



UNESCO INSTITUTE FOR INFORMATION TECHNOLOGIES IN EDUCATION

No. 2'2004

April-June

EDITORIAL

Dear readers,

Since IITE Newsletter 1'2004 saw the light the sixth session of the Governing Board of the UNESCO Institute for Information Technologies in Education (IITE) has become the most important event.

The session of the Governing Board was convened in accordance with the Statutes of the Institute at IITE headquarters in Moscow on 4 and 5 June 2004. The following Board members attended the session: Prof. Saleh Abdulrahman Al-Athel (Saudi Arabia) – Chairman of the Board, Prof. Bernard Cornu (France) – Vice-Chairman of the Board, Prof. Vaino Brazdeikis (Lithuania), Prof. Avram Eskenazi (Bulgaria), Prof. Galym Mutanov (Kazakhstan), Prof. Vladimir Filippov (Russian Federation), Prof. Michael Zgurowsky (Ukraine) – Member of the Executive Committee of the Board, Prof. Alexander Zhuk (Belarus).

In compliance with the Statutes of the Institute, Director-General of UNESCO was represented by Mr Georges Haddad, Director of the Division of Higher Education, Education Sector.

Prof. Saleh Abdulrahman Al-Athel, Chairman of the Board, opened the session on Friday, 4 June 2004 at 10 am. He greeted the Board members and Mr Haddad, representative of Director-General.

Mr Vladimir Kinelev, IITE Director, reported on the results of the 32nd session of the General Conference of UNESCO, its decisions concerning IITE, as well as on UNESCO policies in the field of ICT applications in education.

The Board members thanked the Director for the broad and detailed presentation. They marked a large scope of problems of ICT application in education tackled by IITE, and highly appreciated the progress made by the Institute during previous year, considering it very impressive and promising for UNESCO Member States.

On behalf of Director-General of UNESCO, Mr Haddad thanked the members of the Board for the participation in the sixth session of the Governing Board, expressed his appreciation to Mr Kinelev, IITE Director, as well as to IITE



The sixth session of the IITE Governing Board

specialists for their active and fruitful work in the field of ICT application in education. He informed the members of the Board that he had a very informative meeting with Mr Kinelev and was impressed by the quality and amount of IITE activities. Speaking on behalf of Director-General of UNESCO, Mr Haddad expressed the conviction that IITE has the unique capacity for development of education systems of UNESCO Member States.

The Board discussed the IITE Draft Programme and Budget for 2004–2005 in detail and decided on the distribution of estimated resources according to the main areas of the IITE programme activities, emphasizing the increased resources

assigned for training. The IITE Programme and Budget for 2004–2005 were approved.

The Board expressed the gratitude to the Government of the Russian Federation for its valuable contribution to the programme activities of the UNESCO Institute. A number of recommendations were made concerning IITE further development and activities.

The following articles illustrate some results of the Institute's activities during last year.

The article of Dr Boris Kotsik, Chief of IITE Training and Research Unit, informs the readers about cooperation between UNESCO IITE and South-East European UNESCO

Member States on education capacity development by means of ICTs and describes Institute's activities on the extrabudgetary project funded by the Japanese Funds-in-Trust for Capacity Building of Human Resources. This is an integral project planned for two years, incorporating the main IITE training and research achievements for education development in ten countries of Balkan region.

The project is developed in close cooperation with UNESCO National Commissions, Ministries of Education, and IITE focal points in these countries. The article depicts main events within the project, which includes a preparatory meeting, two training sessions, and three surveys.

During the preparatory meeting held in September 2003 in Skopje, FYROM¹, the leading experts engaged in the project presented the content of the project to the representatives of participating countries to be approved and the project workplan to be adopted.

First training session comprising three events, was held in February 2004 in Romania. More than ten international experts and four IITE specialists were engaged in the training, and more than 50 specialists from the participating



IITE Governing Board Members. Moscow, June 2004

countries enriched their professional experience.

The second training session was in Bulgaria in March-April 2004, embracing three events, when about 40 specialists from the region were trained under the guidance of nine international experts and specialists from IITE.

The support phase of the project consists of one statistical and two analytical surveys targeted at further development of education through the balanced and effective usage of ICTs.

Another article presented in the Newsletter by Prof. Deborah Johnson (University of Virginia, USA) and Lev Gordon (IITE project manager) is the review of the IITE

analytical survey *Ethical, Psychological and Societal Problems of Application of ICTs in Education*.

The focus of the edition is on the ICTs employed in education. The authors stress that the education is, perhaps, the most important domain of life, as it is the domain, in which we prepare people to live, and work, and contribute to society. Educational institutions lay ground for the future; they prepare students who will become the citizens and leaders of tomorrow. Thus, when it comes to education, we should be especially hopeful as well as cautious about the ways we use ICTs.

The papers included in the survey describe and analyze

ethical, psychological, and societal issues encountered as the ICTs have been used in education. The aim of the work is to offer ideas and perspectives that will be instrumental in steering future development and use of ICTs. It consists of two parts. Part I gives the background and history of the ideas that have emerged regarding ethical and legal aspects. Part II examines specific issues.

I hope, dear readers, that the materials enclosed in the issue will help you solve the problems you face in the practice of ICT usage to upgrade the systems of education in your countries.

Vladimir Kinelev
Director of IITE

¹ the former Yugoslav Republic of Macedonia

IITE ONLINE NEWS

- **21–23 September 2004 (IITE, Moscow):** *ICT Application in Secondary Education*. IT-based training session for young specialists from Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, and Russian Federation.
- **2–4 November 2004 (IITE, Moscow):** Training seminar on distance learning for ICT specialists from Armenia, Azerbaijan, Belarus, Georgia, Republic of Moldova, and Russian Federation.
- **14 September – 29 October 2004; 11 October – 26 November 2004 (IITE, Moscow):** Training session for the trainers of educational institutions of higher, secondary and vocational education *Distance Education Tutor*. The session contains three stages:
 1. Face-to-face training seminar (3 days);
 2. Online training session (6 weeks);
 3. Face-to-face training seminar (3 days).
- In September 2004 IITE will publish the **specialized training course** *Development of Educational Personnel for Distance Education* (in Russian). The course is based on the practice of professional tutors of distance education accounting for the peculiarities of vocational education. It comprises the theory of pedagogics, psychology, as well as the efficient behavioural methods of a tutor in the open educational space.

IITE ACTIVITIES FOR EDUCATION CAPACITY BUILDING IN SEE

Cooperation Between UNESCO IITE and South-East European UNESCO Member States on Education Capacity Development by Means of ICTs

In March 2003 IITE launched the sub-regional project for South-Eastern Europe *Information and Communication Technologies for Education Capacity Development Towards the Construction of a Knowledge Society*. The project is planned for two years and funded by the Japanese Funds-in-Trust for the Capacity Building of Human Resources.

The project resulted from the discussions on the problems of education development in Balkan region between Mr Vladimir Kinelev, IITE Director, and Mr Colin Kaiser, former Director of UNESCO Office Sarajevo, at the 31st General Conference of UNESCO in 2001.

Following the results of these discussions and in accordance with IITE Medium-Term Strategy for 2002–2007, the Institute developed the project proposals on its activities to build education capacities in South-East European countries. The initiatives were supported at the high-level conference on *Strengthening Cooperation in South-Eastern Europe* in Paris on 4 and 5 April 2002. In February 2003

the Japanese Government officially approved the project.

The project is an integrative venture that combines the Institute training and research activities on certain key issues of ICT application in education. Target countries of the project are Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Former Yugoslav Republic of Macedonia (FYROM), Republic of Moldova, Romania, Serbia and Montenegro, and Turkey.

In September 2003 the representatives of the countries got together at the preparatory meeting held in Skopje, FYROM, to discuss organizational issues and practical ways of project implementation. The project activities were divided into training and research. All training events were organized in two training sessions.

The first training session was held from 10 to 20 February 2004 in Bucharest, Romania, covering the following events:

- training seminar *Retraining of School Educators on ICT Application in Secondary Education* (10–14 February 2004);

- workshop *Indicators of ICT Application in Education*;
- high-level seminar *Towards Policies for Integrating Information and Communication Technologies into Education*.

Dr Alexander Mironov, General Secretary of the Romanian National Commission for UNESCO, opened the session. He stressed the importance of sustainable education development of the region and wished a success to the participants of the training session.

Training seminar *Retraining of School Educators on ICT Application in Secondary Education* was attended by 19 participants from nine countries.

The seminar programme was based on IITE training and methodological materials, namely, *Informatics in Primary Education. Recommendations* (in cooperation with IFIP); *Elementary ICT Curriculum for Teacher Training* (in cooperation with IFIP); *ICTs in Distance Education*; *Multi-media in Education*; *ICTs in Special Education*; *Information and Communication Technologies in Secondary Education* (IITE Position Paper); IITE

Training Programme for teacher trainers, school administrators and teachers *Retraining of School Educators in Application of ICTs in Education* (IITE support materials).

International expert team consisting of Dr Alexandra Cristea (the Netherlands), Dr Piet Kommers (the Netherlands), Dr Erkki Sutinen (Finland) delivered a set of lectures and guided individual and team work of participants. The experts held the round tables to discuss the most important issues of ICT usage. The participants were divided into thematic groups according to their professional interests. During the seminar each group had to develop its own project. At the final meeting the participants presented their projects, discussed how to apply the gained experience in their practice, and received the IITE certificate. The trainees highly estimated the organization and contents of the seminar, the competence of the tutors, and found the obtained information and experience useful for the development of their own projects in their countries. As they mentioned in their evaluation lists, they got new ideas and skills, valuable professional contacts, opportunities to start joint



Dr Alexander Mironov (Romania)



Dr Erkki Sutinen (Finland)



Dr Alexandra Cristea (the Netherlands)



Dr Piet Kommers (the Netherlands)



The training seminar. The presentation of certificates

projects with partners from the neighbouring countries.

The workshop *Indicators of ICT Application in Education* was meant for the specialists in the field of statistics and ICT data submission from national ministries of education. Dr Boris Kotsik, Chief of IITE Training and Research Unit, IITE expert, opened the workshop and made a report on the results of IITE research in this area. During the workshop the international experience on new methods of quality assessment of the ICT-mediated education was presented as well as the structure of indicators' system and data collection procedures. Under the guidance of Dr Kommers the following discussions were run: *National Experiences on Statistic Approaches to Monitor ICT Penetration; Indicators of ICT Mediated Education Quality*. After the analysis of the offered questionnaires, the participants

suggested their own structure of indicators' system and data collection procedures. As a practical result of this discussion IITE works out the statistical survey *Indicators of ICT Use in Education of SEE Countries* during the research phase of the project.

High-level seminar *Towards Policies for Integrating ICTs into Education*, the third event of the first training session, was intended to assist UNESCO Member States in the development and improvement of educational ICT policies.

The main aims of this seminar were to:

- share views and experiences of different countries, deliver executive summaries on key ICTs in education, present global trends, address typical bottlenecks, analyse and present lessons learnt in different countries;

- address questions raised by participants on ICTs in education;
- establish and state core principles to be taken into account for the development of educational policies;
- provide evidence to support policy formulation, management, and monitoring;
- assist policy-makers in developing strategies to integrate ICTs in educational policies and programmes in a more systematic, cost-effective, and culturally appropriate manner;
- provide assistance in planning, training, assessment, and hands-on support to ministries to help develop or improve policies for the effective use of technologies in education.

The main idea of the seminar was to consider that different issues are to be simultaneously

addressed when designing an educational policy based on ICTs, among them:

- educational philosophy: main trends in education in the era of globalization and construction of the knowledge society;
- technological trends (megatrends and responses);
- the role of ICTs in modernizing education: national policies, strategies, and programmes;
- new pedagogy for new education: pedagogical issues; teachers, the teaching profession, teacher training and education; process issues;
- software and content issues of ICT supported teaching and learning;
- issues of economy: forming national educational strategies; fundraising;
- human, social, and ethical issues.

The seminar provided tools to manage these issues in a practical situation of each country. It helped to identify the priorities and bottlenecks peculiar to every country, elaborate some solutions and design some plans.

Six experts carried out the seminar: Prof. Bernard Cornu (France) – leader of the expert team, Mr Mike Aston (United Kingdom), Prof. Peter Bollerlev (Denmark), Ms Katja van den Brink (Germany), Prof.



Prof. Bernard CORNU,
(France)



Mr Mike ASTON
(United Kingdom)



Prof. Peter BOLLERSLEV
(Denmark)



Ms Katja van den BRINK
(Germany)

Raymond Morel (Switzerland), Mr Matti Sinko (Finland). IITE was represented by Dr Irina Smirnova, IITE project manager.

20 high-rank decision- and policy-makers from seven SEE countries participated in the seminar.

The participants were awarded with the IITE certificates.

The second training session was held in Sofia, Bulgaria, from 27 March to 3 April 2004, and included:

- workshop *ICTs in History Education* (27 March 2004);
- training seminar *ICTs in Distance Education* (29 March – 2 April 2004);
- workshop *ICTs in TVET*.

Prof. Avram Eskenazi, member of IITE Governing Board, opened the training session. Mr Eskenazi greeted the participants on the Bulgarian land, and wished a success in the session activities on behalf of the Governing Board. Mr Dimitar Tsvetkov, Director of Information Technology Department of the Ministry of Education and Science of Bulgaria, read a welcoming address to the participants of the training session from Dr Igor Damianov, the Minister of Education and Science of Bulgaria.



Dr Irina Smirnova
(IITE)



Prof. Terry Haydn
(UK)



Prof. Avram Eskenazi
(Bulgaria)

The session started with the one-day workshop *ICTs in History Education* run by two experts from the United Kingdom – Prof. Terry Haydn, Senior Lecturer, University of East Anglia, and Mr Alf Wilkinson, Professional Development Manager, Historical Association (both UK).

Ten participants from four countries (Bulgaria, Romania, Serbia and Montenegro, and Turkey) took part in the event. During the workshop the experts delivered presentations on various aspects of ICT usage in history education, showed the examples of the use of ICTs in history teaching and learning in the United Kingdom. Experts' presentations were followed by thematic discussions. During the round table the participants presented national experiences of ICT usage in history education. The structure of analytical survey *ICTs in History Education* was

approved, and the procedure of obtaining data for this survey was discussed. The participants suggested changing the title of the survey for *History Education in Knowledge Society*, approved the resolution depicting the aims and structure of the analytical survey to be completed during the research phase of the project.

The second event, training seminar *ICTs in Distance Education*, was organized to train South-East European educators in the IITE course *Information and Communication Technologies in Distance Education*. Dr Kotsik opened the seminar. He described the background of the project *ICTs in Distance Education* and introduced the seminar organizers and facilitators. IITE representatives were Dr Yuri Zaparovanny, IITE project manager, and Dr Natalia Severova, assistant project manager.

Expert facilitators of the seminar were Ms Linda M. Black, online instructor of the Penn State University, USA, and Founding Director, U.S. Information Systems Activity Computer-Based Learning Center, and Ms Katerina Marcheva, Director of St. Clement of Ohrid High School Learning Foreign Languages, Bulgaria. Bulgarian coordinators were Mr Svetoslav Ivanov, Bulgarian Ministry of Education and Science, and Dr Petia Assenova, Head of Department of Computer Science, New Bulgarian University. Prof. Wayne Mackintosh, Director of the Centre for Flexible and Distance Learning, University of Auckland, New Zealand, participated in the seminar distantly providing video lectures and moderating an online discussion forum.

15 participants from seven countries, namely, Bulgaria, Bosnia and Herzegovina, FYROM, Republic of Moldova, Romania,



Prof. Raymond MOREL
(Switzerland)



Mr Matti SINKO
(Finland)



Workshop *ICTs in History Education*



Mr Alf Wilkinson
(UK)



Prof. Wayne Mackintosh
(New Zealand)



Dr Yury Zaporovanny
(IITE)



Ms Linda M. Black
(USA)

Serbia and Montenegro, and Turkey attended the event. They were the heads and representatives of educational institutions and ICT departments in the countries' ministries of education.

During the seminar the participants got to know the theory of distance education, and global best practices in this area, presented national experience of distance education in their own countries. They developed and made presentations of their own projects on distance education. They created a network, which would allow them to share and support each other in their further activities.

After the experts evaluated the seminar results, the participants were given IITE certificates.

The workshop *ICTs in Technical and Vocational Education and Training (TVET)*

was the final event of the second training session. Representatives from Bulgaria, Bosnia and Herzegovina, Republic of Moldova, Romania, Serbia and Montenegro, Turkey attended the workshop. They were the organizers of teacher training and retraining, heads and representatives of ICT departments of ministries of education and institutions dealing with preservice and in-service training of teachers. Dr Kotsik, IITE, and Dr Chris Chinien, Director of UNEVOC – Canada guided the seminar.

The main goal of the workshop was to familiarize the participants with IITE project and analytical survey *ICTs and TVET* and to introduce the specialized training course *ICTs in TVET*, which is under the development at IITE.

To adjust the contents of the training course to the specifics

of a region, the participants decided to develop an analytical survey focused on particular needs of SEE countries in this sphere. The work will be fulfilled during the research phase of the project.

After the training activities and analysis of the results were over, IITE started the research phase of the project. Its main goal is to identify state-of-the-arts and specific training needs of the participating countries in the key issues of ICT application in education, namely:

- history education in information society;
- indicators of ICT application in education;
- ICTs in TVET.

To obtain data from the participating countries the questionnaires on the key issues of

the survey will be distributed through national ministries of education, UNESCO National Commissions, and national coordinators of the project. These questionnaires will be presented to the leading specialists, policy- and decision-makers in education development. The data obtained from the questionnaires will be compared with examples of appropriate international experience and on the basis of this comparison recommendations will be worked out on the education development of the SEE countries to be included in the final report on the project and disseminated among UNESCO Member States.

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Workshop *ICTs in TVET*

ETHICAL, PSYCHOLOGICAL AND SOCIETAL PROBLEMS OF THE APPLICATION OF ICTs IN EDUCATION

Review of the IITE Analytical Survey

The hope that technology can solve the problems of the twenty-first century seems justified when one considers the powerful ways in which technology has transformed life in the twentieth century. Educational institutions lay ground for the future; they prepare students who will become the citizens and leaders of tomorrow. Thus, when it comes to education, we should be especially hopeful but also especially careful about the ways we use information and communication technologies (ICTs).

The analytical survey was prepared by an international team under the leadership of Prof. Deborah G. Johnson (University of Virginia, USA). The team members are Yuri Voronkov and Irina Alexeyeva (Russian Federation), Philip Brey (the Netherlands), Duncan Langford (UK).

The aim of the work is to offer ideas and perspectives that will be helpful in steering future development and use of ICTs.

The first paper, *State-of-the-Art in Ethical and Legal Aspects of ICTs in Education* by Yuri Voronkov, explains the importance of the topic and briefly describes the key issues that have been identified in the field of computer ethics, a field focusing not only on education but on ICTs used in many domains.

Voronkov's review of these ethical issues points to many important books and articles written on the topics.

Author discusses the issues of copyright of computer software and how difficult it is to apply the copyright law to computer components and further discusses the difficulties with regard to achieving global standards for intellectual property. Perhaps, a code of ethics guiding the use of computer technologies in education should be developed. He concludes that while the issues are becoming more and more important, there is too little attention given to them; much more research and cooperation should take place.

Irina Alexeyeva's *History of the Problem* shows the evolution of ideas that have shaped thinking about the ethical issues concerning the use of information and communication technology in education. The first idea is that computer technology is necessary to prepare students to live and work in the future. The necessity of teaching computer literacy and skills followed from the belief that ICTs would lead to the rise of information-based societies. Thus, teachers should prepare students for life in the new form of society.

The second idea has to do with the accessibility of ICTs. According to Alexeyeva, it links two elements, availability and ease of use. She discusses the evolution of each. Improving availability was achieved through a variety of changes in computer systems including, perhaps most importantly, the development of perso-

nal computers and computer networks.

Author identifies the third idea shaping thinking about ICTs in education as the idea of effectiveness. Are ICTs effective in education? Addressing the effectiveness of ICTs in education includes consideration of both the appropriate technologies to use and how to use these technologies. There has been an evolution of both. One of the more recent issues is distance education and its effectiveness. Author discusses international interest in distance education as a means to improve education in the developing world.

Alexeyeva concludes her chapter with a review of the issues that have arisen around the cognitive effects of ICTs in education, that is, the effects of ICTs on human capacities and cognitive styles.

In Chapter 1 in Part II *Information Technology and the Goals of Education: Making Nails for the Hammer*, Prof. Johnson focuses on a concern that in the process of adopting and using ICTs in education we will change the goals of education. Her concern is that in the process of taking advantage of ICTs and the benefits that they offer, educators may change the way they think about their activities and institutions, and this may happen without deliberate choice. Author illustrates this concern in several ways demonstrating that the use of ICTs can

change the goals and values of an activity or endeavour.

Educators should be aware that when a technology is brought into the educational environment (or any environment for that matter), it is used to engage in activities that were being done before the technology's adoption. However, over time, as the technology becomes more familiar, the users see the potential to reorganize activities to take advantage of the technology's potential. In this second stage, the goals of the activity may change. While the change may be for the better, the important point is that such changes must be made deliberately; educators should not let the availability of the technology unintentionally determine the goals of education.

To avoid this pitfall, she discusses the process of negotiation that should take place as ICTs are integrated into education. The negotiation process Prof. Johnson refer to here is the process in which educators do not simply adopt ICTs because they are available but rather they learn more and more about what is possible with ICTs and then match the ICTs with what they think is important to achieve in education. The danger is that educators shift their attention from the content and character of education to its delivery. Since ICTs make it possible (and even easy) to deliver educational modules to distant locations, the goals of education shift

to a goal that has become achievable through ICTs, but this is to the neglect of the effectiveness of the content and materials delivered.

In Chapter 4, Dr Philip Brey focuses primarily on higher education, arguing that universities should be “generating awareness of ethical issues in the use, development, and management of information technology”, and emphasizes that universities should do this both in their computer ethics policies and in computer curriculum.

Author begins his analysis by identifying a set of issues that have arisen as ICTs have come into the educational environment. The six issues are: digital plagiarism; illegal copying of copyrighted media; hacking; improper use of computer resources; harassment and hate speech; and breaches of informational privacy and confidentiality. Brey notes that these issues arise in part because the type of behavior involved is both easy to engage in and difficult to detect because of the nature of ICTs.

Brey argues that universities (and other educational institutions) need policies on each one of the six issues he has identified. If educational institutions do not adopt policies on these issues, they run the risk that students will, at best, get an ambiguous message about the impropriety of the behaviour

and, at worst, will get the unintended message that the behaviour is acceptable.

Before he reviews what universities should do in the way of curriculum to address the ethical issues arising from ICTs, Brey speaks about the importance of academic freedom. He concludes this section by recommending that universities be committed to protect free speech and demonstrate this commitment in their policies. This means that universities should be reluctant to filter, block, or monitor communications and should be reluctant to adopt speech codes.

Having addressed the first area for the action by universities – adoption of computer ethics policies, Brey turns his attention to curriculum. He begins by framing computer ethics in a broader field that he refers to as social and humanistic studies of computing (SHC) and distinguishes SHC studies from applied studies of societal aspects of computing (ASC). SHC refers to theoretical research and ASC refers to applied research on societal aspects of computing. General education is shallow if it provides a view of society without acknowledging the role of ICTs; professional education should provide an understanding of the context in which the profession will be practiced and it often means a context in which

a professional uses and makes decisions about ICTs.

Using the distinction between SHC and ASC Brey provides a set of suggestions regarding which students should be required to take which kind of course. In the final section of this chapter Brey extends his analysis to secondary school education.

In Chapter 5, Duncan Langford discusses the differences between academic culture and the business world and how these differences impact the use of ICTs in education. His analysis focuses on three major constituents involved with ICTs in education – educators themselves, the companies that produce software, and educational administrators. One potential problem is that the ethical issues fall between the cracks; that is, they may be ignored in the interplay between educators (and their demand or need for ICTs) and the software developers (and their pressures to be commercially successful). At the same time, school administrators must deal with educational budgets and must balance spending on ICTs with other kinds of spending.

To begin, Langford notes that while educators may acknowledge their responsibility for responsible use of ICTs, they often fail to recognize the importance of choosing someone to set up and maintain ICTs. The per-

son chosen to maintain ICTs in a school has a great deal of power and a great deal of potential to do harm. Issues the maintainer must address include: respecting the privacy of users as email traffic is monitored; setting up an effective password system that has levels of access while maintaining security; deciding whether and how to filter access to the Internet for content, such as pornography, bomb building instructions, racist literature, and so on.

While not employed by schools, software developers and salespeople have an important role in ICTs in education and yet even if they come from the field of education, because they are in the commercial sector, they have a different perspective.

The role of educational administrators in making decisions about ICTs is often invisible so Langford emphasizes its importance and also the difference between the perspective of a teacher and that of an administrator. Perhaps, the most important role of educational administrators should be to monitor efficient use of ICTs and this requires understanding that ICTs are not like other kinds of resources.

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