# Enrichment of learning experience of rural children through Interactive Multimedia

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## INTRODUCTION

Learning is a process of active engagement with experience. It is what people do when they want to make sense of the world. It may involve an increase in skills, knowledge, understanding, values and the capacity to reflect. Effective learning also leads to change, development and a desire to learn more.

Learning occurs in the interplay between expectation and experience as Kolb (1984) suggests, and is an intellectual process of constructing knowledge, i.e. acquiring, processing, assimilating, and integrating information and ideas through constructive socio-cultural interaction. It is sustained by mental stimulation, and encouraged by the proper environment.

For many students, learning has been dependent on time, place and is fundamentally teacher-oriented. The flexibility of such a learning environment is restricted, and the essence of multimedia learning which anchors on student-centred strategy remains a paradigm untouched. Unfortunately, 'technologies are too often used as substitute teachers that deliver information to learners rather than as learning tools that support the active learning process" (Kiili, 2005).

## MULTIMEDIA

Multimedia is the notion of using multiple channels of communication to present information. In computer-oriented terms Multimedia can be defined as the combining of text, graphics, animation, pictures, videos and sound to present information (Bagui, 1998). Multimedia involves the simultaneous use of multiple media formats (Hede & Hede, 2002). When one enables users to control the pace and direction of information, the program becomes interactive multimedia. With interactive multimedia, the recipient is also an active participant in the experience: not only seeing and hearing the message, but interacting with it as well.

### Interactivity in Multimedia

Interactivity is mutual action between the learner, the learning system, and the learning material. An interactive communication between computer and human can be made engaging through optimal learner-controlled events like active participation in a simulation or an educational game, providing feedback, building on current knowledge and experience, learner control of pace and sequence, with the conclusion that (Sims, 1998) "effective learning requires interaction which stimulates new thinking" (Fenrich, 1997 in Sims, 1998). These interactive characteristics concur with the constructivist view of learning, which encourage the learner as an active participant to construct knowledge in making sense of their real-world experiences.

The presence of interactions and interactivity in technology-based instructional materials has become synonymous with enhanced learning.

The interactions in Multimedia can be presented in a continuum as shown in Fig. 1 (Oliver, 2008).

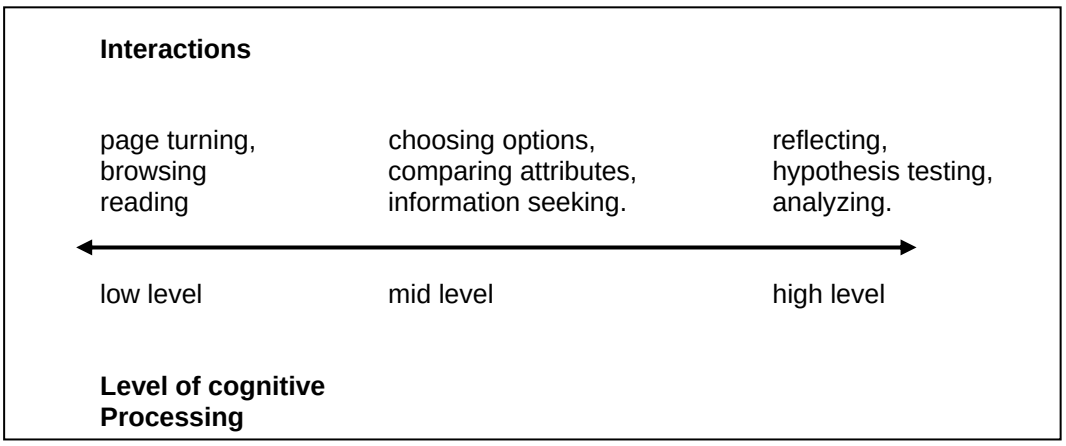


Fig. 1 Interactivity in Educational Multimedia
from Oliver Ron (2008)

## A. Learner activities at low cognition level

The multimedia components as cognitive tools, involved in low-order learning are text, graphics, animation, text window response and feedback prompts. Learner activities include reading information, looking at static diagrams or animations of phenomena reminding learners of mundane events experienced, observing effects on the experiment, re-observing the animations, referring to previous information, or advancing to next set of information.


Fig. 2 Low order learning

## B. Learner activities at medium cognition level

The multimedia components, as cognitive tools, involved in medium-order learning are text, graphics, animation, drag and drop objects and text window response and feedback prompts. The cognition is slightly increased in complexity when the learners conduct on-screen experiment. The learning activities prescribed in medium cognition are derived from the lower level and are augmented with activities such as typing in their answers to questions posed, into the text window for their descriptions of animations, and, clicking the pointing device on objects to drag from one position to another and typing in text to describe effects observed in conducting their experiments.

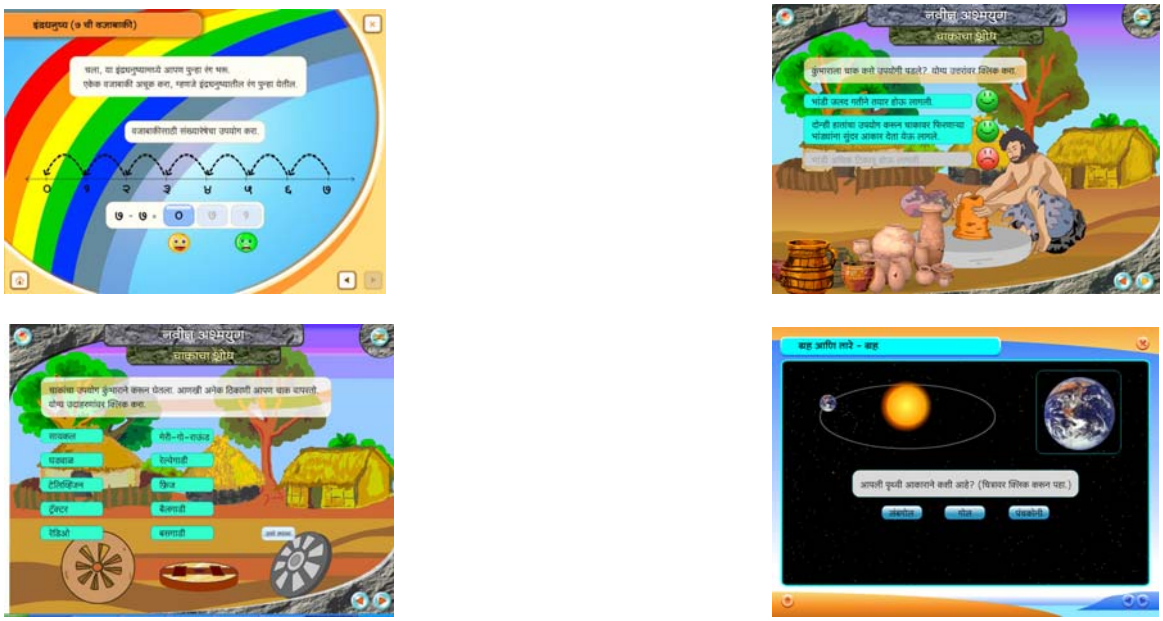

Fig. 3 Medium order learning

## C. Learner activities at high cognition level

The multimedia components involved in the high-order learning are text, graphics, animations, self-conducted on-screen simulations, response and feedback. A high degree of interactivity is involved in which the learner controls the experimental area in designing the electric circuits to test their new knowledge.

Fig. 4 High order learning

## RESEARCH FINDINGS ABOUT INTERACTIVE MULTIMEDIA

A major feature of well-designed multimedia courseware is user interactivity. Researchers (Sims, 1998; Harper & Hedberg, 1997, Shinde, 2003) have shown that an interactive learning environment can generate effective instruction and learning.

There is empirical evidence that multimedia can enhance the learning of, at least, certain kinds of information. A review by various researchers of studies that have investigated the effectiveness of multimedia in learning information suggested that the people who used computer-based multimedia instruction performed better in terms of test scores, compared to those who received instruction through traditional classroom lectures. Topics of interests in the studies ranged from languages, chemistry, and biology, to the procedures for the operation of devices. Equally, the context of the studies varied from primary school education, higher education, and industry, to the military. This may imply that the property of multimedia to enhance learning performance is irrespective of subject area or context.

Why computer-based multimedia may enhance learning performance? One explanation is that using the computer to present information tends to impose the necessity to structure the information (Najjar, 1996), and this, in turn, facilitates learning, since structure and organization facilitate information processing in humans (Leahey & Harris, 1989).

Interactivity during learning has been noted by many (Bosco, 1986; Fletcher, 1989) to have a strong enhancing-influence on learning by improving retention (Stafford as cited in Najjar, 1996) and the speed of learning (Bosco, 1986; Fletcher, 1989). Novelty, also, has been associated with why multimedia may be effective for learning.

## MULTIMEDIA AND STUDENT-CENTRED LEARNING

“One way to bring about a change of emphasis in teaching, from the teacher directed approach to a facilitated approach, is to change the medium of instruction” (Kearsley, 2000). Interactive multimedia offers an alternative medium of instruction to the current learning process. One way, multimedia can give low ability students extensive learning time before moving forward. Alternatively, high ability students can branch out to random sequencing through the module and not be confined by linearity or a much slower pace. This aspect of multimedia learning supports student-centred strategy whereby learners take responsibility in their own learning process. The liberty to proceed or recede allows self-pacing, an important facet to enable learners to learn according to their individual pace.

It is fascinating to watch the ease with which very young students learn to operate and control new multimedia packages. As students gain experience with different packages, there is a high degree of transfer of skills and knowledge from previous activities and experiences. Students have a sense of what forms of response to expect from different actions. Once students have had a degree of experience and in some cases a degree of training in specific functions of packages, we find little evidence of students experiencing any subsequent difficulties with interface control or operation. This

leads us to assert that with time, use of the many of the interactive elements of multimedia programs will become automatic to users and of marginal bearing on what is learned.

## DEVELOPMENT OF INTERACTIVE MULTIMEDIA AT DET, SNDTU

Department of Educational Technology (DET), SNDT Women's University (SNDTU), Mumbai, India develops Interactive Multimedia Packages (IMMPs)in school subjects in the State language, Marathi. There are 48 IMMPs developed for the grades I to IV. The subjects and the titles are presented in Table 1.

**Table 1: Gradewise and subjectwise titles of the IMMPs**

| Grade | | Marathi | Mathematics | EVS | History | Science | Geography |
|---|---|---|---|---|---|---|---|
| I | 1. | Word and Pictres | Addition | Occupations | - | - | - |
| | 2. | Vowels | Subtraction | Our Home | | | |
| | 3. | Consonent | Subtraction II | Our cloths | | | |
| II | 1. | Verbs | Subtraction | Our earth | - | - | - |
| | 2. | Suffix | Shapes and Figures | Sky | | | |
| | 3. | | Multiplication | Communicati on | | | |
| III | 1. | Prefix | Time | - | Stone age Man | Our Body Parts | Direction, Star and Planets |
| | 2. | Jodakshare | Multiplication | | Stone Age Man: towards Progress | Food | Map Reading |
| | 3. | | Division | | | Shelter | Transport & Communicati on |
| | 4. | | Fractions | | | Living Things | |
| IV | 1. | Dictionary of words | Fractions | - | National symbols | Work and Energy | Maharashtra State: Konkan Region |
| | 2. | Types of words | Decimal fractions | | | Internal Organs & Digestion | Plateau Region |
| | 3. | Sentence construction | Measuremen t of Time | | | Properties of Matter | Sahyadri |
| | 4. | | Geometric shapes | | | | |
| Total | | 10 | 14 | 6 | 3 | 7 | 6 |

These packages are based on the identified concepts, procedures in the respective curriculum. The IIMPs are devloped using text, graphics, animations, sound as well as videos (wherever reuired). The total reading time for each package is about one hour. Each individual learner takes time according to his/her pace.

The menu page provides main as well as submenu to the learner. Fig. 5 presents the menu and submenus of some packages.

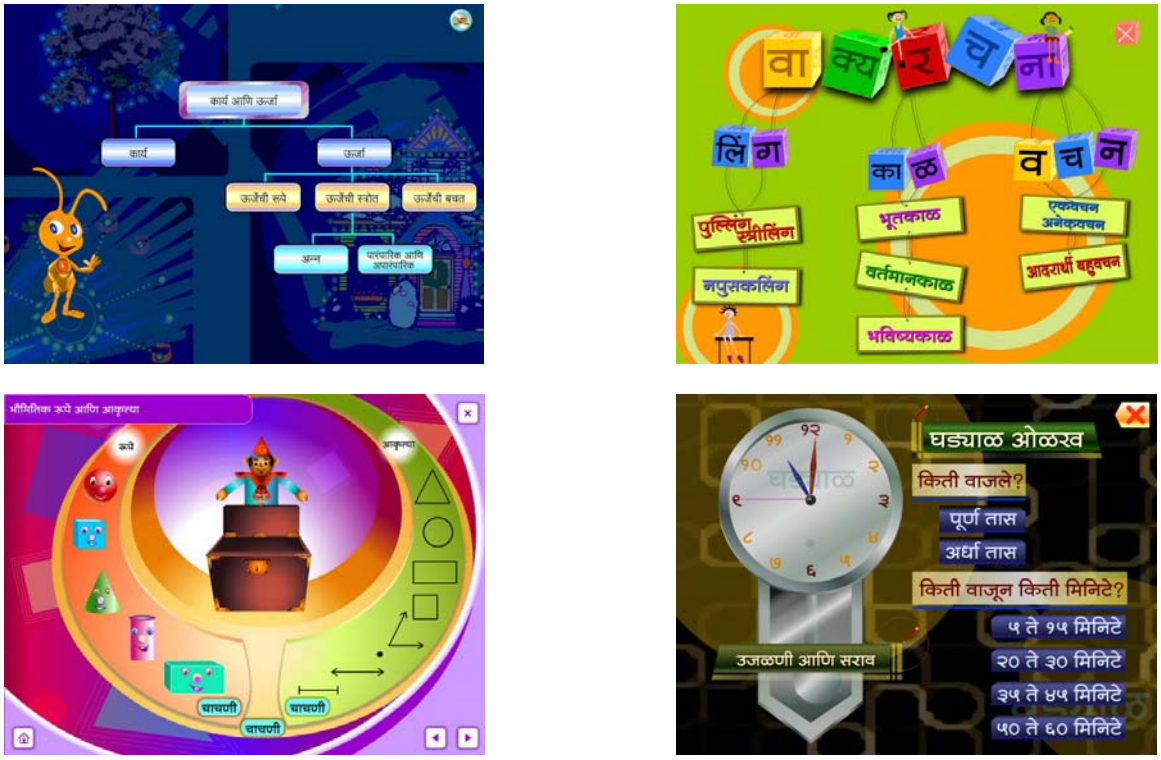


Fig. 5 Menu page showing submenus

Each IIMP is interactive. There is interactivity in nearly every frame. The learner is required to constantly interact with the content and actively participate in the process of learning. Interactivity is built in the package which requires learner to click, type, drag and drop, match, paint, draw etc. Using these techniques many activities are designed for the learner. After every activity the learner gets feedback whether the answer is right or wrong as well as the reason behind it. Some of the activites are listed below:

- Colour the picture, parts of the diagram,
- Type the answer in one or two words, type numbers etc.
- Drag and drop to match, to make whole with its parts, to take out the parts, putting an object on top of the other,
- Match the pairs of various objects,
- Clicking to activate correct action, to magnify, to bring the parts in front etc.

Feedback was provided in variety of ways. The learner gets a token of appreciation every time he/she gives correct answer or performs correctly. These include, objects on the screen like balloons, candies, flowers etc. or scores, at the end if the scores are adequate (e.g. 80% mastery) get a bigger reward etc. Feedback including “try again” gave an opportunity to use the knowledge learnt once again in a somewhat little setting.

**Validation of the IIMPs**

The packages once designed and developed were tried out in Mumbai by inviting learners from Grade I too IV from public as well as private schools. On the basis of feedback (observation of learners, open ended interview as well as written test on the content) improvements were made in the packages. These packages were then used with the rural children in Sindhudurg district of Maharashtra state, India.

**Profile of rural learners**

Sindhudurg district is a hill and costal area, which remained backward due to non-development of communication network (Road, Railway as well as air). Rural schools do not have computer labs and hence the children in primary school (grade I to IV) do not have much access to computers.

One strong point was the network of Non-governmental organizations (NGOs) in the district. DET, SNDTU in collaboration with 5 NGOs in Sindhudurg district planned a program of introducing IIMPs to rural primary school children. Ten villages were selected for the project including 4 where the secondary school had a computer lab. In other 6 villages the NGOs arranged learning experiences through individual personal computers.

The project was conducted for 6 months. On an average 30 children of grade I to IV from each of these 10 villages had an opportunity to study atleast 3 packages. In many villages two to three learners used one computer to study the package. (As against individual learner using the package in Mumbai city during validation).

**LEARNING THROUGH INTERACTIVE MULTIMEDIA**

The students' perceptions on the use of multimedia and interactivity were very positive. Students said that learning with interactivity and multimedia was interesting and engaging; they also found this method of learning useful and favourable. Some expressed their desire to learn whole curriculum through Interactive Multimedia packages.

It was surprising to note that students learned on their own how to navigate through the module. Instantly they were exploring, experimenting with the package. New technology was not seen as a problem.

The students shared their joy of learning at their own pace. Many students commented that the navigation helped them to go back and forth whenever they wanted. That gave them the control of the whole process of learning. They were not dependent on the teacher for the pace of learning and also the content as they selected what they wanted to learn (probably first time in their education life). For some, this feature was exceptionally helpful as they do not have to catch up with other students or the teacher in order to sustain personal learning and understanding.

The use of graphic visualisations and multimedia for presentation of information and interacting with it received encouraging responses. Learners found the graphics very interetsing and visually sound. The graphics creating lasting impact (images of various communication modes, plants and animals, houses etc. was a treat to the learners.)

The effectiveness of multimedia and interactivty as a learning medium clearly promotes engagement in learning which surpasses its status quo of a mere tool of delivery. Many students reported high interests resulting from enriching multimedia experience hence harnessing ownership in self-learning.

The most appreciated aspect of the package was Interactivity. The learners just loved to do things during learning (which is a rarity in the classroom learning, as the teacher does most of the talking). Many students expressed their happiness in working on challenging activities and get positive feedback. Some expressed their appreciation for interactivity as they said there was no reprimand for wrong answer. There was no one to see that they gave wrong answer. They became careful in learning the new content as they did not want to go wrong, they were fascinated by the awards and wanted to get more of them (though this is extrinsic in nature, it was useful in developing interest in learning and sustaining it).

The learning through IIMPs was independent of teacher, and hence it is possible to introduce IIMPs in villages where there is a paucity of teachers. Experinec of workers of NGOs was also encouraging. They were surprised to find young children of 6 to 10 years age exploring and using this new technology to their advantage.

## CONCLUSION

In general, this project has found that learning through interactive multimedia is feasible and is a viable alternative to the traditional classroom which has proved to be limited in achieving the necessary needs of the students in the modern learning context. Students were positive towards active learning and were confident in enforcing self-paced strategy. This is a viable learning strategy and should be encouraged for rural learners as well.

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