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Modern approach to digital literacy development in education

The article is dedicated to the necessity of formation and development of digital literacies for the professional, educational and personal purposes. The article also provides a detailed classification of digital literacies and competences.

Rapid penetration of information technologies in almost all spheres of our life, including education, and the fact that most ordinary users received unlimited access to the Internet, has led to a rapid rise of the information volume or information explosion and massive changes in the way of communication between people in all spheres and also to forming the information society as one of the leading contemporary social processes. Such changes in socio-economic conditions modified the socio-psychological and psycho-pedagogical portrait of the students, the nature of their participation in educational, professional and social life, as well as the methods of teaching the humanities, computer and natural sciences.

The basis of modern educational paradigm are such theoretical concepts as digital literacies, distance learning technologies, information and communication technologies, internet resources, multimedia electronic textbooks, online courses, social networks, Internet resources, individualization and differentiation of learning activities, Personal Learning Network, etc. The importance of improving the educational process through the methodical training of faculty members and tutors, the application of use new technologies in teaching, the formation and development of information and communication competences, digital literacies and knowledge is emphasized.

Keywords: *knowledge digital divide, digital natives, digital immigrants, Personal Learning Network (PLN), social networking, critical thinking, E-Learning, distributed computing, on-line resource, ICT.*

СОВРЕМЕННЫЙ ПОДХОД К ФОРМИРОВАНИЮ И РАЗВИТИЮ ЦИФРОВОЙ ГРАМОТНОСТИ В ОБРАЗОВАНИИ

Статья посвящена проблеме формирования и развития цифровой грамотности для профессиональных, образовательных и личных целей. В статье приводится подробная классификация цифровых компетенций пользователя.

Стремительное проникновение информационных технологий во все сферы нашей жизни, включая образование, неограниченный доступ простых пользователей в Интернет – всё это привело к информационному взрыву и революционным изменениям во всех сферах жизни, к формированию информационного общества как ведущего социального процесса современности. Эти изменения способствовали трансформации как социально-психологического портрета современного студента и преподавателя, так и методов и технологий преподавания гуманитарных, информационных и естественных дисциплин.

Основой современной образовательной парадигмы стали концепции цифровой грамотности, дистанционных образовательных технологий, Интернет-ресурсы, социальные сети, индивидуальная траектория обучения, автономное обучение.

В статье подчеркивается необходимость непрерывного повышения квалификации профессорско-преподавательского состава в использовании информационно-коммуникационных технологий, в формировании и развитии соответствующих компетенций цифровой грамотности.

Ключевые слова: *«цифровые аборигены», «цифровые иммигранты», персональная образовательная среда, социальные сети, критическое мышление, электронное образование, распределенные сети, онлайн ресурсы, ИКТ*

1. Introduction

Federal Law N 273-FZ "On Education in the Russian Federation", dated December 29, 2012, clearly defines distance learning (E-Learning) and distance education technologies. Distance learning provides educational activities using databases of information to form a set curriculum. Information technologies and computer equipment are used to process these databases, and information and telecommunication networks ensure the transfer of these data and the necessary interactive communication between students and faculty members. Distance education technologies are associated with information and

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telecommunication networks which facilitate the indirect interaction between students and faculty members [1].

When implementing a curriculum by means of E-Learning or distance education technologies at the university or other educational facilities, an appropriate level of online awareness should be created. The required online awareness environment shall include: online information resources, e-learning resources, certain information technologies, telecommunication technologies and relevant technological tools, which shall ensure learning by the students of the curriculum regardless of their location [2; 5].

Increasing cultural diversity, integration and internationalization in our life have raised the quality of the educational standards.

One of the features of the process of education and self-education is the active application of Internet resources, ICT (information and communication technologies) competences and knowledge, and also digital literacies, skills and practices. Digital competence means confident, critical and safe use of IC technologies for professional, educational and personal purposes.

Today we have more access to technology than ever before: from gaming machines to cell phones, from fast Internet access at home, offices, universities and on the move to interactive television and various electronic content available through interactive whiteboards, netbooks and other technological devices and tools [3; 4].

There are increasing opportunities for technologies integration into educational contexts in both developed and developing countries. Today's learner is more likely than ever to have access to technology both at home and at school and to be interacting with

learning materials and others on a near-constant basis. Coupled with this greater access to technology and information is a regularly asserted belief in the human ability to know how to operate these technologies, and to use them safely, wisely and productively. People, especially young persons,– are very 'tech savvy' these days.

The source of misunderstanding, how IC technologies work and how they can be used by younger people, can be traced back to the early work of Marc Prensky [8], who promoted the concept of a knowledge digital divide in knowledge by popularising the terms 'digital natives' – those born into a world already brimming with new technologies and connectivity – and 'digital immigrants' – those born before such times.

Concept of the knowledge digital divide is presented in Table 1.

Much has been made of this distinction since that time. Prensky himself has gradually moved away from such a polemical age-based differential and many experts have been quick to elaborate that it is not necessarily the age of the user, but rather how much time and effort they put into using new technologies that lead to the biggest gap in skills between the more comfortable 'digital residents' and the less able 'digital visitors'.

It is often assumed regular, that the 'Net generation' are skilled users of all the technologies that are available to them: from social networks through blogs, from wikis to podcasts, video tutorials and beyond. The assumption is that because everyone can regularly see the users glued to their mobile phone screens, they must – by extension – be competent users of all technologies. It is often erroneously to assume that more presence of some technologies is

Table 1

Knowledge digital divide of Digital natives and Digital immigrants

Digital natives, digital residents or 'born digital' generation, net generation'	Digital immigrants or digital visitors
People born into a world already brimming with new technologies and connectivity, who have been familiar with information technology since childhood.	People born before digital era
Skilled users of all the technologies that are available to them; tech savvy; tech comfy.	Less skillful, confident and experienced user
They often tend to refer to technologies in the form of verbs.	They tend to problematize technologies through a predominant use of nouns.

enough to draw regular technology users to them, when in fact most current surveys of technology use point to a heavy dependence on mobile phone usage over any other medium. Rare is the learner who has worked out the edge that can be achieved by using various technology platforms in the service of their learning [5].

However, the research explodes this myth by showing that young people's immersion in these devices and the time spent on them is not due to an obsession with the technology per se, but largely due to the gadgets' ability to facilitate communication and to enhance young people's enjoyment of traditional pursuits. For most, the focus on this occupation is not the device itself, but more about how it can help them connect, relax or have fun. The technology itself can be 'invisible' to the young consumer.

This does seem to bear up earlier assertions by Prensky that 'digital natives' often tend to refer to technologies in the form of verbs (that is to say in terms of what technologies can do, and what technologies can enable them to do), whilst immigrants tend to problematize technologies through a predominant use of nouns. Information technologies reach their greatest level of utility, when they become ubiquitous, commonplace, everyday objects invisible save for the processes that they facilitate [6].

However, this level of comfort with certain technologies, this 'invisibility' does not necessarily carry over into any tangible or positive benefits in terms of their learning. 'Natives' are too often described as 'tech savvy' when what we really mean is that they are 'tech comfy': that is that they are comfortable with technology, but not necessarily in a good position to put it to work in service of their knowledge

and learning. A new educational role may assist in the transformation IT from practical, social and entertaining use of technology to more rigorous, pedagogical and scientific application.

2. Developing digital litaracies in educational process

In recent years a variety of ways of classifying and describing digital literacies have been proposed. As usual new literacies are divided them into four main areas: language, information, connections, design and redesign (see Table 2).

New key digital literacies, which focus on communication via the language of text, image and multimedia, include the number of the following ones.

Print literacy is the ability to read and produce online text, such as blog entries, tweets, emails etc. This is clearly related to traditional print literacy, but includes an awareness of online text genres. This requires some familiarity on the part of the teacher, particularly when working with the writing skill; as email and synchronous chat overtake the use of more formal letter writing, an awareness of genre, register and appropriacy will become ever more important.

Texting literacy means awareness of the conventions of texting language (abbreviations, acronyms, symbols etc.), and of knowing in what contexts to use or not use it. Whilst print literacy is a familiar typology, texting literacy remains the domain of regular mobile phone users and is much maligned in educational circles for the purported detrimental effect it is having on literacy.

Hypertext literacy implies understanding how hyperlinks in online text work, and being able to produce

texts with effective use of hyperlinking. In might include knowing how many hyperlinks to insert in a text and why, what to link to, understanding the effects of over- (or under-) linking in a text, and so on. Hypertext literacy also extends beyond the producer to the consumer, to issues of focus, concentration and multi-tasking. In an age of Web 2.0 where everything is linked to some-thing else, hypertext literacy demands that we consider how people read online, and how to keep them focused on particular sources, resources and tasks.

Visual, media and multimedia literacy is supposed to be an understanding of how images and multimedia (audio, video) can be used to supplement, enhance, subvert or even replace text communication. There is also an underlying need to produce multi-modal messages ourselves, from sharing our photos on Facebook to creating video clips for You Tube. In the epoch of Web 2.0 there are no longer passive consumers who need to learn how to sit back and critique mass media (although this is still a key skill). There appeared now 'prosumers' (producers and consumers) of multimedia artefacts.

Gaming literacy includes a macro literacy involving kinaesthetic and spatial skills, and the ability to navigate online worlds (such as Second Life) or use gaming consoles. Although at first glance this literacy may seem unconnected to education, there is a growing interest in serious games for education.

Mobile literacy suggests an understanding of how mobile technology is transforming our world, from issues of hyper connectivity (always being connected to the Internet), to understanding how to use geolocation and augmented reality. As suggested above, mobile phones themselves are perceived as somewhat problematic

Table 2

Classification Digital Literacies

Focus on communication via the language of text, image and multimedia	Focus on information	Focus on connections	Focus on design and redesign
print literacy	search literacy	personal literacy, including safety literacy	macro literacy
texting literacy; hypertext literacy	information literacy	cultural and intercultural literacy	remix literacy
visual, media and multimedia literacy	tagging literacy	network literacy	how to be the member of the digital culture
gaming literacy; code and technological literacy	how to find, evaluate and apply information	participatory literacy	

in class, where issues of focus and concentration appear to clash with having connected devices in the hands of learners. This can be exacerbated in the language class, where perceptions of a resultant lowering in the quality of language produced by the learners are coupled with teacher anxiety that an over-reliance on translation and phrasebook style apps and resources may impact on the independence of the students. Many of these concerns are a result of teacher misunderstanding of how mobile devices are used by younger learners, but also result from draconian policies that prohibit the use of such devices at the universities and schools. Key to acquiring mobile literacy and integrating it into the classroom are school policies regarding acceptable mobile use, as well as negotiation between teacher and the students.

Code and technological literacy involves apart from basic technical skills (such as knowing how to use a word processing program, or how to send an attachment by email), a basic knowledge of html coding can help us understand how online tools and products are put together and, more importantly, enable us to make changes to these to overcome limitations.

Very basic coding skills can help one customise the elements in one's blog for example, or route around censorship (for good or bad). A renewed interest in computer programming and related code skills can be seen in many countries around the globe. Social networks such as CoderDojo [9] have sprung up to fill the knowledge gaps in the teaching body, allowing young people to jointly develop these vital skills.

A focus on information is also important in using modern technologies. These are key digital literacies that concentrate on how to find information and resources, how to evaluate them and how to store them for later retrieval. They include a certain number of skills.

Search literacy indicates the ability to search for information effectively online. This means an awareness of search engines beyond Google, including visual search engines, voice-driven search engines and specialized search engines concentrating on single resource types. Arguably the most

basic and vital of the literacies, search literacy is increasingly important in an age where the production and sharing of online resources is spiralling out of control and data management is becoming increasingly challenging. Getting to what people are looking for is more of a challenge than it has ever been.

Information literacy is coupled with effective search literacy. Information literacy is the ability to evaluate online sources of information for veracity, and credibility. In this age of information overload, people also need to augment these two skills with filtering and attention literacy so as to know what to pay attention to and what not - and when. Information literacy requires a heightening of critical analysis of resources, an ability to judge and evaluate the utility of those resources and an ability to use them in the service of our learning [4].

Tagging literacy suggests knowing how to tag or label online content, how to create tag clouds and to contribute to 'folksonomies', i.e. user created banks of tags. As resources become more plentiful, there is an increased need to be able to classify, label, store and retrieve sites and information. Moving beyond simple bookmarking in browsers, tagging literacy moves classification systems online, into a more social space where scattered groups of users contribute to a group's knowledge and access to information by keeping a shared repository of relevant data.

A focus on connections entails, that these literacies come to the forefront in social net-working spaces and other online media where personalisation occurs. They may include blogs and wikis, as well as social networks such as Facebook. In such spaces users not only write about themselves and their lives, but also participate in wide social groupings that transcend more closed groupings in terms of ethnicity, religion, geography, etc. They include a series of particular skills.

Personal literacy means knowing how to create, project and curate online identity, present someone's own portfolio. This includes an awareness of issues such as online safety or identity theft. Knowing what to share – and with whom – has huge implications not only for our personal lives, but also for

our professional image and our career trajectory. Understanding the potential impact of our digital footprints is key to managing them.

Network literacy is focused on the ability to take part in online networks and to leverage these to help us filter and find information. For teachers and tutors, their PLN (Personal Learning Network) - online professional contacts - can be useful as a means of tapping into on-going professional development. Network literacy is about pure connections, about how people share and transfer information from one grouping to another. In many ways network literacy has obvious parallels in early communities of practice theory with its core and boundary members and their interactions inside and outside a given group.

Participatory literacy is closely aligned to network literacy. Participatory literacy involves contributing to and participating in online networks. This equates to something over and above merely reading professional development tweets on Twitter, but contributing your own tweets. Not just reading blog posts, but leaving comments - or even writing your own blog. Participatory literacy is the lifeblood of the post in Web 2.0 social era of distributed computing, where what you share is what you are. In this sense, many of the major implications of personal literacy also hold for this skill.

Cultural and intercultural literacy implicates understanding digital artifacts from other cultures, and interacting effectively and constructively with people from other cultures takes on even more importance in our global world, where intercultural contact via digital communication is increasingly possible and increasingly likely. As learning projects become more globalised, more exchange based, learning how to interact with other cultures is key – not only to successful completion of a given project, but further on, with wider implications in the professional sphere.

As a result **focusing on content design or redesign** macro literacy and remix literacy are usually distinguished.

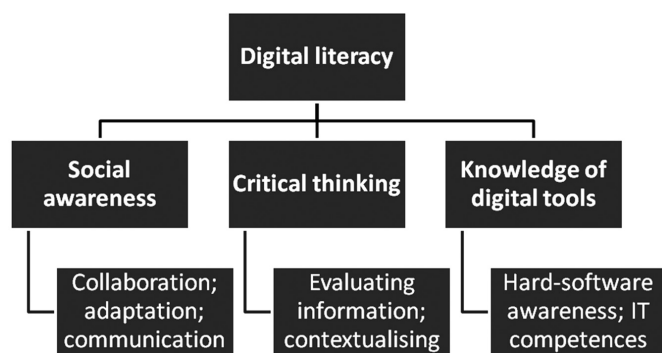**Macro literacy** refers to the ability to repurpose or change already-made content in order to create something

Figure. Factors, influencing the development of digital literacies

new. Typically it is associated with multimedia expression.

Remix literacy refers to the modern trend of 'remixing' pictures, videos and other media and receiving striking effect. This may relate, for example, to the trend for making 'literal versions' of music videos, through remixing music videos for political or satirical ends. This literacy is also closely associated with Internet 'memes'[10]. In each instance, recognition of the 'remix' that has taken place is crucial to an understanding of the media being viewed.

To be concluded, on the whole digital literacies are based on social awareness, critical thinking and knowing digital tools (see Figure).

3. Conclusion

The penetration of information technologies in almost all spheres of our life, including education, and the fact that most ordinary users received unlimited access to the Internet, has led to a rapid rise of the information volume (information explosion) and massive changes in the way of communication between people in all spheres and also to forming the information society as one of the leading

contemporary social processes. Such changes in socio-economic conditions modified the socio-psychological and psycho-pedagogical portrait of the students, the nature of their participation in educational, professional and social life, as well as the methods of teaching the humanities, computer and natural sciences.

Many years of empirical observation and scientific experiments prove conclusively that digital natives perceive and process information very differently than digital immigrants. The representative system in digital-natives and their mnemonic processes of digital-natives are better able to receive and retain the data through audio and visual channels.

Based on the scientific works of the outstanding Russian psychologist A.R. Luria [6], modern scientists came to the conclusion about the changes in mental processes, depending on the influence of long-term human-computer interaction in childhood and adolescence. These students have a hypertext structure of cognitive structures, i.e., cognitive processes occur in parallel rather than in turn. Therefore, teaching any subject based on textual material can sometimes slow down the learning processes, because today's students

are accustomed to getting information through other channels.

Scientists found out the following specific features of cognitive processes of digital residents:

– perception and understanding three-dimensional and multi-dimensional images;

– use of connection diagrams or intellectually card (mind maps), relating to the associative thinking processes;

– ability to mentally virtually perform actions with objects and visualize the results of these actions;

– observation of several separate images – so called 'dispersal of attention';

– ability to respond to expected and unexpected stimulus or stimuli.

Therefore, nowadays it is considered to be necessary:

– to develop digital competence and create conditions for successful implementation of effective educational policy in the field of electronic, open and distance learning;

– to train specialists and faculty members in the field of ICT;

– to create conditions for international examination of the content and processes in distance learning,

– to provide opportunities for virtual mobility and E-Learning;

– to support not only theoretical but also empirical research in the field of mobile learning and information security of e-learning;

– establish conditions for professional networking community to organize, classify, identify best practices of electronic educational resources for subject areas, as well as an assessment of their quality;

– to promote ICT competencies of educators at various levels and to look for ways to increase their motivation.

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