Highlight: Game-based learning
The place of computer games in education – Potential and possible repercussions
This article explores recent notable literatures on potentials of game-based educations. All over the world, educators would be more than delighted if they could also engage their students in the same way the games engage them and help them to achieve in school. Such excitement and engagement among students playing computer games bear considerable potential for education.

Learning is fun: Play to learn with game-based learning
The Information Technology Service Center, Chiang Mai University (CMU) has designed and developed online game-based learning to enhance learning through learners’ interaction with games under the principle notion that “Learning is Fun.” Learners who access the CMU online game-based learning will not only gain understanding of the learning content, but will also simultaneously develop other skills, including communication skills.

News & Events
It’s a matter of HOWs: Participants reflection from PBL workshop
A participant talks about her experience at a workshop on Project Based Learning and Tele-collaboration, organized by Institut Pendidikan Guru, Kampus Tun Hussein Onn (IPTHO) in collaboration with UNESCO Bangkok and held 7-10 May in Johor, Malaysia.

UNESCO leads discussion on mobile learning at WSIS Forum

New UNESCO training to meet future challenges in education sector planning
A new distance training programme on education sector planning was launched simultaneously in Thailand, Indonesia and Vietnam on Wednesday 6 June 2012. The Thai launch took place at Chulalongkorn University in Bangkok, Thailand.

ICT in Education Leadership Forum in the Pacific
“Exposure to ICT for teachers is not necessarily the best focus but more so the promotion of excellence in teaching and ICTs should not only be seen as an enabler of learning outcomes but also an enabler of educational reform.” This was the key message highlighted in the keynote address during the opening of the ICT in Education Leadership Forum in the Pacific at the Microsoft Office in Sydney, Australia from 30 April to 2 May, 2012.

The future of (open) education with Sir John Daniel
Eight years after he left his position as Assistant Director General of UNESCO, Sir John Daniel visited UNESCO Bangkok to present on the concept of open education, the persistent
challenges, achievements made and implications for the future of education, particularly in the context of discussion on the post-2015 international development agenda and post EFA.

**eLearning Africa report shows ICTs transform education**
Max Ahouéké, Minister of Communication and Information and Communication Technologies of Benin, presented the results of the eLearning Africa Report, which shows the impact of new technology and improved connectivity on education throughout Africa.

**Young innovators competition - your innovation on a world stage**
ITU, the leading United Nations agency for information and communication technology is looking for the next generation of young visionaries for its Young Innovators Competition.

**Programmes & Projects**
**ABCs and ICTs: Delivering scale and value with a whole class learning solution**
In partnership with USAID/Senegal and Columbia University’s Earth Institute, CyberSmart Africa has introduced a whole-class learning solution that integrates the use of a specially adapted interactive whiteboard directly into classroom instruction.

**Resources**
**New UNESCO paper on mobile learning: Global themes**
Over the past several weeks UNESCO has been publishing individual titles in its Working Paper Series on Mobile Learning. Recently the Organization concluded the first phase of the Series by releasing two Global Themes papers that synthesize information contained in the regional papers to identify salient trends that cut across geographic boundaries.

**EnerCities, a serious game to stimulate sustainability and energy conservation: Preliminary results**
This paper presents some preliminary evaluation results of a serious game developed to increase awareness and attitudes relating to energy use in the household, in a number of European countries.

**Game on: Increasing learning through online games**
This website is dedicated to educational games across subjects studied in (American) schools. These games, the majority of which are free, can be used as supplemental resources for teachers. A brief description and link is provided for each game.

**Welcome to enquiring minds**
At a time of curriculum reform in primary and secondary schools, Enquiring Minds provides guidance and research to help support schools through the process of change. It shows how schools can develop enquiry-based approaches to the curriculum, teaching, and learning.

**Help for mathematics!**
Free Math Help provides free online math lessons, such as Algebra, Calculus, and Trigonometry. It offers lessons in form of text, video, links to other related sites, and online message discussion board where volunteers may assist those who are stuck in a math problem.

---

**Highlight**

*Learning is fun: Play to learn with game-based learning*

*By Assoc. Prof. Thanomporn Laohajaratsang, Ph.D., Director, Information Technology Service Center, Chiang Mai University*

Today’s students are different from the past. They are living in the digital world where technology is easily accessible. Working with information in the digital world is an essential skill, and computer-based learning has become more important than ever. For the contemporary student, learning does not always mean a formal situation in which acquiring knowledge from teachers directly is the only approach available, and learning approaches that worked well with students in the past do not necessarily work as well with the “digital native” students of today. Several attempts have been – and are being – made by educators to seek for a new learning approach suitable to the new information-rich digital environment.

The Information Technology Service Center, Chiang Mai University (CMU) has designed and developed online Game-Based Learning to enhance learning through learners’ interaction with games under the principle notion that “Learning is Fun.” Learners who access the CMU online Game-Based Learning will not only gain understanding of the learning content, but will also simultaneously develop other skills, including communication skills.

*“Eurasia”*

*Eurasia* is an online game for young students that allows synchronous interaction for several players. “Eurasia” blends content derived from four primary-level learning subjects: 1) science, 2) Thai Language, 3) social studies, and 4) occupational foundation and technology. The design of *Eurasia* is based on the conceptual framework of goals, rules, competition, challenge, fantasy, curiosity, and entertainment. The major goal of the game is to accomplish all the assigned missions by trying to answer questions based on interaction with the game’s characters. The game is fun; players enjoy collecting rewards along the way when they solve various types of problems from different learning subjects. *Eurasia* has already become a popular game for Thai learners at the primary level in Thailand.

*Eternal Story*
Eternal Story is a visually captivating 3D interactive online Massive Multiplayer Online Role Playing Game (MMORPG). The educational content offered in the game is a reengineered version of the popular Fundamental English course which has been used with Thai students throughout the Kingdom for many years. The design of Eternal Story is based on the conceptual frameworks of Keller’s ARCS (Attention, Relevance, Confidence and Satisfaction) model. Learners take the roles of warriors, completing assigned tasks via interaction with non-player characters. The fun is derived from traveling through the beautifully-designed fairy tale world and gathering rewards along the way by destroying monsters. CMU freshmen are now enjoying Eternal Story as a part of their English learning experience each year. Eternal Story is considered the first and only language learning tool of its kind in Thailand, and it won the Best Serious Game DMA Award 2010 from the Venture Capital Forum Asia 2010 because of its great potential to form an integral part of student language learning in the future.

In sum, Game-Based Learning is an alternative method of learning for today’s students, and a complement to traditional learning models. This is because it not only makes learning fun by employing the concept of “edutainment”, but also it promotes learner participation and provides them with control over their learning.

For more information on Eurasia and Eternal Story, please visit [http://itscgames.cmu.ac.th](http://itscgames.cmu.ac.th)

**Further information:**

- [ITSC Educational Games](http://itscgames.cmu.ac.th)
- [Information Technology Service Center Chiang Mai University](http://itscgames.cmu.ac.th)

**Related links:**

- [Interactivate - exploration in science and mathematics](http://www.interactivate.org)
- [Fast Car: Travelling safely around the world](http://www.fastcar.com)
- [A 3D NASA exploration game](http://www.nasa.gov)
- [Practical use of animations in teacher training](http://www.animationineducation.org)
- [Discovery education: Turfmutt](http://www.turfmutt.com)
- [UNESCO launches first computer game for young people on HIV and AIDS](http://www.unesco.org)
- [Immune attack: Biology class in videogame form](http://www.immuneattack.com)
- [Animated Science](http://www.animatedscience.com)
- [NASA World Wind](http://www.nasa.gov/worldwind)

**Previous issues of the e-newsletter:**
The place of computer games in education – Potential and possible repercussions

By Lee Yong TAY¹

Computer games in educational setting
Over the past decade, computer games have become areas of research interest in education. The main attraction in conducting research in this is that educators could adopt the concepts and ideas in game design to engage learners, especially school going students. It is hoped that learners could be captivated in the same way that computer and online games have done. Many students spend considerable amount of time and, at times, money understanding and exploring these games. All these seem rather effortless and even natural from the gamers’ point of view. All over the world, educators would be more than delighted if they could also engage their students in the same way the games engage them and help them to achieve in school. Such excitement and engagement among students playing computer games bear considerable potential for education (Gee, 2004).

Literature review
Literature on the use of computer games in education seems to suggest that computer games could be used to better enhance and facilitate learning amongst students (Jenkins, Klopfer, Squire, & Tan, 2003). Computer games create environments that stimulate learners to become absorbed in a fantasy world which can help motivate and engage them in activities (Malone & Lepper, 1987). There are also various studies that look into how computer games design can be applied in the learning of content areas in the classrooms (Amory, Naicker, Vincent, & Adams, 1999; Dickey, 2005; Gee, 2003).

Some initial concerns
Initially, there were concerns with the introduction of computer games into the school setting.

¹ Beacon Primary School, Singapore
Email: tay_lee_yong@moe.edu.sg (Any inquires to this article should be directly sent to the author)
There were some worries that computer games could only be used to motivate and engage male but alienate female students (Ellis, Heppell, Kirriemuir, Krotoski & McFarlane, 2006). However Bryce and Rutter (2005), Carr (2005), and Cassell and Jenkins (2000) counter proposed that female students’ engagement with computer games depends on how the games were being designed and that gender alone was not a reliable predictor of gaming habits.

Dickey (2006) further suggests that the influx of girl gamers and the emergence of female-oriented game design can be used to inform educators about the design of interactive learning environments.

**Issues & challenges – technical, structural & cultural**

More importantly, Egenfeldt-Nielsen (2004), Muehrer, Jenson, Friedberg and Husain (2012), Lim (2008) and Tuzun (2007) caution and highlight possible implementation issues and challenges of introducing computer games into the school setting. These issues and challenges could be technical (e.g., lack of technical resources); structural – (e.g., lack of professional learning opportunities); and cultural – (e.g., teachers’ perceptions of teaching and technologies (Lim, 2008). Although the use of computer games into schools has been around for some, many of the issues and challenges mentioned by the above authors still persist.

To elaborate, technical consideration remains one of the many challenges, many studies have confirmed that there is still relatively little use of technologies for teaching and learning as accessibility still presents a major challenge to most schools. A recent study by Muehrer, Jenson, Friedberg and Husain (2012) notes that the most overwhelming obstacle to successful gaming sessions at every site is the unavailability of technology, be it due to slow Internet connection or faulty computers. Limited access leads to limited use, resulting in limited impact (Tay, Nair and Lim 2010). The availability of technological set ups are essential and a necessary condition to the successful introduction of computer games and ICT integration in schools.

For structural issues and challenges, it is necessary to provide relevant professional development opportunities to teachers so that they could have a better understanding and skills to use the computer games for teaching and learning. Researchers have listed “teachers’ beliefs and practices” as one of the key factors affecting successful integration of technology into the classrooms (Ertmer, 2005). While basic teaching skills and knowledge remain important, in the new gaming learning environment appropriate pedagogy should also be ensured. All these would require various forms of professional development efforts to bring teachers’ pedagogical practices to match this educational innovation. A good teacher is probably worth more than a computer with a lousy teacher. It is important to note that technologies are only tools; it is unlikely that technology in itself can improve ineffective teaching practices.
More importantly, the cultural issues need also to be considered. Games and play, and especially computer games, may not be well accepted in school settings where teaching and learning are often seen as “serious” matter and should not be associated with game play. School administrators and teachers need time and also a change in perspective to be able to embrace the use of computer games to engage students in their learning. Teachers have very often being identified as one of the most significant resources in the integration of technology into schools but they could also be one of the main barriers (Watson & Tinsley, 1995). The teacher’s attitude, knowledge, and skills in the use of games for the purpose of teaching and learning have a considerable impact on the outcomes to be achieved.

*Students’ readiness and engagement with content or game elements*

In addition to what has been mentioned above, there are two more points that deserve some considerations – students’ readiness and level/degree of engagement in a computer game-based learning environment.

Muehrer, Jenson, Friedberg and Husain (2012) raised the highly relevant issue of the level of readiness of the students in a technologically enriched learning environment and in this case a computer gaming environment. One would assume and expect the new generation of digital native learners not having any issues using technologies. But according to a report on students’ online digital technologies and performance by OECD (2009) nearly 17% of 15 year-olds who have grown up in this technological era do not have the skills to move easily through the digital environment – students could still encounter problems using technologies for studies, applying for jobs, filling out online forms for various purposes in the future.

Student engagement is one important topic that deserves more discussions and explorations. Learner engagement is critical to learning success but in order to understand engagement we also need to understand the role of emotions in learning. Fredricks, Blumenfeld and Paris (2004) take a psychological approach and describe three aspects of engagement – behavioural, emotional, and cognitive, and recommend that engagement be studied as a multifaceted construct. Although there are issues that make it difficult to draw firm conclusions, “there is evidence from a variety of studies to suggest that engagement positively influences achievement” (Fredricks, Blumenfeld and Paris 2004, p. 71). The results of the study presented by Muehrer, Jenson, Friedberg and Husain (2012) indicated that students were more interested in game-playing and progressing through the levels than in developing an in-depth understanding of the science concepts embedded in the games. These findings are congruent to an earlier study where students were attracted to the playing of games and not the academic content to be learned (see Tay and Lim 2008). Lepper and Chabay (1985) in a classic study on the use of games for teaching and learning, pointed out that the extra game-like elements could
be seen as likely to be distracting and to impair learning or make learning less optimal. In short, students might be engaged with the game elements rather than the content to be learned. Although computer games enhance and allow for greater levels of student engagement, these gaming elements could also be distractors to students’ learning of academic content. A balance between these perspectives is necessary to be more effective when computer games are used in school settings.

Conclusion and further considerations
The introduction of computer games into schools and educational institutions seems to be more complicated than what we have imagined initially. Adequate technological infrastructures (e.g., availability of Internet access, computing devices, technical support) are necessary conditions to support the use of computer games in the classrooms. Relevant professional development is also crucial so that teachers could better embrace the use and integration of computer games in their lessons. The acceptance of the use of computer games as a teaching or learning tool or media for teaching and learning by teachers and its institutions, that is, to be able to accept game play (and more specifically computer games) as an approach or pedagogy for serious school related work and studies. In addition, readiness of not only the teachers but also the students need some attention as it is very often misconstrued that students growing up as digital natives are ever ready to take on any forms of learning with the use of technology. Lastly and also probably the more appropriate question which requires further in-depth deliberations would be how computer games could engage our students either behaviourally, cognitively or emotionally in the way that facilitate their learning of school related content and work.

References


Tay and Lim 2008


Authors’ Biography
Lee Yong TAY is the Head of Department for Research and ICT in a primary school under the Future Schools at Singapore project (FutureSchools@Singapore) – a collaborative project by the local Ministry of Education and Infocomm Authority. He is currently a core member of the Teacher-Researcher Network of the Academy of Singapore Teachers. He obtained his PhD from Edith Cowan University, Western Australia. His research interests include – integration of ICT into the curriculum, use of ICT for higher-order thinking, use of computer games for teaching and learning, and the sustainability and scalability of ICT in school setting.

Further information:
- FutureSchools@Singapore
Related links:

- Interactivate - exploration in science and mathematics
- Fast Car: Travelling safely around the world
- A 3D NASA exploration game
- Practical use of animations in teacher training
- Discovery education: Turfmutt
- UNESCO launches first computer game for young people on HIV and AIDS
- Immune attack: Biology class in videogame form
- Animated Science
- NASA World Wind

Previous issues of the e-newsletter:

- UNESCO "ICT in Education" Announcement e-newsletter

What do you think about this topic?

- Visit our on-line forum and share your views

News & Events

It's a matter of HOWs: Participants reflection from PBL workshop

By Shamira Abu Dzarim with contributions by Wan Hasmiza Kamarrudin & Zailah Ribot

I was trained to teach English to secondary school students. When I was doing my first degree, I was introduced to the theory of cooperative and collaborative learning. I graduated with a very strong belief that ‘no man is an island’ and we, humans need to be connected to one another. Hence, the need of students to communicate with each other is essential during the teaching and learning process.

However, after two years of teaching in school, I realized that it requires a lot more than just theoretical knowledge to actually manage students in collaborative learning. No matter how much I like the students to work collaboratively there are a number of issues that I have to consider. For one thing, there will always be students who do nothing. Worse, group learning
can be very boring if the objectives and aims are not made clear to them. Thus, these glitches had impeded my intention in doing collaborative learning among my students.

On 7 May 2012, I was invited to a workshop on PBL organized by Institut Pendidikan Guru, Kampus Tun Hussein Onn (IPTHO) in collaboration with UNESCO Bangkok and funded by Korean-Funds-in-Trust. It was only then that I came across this pedagogical approach.

With the introduction of PBL in school, it would help the students to think out of the box. I must say it would be challenging and time-consuming but one can always say it is worth trying. I believe that PBL, together with the use of ICT, would attract their curious minds to learn more and more.

The course was very comprehensive where experienced PBL advocates discussed the theoretical background on PBL and provided guidance in its practical execution in real classroom settings. It was an eye-opener to us as most of the participants had the perception that PBL was supposed to be an ICT project. During the course, we learned that the PBL approach primarily assists the pupils to integrate the lesson they learned and that ICT is a tool, among many, that complements the tasks in PBL.

In this course, I was enlightened on how to design and develop a project that can optimize the learning of the students by considering various relevant aspects, building a realistic and measurable set of objectives, designing engaging activities, and using appropriate ICT tools.

A session with Ms. Zamimah Azaman of Tun Datu Tuanku Haji Bujang College helped us grasp the benefits and challenges in actually implementing PBL. We had set her PBL experience as the benchmark to initiate our own projects for our students. Since Ms. Zamimah’s project involved secondary school students, it made us ask ourselves whether our primary school pupils would be able to do the same thing. Fortunately, through the guidance of the UNESCO trainers and IPTHO mentors, we were able to outline and customize the draft of our intended projects to be practical and achievable by our pupils.

Some Malaysian teachers might say that PBL is just another acronym that has been introduced into our teachers’ dictionary or some may even think that it’s another burden on our shoulders. However, let us take a look at the role of a teacher in this 21st century. Teachers in modern classrooms are no longer lecturers. They are facilitators. Their main task is to set goals and organise the learning process accordingly. We train the students HOW to gain information, HOW to select them, and HOW to use them properly. The focus is no longer on WHATs, it is
now a matter of HOWs. PBL has the answer to these. It gives students opportunities to get involved in the dynamics of real world situations and challenges.

PBL will boost teachers’ creative and thinking skills whereby we can share experiences, improve social skills, exchange ideas, and develop leadership.

For me, the course has definitely opened a door to another dimension of teaching and learning process. Most of us tend to stick to the stand-and-lecture style of teaching because we think that we cannot possibly change the theme or the topics spelt out in the Curriculum Specifications provided. I had the same belief before, too. But I hope that after this course, I will be able to make a change in my classroom. I have pledged to provide students opportunities to explore, innovate, and experiment in my classrooms. I am now busy working on a project for my Form-4 students. I am not just able to cover the topics in the textbook but what is more important, I ensure that my students will experience “real” learning – and I hope that at the end of the lesson, they will be benefited by this project not just as students but also as human beings.

Contact: Shamira Bt Abu Dzarim, Smk (P) Te.Ibrahim School, myto_0306(at)yahoo.com

Further information:

- Facilitating Effective ICT-Pedagogy Integration Project

Related links:

- UNESCO Bangkok is kicking off the KFIT International School Project (KISP)
- Successful series of project based learning (PBL) and telecollaboration workshops continued in Bangladesh
- Project-Based Learning and Telecollaboration enhances teachers’ confidence in Bangladesh
- Connecting Classrooms
- UNESCO Bangkok supports Thailand’s second decade of education reform using project-based learning and ICT

---

2 Primary Year 4.
UNESCO leads discussion on mobile learning at WSIS Forum


The session focused on the opportunities and challenges that mobile and e-learning have brought to the conventional education system and the learners of different generations. Presentations covered mobile learning policy research by UNESCO, digital textbook strategies in South Korea, surveys of 1:1 netbook implementations in Europe, and the role of the private sector in scaling up mobile learning initiatives.
“Access to Information and Knowledge: Innovative Use of ICTs for Accessible Education” and “The relationship between Local Content, Internet development and Access Prices” were also among the sessions led by UNESCO.

UNESCO co-organized the event with the International Telecommunication Union (ITU), the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Development Programme (UNDP). It provided structured opportunities to network, learn and participate in multi-stakeholder discussions and consultations on WSIS implementation. The WSIS aims at building an inclusive Information Society and at addressing the issues raised by information and communication technologies (ICTs). The cluster of WSIS-related events is known as WSIS Forum.

Further information:

- [UNESCO leads discussion on mobile learning at WSIS Forum](#)

Related links:

- [Learning in a book-poor, mobile-rich world](#)
- [UNESCO and NOKIA held workshop on mobile technologies for teachers](#)
- [UNESCO joins hands with NOKIA for Mobile Education Program](#)
- [UNESCO Mobile Learning Week produces tangible results](#)
- [First UNESCO Mobile Learning Week](#)
- [Mobile learning and life skills](#)
- [Driving female literacy through connectivity in Pakistan](#)
- [From Illiteracy to mCommunity, Jokko Initiative Empowers Women with mLearning](#)
- [The impact of a mobile phone literacy program on educational outcomes](#)
- [Mobiles and internet improve the livelihoods of the poorest](#)
- [Africa: Mobile phones revolutionizing education](#)
- [Mobile learning: Transforming the delivery of education and training](#)
- [UNESCO to help community media with mobile content production](#)
- [Mobile phones make literacy real](#)
- [Mobile learning: Small devices, big Issues](#)

Previous issues of the e-newsletter:

- [UNESCO "ICT in Education” Announcement e-newsletter](#)
New UNESCO training to meet future challenges in education sector planning

A new distance training programme on education sector planning was launched simultaneously in Thailand, Indonesia and Vietnam on Wednesday 6 June 2012. The Thai launch took place at Chulalongkorn University in Bangkok, Thailand.

“In Education planning nowadays, the most notable change is change itself,” said Mr Gwang-Jo Kim, Director of UNESCO Bangkok, at the opening of the half-day panel discussion to mark the launch of the new training programme. Education sector management is facing new challenges such as jobless growth, student mobility, labour migration, advances in technology and climate change.

“This requires very careful educational planning, and we need to think about what kind of future we want to have. Educational planning is aiming to close the gap between now and the future,” said Mr Kim.

The training was developed by UNESCO’s International Institute for Educational Planning (IIEP) with financial support of the J.P. Morgan. Mr Khalil Mahshi, IIEP Director, addressed participants via a video message.

“Without educational management and planning, we will not meet the challenges ahead and the expectations towards educational decision makers,” Mr Mahshi said.

Ms Jean K. Sung, Executive Director & Manager, Global Philanthropy Asia-Pacific of J.P. Morgan Chase Foundation highlighted the importance of investing in human resource development.

“We have seen investments in human resources help lift countries out of poverty and steadily improve basic socio-economic indicators and social welfare. Strong, compelling evidence of this has occurred in recent decades in Thailand, Indonesia and Vietnam,” Ms Sung said.

The panel discussion focused on educational planning issues in Thailand. Panelists were Dr. Kunying Kasama Varavarn, former Permanent Secretary of Ministry of Education, and Dr. Yongyuth Chalamwong, Research Director at the Thailand Development Research Institute (TDRI).
Dr. Kasama said: “From my personal experience education starts long before the age of three. Children from a rich family tend to have a high language acquisition skill, whereas children from a poor family have a very low language acquisition skill. So, if we only focus on school and do nothing before they enter school, you’ll never be able to deal effectively with educational disparity.”

The panelists discussed issues, such as creating inclusive school environments, student performance, employability and lifelong learning.

“Education planners and policy makers should look at the employability aspect of graduates beyond the domestic boundary. Education should not be a preparation for life but should happen throughout life as lifelong learning,” said Dr. Yongyuth.

Closing the discussions, Dr. Pruet Siribanpitak, programme coordinator and Head of the Educational Administration Division, Faculty of Education, Chulalongkorn University, addressed the 22 course participants from the Thai Ministry of Education, different universities and other public institutions in Thailand.

Mr Siribanpitak said: “Because we face various changes, education can help to cope with these changes, and we hope that all of you become a new generation of educational planners. Some of you may be instructors of a new educational planner too.”

The new UNESCO distance training programme provides six modules to be learned over a time span of 11 months. The training offers a whole range of skills and techniques required for education sector planning.

Further information:

- New UNESCO training to meet future challenges in education sector planning

Related links:

- Innovative financing for education in Africa
- Education system profiles unveiled
- Launch of the NESPAP Open Platform eLibrary
- Directory of ICT for Development Training Institutions in the Asia-Pacific and Everyday ICT Terms for Policymakers and Government Officers
ICT in Education Leadership Forum in the Pacific

“Exposure to Information and Communications Technology (ICT) for teachers is not necessarily the best focus but more so the promotion of excellence in teaching and ICTs should not only be seen as an enabler of learning outcomes but also an enabler of educational reform.”

This was the key message highlighted in the keynote address given by the Minister of Education, News South Wales (NSW), Government of Australia, Mr Adrian Piccoli (MP) during the opening of the ICT in Education Leadership Forum in the Pacific at the Microsoft Office in Sydney, Australia from 30 April to 2 May, 2012.

A team from the University of the South Pacific (USP) led by the Vice-Chancellor and President of USP, Professor Rajesh Chandra, attended this forum. The Dean of the Faculty of Arts, Law and Education, Dr Akanisi Kedrayate, Acting Head of the School of Education, Dr Salanieta Bakalevu and the Centre for Flexible and Distance Learning representative, Ms Alanieta Lesuma-Fatiaki were also part of the USP team.

Participants at the forum included representatives from nine Commonwealth Pacific Island Countries (PICs). Among the participants were the Honourable Ministers of Education from Samoa and from Kiribati.

The forum was a joint initiative of the United Nations Educational, Scientific and Cultural Organization (UNESCO), the Commonwealth Secretariat, the Commonwealth of Learning (COL) and Microsoft, aimed at providing a platform for exchange and action on education transformation.

The objectives of the forum were to:

- Explore how ICT has been integrated into teaching and learning in the Pacific;
• Review the issues, challenges and initiatives related to ICT competencies for teachers in the Pacific;

• Introduce the UNESCO ICT Competency Framework for Teachers (CFT);

• Discuss teacher development approaches that make capacity building possible;

• Discuss where and how policies and practices in education need to respond to harness the potential of ICT in teacher development;

• Explore possibilities for further implementation/contextualisation of the UNESCO ICT CFT in the Pacific; and

• Engage multilaterals, donor agencies, NGOs, private sector on collaboration within the region to implement ICT in Education initiatives.

During the forum, presentations were made by Pacific regional representatives including USP, UNESCO-Pacific Office and the Secretariat of the Pacific Community on the current status of ICT in education in the region.

Professor Chandra made a presentation on ICT and its role at USP and the Pacific region. He was also a member of the panel discussion on issues in ICT in the Region. The donor presentations were focused on the importance of building teacher capacity in ICT in education. Best practices and case studies from the Caribbean region were also shared with the objective that they could possibly be re-contextualised for the Pacific region.

The presentations brought about engaging discussions amongst the delegates on experiences, challenges and opportunities of integrating ICT in education for the Pacific region. The discussions will be extended through an online forum to continue to discuss issues raised at the forum.

The forum also provided USP with the opportunity to share and create awareness of its role in ICT in the Region. It also provided an opportunity to discuss with COL the Open Education Resource (OER) that was developed by COL, known as the Commonwealth Certificate for Teachers’ ICT Integration (CCTI).

It was mutually agreed that the CCTI will be used by the School of Education as part of its offering to enhance the knowledge and skills of both pre-service and in-service teachers. COL has also agreed to send a consultant to assist SOE in implementing this programme.

One of the key documents discussed at the Forum was the UNESCO ICT Competency Framework for Teachers. A lot of lively discussions centred on the document and the way
forward in terms of its implementation.

It was discussed that the Regional ICT Framework for Teachers mandated by the leaders to be formulated jointly by USP and SPC was to be discussed at the Forum of Education Ministers’ Meeting (FEdMM) in Vanuatu. It was then generally agreed by regional participants that they would have to wait until endorsement was made at the FEdMM meeting. It was also pointed out that leaders were free to decide the development of ICT in Teacher education in their own countries.

Delegates were also briefed on the upcoming OER World Congress to be held at the UNESCO Headquarters in Paris, France from 20 - 22 June, 2012.

Source: University of the South Pacific

Further information:

- [ICT in Education Leadership Forum in the Pacific](#) (University of the South Pacific)

Related links:

- [Policy Forum for Asia and the Pacific: Policy and Practices in Open Educational Resources](#)

Previous issues of the e-newsletter:

- [UNESCO "ICT in Education" Announcement e-newsletter](#)

What do you think about this topic?

- [Visit our on-line forum and share your views](#)

The future of (open) education with Sir John Daniel

“Open education broke open the iron triangle of access, cost and quality that had constrained education throughout history and had created the insidious assumption, still prevalent today,
that in education you cannot have quality without exclusivity,” says Sir John Daniel, CEO of the Commonwealth of Learning.

Open education or open learning involves the policies and practices that permit entry to learning without barriers connected to age, gender, time constraints or prior learning. Arguably, the demand for open education has never been greater, particularly given the rapid development of ICTs and the ubiquitous spread of information through internet technologies.

The benefits of open education are clear; not only can it enhance the cost-effectiveness of education and training systems, it helps to reach target groups with limited access to conventional education and training, it promotes innovation and allows greater opportunity for lifelong learning. As institutions including the Open University (Britain) and Athabasca University (Canada) throw away entry requirements and engage in distance learning programs, one might consider the critical role of open education in achieving Education for All, and beyond this, in shaping the very future of education.

At the same time, many challenges need to be overcome, including persistent negative attitudes to e-learning and technological shortfalls which undermine the great potential of open education.

Eight years after he left his position as Assistant Director General of UNESCO, Sir John Daniel visited UNESCO Bangkok to present on the concept of open education, the persistent challenges, achievements made and implications for the future of education, particularly in the context of discussion on the post-2015 international development agenda and post EFA.

Sir John Daniel has been at the forefront of open education since its early days. He was studying in Paris during the 1968 student riots, which can be seen as a precursor to the ideals which initiated the development of open education. Later on, he aspired to become part of the new trend towards open education and joined the Quebec Open University. In 1990, he was appointed Vice-Chancellor of the Open University in the United Kingdom. In his current career, as President of the Commonwealth of Learning, he has been promoting learning for development, particularly through technology.

Throughout his career in education, he has been instrumental in the development of paradigms regarding open education, including his signature ‘iron triangle’ which explains the balance between costs, access and quality in the education system, and how when one increases, the other two factors are compromised. As Sir John explains, “Pack more students into the class and quality will be perceived to suffer. Improve quality by providing more learning materials or better teachers and the cost will go up. Cost cutting may endanger both access and quality.”

Having been part of the movement for so long, he has been witness to the development of the ideals which sustain open education. The ‘original’ Open University in the UK was founded on four key principles: being Open to People, Open to Places, Open to Methods and Open to Ideas. As the movement has grown, so have the ideals behind it. Empire State College even has an ‘open curriculum’ allowing students to design their own degree course. Open admissions and
distance learning have been widely adopted by universities around the globe. This successful formula has lead to the growth of ‘mega universities’ with other 100,000 students, particularly dominant in the Asia-Pacific region.

Technology has had an undeniable impact on open education, revolutionising the way in which it is implemented. It has, for instance, distorted the ‘Iron Triangle’; enter technology and there is no longer the same cost, access and quality constraints that may have existed previously. High quality education can be more easily accessed at lower costs. Open universities have been exploiting the benefits of technology for some time, including, for example, using technology to diffuse Open Education Resources to a wider audience.

Initially, there were concerns about the economic viability and thus sustainability of such an approach. Surprisingly, however, universities have found economic benefit since the resources do attract students to paid courses. Indeed, the UK Open University’s OpenLearn website now has 28 million users, and is the largest global player on iTunesU with 450,000 downloads per week. The scope of open learning now goes far beyond traditional degree courses. The Yashwantrao Chavan Maharashtra Open University, for example, has offered a programme for tuk-tuk drivers. Technology has also allowed open education to spread to secondary schooling. This development has not been without its problems, but as the demand for secondary education surges, open education at this level can dramatically increase access. For Sir John Daniel, “Expanding access to secondary education is now education’s biggest challenge.” Technology could well aid the response to this.

As Open Education becomes continues to spread, a number of issues need to be addressed, including perennial copy-right concerns. Publishers, who have had something of a monopoly in the production of educational materials, are increasingly up-in-arms, as governments cut costs through Open Educational Resources. Simultaneously, as Open Educational Resources spread, it is increasingly difficult to monitor quality, particularly if adapted when delivered. With regard to secondary education, younger people may require more contact hours than open education may provide for.

The Commonwealth of Learning (COL) has been supporting the ‘opening’ up of open education in many dimensions. It supports integrative open schools placed at the heart of school systems, so that the open schools can improve the quality and reach of the overall system and act as a source of innovation and a catalyst for reform. COL and UNESCO have already collaborated on several projects; for example UNESCO’s highly respected competency framework for ICT for teachers, reinforced by the Commonwealth certificate for ICT and teachers.

As institutions increasingly embrace the concept of opening education or open learning, it is very likely open education will be critical in achieving Education for All, and beyond this, in shaping the very future of education.

Further information:
The future of (open) education with Sir John Daniel

Related links:

- Policy Forum for Asia and the Pacific: Policy and Practices in Open Educational Resources

Previous issues of the e-newsletter:

- UNESCO "ICT in Education" Announcement e-newsletter

What do you think about this topic?

- Visit our on-line forum and share your views

eLearning Africa report shows ICTs transform education

Max Ahouéké, Minister of Communication and Information and Communication Technologies of Benin, presented the results of the eLearning Africa Report, which shows the impact of new technology and improved connectivity on education throughout Africa.

The eLearning Africa Report is an attempt to provide a 'snapshot' of how ICT and better connectivity are believed to be changing the face of education in Africa. It is based on a detailed survey of the experience of nearly 500 education professionals across Africa and confirms that ICT-enhanced learning has been widely embraced throughout Africa.

The report, which was presented by Ahouéké at the opening session of the eLearning Africa Conference, sponsored by CoZa Cares Foundation, in Cotonou, Benin on Wednesday, 23 May 2012, shows that 71% of those surveyed are now using ICT-enhanced learning in their classrooms and 48% use mobile phones for education.

Prospects for African ICT-enhanced learning

The report includes a detailed analysis by commentators from 41 countries of the prospects for
African ICT-enhanced learning. It describes new trends, examines some of the possible obstacles to further development and considers the contribution ICT is making to the achievement of 'Education for All' in Africa. It also identifies the challenges and opportunities that are likely to define eLearning over the coming years.

According to eLearning Africa's programme director and co-author of the report, Shafika Isaacs, "the aspiration of the eLearning Africa Report is to provide regular, yearly snapshots of how perceptions and realities combine and collide over time, with particular reference to the eLearning experience in Africa. It is hoped that these will lead to richer, more nuanced conversations, healthier decision-making and more effective action-taking towards ensuring 'Education for All' in Africa."

The report, sponsored by WYSE and supported by the Association of Portuguese Language Universities (AULP), is available for free download at www.elearning-africa.com/report2012.

Further information:

- eLearning Africa report shows ICTs transform education

Related links:

- Learning in a book-poor, mobile-rich world
- Developing and deploying OERs in sub-Saharan Africa: Building on the present
- An update on the use of e-readers in Africa
- Help my hand write my future: Literacy project launched in Senegal in collaboration with UNESCO and Procter & Gamble
- Innovative financing for education in Africa
- SchoolNet SA is learning from experience
- TIGA awards celebrate 'ICT for Education' projects at eLearning Africa

Previous issues of the e-newsletter:

- UNESCO "ICT in Education" Announcement e-newsletter
What do you think about this topic?

- Visit our on-line forum and share your views

Young innovators competition - your innovation on a world stage
This is your opportunity to shine a global ICT spotlight on your innovative ideas and digital creativity. Enter the Young Innovators Competition at ITU Telecom World 2012 to show the world how your fresh thinking and talent for technology can provide real-world solutions to real-world problems and change the future for the better. Showcase your innovation on a truly international stage and win the chance to access development workshops, industry expertise and the unparalleled networking potential of World 2012.

- Are you 18-25 years old?
- Do you have an innovative ICT-based concept or project?
- Are you in need of resources to take the next step?
- Are you a social entrepreneur?

If your answer is yes to these questions, this could be just the competition for you. Any solution using innovative ICT to support development, from concepts to mature projects can compete to win!

Finalists will be invited to join at the ITU Telecom World 2012 in Dubai, where they will receive the following:

- **Up to CHF 10,000 (10,500 US$) in prize money:** great concepts can win up to CHF 5,000; innovative projects can win up to CHF 10,000.
- **Industry mentorship:** benefit from intensive one-on-one sessions with high level industry mentors, plus their ongoing support over a one-year development period.
- **Hands-on Workshop:** training sessions focusing on developing entrepreneurial skills.
- **Networking:** Opportunities to build relationships with top ICT names from industry, governments, academia and peers.
- **Showcase at the InnovatorSpace:** demo your submission to our influential audience.

Enter the young innovators competition today! Click [here to submit your application](mailto:young.innovators@itu.int).

Should you require any further information in the meantime, please contact us at: [young.innovators@itu.int](mailto:young.innovators@itu.int)
Programmes & Projects

ABCs and ICTs: Delivering scale and value with a whole class learning solution

*By Jim Teicher and Sarah Nehrling, Education Technology Debate*

*D is for desktop. L is for laptop. M is for mobile. E is for expensive!*

For the time being, traditional technologies are too expensive and complicated to implement in scale, while also allowing sufficient funding for teacher training and learning materials development.

Desktops in school computer rooms require a dedicated, secure classroom that would otherwise serve as an instructional space in an often-overcrowded school. The opportunity cost associated with losing an instructional space alone, is incalculable. Some initiatives adopt a “mobile lab” approach, where they introduce laptops – or increasingly, tablets – to provide students with 1:1 instruction, without losing instructional space.

Another approach is mobile phone technology. Nokia recently announced a **Linux-based smartphone** for $100, and there have been announcements about **Google-powered Android smartphones**, also priced in the $100 range.

Yet, the challenges with all three approaches remain more or less the same. First, there may never been enough computers and smartphones available (at least not in the foreseeable future) to adequately serve every student. Second, assuring the necessary maintenance of equipment, networks, and access to reliable electricity is a particularly expensive proposition when a nation considers equipping the majority of its schools.

And finally, the responsibility placed on the individual teacher to effectively integrate technology into instruction is immense. He must be trained to facilitate use of high-quality software, facilitate student use, troubleshoot technical issues during facilitation, and monitor individual and collective student progress in order to achieve measurable goals – in addition to his regular teaching responsibilities!

For technology that relies on the delivery of web-based content, there are even greater risks for abandoning use of computers altogether if the network is not fast or reliable enough, or if the cost is prohibitive over a longer period.

*Providing a whole-class learning solution to reach more schools*

In partnership with USAID/Senegal and Columbia University’s Earth Institute, **CyberSmart Africa** has introduced a whole-class learning solution that integrates the use of a specially
adapted interactive whiteboard directly into classroom instruction. We started the program in 2010 and now operate in three primary schools and six middle schools. The objective is to focus on learning, as teachers facilitate an active, student-centered classroom that integrates the use of digital resources in support of all core academic subjects.

The whole class learns together as an interactive whiteboard moves between classrooms, impacting hundreds of students during a single school day. More than a dozen students will actually use the interactive whiteboard during a single class session, while all students become active learners as they benefit from the experience of observing and influencing their peers’ work at the board.

Implementation is simplified and the Total Cost of Ownership is low compared to laptop and school computer room initiatives because there is less equipment to be maintained and managed; and there are minimal installation costs because all of the equipment is portable. Resources are primarily directed toward ongoing teacher training, the single investment in education that is most closely associated with student success.

Many of the classrooms in our partner schools have rusted ceilings, and some lack electricity. Power is supplied with a solar-charged battery that moves between classrooms along with the equipment. The technology consists primarily of a lightweight screen manufactured in-country, a netbook, a low-power video projector, and an interactive “controller” that enables the touch-screen capability. Users interact with the computer – opening files, playing games, searching for content – by touching the screen with a special infrared pen that acts like a mouse.

All the necessary software to run the applications resides in the stand-alone netbook, and Internet connectivity is optional. The equipment is easily moved between classrooms, over sand and sometimes even through the village to an off-site space, and can be completely set up in under ten minutes.

In contrast to using a regular video projector, the teacher and students are not glued to a computer keyboard – which will most likely be controlled by the teacher – in order to manipulate desktop content on an interactive whiteboard. Lessons are purposely designed to be participatory, and viewable by the whole class so that students are more engaged in the learning process. Interactive whiteboard software also makes use of a suite of “blackboard-like” annotation tools – underlining, circling, coloring – among other capabilities.

Success requires a “toolbox” consisting of ongoing training, content, and support

As ICT has become central to the USAID Education Strategy (February 2011), it is essential to keep in mind that ICT use in schools will accomplish very little if not integrated within a toolbox full of supporting educational content, ongoing teacher training and support, and a context that nurtures evolving teaching and learning styles.
Our work at CyberSmart Africa has been motivated by the unfortunate reality of too many education initiatives who introduce ICT simply for ICT’s sake, and whose budget and program activities go to supporting only the use of the provided equipment. Our approach extends directly into the pedagogical implications of ICT; the bulk of our activities support the ongoing teacher training necessary to successfully integrate ICT to improve the quality of instruction, and thus impact student learning.

**A Focus on Professional Development including use of SMS**

Through our ongoing professional development activities, we support the teachers in a shift toward learner-centered strategies. The teachers gradually move away from the traditional lecture-style approach and become facilitators of the learning process.

As part of our teacher professional development activities, we nurture professional learning communities where teachers support one another and create their own technology-integrated lessons. With ongoing teacher-to-teacher support, the content shared in the classroom is guaranteed to align with the Senegalese national curriculum, as well as the teacher’s personal instructional objectives.

Relying again on simple, available, and affordable technology, CyberSmart Africa uses SMS to extend our professional development. Every Monday, teachers receive by SMS a “Weekly Challenge” exercise, a follow-up on themes introduced during face-to-face meetings and classroom observations.

The challenge may simply require a response to a question, such as “What software did you use the previous week?”. Other challenges may be task-oriented, such as “Co-facilitate a technology-integrated lesson with a colleague this week.” The challenges are designed to both provide direction, and encourage teachers to put their learning into practice. We have found that the challenges are motivating and fun, while also providing CyberSmart Africa with valuable feedback concerning the level of teacher participation.

**Teaching reading in support of the USAID Education Strategy**

The USAID Education Strategy (2011) intends to leverage ICT to improve reading in primary grades; and we observe that the possibilities to use the interactive whiteboard for reading instruction are seemingly endless. It provides a way to accommodate for different learning styles, as students not only write on the interactive whiteboard, but also read, speak, listen, and even manipulate otherwise static content.

As part of CyberSmart Africa’s Senegal implementation, for example, we have created the framework for a word magnet exercise, where students form sentences by dragging disassociated words, and sometimes images, from one part of the screen to the other. This
creative learning exercise sharpens students’ ability to think critically, as they learn sentence construction and vocabulary.

With an interactive whiteboard in their classrooms, teachers and their students are not limited to the static content of their textbooks – often in short supply – nor are they obligated to search very far for content presented in different formats – audio, visual, and text. In an effort to produce appropriate localized reading materials, CyberSmart Africa has collaborated with teachers to create various talking books that integrate different learning modalities.

With each talking book, students are able to listen to the story, read the text themselves, participate in discussions based on the pictures, annotate the story directly on the interactive whiteboard screen, and more. These stories can be shared among teachers, and enriched and shared again. They present a unique learning opportunity for students who otherwise have little, if any regular exposure to a variety of reading materials.

Learning to read does, of course, require practice and ongoing support beyond the classroom. Still, the classroom is, and will be for the foreseeable future, the place where students learn to read. When teachers facilitate technology-integrated lessons directly in the classroom, they can draw from engaging content originating from teachers, the community, packaged software, and other sources globally.

Conclusion

Although use of an interactive whiteboard by no means represents a complete solution for reading improvement, our experience in Senegal indicates that teachers and students enthusiastically embrace use of the interactive whiteboard for active, whole class learning. The approach impacts large numbers of students with minimal equipment, and has the potential to scale because the Total Cost of Ownership is low. Still, it is important to emphasize that teachers need ongoing professional development in order to prepare high quality technology-integrated lessons, and to facilitate an active, learner-centered classroom. With the appropriate support, use of an interactive whiteboard holds tremendous potential to shape the classroom learning environment in Sub Saharan Africa, and globally.

Don’t miss a moment of the action!

Further information:

- ABCs and ICTs: Delivering scale and value with a whole class learning solution
Related links:

- Technology adoption for use in instruction by secondary technology education teachers
- Singapore ‘Future School’ Project
- Making the most of your interactive whiteboard
- Hong Kong primary school bolsters interactive learning

Previous issues of the e-newsletter:

- UNESCO "ICT in Education" Announcement e-newsletter

What do you think about this topic?

- Visit our on-line forum and share your views

Resources

New UNESCO paper on mobile learning: Global themes
Over the past several weeks UNESCO has been publishing individual titles in its Working Paper Series on Mobile Learning.

Recently the organization concluded the first phase of the Series by releasing two Global Themes papers. These papers, unlike previous titles, are not region-specific. Instead they synthesize information contained in the regional papers to identify salient trends that cut across geographic boundaries.

One paper, Turning on Mobile Learning: Global Themes, highlights issues policy makers and other stakeholders should consider when infusing mobile learning into education systems. The other paper, Mobile Learning for Teachers: Global Themes, examines characteristics shared by programmes that assist educators, either by aiding their work in schools or by helping them improve their own pedagogical and content knowledge.

The completion of the regional and “Global Themes” mobile learning papers marks an important milestone for UNESCO. After over a half year of effort the organization has
consolidated its burgeoning understanding of the current state of mobile learning and shared this understanding with the world.

Further information:

- New UNESCO paper on mobile learning: Global themes

Related links:

- UNESCO joins hands with NOKIA for Mobile Education Program
- UNESCO Mobile Learning Week produces tangible results
- First UNESCO Mobile Learning Week
- Mobile learning and life skills
- Driving female literacy through connectivity in Pakistan
- From Illiteracy to mCommunity, Jokko Initiative Empowers Women with mLearning
- The impact of a mobile phone literacy program on educational outcomes
- Mobiles and internet improve the livelihoods of the poorest
- Africa: Mobile phones revolutionizing education
- Mobile learning: Transforming the delivery of education and training
- UNESCO to help community media with mobile content production
- Mobile phones make literacy real
- Mobile learning: Small devices, big Issues

Previous issues of the e-newsletter:

- UNESCO "ICT in Education" Announcement e-newsletter

What do you think about this topic?

- Visit our on-line forum and discuss this topic
EnerCities, a serious game to stimulate sustainability and energy conservation: Preliminary results

Serious gaming is generally considered to be a powerful means to educate people. Using such games in order to influence the energy consumers of tomorrow –i.e. present-day secondary school students to become more environmentally friendly and conserve more energy at home– presents researchers and designers with a specific set of challenges. In addition to resorting desired effects on outcome variables, the game also has to appeal to people who are highly critical.

This paper written by Erik Knol and Peter W. De Vries presents some preliminary evaluation results of a serious game developed to increase awareness and attitudes relating to energy use in the household, in a number of European countries.

Combining results from exploratory quantitative and qualitative pilot studies and quantitative field experiments, we come to the following conclusions: (serious) gaming in the field of sustainability and energy conservation is not common among students, as evidenced by extremely low percentages of reported use.

Furthermore, results clearly show that playing EnerCities increased awareness, and more positive attitudes towards some everyday-life energy-related behaviours.

Read the paper:

- EnerCities, a serious game to stimulate sustainability and energy conservation: Preliminary results

Related links:

- Interactivate - exploration in science and mathematics
- Fast Car: Travelling safely around the world
- A 3D NASA exploration game
- Practical use of animations in teacher training
- Discovery education: Turfmutt
- UNESCO launches first computer game for young people on HIV and AIDS
- Immune attack: Biology class in videogame form
- Animated Science
- NASA World Wind
Previous issues of the e-newsletter:

- UNESCO "ICT in Education" Announcement e-newsletter

What do you think about this topic?

- Visit our on-line forum and discuss this topic

Game on: Increasing learning through online games
This website is the result of a collaborative group project created for the course “Technology and Educational Reform” taught by Professor Nicholas C. Burbules at the University of Illinois at Urbana-Champaign, during Summer 2011.

The website is dedicated to educational games across subjects studied in (American) schools. These games, the majority of which are free, can be used as supplemental resources for teachers. A brief description and link is provided for each game.

For more information about further research supporting educational gaming, visit the section entitled 'Why Games?' The resources in that section represent the many resources available online that provide information and answer questions to help teachers who are considering using games for student learning.

Further information:

- Game on: Increasing learning through online games

Related links:

- Interactivate - exploration in science and mathematics
- Fast Car: Travelling safely around the world
- A 3D NASA exploration game
- Practical use of animations in teacher training
- Discovery education: Turfmutt
- UNESCO launches first computer game for young people on HIV and AIDS
• **Immune attack: Biology class in videogame form**
• **Animated Science**
• **NASA World Wind**

Previous issues of the e-newsletter:

• [UNESCO "ICT in Education" Announcement e-newsletter](#)

What do you think about this topic?

• [Visit our on-line forum and discuss this topic](#)

---

**Welcome to Enquiring Minds**

Enquiring Minds explores how students' ideas, interests and experiences can inform the content, processes and outcomes of teaching and learning in schools.

At a time of curriculum reform in primary and secondary schools, Enquiring Minds provides guidance and research to help support schools through the process of change.

It shows how schools can develop enquiry-based approaches to the curriculum, teaching, and learning.

This site features all of the materials, guidance, research evidence and resources produced during the project.

**Further information:**

• [Enquiring Minds](#)

**Related links:**

• [ICT-enhanced teacher development model](#)
• [Creating a new culture of teaching and learning](#)
• Making real world connections through project-based learning and telecollaboration

Previous issues of the e-newsletter:

• UNESCO "ICT in Education" Announcement e-newsletter

What do you think about this topic?

• Visit our on-line forum and discuss this topic

Help for mathematics
“Free Math Help” provides free online math lessons, such as for algebra, calculus, and trigonometry. It offers lessons in form of text, video, links to other related sites, and online message discussion board where volunteers may assist those who are stuck in a math problem. It also has tools such as calculators, games, and glossary which can help the learners study.

This site is a good complement to learning math outside school. When the school textbook is not clear enough in explaining a subject, this site offers further explanations and has “volunteer helpers” who can help learners solving the math problem together.

Further information:

• Free Math Help

Related links:

• Interactivate - exploration in science and mathematics
• Microsoft Mathematics 4.0
• Wolfram Alpha for educators
• MathWorld - an online mathematics reference work
Previous issues of the e-newsletter:

- [UNESCO "ICT in Education" Announcement e-newsletter](#)

What do you think about this topic?

- [Visit our on-line forum and discuss this topic](#)