

## Evolving Perception of Materials

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Materials can be important for helping children learn. The very young child learns in interaction with and acting on the objects around her. In the beginning, the senses, motor abilities and subsequent causal analysis develops through their observations of the things around and their behaviour in different circumstances. This interaction with materials is spontaneous and directed by the child. The manner of interaction is decided by her and often their explorations do not meet with the approval of the adults. There is a certain obstinacy in their toying around and extending boundaries of the pre-decided purposes, expected behaviour patterns and other such constraints. We have, as adults, played with children in the games they create in their effort to explore materials. Even when we bring in objects for specific purposes and specific motives they find their own purposes and manner of interaction.

This interaction, in a sense, play with materials, is essential for learning. This sense of materials is different in two important ways from the way Teaching Learning Materials (TLMs) are conceptualised. One, these materials are not specific to one area of learning and not certainly limited to a few concepts and, second, they are not specifically associated with the idea of teaching and learning. These points are important, as are some others, for us to understand the possibilities, risks and advantages of talking about TLMs for the classroom, where materials and situations need to allow and create opportunities for children to tinker and do what may be called brief studies for themselves. It is therefore important to keep in mind the principles that govern this usage and the concerns and the questions that we must be aware of as teachers and as curriculum or material developers.

The other point is about the nature of learning and concepts. Human concepts and the conceptual structures built on them are retained in the absence of materials and indeed the entire here and now of the situation. We have by now developed the ability to talk about and visualise objects and events in their

absence. The purpose of learning is also to move away from concreteness and engage with ideas and constructs and even build combinations that have not been seen or are never seen and maybe do not exist yet. These imaginations are built in the mind and we want to sharpen this ability too, the implication being the need to consider materials as props and temporary aids and use them as means to develop the ability for abstractions. This is apart from their being an essential part of our lives and experiences where we work with and upon them. The point is that we have to learn to go beyond them in our imaginations and even our conversations as we name something and associate with it properties and behaviour that keeps getting modified and built upon. The question is thus not about the need or otherwise of materials but is about the purpose, context and manner of use.

It is often argued that most learning theories and researchers in that field have suggested use of materials. The Montessori programme talks of going from the concrete to the abstract. Also, Piaget and Vygotsky among others talk about going from concrete ideas to abstractions. It is however, important that the suggested use and importance of materials for learning be nuanced. They do not all imply that concrete materials are the most crucial and critical factors for learning, nor are they suggested as essential for learning everything. They recommend situations that allow children opportunities of tinkering, exploring, playing around, doing small experiments and studies. Vygotsky, in his formulations, underlines the role of the adult as a more knowledgeable peer and suggests situated human interaction and dialogue as essential for learning.

Thus, the principles behind the theories do not necessarily recommend physical materials but what they imply is that ideas and concepts must be embedded in contexts that are concrete for the learners. These may include experiences that they have had before, with the learning being the organising of these experiences under a new conceptual framework. It also does not mean that

physical materials and objects define learning possibilities. The essence of the message whether we look at Piaget, Vygotsky or Bruner is that the child must be active in the process of learning, but simultaneously the learner is expected to apply her mind to organise the materials, her experiences with them and her observations on her own terms based on her previous knowledge system. For Vygotsky this occurs along with social interaction.

These points are critical when thinking of creating, or choosing materials and constructing ways of using them in the classrooms. The emphasis has to be on guiding the learning process such that children can have opportunities to exercise all aspects of their ability and use the language available to them to reconstruct or modify the way they have organised their knowledge of the world. Almost all the serious educators who have emphasised concreteness of the learning experiences in their work, have simultaneously emphasised cooperative and collaborative tasks with a lot of dialogue and discussion. The sense of materials and learning situations embedded in ideas of Dewey, also reflected in Nai Talim and many other educators recommend concreteness of engagements and purposes, rather than of physical materials. The learning tasks are required to be embedded in the experiences, language and environment of children and be useful for the community as well. The linkage of learning to work that is useful for the community is also considered important for facilitating interaction and sharing. We will now briefly examine the present focus in use of materials, the discourse around them and how the idea has grown in recent decades.

### **Using Materials as Aids**

The use of materials started as an aid to the teaching process that emphasised giving information as the primary objective. Materials were used only to aid the memorisation of information considered important, repetition of tasks to acquire the ability to do the same and rote learning of available explanations, descriptions and even arguments. The expectations of the curriculum were limited to recapitulation and reproduction was the only mandate. No application of knowledge was asked for or expected.

However, in order to do this well, teachers were urged to go beyond chalk and talk. Information was to be presented such that it became more striking and hence retained. The initial use of materials

was, therefore, a means to aid the transfer of information and make it more effective. Teaching aids like visuals made of charts, thermocol, slides, etc presented a model and showed the entire information content in chunks. It was meant to simplify and present information slowly and tangibly so that learners could grasp it bit by bit. It was thought that this would reduce the mental effort needed by children to acquire and reproduce desired information and add an element of novelty and excitement. Materials have been therefore seen as sugarcoats on, bitter pills to be swallowed.

The first set of TLMs, therefore, was teaching aids. The focus on these was to show children in attractive ways what they had to learn. The object was not to engage them mentally or excite their curiosity and enable them to focus on the presented objects or its experiences, but use it as aids for memorisation or merely as interesting distractions. The exercise of using teaching aids led to posters, slide shows, models made from different kind of materials, models bought or made by teachers. These were aligned with ideas prevalent at the time on what knowledge is to be acquired, how humans learn and what it means to know.

Today supposedly under a very different set of human learning concepts we can see ideas of teaching aids as morphed into demonstration experiments, videos explaining ideas routinely or giving information. They have the same purpose and follow the same pedagogical principles as materials followed seven decades ago.

### **Active Materials**

Teaching aids were criticised as they failed to make the child active. It was argued that the purpose of classrooms is to have the child actively engaged in her own learning. This implies that materials must go into the hands of children. For this, flash cards, science kit materials, cut-outs, pocket boards, beads and strings, solid geometrical object and other similar things were emphasised. Due to the effort of institutions within and outside the government, the norm to be achieved became that experiments are important for science education. The purposes and pedagogical principles driving these materials were mixed: the same materials were presented but used very differently by different groups.

By 1986 even the National Education Policy (NEP 1986) emphasised the use of materials for primary classes and gave the indication of what these materials could be. A subsequent effort made in

those years was to supply both science kits and materials to schools, but they mostly lay unused. The quality of the materials supplied, the nature of the write-off rules and the difficulties arising out of these are not sufficient to explain the absence of any significant use of these materials. Yet, the talk about materials got extended to upper primary and secondary classes as well; the presence of materials seemed a convenient way of showing yourself as different. They were also seen as distractions, breaks in the monotony for children. Activity rooms, language or maths labs, smart classrooms, interactive online learning, and such things became the norm. All this slowly led to a race for 'sophisticated materials' in private schools and a large market for materials of multiple kinds was created and is growing.

In recent times, the emphasis on ICT in learning has increased with a lot more investment. We have moved away from the use of physical objects, paper folding, flash cards, posters, charts etc. as a means to learn to visualise different shapes and objects or as means to depict parts of a whole. Based on experiences, beads and strings have been replaced by other forms of modelling of the natural number system and pictures and cards depicting fractional numbers by Dienes Blocks and other such specially constructed materials. There are kits for pre-designed experiments, working models and projects for students and teachers. These already constructed materials, tasks and structures of interaction, to be used with the children, have increasingly become prominent. 'Well formed' lesson plans with aids and materials, smart classrooms with installed packages available in the market have reduced the teacher's responsibilities to that of a materials store-keeper.

There is no doubt that there is now a lot of progress in thinking about materials and make them more 'efficient' and predictable and there is no doubt that materials can be useful and we must have them in classrooms. The point, however, is to ask whether the manner of use of materials leads to improvement in classroom transaction processes and if it does not, is there not something fundamentally wrong with our approach and understanding of materials and of concreteness of learning situations?

The conception of materials as aiding learning emerges from the need to develop engaging tasks for children, tasks that would help them engage

with concepts and logical structures that can be created through using them in dialogue with peers and the teacher. This would require facilitating situations where they learn together and develop insights that, although not new knowledge, are new in the manner they have come about and are new for them. The novelty and the joy is not in the materials but in the engagement and the interaction surrounding the use of materials. The process of learning is not assumed to be linear and leading to a slow transfer of chunks of information, but a process of collective re-construction of concepts, imbibed in a specific manner by each child in the collective based on the structures she already has.

The purpose of materials is not activity but to make minds active and to make interaction between active minds possible. Materials are thus meant to extend the experience base and scope of learning and scaffold through various ways like temporary models, concrete illustrations, make possible engagement with concepts to elaborate them, the intent being to help the child exercise the ability to use the concepts and extend her abilities of building logical formulations cogently, observing and describing more sharply and so on. Its major purpose is not to simplify anything or to provide fun. To be relevant to the context, they have to be visualised based on the need by the teacher with collaborative inputs from the children so as to make both the purpose and the task accessible.

The basic set of materials that are available, including the concrete descriptions of experiences and observations of children, have to be moulded to suit the contextual requirements. And that can only happen if the materials and the learning tasks are controlled by the teacher (and to some extent aided by the children) and are not pre-decided impositions. Such impositions, even if well conceived, cannot be effectively used by the teacher or match the context. The possibility of these being well-conceived is therefore in itself impractical as we can not expect groups of children in the classrooms to be universal in the way they engage, interact and learn.

### **The Current trend**

The current trend is a movement away from such use of creation that involves the whole class. Use of materials where teachers and children participate in, conceptualising, putting together and using materials. Use that leads to observations, experiences and then processes expecting children

to make logical formulations to construct things and concepts. and in the process discovering insights that are new for them and are not from the textbook.

This understanding of materials emerged from the recognition of conceptual understanding as the goal. This goal demands that children formulate their own descriptions, their own logical constructs, their own articulations and expressions and therefore present their own answers. This is broadly aligned with some of the principles indicated by learning theorists as well as educators. The mistake, if we may call it that, was only to think that concrete operational stage means the same as work on concrete objects and that the use of materials helps to break up concepts into parts.

The points of view on the use of materials lie between materials being panacea for learning and their merely being supplementary to what the teacher can do. The journey from textbooks and library being materials and efforts to ensure their effective use to the subsequent use of pebbles, straw, things in nature, small kits and inexpensive things being considered TLMs has now rapidly moved to materials being specially curated products developed by 'experts'. The gap between what is stated as principles of learning and the beliefs that prevail aided by the push of the market leads to use of materials quite contrary to the principles and features of a good classroom embedded in the National Curriculum Framework. This is certainly a movement away from the understanding that it is the children and the materials that are important and the teacher is only a facilitator. The key, however, is that in reality, policies and programmes do not want to invest in teachers, with more and more investment on availability of materials and the over emphasis on materials without considering purposes and pedagogical principles has made active classrooms a fashionable word, with the idea that everything has to be activity based in the physical, novel and fun sense. The distinctions between play, game, engaged learning, experiment, and so on has been lost.

There are, of course, some educators who clearly state that the guidelines should be to produce foolproof materials as there cannot be sufficient resources for teachers and their preparations. Bureaucrats who double up as educators generally align themselves with this view and to add to the

promotion, there are many for private companies working in education which are developing materials and manuals to aid/guide/direct the teacher. The emphasis is that the teacher has to just follow what is suggested and use the materials as directed. This perspective of materials and their use is certainly not the one suggested by advocates of concrete learning experiences as the foundations for learning.

The use of materials thus rests on the premise that good materials would help children learn irrespective of everything else, and well constructed thought through materials can make children learn on their own just as 'constructivism' would suggest. Children using prepared materials must be allowed to be free and not require much support. The emphasis on the use of materials comes from two opposite camps: one camp that says that materials would help the child repeat, practice and remember better and the other that suggests that they would help children learn automatically. Discussions hover between these two extreme views, but essentially they have the same roots as they posit the teaching learning process as individual and not social. The requirement that teachers engage children, help them structure their learning, continuously interact with them, assess them, encourage them, guide them, have a continuing dialogue with them and carry the responsibility of learning has been buried. The suggestion that materials must be special and require high effort and investment to conceptualise and design implies that they can not be developed at a small scale; not by the teacher in her school based on her needs and not even at the cluster and the block level. To make the best available to all and be able to make their production economically affordable the pressure is towards centralisation of their conceptualisation, development and production. They have thus to be universal and widely applicable. With no preparation of teachers to use them effectively and no discourse around multiple use of materials, there are no possibilities in the classrooms to use them for alternative purposes in alternative ways. The emphasis is on thinking of such TLMs as universal and developing them as such. Interactive systems are geared towards individuals and not groups and their responses aligned with the profiles entered.

### **Conclusion**

TLMs are tools for the aid of teacher and children, unless there is clarity of purpose between these

most critical players, materials can only be an obstruction to the exercise of the mind by the child. It may also be important to recognise that materials can retard the effort of visualisation and mental construction of ideas that are abstract even though they can be seen embedded in many live experiences and familiar objects. So unless the teacher is central to the project of thinking of, developing and deciding the use of materials our classrooms would continue to remain one-sided delivery. The only change being the retrograde one, that instead of the teacher it is now the materials

that are the source of all knowledge and provide the learner with the purpose and content that is to be learnt. The conversation on teaching-learning materials thus needs to start from the purpose of using them and their material and conceptual accessibility to teachers and children. They should not be imposed learning trajectories and tasks to be followed mechanically.

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### **Bibliography**

1. Nawani, D. (ed.). (2016). Teaching-learning resources for school education. New Delhi: Sage Publications
2. David Wood & Heather Wood (1996) Vygotsky, Tutoring and Learning, Oxford Review of Education, 22:1, 5-16
3. Dewan, H.K. (2008). TLM vs. Teaching Aids. Buniyadi Shiksha 18: 7-11. (Published by Vidya Bhawan Society and Azim Premji University)
4. Elkind, D. (1976). Child development and Education: A Piagetian Perspective. Oxford University Press. New York.
5. National Council of Educational Research and Training (2005), Learning and Knowledge Chapter 2, New Delhi: NCERT, 12-34 .
6. Lawrence. H.S.S. (1950). Gandhiji's Contribution to Education, The Phi Delta Kappan, Vol. 32, No. 2, pp. 42-44
7. Gowrie, S. (1958). Basic Education in India. Merrill-Palmer Quarterly of Behavior and Development, Vol. 5, No. 1, pp. 46-60
8. Vygotsky, L. (1978). Interaction between Learning and Development. Mind and Society. Cambridge, MA: Harvard University Press, pp. 79-91
9. Piaget, J. (1964). Development and Learning. In: R E Ripple & V N Rockcastle (Eds). Piaget Rediscovered, pp. 7-20

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