getting over these issues.

3. RECOMMENDATIONS

In revitalising and reorienting existing resources

- Capitalise on the existence of a large number of institutions and facilities, nationwide networks, and trained, professional, and creative manpower in the area of ET. Re-engineer and convert all of these into a potent system.
- Encourage these institutions to take up new roles, including action research, data collection, in-service training of teachers, networking to establish and coordinate nationwide efforts in education, evaluation research, developing models for interactive classes, interactive multimedia, teleconferencing, video conferencing, and in leading the process whereby materials can be generated by teachers, parents, and children at every level.
- Recognize the potential of ICT and the Internet, promote universal access, facilitate participatory forums, and develop communities and interest groups.
- Invest in continuous, on-demand teacher training and support, research and content repositories, value-added distance education and online campuses, all of these steps aimed at increasing access to, and equity and quality of education.

In systemic reforms

- Ensure that technology is used in an equitable and democratic manner to enhance the self-worth and self-image of the poor and the disadvantaged.
- Counter the tendency to centralize; promote plurality and diversity.
- Ensure opportunities for autonomous content generation by diverse communities.
- Shift focus from fixed to flexible curricula, with competencies and skills identified rather than specific factual content.
- Deploy ET to enhance open education, which implies openness in curriculum transactions.
- Work towards transforming all schools into ICT-rich environments.

- Create opportunities for administrators and educational leaders in the school system to become ET savvy and to be able to use ICTs competently.
- The proper maintenance of the tools of educational technology for a longer period.
- Uninterrupted supply of solar energy to schools without feeling the interrupted supply of electricity in the utilization of educational technology.
- The availability of the help and the cooperation of experts for the purpose of coordinating subject knowledge with technical knowledge.

In refreshing skills of in-service teachers

- Mandatory training and orientation courses on regular basis for skill development of teachers to make them competent enough to deal with different aspects of educational technology i.e. teaching learning material, technological devices in education, and teaching learning strategies.
- Create a system where teachers can share their own classroom experiences regarding teaching learning and know about others experiences, be it online or in small groups i.e. at manual or cluster level.
- Encourage ICT literacy for official and personal use to build comfort and later creativity in educational work.
- Encourage teachers to reflect on their work at their own leisure

In pre-service teacher education

- ICT literacy regarding education to be introduced in the teacher training programs.
- Encourage use of ET and teaching learning material during practice teaching sessions.
- Train teachers to evaluate and integrate locally available materials into the learning process.
- Enable trainee teachers to access sources of knowledge and to create knowledge.

In school education

- Allow & enable students to access sources of knowledge and interpret them, and to create knowledge rather than be passive users.
- Provide space to the teachers in use of curriculum content, its delivery and evaluation
- Promote individual learning styles.
- Encourage individual teacher to document the work they do in the classrooms.

In research

- Create a framework to identify the generic skills (problem identification and troubleshooting, for instance) needed for the new initiatives to be undertaken in ET.
- Acquire knowledge on how learning takes place in ICT-rich learning environments, optimizing learning paths for learners with different learning styles coming from a variety of social backgrounds, including gender differences.
- Examine the possibilities of mobile technologies for learning purposes.
- Collection of information, enrolment, codification, analysis etc continue to be dealt with as per the traditional methods without utilizing the educational technology.
- Providing information to teachers in the proper utilization of various tools of educational technology according to the needs.
- The proper maintenance of the tools of educational technology for a longer period.
- Uninterrupted supply of solar energy to schools without feeling the interrupted supply of electricity in the utilization of educational technology.
- The availability of the help and the cooperation of experts for the purpose of coordinating subject knowledge with technical knowledge.
- Preparing multimedia lessons and class lessons besides utilization of lessons already available, the involvement of students and teachers in their preparation.

CONSTITUTION OF INDIA PREAMBLE

WE, THE PEOPLE OF INDIA, ***having solemnly resolved to constitute India into a***

SOVEREIGN, SOCIALIST, SECULAR, DEMOCRATIC, REPUBLIC ***and to secure to all its citizens***

JUSTICE, *social economic and political*

LIBERTY *of thought, expression, belief, faith and worship*

EQUALITY *of status and opportunity and to promote among them all*

FRATERNITY *assuring the dignity of the individual and the unity and integrity of the nation.*

IN OUR CONSTITUENT ASSEMBLY this twenty –**sixth day of November, 1949**, do HEREBY **ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**