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### Using digital tools to animate the classroom



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*Special Arrangement*

As children move from concrete to abstract concepts in learning, educators are constantly experimenting with ways to make the subject more 'real' for children.

With innovations in technology, educators have been exploring possibilities of using simulations for science and graphic calculators for mathematics, to bring alive and animate certain phenomenon or concepts.

### Abstract to real

For example, in the traditional frameworks of school algebra, symbolic algebra is emphasised and the concepts are studied in isolation from other representations, making it abstract and difficult to understand. Now, educators are beginning to use a 'function-based' approach to conceptualise algebra. This involves interconnecting multiple representations (graphical, symbolic, numerical or tabular), graphing and mathematical modelling. Geogebra (<http://www.geogebra.org>) is one such interactive computer aided mathematical tool that connects geometry, algebra, statistics and calculus. With this, animations can be made to visually simulate understanding of mathematical concepts.

### Simulating eclipses

Similarly, Stellarium and Kstars are two free applications that are desktop planetariums. Using these tools, the teacher can simulate the lunar and solar eclipses and other astronomical phenomenon.

KGeography helps study different political maps of the world, while Marble is a desktop globe that enables teachers to explain latitudes and longitudes, day-night phenomenon and time zones.

STEP is an interactive tool for Physics, which can be used for simulating complex interactions in mechanics. KTechLab is a software that helps to make different types of circuits and conduct experiments.

While there is no substitute for hands-on experimenting in science, one can use these tools as a second option to help reinforce certain concepts.

### Free resources

Mathematics, science and social science teachers working in government school across the State have been learning to use these tools.

What is significant here is that teachers have been able to create their own digital teaching-learning resources, which are free to share and modify, rather than use the handed down non-modifiable material.

Most information and communication technologies (ICT) programmes in schools tend to consist of providing ready resources to teachers to use in their teaching, which is a behaviourist model of learning, similar to the traditional 'textbook' culture. The real power of ICTs in teaching-learning is in enabling teachers to use it as a tool to create resources, which is a constructivist approach to teaching-learning, emphasised in our National Curriculum Framework 2005.

All the tools mentioned above are free and open source software, hence can be freely customised and enhanced. For example, enhancements are happening at a rapid pace in Geogebra and sophisticated manipulation of three-dimensional geometry is being released. This creates a rich universe of collaborative creation.

In fact, a government school teacher, Manjula S., from GMPS Yediyur, Bangalore, in just an hour, created a video resource simulating the lunar eclipse (<http://rmsa.karnatakaeducation.org.in>). She was able to use free software tools Open Office Presentation, Record My Desktop (to make a video recording of her desktop) and Stellarium to create her own resources and share them with teachers across Karnataka.

Computers are now common in urban and 'elite' schools and soon all government high schools in the State will also be so equipped, thanks to the ICT@Schools programme. However, usage is limited to acquiring basic digital literacy skills and accessing and downloading information.

ICT tools, when used effectively in schools, gives opportunities for the teachers to self-learn and build on their subject knowledge. Eventually it provides the students a new context for engaging with each of these subjects.

*(The author works with Public Software Centre (<http://public-software.in>), IT for Change, which has conducted workshops on Geogebra for government school mathematics teachers across Karnataka. Resources created by these teachers are available on their resource portal for teachers and teacher-educators <http://rmsa.KarnatakaEducation.org.in>)*

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