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REVIEW ARTICLE

Role of Information and Communication Technology (ICT) Kitand Rubricsin Mathematics

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ABSTRACT
The role of ICT in mathematics curriculum much more than simply a passing trend and it is envisaged not simply as a technical skill or as a means of improving learning effectiveness but also as a way of transforming the goals and the processes of education. It provides a real opportunity for teachers of all stages and subjects to rethink fundamental pedagogical issues alongside the approaches to learning that students need to apply in classrooms.ICT Kit in mathematics describes a design of a source for teacher's professional development in mathematics as well as rubrics based continuous and comprehensive evaluation tool.
Key words- Information communication Technology, Kit, Rubric, Mathematics

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INTRODUCTION

We believe that use of ICT foregrounds the ways in which teachers can match in school the opportunities for learning provided in home and child's other surroundings. In fact, there is increasing evidence that young people who have always been surrounded by and interacted continuously with ICT develop a different approach to learning and knowledge management from students who have not opportunity. Therefore, the integration of ICT is believed to be very crucial for the welfare and well-being of our future generation.

In educational reforms the teacher is the last but most crucial chain. However, when considering ICT related innovations in education we cannot conceive teachers as isolated actors. Teachers follow routines that they have learnt during pre-service training and on the job, they are required to implement curricular objectives and contents that quite often are formally established, they work within the constraints of the school organization having fixed timetables etc. Innovations that require teachers to change many aspects of their daily routines are very demanding for them. Complex innovations can only be successful if a number of interacting conditions are met.

It is believed that when students learn with technology, they may use it as a cognitive tool that helps them to construct meaning based on their prior knowledge and conceptual framework. Also, the growth rate of Web users and developers has increased exponentially.

Publishers, curriculum specialists, mathematicians, teachers and students have placed a great deal of mathematics and mathematics related information and activities on the Web. There is a need to consolidate these applications so that students can access a greater range of learning opportunities and teachers can have a stronger sense of the technology's utility and connection to learning outcomes. Also technology enhances learning opportunities because it can efficiently support graphing, visualizing and computing. Moreover, the technology is used as a medium to provide resources and learning situations that would otherwise be unrealistic or impossible to create.

Keeping in view this visionary attitude, this article focuses on following broad objectives-

1- How to design and develop e-content using different subject-specific open source software on various concepts of Mathematics as digital-interactive content.

2- How to develop rubric based continuous and comprehensive evaluation system on process evaluation.

Digital Technologies and Mathematics Education-

The mathematics education community is engaged in a constant quest to find out how children best learn mathematics. Due to coherence property, mathematics is an enormous and constantly expanding network of interrelated facts and ideas like the field of cognitive development and the psychology of learning. A large proportion of teachers these days try to base much of their teaching practice on constructivist ideas-that is, on the belief that the teacher's role is to create opportunities for children to build their own understanding of the concepts. However, if only we could discover precisely how the child best learns mathematics then we could work out exactly how to teach the child the subject in the most effective way. Many would say that this is an impossible dream. We can never achieve ultimate professional enlightenment, not only because every child and every teacher is different, but because the social and culture contexts keep changing. The impact of advances in science and technology cannot be underestimated.

Even though technology can influence what is taught, teachers needto be mindful of designing instruction and environment that promote these content and learning framework. In fact, technology supports learning requirements when it is used as a tool for processing the concepts with investigations and problem-solving. Digital technologies can be seen as catalysts for a paradigm shift. Since printed material and books became readily accessible, education has experienced a gradual shift away from the idea that their successes relies on the student's capacity to memorie and accurately recall large amounts of information. Instead, greater emphasis has been placed on developing research and problem-solving skills. In recent years, with emerging information and communication technologies (ICTs), the pressure has rapidly mounted to shift our views on effective teaching and learning even further. Emphasis is now placed on equipping students with effective 'inquiry skills' including the ability to find and process new information using digital technologies. Many educators are now seeing digital technologies, with their interconnectedness, as environments, rather than just tools, for learning and teaching. The difference between these two perspectives is significant, the former requiring a fundamental change in teaching practice for many teachers.

Continuous Professional Development through ICT Kit-

The ICT Kit will be about supporting quality teaching in mathematics. Our intent with the ICT Kit is to provide design of a tool for teachers as they seek to improve their effectiveness in delivering high quality, productive learning experiences for all students.

We will define tools and techniques in the ICT Kit for practical and user-friendly support for effective teaching. Regardless of how effective any more one of use might be in our teaching, we can continue to grow and improve. The ICT Kit will be aimed at continual improvement and sustaining quality teaching as well as for the beginners it will be designed to help identify areas for performance improvement, and to focus support for the important and ongoing process of development. With ICT Kit in mathematics, our ultimate goal is to improve the educational experiences and achievement of the students we serve in our schools by focusing directly on teacher effectiveness. The focus is for pedagogical enhancement, technological empowerment of users along with implementing a rubric-based effective evaluation system. The most important point to make about the use of ICT is that it cannot and should not replace the teacher. Excellent teaching and effective learning can only occur when a good teacher is present. The key lies in how the technology is used and employed, not in the teaching of the technology itself.

In order to enhance the quality resources and its availability to a teacher of mathematics, following points should be met by effective use of ICT:

1- It should integrate easily into the teacher's daily work.
2- Increase interest for learning and making it a fun for those who find the concepts tough by providing innovative presentations of content.

Working of the ICT Kit-

Teaching is being viewed as a process of facilitating student's learning by creating a learning environment conducive to enquiry. This necessitates the teachers to upgrade and reorient themselves. Though every teacher has her own style, here comprehensive technology exposures alone with how to design digital content resources with pedagogical approaches and evaluation mechanism through ICT is to be successfully incorporated into any lesson then there are some fundamental issues that need to be tackled at a very early stage. The subsequent success of the lesson depends upon that. Employing ICT as a part of a mathematics lesson is not difficult, but it adds another dimension and the place and purpose of it need careful consideration.

Planning the ICT Lesson-

So what does mathematics lesson where ICT is to be used look like? Much of it will be familiar, containing as it does all of the key features that one would expect in a plan for a mathematics lesson. This is detailed below-

1- Selecting an appropriate topic: Why has a particular mathematics topic been chosen?
2- Key learning objectives: What are the intended learning outcomes as a result of the lesson?
3- The content of the lesson: What exactly is to be taught?
4- Details of any prior learning: The starting point may often be the children's previous experiences.
5- Teaching methodology to be used: Particularly crucial, whenever ICT is involved.
6- Key teaching points: What are you actually going to teach the students? What are you going to say to them? What are you going to ask them so as to ensure that they learn what you want them to learn?
7- The foci for assessment: How are you going to assess what you hope the children have learned? What do you think they will have learned? What are the intended learning outcomes?
8- Cross-curricular links: Are there any clear and relevant connections to other areas of the curriculum?
9- Follow-up work: Where does this lesson fit into an overall sequence of work?
10- Resources: What hardware or software is to be used?

On the basis of above exhaustive features, following design for our template may be selected to develop a mathematics lesson:

1- Learning objectives
2- Introduction of a topic
3- Some thought-provoking questions
4- Flow of chapter
5- Examples
6- Hands on activities
7- Daily life applications
8- Extension activities
9- External Web resources for the content
10- Time management tricks for teachers
11- Suggestive reading
12- Thought provoking questions that lead students to do some kind of exploration

Introduction of Rubrics-

At its most basic, a rubric is a scoring tool that lays out the specific expectations for an assignment. Rubrics divide an assignment into its component parts and provide a detailed description of what constitutes acceptable or unacceptable levels of performance for each of those parts. Rubrics can be used for grading a large variety of assignments and tasks: Project evaluation, discussion, participation, laboratory reports, portfolios, group work, oral presentations and more.

Parts of Rubric-

Rubrics are composed of four basic parts in which the teacher sets out the parameters of the assignments. The parties and processes involved in making a rubric can and should vary tremendously, but the basic format remains the same. In its simplest form, the rubric includes a task description a scale of some sort, dimensions of the assignment, description of what constitutes each level of performance all set out on a grid.

Part-to-part development of a Rubric-

Task Description-

The task description is almost always originally framed by the teacher and involved a performance of some sort by the student. The task can take the form of a specific assignment, such as a project, an activity, or a presentation.

Parts of Scale-

The scale describes how well or poorly any given task has been performed and occupies yet another side of the grid to complete the rubric's evaluative goal. Terms used to describe the level of performance should be tactful but clear. Here are complied some common used labels-

1- Sophisticated, competent, partly competent not yet competent.
2- Exemplary, proficient, marginal, unacceptable.
3- Advanced, intermediate high, intermediate, novice.
4- Distinguished, proficient, intermediate, novice.
5- Accomplished, average, developing, beginning.

Dimensions of the Rubric

The dimensions of a rubric lay out the parts of the task simply and completely. A rubric can also clarify for students how their task can be broken down into components and which of those components are most important. Is it calculation? The analysis? The factual content? The process techniques? And how much weight is given to each of these aspects of the assignments? Adding points or percentages to each dimension emphasizes the relative importance of each aspect of the task. Dimensions should actually represent the type of component skills students must combine in a successful work, such as the need for a firm grasp of content, technique, citation, example, analysis etc. When well done, the dimensions of a rubric will not only outline this component skill, but after the work is graded, should provide a quick overview of the student's strengths and weaknesses in each dimension.

Breaking up the assignment into its distinct dimensions leads to a kind of task analysis with the components of the task clearly identified. Both students and teachers find this useful. It tells the students much more than a mere task assignment or a grade reflecting only the finished product, Together with good descriptions, the dimensions of a rubric provide detailed feedback on specific parts of the assignment and how well or poorly those were carried out.

DESCRIPTION OF THE DIMENSIONS

Dimensions alone are-encompassing categories, so for each of the dimensions, a rubric should also contain at the very least a description of the highest level of performance in that dimension. A rubric that contains only the description of the highest level of performance is called a scoring guide rubric. Scoring guide rubric allows for greater flexibility and the personal touch, but the need to explain in writing where the student has failed to meet the highest levels of performance does increase the time it takes to grade using scoring guide rubrics.

On the basis of learning objective of modules several task may be identified. For each task towards the dimensions knowledge/understanding., geometrical skill, analytical skill and application-performance anchors have been described in the form of rubric related to the task. Sufficient number of mathematical illustration would also be providing for the effective utilization of these various task-based rubrics. Rubrics not only save time in the long run, but they are also a valuable pedagogical tool because they make us more aware of our individual teaching styles and methods, allow us to impart more clearly our intentions and expectations and provide timely, informative feedback to our students.

In fact, rubrics will make grading easier and faster in several ways-

1- Establishing performance anchors
2- Providing detailed, formative feedback
3- Supporting individualized, flexible, formative feedback
4- Conveying summative feedback.

These four ways are generally chronological in nature. Establishing performance anchors will help us get started more quickly and also more fairly. Three-to-five rubrics allows us to provide detailed, informative feedback very rapidly by simply checking and circling prewritten criteria, whereas scoring guide rubrics allow us to do the same thing more flexibly and in a more individualized fashion, at the cost of speed. Finally, by conveying summative feedback in an easy to read, almost graphic fashion, rubrics will enable us to assign grades more rapidly and defend them more easily.

CONCLUSION

The characteristics of digital technology provide potentially powerful learning and assessment tools, but in schools it's the teacher who creates the learning environment that either unleashes this potential or inhibits it. Teacher can create learning environments likely to maximize the educational benefits of using digital technologies. These learning environments exist, at least partially, within the technologies themselves.Rubrics will enable us to assign grades more rapidly and defend them more easily. Finally we can say that role of ICT kit and rubrics in mathematics are very important.

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