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ICTs IN EARLY CHILDHOOD CARE AND EDUCATION

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Innovative early childhood care and education (ECCE) teachers, researchers and educational authorities are often reporting creative ideas and examples of the potential value of ICT in terms of children's play and learning. Based on their growing experience, they assume that exploiting new digital technologies in ECCE can help children develop their competencies and personalities in effective, authentic and attractive ways.

As a natural follow-up, several governments are currently developing and implementing their ICT policies for early childhood education. Therefore, we decided to harness the expertise of IITE in this field and transform it in a policy brief. Its purpose is to describe the process of integration of ICT into ECCE and identify the key aspects that must be taken into consideration when developing and implementing the policies that are needed to guide the transformation. As the highest priority we recommend focusing on the appropriate professional development of the ECCE teachers. We also point to various risks which may occur after initial development and may retard successful and productive integration.

ICTs AND EARLY CHILDHOOD LEARNING

We can hardly imagine an education institution today, of any stage, without any presence of ICT. As Siraj-Blatchford and Whitebread (2003) point out, *young children today are growing up in a world which not only contains but is also increasingly shaped by ICT.* More and more children encounter a computer before they go to school, even before they go to preschool. It is then natural to notice that they are exposed to all kinds of impacts of ICTs. Thus, ECCE cannot ignore any of them. It must look for procedures and strategies and how best to engage them so that the learning objectives are achieved in a way closer to 21st century expectations and requirements.

An important contribution to the process of integration of ICTs into ECEE came in the form of a report from the New Zealand Ministry of Education (2004), which became the foundation of the government's *ICT framework for early childhood education* and also influenced Te Whariki – the curriculum for early childhood care and education in New Zealand (Ministry of Education, 2009) and in several similar ICT frameworks in other countries. When used appropriately, the report affirms, ICT can be a productive tool for supporting young children's learning and development. *Studies suggest that ICT use can provide a context for... positive learning experiences between children, or between children and adults.* However, in order to obtain this practitioners must adopt new pedagogical strategies to harness this potential.

Educators and politicians are much interested to understand the role of ICT in promotion of ECCE children's achievements. Unfortunately, little in the way of systemic research and review has to date been carried out in this area. So far, the following key areas of learning in ECCE that ICTs could support have been identified:

- communication and collaboration,
- cognitive development,
- creativity,
- socio-dramatic play, and
- learning to learn.

Some researchers study the... *holistic development of the child's disposition to learn* (Hayes and Whitebread, 2006). Within this process, they examine the following areas of learning and how they could be enhanced by integrating ICT: (a) ICT and literacy; (b) ICT and mathematical understanding; (c) ICT and science; (d) Creativity, problem solving and playful use of technology; (e) Visual literacy and painting; (f) Media education (digital animation); and (g) Learning of music.

In order for ICT to make a contribution to these areas in early childhood education, it needs to be used by young children in ways which recognize and respect how they learn most effectively, and what is involved in helping them to become confident and creative thinkers.

IMPLEMENTATION

Although well analyzed experience and valid findings are insufficient so far in this field, we may already conclude that harnessing the potential of ICT in favour of complex development of children requires thorough integration of new technologies into everyday playing and learning activities, instead of simply adding them to previous equipment as new kinds of toys or aids.

In the leading innovative ECCE centres around the world, computers and other ICTs are included into children's learning experiences alongside many other kinds of activities. New digital technologies should not be seen as a way of displacing ordinary experiences. In any case, ICTs use should not be at the expense of any other... *outdoor or indoor experiences which promote development of gross motor skills through running, climbing, jumping, swinging, and using wheeled toys* (Siraj-Blatchford and Siraj-Blatchford, 2006).

The process of implementation of ICTs into ECCE learning experiences can be perceived from different perspectives:

Macro perspective

This level may cover national ICT policy for ECCE, its implementation framework, or different kind of standards. Naturally, it often happens that national policy is being developed only after several isolated and exceptionally innovative ECCE centres acquire certain experience and thus draw attention to new opportunities.

Meso perspective

These are activities at the regional or district level, e.g. an innovative initiative of several ECCE centres in one community or in certain area, often initiated and administered by the relevant educational authority or an academic institution. The advantage is that all involved centres are closely connected (in geographical or other sense), usually have similar conditions and are used to collaborate, learn together and inspire each other.

Micro perspective

Of all, this is the most important level – inside an ECCE centre – where the whole process of integration is being conducted.

Let us examine the micro perspective in detail as far as at this level most of the practical know-how is accumulated. We will inspect five key aspects of the process:

Who is involved

While children, teachers, their headmasters, and the educational authorities are evident actors of the process, it is of key importance to build a true partnership with parents and engage them into the transformation as well. Later in this brief we will consider another vital aspect concerning the teachers, namely their related professional development.

Why do we do it

This aspect has been discussed in detail in the previous section: we understand the importance of the early childhood education and we identify enormous potential of ICTs to support achieving the learning goals in a way closer to 21st century expectations and requirements.

What kinds of ICTs

It would be a mistake to misinterpret the concept of ICTs in education as *computers* or merely *learning about computers*. On the contrary, we have to capitalize on the fact that ICTs comprise a rich set of digital tools, environments and procedures, which could be employed for complex support of all developmental domains of children. When planning the ICT equipment, we should keep in mind such broad intention – and thoroughly consider so called *developmental appropriateness* of our choice, see the following section.

Where to use it

Important issue is how to organize the space with ICT. If the ECCE centres locate it directly in the children's classrooms, usually in a special *ICT corner*, it is easier to integrate it directly into various activities across the curriculum. Other topic is that, as reported by several researchers, it would be a major loss not to exploit exceptional opportunities of using mobile tools (cameras, tablets, etc.) in the outdoors as well.

How to integrate it

Productive class management and working scenarios must be developed, implemented and evaluated. ECCE centres report single child activities, small group activities or whole class activities. Class management involves pondering on the safety issues as well, see the following section.

Some outstanding innovative ECCE centres with valuable experience invest considerable effort in developing complex websites to share their knowledge and skills with wide national and international communities. There they usually articulate their learning and development strategy, their ICT strategy including safety concerns; sometimes they offer expertise or cooperation, various resources, practices, etc.

As an example, we may visit the ICT in the Early Years site of the Homerton Children's Centre in UK (see *www.homerton.cambs.sch.uk*, *ictearlyyears.e2bn.org*, and also Price, 2009) which provides a framework for planning learning objectives for each developmental domain. The experience cumulated on this website may be remarkably supportive also for those who are currently constituting their national ICT strategies for ECCE or formulating the role of ICT in ECCE learning and play:

ICT compliments and extends traditional means of learning; it reflects the real world inside… and out! It provides opportunities for developing enquiry, exploration and other children's interests; it enables children to play roles they see in the adult world; it adds to children's possibilities for being creative; it can support independent learning; it allows children to record their own personal view of the world; it can provide opportunities for children to play with friends; it helps provide equal opportunities for all children; it supports all areas of learning including communicating, problem solving and developing self esteem (see *ictearlyyears.e2bn.org/gallery.html*).

SAFETY CONCERNS

While many educators point out numerous and productive forms of integrating ICT into preschool learning and play, there are several writers in early childhood education who present an assortment of safety concerns. While there is rarely clear evidence about the degree to which these concerns pose a real risk to children, most authors and practitioners agree that ECCE educators need to be aware of the debate about ICT use by young children, and the need to safeguard children's health and development.

Based on (Byron, 2008), (New Zealand Council for Educational Research, 2004), and (Stephen and Plowman, 2003), most of the safety worries may be classified into groups of concerns about:

- harmful physical effects,
- children's learning, cognitive, social, and emotional development,
- exposure to harmful contents,
- new technologies displacing other important learning and play activities.

We must deal with all of these concerns with attention. However, most of the authors who warn us about all risks and dangers, have often in mind the *solitary playing of computer games* and may not have actual insight into what are current modern trends in many innovative ECCE centres. As clearly expressed by Adams and Brindley (Hayes and Whitebread, 2006)... *The model of the passive child in front of the computer screen only holds until one has actually experienced young children interacting with any form of technology, whether it is a programmable robot, a digital camera or a computer. Immediately, one witnesses the engagement, the social interactivity and collaboration, the creativity that is stimulated and the potential of ICT for young children's learning becomes very clear.*

A guiding principle is the concept of the *developmental appropriateness*, which provides a useful general framework for teachers and decision-makers to develop their skills in recognizing and applying the most appropriate ICT tools (hardware or software). This framework identifies general criteria for determining the appropriateness of the ICT tools to be applied in the early childhood education. According to (Siraj-Blatchforfd, 2006) and (Siraj-Blatchford and Whitebread, 2003), the ICT tool should:

Be educational

Any ICT tool employed in the early years should be educational in nature. This effectively excludes all applications where clear learning aims cannot be identified.

Encourage collaboration

Working in collaboration in a range of different ways in interacting with technology is of the key importance. *Joint attention* and *children learning to share* and *being engaged jointly* provides a cognitive challenge for young children.

Support integration

ICT applications should be integrated as far as possible with other established ECCE practices (play, project work) which make the curriculum relevant to the children. ICT products should be integrated as tools. Tools are designed to be applied for particular purposes when required; they are not usually designed for continuous use for their own sake.

Support play

Play (role-play) and imitation are central to the processes of learning in the early years. Artefacts such as toys and other manipulables (functioning or pretend, including ICT tools) provide important symbols for the children to play with, a wide range of virtual objects and environments.

Leave the child in control

If possible, ICT applications should be controlled by the child; they should not control the child's interaction through programmed learning, they should not control the child.

Be transparent and intuitive

If possible, we should choose only such ICT applications which are *transparent* – their functions should be clear and intuitive.

Avoid violence or stereotyping

Where applications fail to meet these criteria it would be difficult to justify their use in any educational context.

Support awareness of health and safety

Time spent using any desktop computer application (and any other application) by a child should be comparatively short, not extending beyond 10–20 minutes at a time in the case of 3-year-olds.

Involve parents

When parents, teachers and children collaborate towards the same goals it leads to improved academic performance.

To understand all safety concerns appropriately, a systemic research is required. However, the only efficient way to eliminate or minimize potential harm is knowledgeable teacher. It is the teacher's responsibility to critically consider proper forms of ICT and employ them to support creative play and expression, both through the selective use of particular software applications and through using a range of different forms of ICT, such as digital cameras, sound and voice recording devices, programmable toys, educational robotics sets, digital microscope, etc.

MONITORING THE PROCESS

Research literature and also our own experience from various national and international activities proves that the process of integrating ICT into ECCE should be supported, supplemented, and monitored by a simultaneous evaluative research. This holds both if the process is conducted in a *top-down* style, e.g. as a national or regional developmental project, or as a *bottom-up initiative* of one or a few innovative ECCE centres in a country or a region. Such research should be operated in the long run and should thoroughly observe different attributes of the process like:

- initial teachers development – how is the initial professional development of the ECCE teachers designed and implemented; what is its content, form and extent and what is its actual impact on everyday processes in the centres;
- clear educational vision – do the principals and teachers have clear vision of direction and objectives of the process; do they have sound strategy how to clearly present it to parents, education authorities, etc.;
- support – has the ECCE centre or centres won the support of all actors involved in the process; are they able to involve the parents in the process;
- selecting ICTs – which technologies (both hardware and software) are being used; how are they being selected; how is their appropriateness evaluated; are they all acquired in one go or in several iterations resulting from continuous assessment;
- using ICTs – in which ways are ICTs used by teachers and by children; how are the activities exploiting ICTs organized; how do the pedagogies evolve; are children motivated to work with technologies and are they in control in the sense of the principles of the *developmental appropriateness* presented in the previous section;
- continuing professional development – how does the initial teacher development continue and how is it implemented at the centres' level; do teachers exploit ICTs more intensively and efficiently than before for their personal development due to higher level of digital literacy; are any open educational resources utilized for the teachers' professional development or by teachers themselves when they prepare or conduct activities with children;
- community of practice – has a professional community of common interests been established, which supports mutual communication, exchange and sharing the experience among practitioners and institutions; how is the dissemination of experience spreading beyond one centre (e.g. through open sessions for the colleagues from other centres, study groups, workshops, demonstrations, etc.).

RISKS TO SUCCESSFUL TRANSFORMATION

We should be aware of various risk factors, which may slow down successfully initiated process of integration of ICT into ECCE or even completely stop it. These include:

Lack of professional development

This may result from insufficient duration of the initial program for professional development; incorrect focus on training basic computer skills (instead of developing complex digital literacy, new pedagogies, new organization forms, etc.); incompetent mentors (from the perspective of their knowledge and experience with ECCE and pedagogy of ICTs).

Lack of understanding and/or confidence

It may happen that either teachers, parents, centre leaders, or educational authorities (at any level) will doubt or misunderstand the educational potential of ICT; they may interpret it as learning about computers; they may fail to identify the educational values and potential of ICT to support and enrich the learning processes, play and self-expression; they may lack self-confidence in their know-how to conduct the process of integration.

Even more dangerous risk is that public, politicians, or parents would fail to see the key importance of the pre-primary education as such. In that case they would not support additional investments into its personal and technical development.

Lack of support

If teachers – after completing initial professional development programme – are left alone to solve all everyday technical and educational problems concerning ICT by themselves, they may easily lose their enthusiasm. The same disappointment may result from none or insufficient support or isolation of leading innovative teachers, absence of their own professional community, etc.

Lack of educational resources

The lack of study materials, learning resources or any other supporting instruments to get, share and use for learning and teaching is another serious risk factor.

Lack of continuation

We have to thoroughly consider children graduating from well experienced and digitally literate ECCE centre (ISCED 0). Is there any danger that after their long-term technology enhanced practice those children will find themselves in a digitally underdeveloped primary school (ISCED 1)? Instead of this, their new primary teacher should identify their digital and higher order skills, respect them and build opportunities to cultivate them more and more.

RECOMMENDATIONS FOR POLICY AND PRACTICE

Finally we summarize several recommendations for policy-makers, educational authorities and innovative ECCE leaders to effectively stimulate and support the integration of ICT into early childhood education.

Clear vision and policy statement

It is essential that Ministries of Education set clear vision and policy statement concerning the role of ICT in ECCE – an ICT strategy for early childhood education. As an inspirational example, see e.g. The New Zealand Government's ICT framework for early childhood education (New Zealand Ministry of Education, 2009) which plainly states that... the thoughtful and meaningful use of ICT in early childhood education services can support children *to grow up as competent and confident learners and communicators, healthy in mind, body, and spirit, secure in their sense of belonging and in the knowledge that they make a valued contribution to society*.

Instruments to initiate and support integration of ICT

Corresponding instruments should be developed, e.g. ICT standards for ECCE teachers, curricular supplements, assessment framework, learning resources, collections of good practices and other supportive frameworks. Stimulating initiatives, national and regional projects, professional development programmes for educators and various forms of the permanent support of their work must be conducted continuously.

Professional development of the teachers

The essential imperative necessary for productive integration is professional development of the ECCE educators. We must be aware that the process of becoming ICT competent ECCE educator is a long-term transformation, which requires continuous support and monitoring.

Since its beginning, efficient professional development program must focus both on (a) developing *ICT literacy of the educators*, and simultaneously utilize their emerging new literacy for (b) building *new pedagogies of ICT in favour of children's learning and development*.

Safety concerns and gender issues

When designing and implementing an ICT strategy for ECCE, all safety concerns (as discussed earlier in this Policy Brief) must be fully respected. The *developmental appropriateness* (discussed ibid.) should be applied as a guiding principle whenever any new ICT tool (hardware or software) is being considered for the ECCE.

Moreover, thorough and complex integration of ICT (of various categories, in various scenarios and across curriculum) into ECCE will establish boys and girls as confident and equal users of ICT as a tool for *learning, self-expressing and communicating*. Such approach may postpone, restrain or moderate the stereotypes, which otherwise boys and girls create and carry to higher stages of education and for their lives.

On-site strategy

These are recommendations for a principal of an ECCE centre or any local or higher educational advisor, authority or decision-maker who plans to initiate or foster further progress in integration of ICT in the learning and playing activities of the centre.

- Familiarize with the potential of ICT to support and enrich the learning processes, play, self-expression, and complex development of the ECCE children in all developmental domains.
- Build your own complex digital literacy, especially knowledge and skills concerning appropriate, safe and productive use of ICTs to support your own learning and learning of the children. Your digital literacy must focus on mastering pedagogical aspects of harnessing ICT in ECCE.
- Set up appropriate learning and developmental goals, objectives, and strategy. Keep the strategy simple and flexible so that it can be explained to different people with different ICT competency level. When in the course of the transition the centre will learn more and develop deeper insight and experience, the goals and means how to achieve them may be extended or reformulated.
- Thoroughly select initial ICT equipment, not necessarily a rich selection (simple digital cameras for children to document their own work and a digital frame to present those pictures to parents, or a notebook with carefully selected drawing software, or a simple digital programmable toy robot may serve as highly stimulating beginning).
- Build the *ICT space* (*ICT corner)*, respecting all valid safety regulations. Keep it functional, practical, accessible, manageable, and flexible. Try to have it connected to Internet. Establish the *rules of usage*.
- Promote continuing professional development for the staff. Provide teachers with an opportunity to collaboratively design their own ICT-enhanced curricula.
- Search for examples of *good practice*; look for similar experiences at home and abroad. Learn from other innovative ECCE centres around the world, some of them have published their cumulated experience in highly useful websites. Good example is Homerton Children's Centre, see *ictearlyyears.e2bn.org*.
- Although many good practices are conducted indoors, it would be a major loss not to exploit productive opportunities of using ICT in the outdoors as well. *The outdoors is where some children learn best and technology can offer motivating, captivating and new ways into that learning* (Price, 2009).
- Win the support of the parents. They should understand the learning values of the integration of ICT. It is also highly recommended to learn from them what their children do with ICT at home and try to exploit it in our work.
- Reflect and learn to recognize and exploit new possibilities brought in by new technologies. Share your experience with others.
- Plan further development. Study actual trends in the area of ICT in ECCE, carefully observe how the integration of ICT is changing the climate in your centre, how the communication and collaboration between the teachers are evolving.

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One of the important research findings of 20th century was the recognition that early childhood and primary education stages play the key role in the development of the personality of children. Similar attention in high quality early childhood education has never occurred before. Another important recent finding points out the extraordinary potential of ICT to enhance the learning processes of children: digital technologies can provide children with new opportunities to attractive and relevant learning, communication, exploration, and development. Digital toys and tools properly integrated in learning and play can empower children by granting them a voice they have never had before. Digital technologies also open new pathways to social interactions and change the learning relationships between children and teachers.

The Policy Brief outlines the values that ICT offers to early childhood learning; gives different perspectives on the process of implementation of ICTs into ECCE practice; lists most frequent safety concerns and presents general criteria for determining the developmental appropriateness of the ICT tools to be applied in ECCE; calls attention to the necessity to support the transformation by simultaneous evaluative research; specifies several risks to the process; and summarizes several recommendations for policy and practice. The omnipresent message of the Policy Brief is the understanding that the potential of ICT for ECCE can be productively harnessed only if new technologies are integrated into early childhood learning experience alongside many other ordinary everyday activities, not displacing them.

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