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Aleksandrs Gorbunovs

MOBILE LEARNING SYNERGY — THE STAR MODEL

I. Introduction

Nowadays we cannot imagine our life without technologies, surrounding us. Educational specialists all over the world have adjusted to the new situation. Universities and schools use such technologies to improve educational process and make it more attractive and effective.

E-learning became an integral part of training programs in many universities and colleges. Even the 2009 Sloan Consortium Survey of Online Learning shows that enrolment has risen by one fifth from a previous year. The survey of more than 2,500 colleges and universities finds about four and a half million students enrolled in at least one e-learning course in Autumn 2008 [1].

Other technologies, such as mobile phones, iPods, interactive, integrated digital TVs (iDTVs), video conferencing systems and gaming consoles aiming at using them in education organizations to achieve learning objectives. A lot of training centres, especially military ones, cannot imagine their educational efforts without simulators.

Technologies are also used to motivate learners to cooperate, to work in teams, to assess peer achievements, and to improve study progress and to realize set targets.

So we may conclude that learning streamline is based on technologies, is combined in a new concept. It can improve educational results.

II. Proposed Star Model as a Synergy of Mobile Learning

To realize the goals, noted in Figure 1, I have to propose the Star Model as a synergetic application of the following kinds of technology. Such Model is based on different kinds of learning:
- Electronic or computer and internet based learning (e-learning);
- Television based learning (t-learning);
- Mobile technology based learning (m-learning);
- Nano learning (n-learning);
- Gaming and simulating based learning;
- Social networking based learning on experiences and knowledge;
- E-portfolios as a tool to enhance quality of educational process and results.

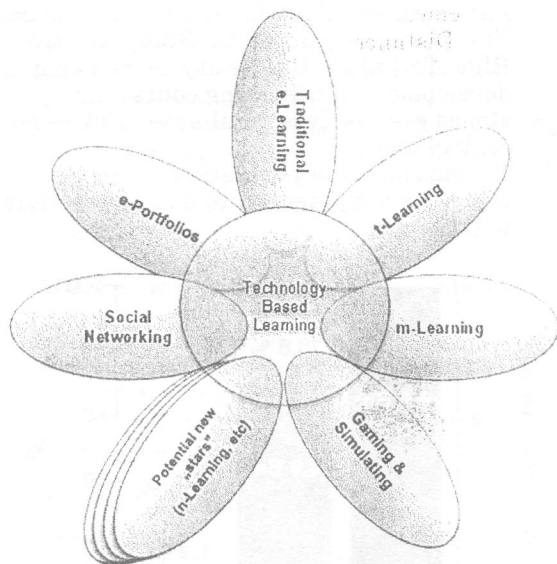I reserve also a place for further potential stars of the Star Model — it is almost impossi-

Figure 1. The Star Model

ble to predict exact technologies' development directions; besides, technologies boom.

There were some few attempts to organize these learning kinds. For instance, eBig3 project considered the merging of e-learning, t-learning and m-learning [5]. There was also an overview of ePortfolio using in e-learning applications [2].

Proposed Star Model ensures smart mix of appropriate e-technologies to be used in educational field.

III. Impact of Technologies on Learning

To be sure about the necessity of new proposed model we will examine each star of the model.

(1) E-learning

E-learning Nowadays everybody knows — what does it mean, at least, in general.

E-learning can save your money and time, and be more flexible.

Now it has been a good time to start calling a well-known e-learning as the "traditional e-learning". It includes electronic learning, distance learning, blended learning, computer based learning, flexible learning, etc.

(2) T-learning

T-learning has not been evaluated yet. But there are a lot of factors which make t-learning a key element in technology based on learning. There are some points to prove it:

– in response to ITU World Telecommunication / ICT Indicators Database's info [3] the number of TV is growing every year and is widely accessible. The number of people who have an access to TV is three times more than the number of people who have an access to computers (Figure 2). Proportion of Digital TV (DTV) in households is growing. At the same time three quarters of households globally have a TV, one third has a computer (Figure 3);

– we have an evidence of successfully implemented educational TV programmes. The Distance Education Study Centre of Riga Technical University is working on development of t-learning courses now;

– almost everybody is familiar with TV remote control tools;

– TV wins minds of population;

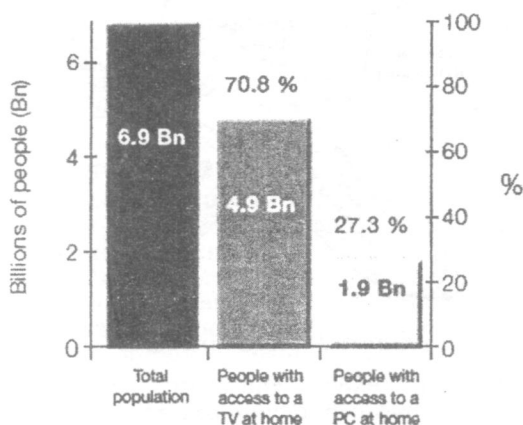– there is a big potential to add interactivity to DTV;

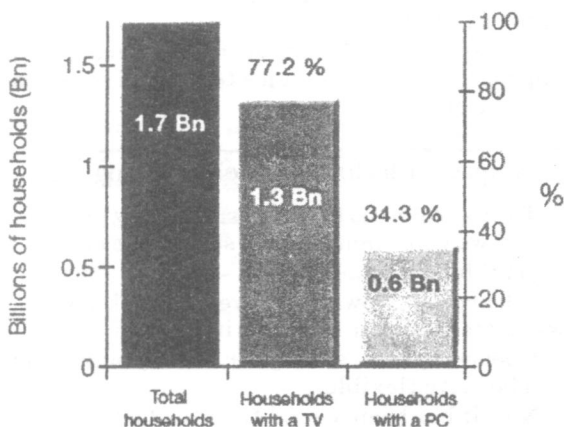*Figure 2. Number of people who have an access to TVs and PCs [3]*

Figure 3. Number of households with an access to TVs and PCs [3]

– the transition to digital TV (DTV) from the analogue one in European membership (EU) will take place from 2007 to 2015. In some of EU countries the transition has to be finished sooner than it is planned. For example, in Latvia the date of transition to DTV has to be planned to January 1 2011, but in reality this process has been accomplished by June 1 2010.

To support a statement concerning the actuality of t-learning we'd like to stress your attention on Digital terrestrial television (DTT), using DVB-T technical standard, which is gaining the progress every year all over the world, not only in EU states.

DVB-T services are on the air in more than 35 countries where more than 90 million receivers have been sold. The most successful markets with DVB-T receivers available for less than EUR 30, include the UK, Germany, France, Spain, Italy and Australia. Every year we can see the launch of services in more countries and there are broadcasts on the air in the whole world.

In Figure 4 we can see the most successful DVB-T markets [7].

Country	Population (million)	DVB-T Services Launched	Receivers Sold (million to nearest 0.5)
United Kingdom	60	1998 (2002 Freeview)	40
Spain	45	2002	17,5
Italy	59	2004	11
France	64	2005	9* (households)
Germany	82	2002	8
Australia	21	2001	2,5
Taiwan	30	2005	2,5

* The figure for France refers to DVB-T homes rather than receivers have sold.

Figure 4. The most successful DVB-T markets

Regarding t-learning we ought to keep in the mind some limitations and problems which could be solved in future or have been already solved, at least in part. Thus, these overcoming limitations are:

– Combination with other technologies such as telephone, fax, and so on;

– Delayed video watching and re-watching (before — VCRs now — also integrated hard discs and memory slots);

– Interactive support was added by the Internet. Content on the web site allows students to interact with the program in a proper way;

– Digital video recording and video compression standards;

The latest researches show that mobile technologies can be used to support iDTV interaction effectively.

(3) Video conferencing (VC)

From my point of view Videoconferencing (VC) must be considered as a part of t-learning and the whole Star Model.

Typical VC provides not only audio/video communication but also multimedia communication (to send and receive data) in a dual stream.

Technically it allows sending two high quality streams and receiving two streams simultaneously.

It is important in particular in engineering where visuals (formulas, graphs, diagrams, etc.) play an important role in teaching. It is very useful in any teaching and meeting to show any visuals; use a computer screen, document camera, or any other external video sources.

Key aims of the VC are e-learning and learners support; human resource development; enhancing business cooperation.

In other words, it means:
- Reduction of travel expenses.
- Universities and other educational organizations ought to find new motivating ways to support e-learning and traditional studies.
- Students should become proficient and productive specialists who are able to work effectively with other ones in teams.
- Business can be enhanced by VC cooperation tools to organize low cost meetings with the help of a short notice among existing partners and invitators.

VC opens up new opportunities to fulfil such goals.

VC can motivate e-learners:
- Students and tutors can choose to undertake courses from the remote locations, attend recorded lecture materials after hours and interact via the VC medium.
- Historically distance learners have had less opportunities for interaction with their peers and tutors. Communication technologies such as VC and WebTV with High Quality streaming have increased the opportunity for students' interaction in distance education.
- VC can give students more responsibility for their learning, working in groups and participating in activities.
- Students are ought to take more control of how they learn.

- The teacher has to assume a more supporting role because of the distance factor.

(4) M-learning

M-learning could be recognized as the learning that takes place with help of mobile technologies. Often we see m-learning as a further development of technology enhanced learning. M-learning is also described as any sort of learning when a learner is not at a fixed of predetermined location [4].

Mobile phones have been the most rapidly adopted technology in the history. Today it is the most popular and widespread personal technology on the planet. Mobile broadband subscriptions overtook fixed broadband subscribers in 2008, highlighting the huge potential for the mobile Internet. In 2009, more than a quarter of the world's population used Internet. The Figure 5 shows a decade of ICT growth driven by mobile technologies [3].

Based on Internal Ericsson forecast for broadband subscriptions [8], in 2013 we could expect five times more mobile broadband subscriptions against fixed ones. This forecast gives golden opportunity for m-learning.

Nowadays we can see also an increasing growth of data traffic which substitutes voice traffic.

In recent years we will have mobile phone devices with smart superior displays, a user friendly keyboards, great functionality, and smaller energy consumption.

M-learning like t-learning has some limitations which ought to be solved by engineers and scientists:
- Minimal possibilities for the user terminal upgrade;
- Connection stability problems;
- Limited or expensive transfer of data;
- Limited memory and processing power;
- Data input problems;
- Data display problems;
- Limited time to work on a charged battery.

(5) N-learning

Nano-learning (n-learning) covers the delivery of bite-sized content to small embedded / handheld device. Small but important facts put
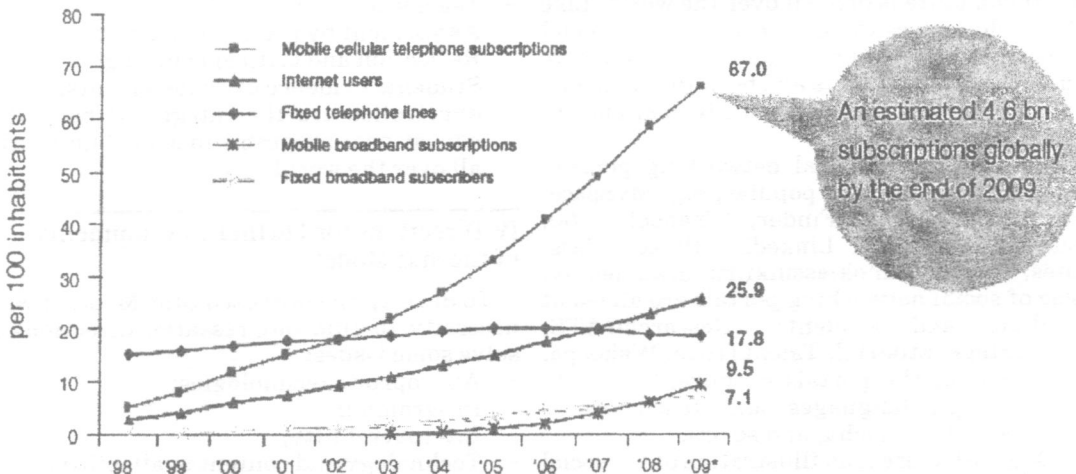

Figure 5. A decade of ICT growth driven by mobile technologies

together in an engaging way designed for the delivery not only in time, but in a method to stay in mind:
- Lessons, seminars and only needed facts and information — no artificial fillers;
- Games that make learning fun;
- Quizzes;
- Presentations, etc.

There is a very thin line between m-learning and n-learning. The essence of n-learning includes the delivery to a learner of not big but really important learning materials and data. For this reason n-learning course developers and n-learners could use all kinds of mobile devices, among them iPods and other ones. In future n-learning devices will include not only possibilities to use the visual/video and sound/audio training materials but also n-learning essence will contain tangible feelings, warm or cold feelings, textual feelings, and even taste and smell feelings.

New learning technologies are the reasons to leave some empty fields for future stars in my proposed Star Model.

(6) Gaming and Simulating

Games are naturally engaging to people. They provide fun and quick paced environment that demands immediate attention and gives instant feedback and results, allowing you to work gradually, come to the challenging level and improved your skills. All these combined factors provide the ideal learning environment.

Simulators help people to gain useful practical skills, save money which is necessary for obtaining new competencies or improving existing ones.

There is a very thin line between gaming and simulating, practically vanishing.

(7) Social Networking

Social networking is the group of individuals who unite into specific groups. Social networking websites work like an online community of internet users. They allow exchange of information, promote learning from peers and other members of networking community.

Social networking provides different benefits. It can unite people all over the world. Like other technologies based on learning cases social networking allows learners and teachers to save time, reduce travel costs and be more flexible.

Social networking applies in formal and informal learning.

There are lot of social networking portals, many of them are very popular, e.g. MySpace, FriendWise, FriendFinder, Yahoo! 360, YouTube, Facebook, Linkedin, Plaxo, Classmates, Twitter, odnoklassniki.ru, draugiem.lv. Some of social networking portals are aimed at scientists and students (ResearchGATE, ScienceStage, StudiVZ, TalentTrove, Wakoopa, etc.); some of the portals encourage users to learn foreign languages and teach others (italki.com, Livemocha, and so on).

In Figure 6 there is an illustration of the social networking — it's structure and function [6]. I'd like to add extra "balls" — "Educate/teach"

and "Learn" or add a comment linking of the existing items in a thesis — "Learning through communication and cooperation".

Figure 6. Social Networking Layout

(8) ePortfolios

E-portfolio should be approved as an excellent tool:
(a) For students it:
- Facilitates education process,
- Encourages and motivates learners,
- Allows students to display their achievements;
(b) For teachers it:
- Empowers them to assess students' achievements, learning progress and give them proper assistance.

There are key features which make ePortfolios very important from the educational point of view:
- Interaction between students2students, students2teachers;
- Team work;
- Assessment by peers; Just assessment
- Reflection and critical thinking;
- Students evidence of achievements;
- ePortfolios are the integrated part of the educational programs in some l universities all over the world.

IV. Directions for Further Developments of the Star Model

To develop the proposed Star Model it will be necessity to find out research directions and solve some issues:
- Appropriate technologies;
- Programming;
- Interoperability;
- Technology and content availability;
- Content development;
- Content distribution;

- Study support;
- Interaction, communication and cooperation
- Administration system of the Star Model;
- ePortfolios / data base management;
- Assessment;
- Feedback;
- Cogency, supporting efforts;
- Funding issues;
- Work at the improvement of the Model.

Examining pointed issues we can draw a further parallel research analogy with eBig3 project [3] focussed on developing efforts. It is assumed that the proposed Star Model could be implicated into eBig3 project which will combine three "e" components into a joint e-educational system: e-learning, t-learning and m-learning.

V. Conclusions

To enhance high quality education and training we ought to extend technology based learning to the Star Model by following considerations:

- mobile phone devices and TVs are widely accessible and more widespread than computers;
- gaming & simulating provide attractive training opportunities;
- social networking allows work with others via Internet, and improve users' communication skills and study results;
- ePortfolios have a great potential as a tool to improve quality of education.

Synergetic application of ePortfolios, social networking, m- and n-Learning, t-Learning and video conferencing, and traditionally used e-Learning meet in a better way expectations and needs of educational/training target groups.

This synergetic application, i.e. "The Star Model", can be used complementarily as a part of blended learning.

There are several research directions to find out proposed Star Model's composition such as: scope, interoperability, implicated technologies, programming, learning content development, staff support, system administration, funds, cooperation issues and so on.

Technologies should be integrated for learning delivery and for provision of interactivity building on their individual strengths as opposed to simple replication or artificial filling.

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В статье изложены аспекты влияния современных технологий на процесс образования. Предложенная автором модель является совокупностью усилий, направленных на эффективное использование новых технологий и видов обучения с целью улучшения качества образования.

Ключевые слова: дистанционное обучение, э-, т-, м-, н-обучение, социальные сети, игры и симуляторы, э-портфолио.

У статті викладені аспекти впливу сучасних технологій на процес освіти. Запропонована автором модель є сукупністю зусиль, спрямованих на ефективне використання новітніх технологій та видів навчання з метою поліпшення якості освіти.

Ключові слова: дистанційне навчання, е-, т-, м-, н-навчання, соціальні мережі, ігри та симулятори, е-портфоліо.