Development of Open Educational Resources
Opportunities and Challenges

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Introduction

Science and technological developments are influencing the lives of even the common man on the street. These changes have forced us to change the way we look at the teaching learning process in schools. School education has, therefore, witnessed significant changes in the recent years. The typical teacher in typical school of India, however, remains ignorant of these changes. In the absence of a strong in-service training programme the teacher continues to teach in the age old fashion. While only a small fraction of the teachers is fortunate enough to lay their hands on recently designed learning resources, a majority of the teaching community in India remains ill informed of the developments in this arena. In order to overcome this problem the idea of Open Educational Resources (OER) for schools is being suggested.

The phrase 'open education resources' was first coined in 2002 at UNESCO's Forum on the Impact of Open Courseware for Higher Education in Developing Countries. According to Atkins and Brown (2007) open educational resources are teaching, learning and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use or re-purposing by others. Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge.

As the situation stands today a variety of educational material is available in the open domain. However, this material is directed towards general audience in the society. The hugely successful Wikipedia is an example of kind of this kind of resource. In addition, there are course materials focused on specific courses. MIT's course material can be cited as an example in this context. Nevertheless, curricular material supporting school education hardly exists. Moreover, most of the resources are in English and are biased towards developed world. Teachers teaching in vernacular medium can seldom obtain benefits from these resources. Students and parents who are not proficient with this language and culture feel themselves at disadvantage. They need resources that are directly useful for their curriculum and have direct relevance to their culture. It is with this view in mind that a project on open educational resources for school was launched for the schools in the state of Maharashtra where a large number of schools still use Marathi as a language of instruction. We would like to share our first hand experiences gained while working in this project.

About OER4S Project

Homi Bhabha Centre for Science Education (HBCSE) is the national centre of the Tata Institute of Fundamental Research (TIFR) for science and mathematics education (http://www.hbcse.tifr.res.in). Established in 1974 it has been developing methods and materials to facilitate teaching of science and mathematics in Indian schools and testing them both in urban as well as rural settings through its field projects. HBCSE has embarked on developing free knowledge resource (www.gnowledge.org). As a next step it wishes to design Open Educational Resources for Schools (OER4S) that can be used to provide quality education to the students. The project is being funded by the Rajiv Gandhi Science and Technology Commission of the Government of Maharashtra and would be implemented jointly by HBCSE, Maharashtra Knowledge Corporation Limited (MKCL) and the Indian Consortium for Educational Transformation (I-CONSENT). The project aims at developing suitable resources taking into account the needs and requirements of the system and make it available through the MKCL website. Over the past decade MKCL has developed a brand of distributed classrooms that make the website data available to the customers for a small charge. They would download the information (in the form of PowerPoint, video clips or lecture notes) and make it available to the teachers. Teachers in turn are expected to use the material and provide us feedback. They can even access the website and modify the content based on their classroom experiences. Based on the feedback received from the end-users appropriate modifications will be made in the material.

The material is being prepared for all the three stakeholders: Teachers, Parents and Students. As the teacher plays a crucial role in shaping the attitude of students towards school education, teacher material will have guidelines for performing different activities, PowerPoint presentations to help teaching of abstract scientific concepts, projects to be assigned to the students and other useful teaching resource. The website will also provide a platform for exchange of ideas and experiences among the teachers. Such a platform is expected to give them immediate feedback and establish academically useful peer interaction in the teaching community. Since a large number of parents in India take great interest in the education of their wards the website material is being planned for the enthusiastic parents. The third and the most important stakeholder of the programme is school child. Digital material is being developed to support his/her school learning. A variety of formats like story telling, skits, lecture demonstrations, projects, etc. are being planned in this regard.

For each of the stakeholders there would be three types of spaces: Information space, Interaction space and Creation space. Information space contains information in the form of facts, concepts/meaning, procedures/experiments, theories/principles and development/impact, etc. This space at different levels also contains information about the media used and the performance assessment measures undertaken in learning. Interaction space provides for action oriented learning achieved through individual or group efforts. The creation space provides for various types of approaches and methods for assessing developmental and creative activities such as projects, services, innovations, etc. There is also a provision for learning tools and techniques for all the three stakeholders.

The website also aims at developing a question answer forum for the entire stakeholders with a focus on the questions raised by the students. A child will be encouraged to send his/her question through email which would be answered by the experts in the field. The answer would then be stored in the 'Why Files' of the website for the use by a large number of students and teachers. Anyone who reads the answer is free to modify it as per his/her interest and background. In fact, the project aims at making all the stakeholders (teachers, student, parents and researchers) equal partners in the development and implementation these resources.

Material Development

Development of relevant material is a crucial task in the project. It is done at various levels. Description of the steps followed in the development, quality assurance, tagging, uploading and field testing might be relevant here.

a. Organization of workshop

Organization of workshops is one of mechanisms followed to generate new resources. Eleven workshops have been so far organized to develop resources in science and mathematics suitable for primary, upper primary and secondary level of schooling and for editing and development of reusable learning objects. The participants for the workshops were drawn from practicing teachers, teacher educators, parents and subject experts. More than 500 participants are connected in this process. A good networking is formed among these resource persons.

b. Content Creation

The creations of relevant materials in vernacular language, preparation of syllabus, different formats for content development and forming experts team for quality assurance was the crucial things for the first year. But from last two years through workshops mode we have created more than 3000 modules in vernacular language. As stated above this material envisages fulfilling the requirements of teachers, students and parents. Content for teacher includes Content enrichment and conceptual clarification, guidelines for teaching and for performing experiments, teaching aids to explain abstract scientific/mathematical concepts, tools/techniques including management and assessment techniques and suggestions and topics for action research. Material for student consists of content enrichment, puzzles, games and activities to support school education, answers to questions posed by the students, anecdotes from the lives of scientists and mathematicians, simple experiments and projects and quiz/questionnaires for self assessment. The parents section has material related to everyday science and mathematics, developing quantification skills, support in problem solving, new ideas in teaching and learning, educational projects, out of school activities to support school and mathematics, identification and nurturance of talent in science and mathematics, health and hygiene and parenthood in 21st century.

c. Reusable Learning Object

Majority of the units prepared are in the form of Non Learning Object (NLO). Nevertheless, realizing the importance of Reusable Learning Objects (RLO) in the teaching learning process it was thought appropriate to make efforts to develop some sample RLOs through a workshop. The term Learning Object means small units that can be handled by the learners easily. Even though small in size, they are self contained and independent. One more quality that is attributed to LOs is its reusability. Taking these criteria in mind LOs are often called Reusable Learning Units (RLU). There are various definitions of the term Learning Objects (LOs). For the purpose of this discussion let us use the definition given by Chappe et al (2007).

A five day workshop was organized with the sole purpose of designing learning objects in science, social science, geography and environment at the secondary level of schooling. Subject experts, practicing teachers and teacher educators from these areas were invited. The first task was to explain the concept of Learning Objects as applicable to school subjects. The point was illustrated through sample examples. They were given framework for designing learning objects for a students, teachers and well as for parents. To begin with all the participants got engaged in developing a blue print of the syllabus and then undertake the task if developing learning objects.

The confluence software was used for the purpose of development. The participants had to be exposed to this software with adequate practice to master it. Almost two days of the workshop were spent in this familiarization task and in the preparation of blueprints for different subjects. On the third day the participants were divided in small groups and were asked to design RLOs in the field of their specialization. Half cooked RLOs were discussed to get the feedback and to clarify the concept. Through this mechanism about two dozen RLO were designed during the workshop. Although the work during the workshop was slow the participants could continue their work later and submit to HBCSE at their convenience.

d. Quality Standards & Quality Assurance System

Quality assurance methods are strictly applied on the material produced during workshops. After receiving the material from workshop it is typed in the textual format with Unicode fonts. Grammatical and typographic corrections are to be made by the copy editors / in-house team. Typed copy is checked for accuracy with original version. Leader of the In-house editing team judges whether the article is worth undertaking for editing task. After due editing the unit is published as OER in appropriate box of the website.

 While editing the care is taken to ensure that the content is accurate and unambiguous, Illustrations used are appropriate and relevant, Activities and questions are given to use the tools and techniques appropriately, Sequencing of the points is proper and supports logical and rational presentation, Pictures, diagrams, sketches are used where necessary and contributes to better learning. Language also forms an important criterion in quality assurance. It is ensured that the language is simple and direct appropriate for the stage, correct communication language appropriate to the subject is used, metaphors use are suitable and does not convey inaccurate or wrong message and memory peg is used to help remembering of learning material.

Opportunities and Challenges

E-learning as stated by Zemsky and Massey (2005) has a tremendous potential. The present web based programme offers a large number of opportunities to cater to the needs of practicing teachers teaching in remote areas. It will enable to make available innovative material developed by different organizations working for the improvement of school education. It would hopefully bring in qualitative changes in the classroom interaction in rural as well as in urban schools. Nevertheless, the project poses many challenges. Firstly, the teachers and parents are not psychologically prepared to receive inputs offered through the modern technology. Developing appropriate technological literacy among the stakeholders would be the biggest challenge. Yet another challenge is to develop appropriate material for teachers, parents and students in vernacular language. Some relevant material exists on different websites. This material is being screened and adopted for schools in India. Many research and educational institutions have brought out a lot of useful material in print form. These resources need to be suitably converted into digital form so that they can be uploaded to the website. Moreover, new and relevant resources are to be developed taking into account the needs and requirements of Indian school system. Attempts are being made in this direction at different levels.

Next steps

In the next phase of work, we propose to focus on building a sustainable infrastructure to support OER and on demonstrating how OER can help transform teaching and learning at school level. To demonstrate OER's capacity to transform teaching and learning at school level, we are planning a pilot project in one of the districts of the state of Maharashtra. The pilot demonstrations, hopefully, will harness the power of the Web to engage, motivate, and stimulate learning in ways unique to open online environments.

Conclusions

The importance of OER in teaching learning process in developing countries is being realized slowly (Lujara, 2007). In India too distance mode of education has come to stay (Sharma, 2005). Its potential is also being explored in the country. Internet facility is being expanded to cater even to rural areas. As the people (students, teachers and parents) get familiarized with the new technology they would demand more and more digital material. It is, therefore, all the more necessary that the suitable tested material is made available to all the stakeholders of school education. The programme described in the paper is a step forward in this direction. It is expected that the large number of OERs in vernacular languages will be developed through the workshop, uploaded to the website and feedback from students, teachers, teacher educators and expert is obtained. Based on the feedback received OERs will be modified appropriately. It is supposed to be the ongoing activity where development, quality assurance and modifications are done continuously.

An Appeal

The work envisaged in the proposed project is of gigantic nature. It needs the cooperation of people in content, pedagogy, technology as well as in assessment. It is basically a collaborative activity on the lines of free software movement. It will bear fruits only if people with different expertise come together to develop, test and modify the material. The process is expected to be an ongoing activity where the developmental work continues for ever. We take this opportunity to appeal all the academicians present in this gathering to extend their cooperation to this noble cause.

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