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Teachers and ICT skills: towards a new digital literacy

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Introduction

The information society, as an organizing paradigm of our society, is based on a vision of a globalized society, supported by the development of the Information and Communication Technologies (ICT). These technologies enable a quick communication, production and distribution of information, they accelerate the change and the outdatedness of knowledge and skills and, consequently, they raise the need for ongoing training. The use of ICT in all the fields of personal and professional life changes the socio-cultural coordinates, making this society more dependent on media in the processes of communication, interaction, socialization, work, learning and training. This framework of reference should necessarily have an impact on the adequacy of the educational and professional development systems. In what concerns the ICT teacher training for the school of the information society, the thematic bibliography show expressions such as ICT skills, digital skills, teacher 2.0 skills, digital literacy, technological literacy, among others. Although there is no full consensus on the meaning of these expressions, its ultimate goal is to train teachers to the use of ICT in the teaching-learning processes. This is the aspect that most efforts have been developed on.

The term digital literacy usually arises with a broader meaning, encompassing not only the acquisition of the necessary skills for the use of the ICT in a school environment, but also with the sense of educating for the media. It is in this sense that it is used in this chapter, where it is intended to demonstrate a new professional

development context, addressing a new professional profile in relation to the ICT and demonstrate the need for a more comprehensive digital literacy.

A new context of teacher professional development

If we consider some of the documents of the European Union, OECD or UNESCO, which are international organisations who care about the orientation of educational policies and the corresponding teacher training, we see the ICT constantly associated to the development of a new culture of learning and training. In the new social context it is unthinkable to separate the processes of learning and training from the ICT. We have seen the emergence of new models of school transformation, with new roles for the teacher and for the learner (OECD, 2001).

Western countries have implemented successive reforms of educational systems, in order to adapt them to the new education and training needs of the information society. One of the key reforms is that of the teacher training systems, as catalytic agents of educational changes, seeking to develop a new professional profile more adjusted to the new educational challenges.

The introduction of reforms in the teacher training systems is not a recent process nor is it free from suffering some corrections. Marcelo (2002) points out that one of the criticisms to the current teacher training programmes is their poor adaption to the changes produced. Esteve (2003) refers to the maladjustment of the training systems, pointing out that the training of teachers has been targeted at social contexts and educational systems which have ceased to exist or have lost much of the meaning of their existence. Without any doubt, some important aspects should be addressed at the time of the implementation of any major reform that aims to qualify the education professionals for the adequacy of the educational systems to the current social context. One of the main reforms has been focused on the initial training.

Nowadays we know that it is too pretentious to view initial training as a step to provide a set of knowledge and skills for all the professional life. Traditionally, the training monopoly has been assigned to initial training. In-service training has emerged in a more secondary plan if compared with initial training. What was acquired during initial training has, in fact, an increasingly relative utility when compared to the advances produced by research, production and circulation of knowledge. As a result,

criticism has been more frequent towards initial training programmes and its current limitation to prepare people to exercise a lifelong profession.

The growing emergence of the importance of in-service training as a fundamental stage of training does not remove importance to initial training. It is only recognized that in addition to the initial training there is a continuous training that is as much or even more important than initial training.

The latter tends to lose the center of gravity and is no longer the only way of accessing to professional development. In fact, in-service training has taken on increasing importance over educational and training systems. Initial training is increasingly seen as an initial process that opens the doors to a professional dimension based on lifelong learning. In this sense, teacher training requires a very strong interconnection between initial and in-service training.

The ICT, since its emergence and growing implementation on a larger scale in society, always exerted pressure on the school and on the professional development of the teacher.

In terms of timing, this pressure became more evident in the second half of the 80's of the 20th century, with the emergence of the personal computers or desktops. In the early years of the 90's, with the emergence of the hypermedia, this pressure has become even more evident. And, a third stage, which intensifies even more the pressure on the education and training systems, starts in the second half of the 90's, with the arrival of the Internet. With the development of the Web 2.0, in the first decade of the 21st century, the emergence of the e-learning platforms, and the generalization of the mobile computing, which allow the communication and interaction based on new space-time coordinates, the pressure intensified even more. If we add the emergence of some movements arising in the information society, such as the open source, the open access, as well as the problems of copyright and security issues in the digital world, we find that the challenges of the training require the constant acquisition of new skills.

A professional who uses ICT is constantly in a process of devaluation of skills associated to technologies and previous work methods and in a process of valorisation of skills associated to the emerging technologies and associated working methodologies, learning and training. Although it is now frequent to refer in the educational speeches about the teacher's 2.0 training, for students 2.0, in a school that should be 2.0, the teacher training systems should worry about training

teachers for the future, in order to qualify them for a constant change. If the teacher now is the teacher 2.0, he should already be preparing to become the teacher X.0+1 (Meirinhos & Osório, 20029). As such, the first skill to be developed should be the ability to change and innovate.

Teachers and ICT skills

In Portugal, the specific profile of professional performance of the kindergarten teacher and the teacher of the first cycle of basic education is established by the Decree-Law No. 241/2001 (30 August).

Without exhaustive references, both profiles have skills related with the use of the ICT: i) the general profile refers in its development the dimension of teaching and learning that the teacher “uses, depending on the different situations, and incorporates properly in the learning activities several kinds of languages and different supports, in particular the information and communication technologies, promoting the acquisition of basic skills in this latter domain”; ii) in the respective specific profile, and in the context of the design and development of the curriculum, the kindergarten teacher “mobilizes and manages the educational resources, namely those linked to the information and communication technologies”; iii) as regards the specific profile of the teacher of the first cycle of basic education, within the framework of the design and development of the curriculum: “he promotes the integrated acquisition of methods of study and intellectual work in learning, namely at the level of the research, organization, processing and production of information, using the information and communication technologies”.

This profile seems too vague with reference to the digital literacy modern teachers need to develop.

One of the permanent aspects in the debates about the training of teachers has been the need to develop skills for the use of the digital technologies, in order to put them at the service of the teaching and learning.

The approach of these new skills has been made by a wide range of educational researchers. In the thematic bibliography expressions such as transformation of the teaching function, new professional profile for ICT, 2.0 teacher profile, among others are quite often found. Associated with these profiles lists of ICT skills that the teachers should have in the information society arise frequently.

Generally speaking, three levels of skills appear well evidenced: i) technical training; ii) technical and pedagogical training, and iii) learning and training in learning networks.

Technical training is related to the field of the technical instrument and computer tools, in a more instrumental way. The appropriation of technology and its easy and transparent use by the teachers is a necessary condition so that they can develop pedagogical ICT related skills. This kind of skills allows the teacher to become independent in the use of technology and to develop their own teaching materials (tests, worksheets, presentations, etc).

The second level is related to the development of technical and pedagogical skills, necessary for the use of technology in learning contexts. Being an inevitable reality teachers need to learn how to use such technologies for educational purposes. It is a means of giving teachers, skills about the ways of using and implementing these tools for learning promotion purposes. Something many authors call ICT curricular integration. This is a very important point of view, focused on the promotion of learning and cognitive development of the student in disciplinary, interdisciplinary and extra-disciplinary contexts.

The lists of skills teachers should possess in relation to the specific domain of ICT in educational contexts rely a lot on this second perspective: the use of the ICT for learning purposes. The TPACK model (<http://tpack.org>) focused on the interaction of three components: technology, content and pedagogy. Used by many researchers, it is an example of the importance attributed to this dimension of the use of ICT for the promotion of learning. It is a very essential and necessary component, but it should not be seen as unique.

Despite the importance attributed to the second level of skills, it begins to be evident that the skills belonging to a third level “... the future teacher will find on the ICT a precious aid that will help him to pursue the professional development and to create learning and teaching situations that arise in a spirit of a pedagogic renewal” (Loiselle *et al.*, 2006, p. 83). These networked training skills present several aspects. They are necessary for the teacher, while educational agent, to the extent that he can also create conditions so that his students learn using the new distance learning environments. In this sense, this is a continuation of the second level of skills, because the aim is the use of the ICT for educational purposes. On the other hand, they are also necessary for the teacher, while trainee, predisposed to a continuous

improvement, in order to promote their professional development in distance training environments, supported by the collaborative/formative technologies. Nowadays, the teacher continues their professional development in virtual communities, communities of practice, Mocc courses, etc. They are also required to work in a team and to make out the school from their own walls and to establish a new school-family relationship.

International institutions and the ministries of education of all European countries have had concerns with the development of skills by teachers. The UNESCO project *ICT Competency Standards for Teachers* presents a model that aims at the improvement of education and consequently at the economic and social development of the countries. UNESCO develops a modular model with six components (Figure 1), where its main concern is not only the development of skills on the part of the ICT teachers, but it also presents a broader view, with the objective of changing the education system, including the transformation of the school organization.

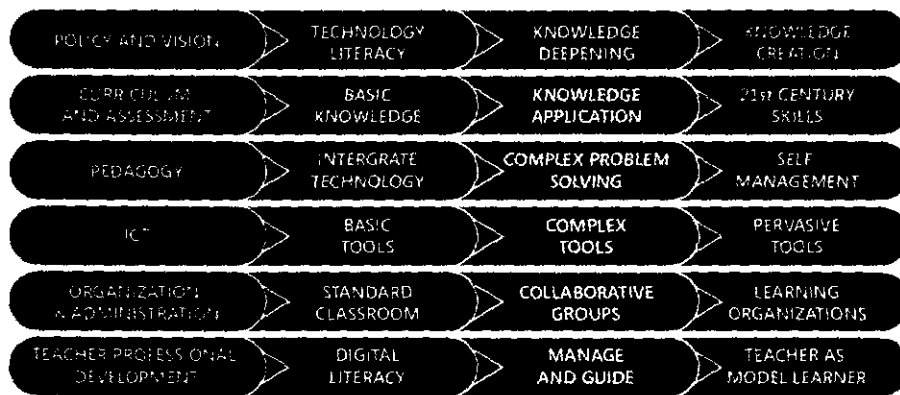


Figure 1. *ICT skills development model* (UNESCO, 2008)

The model forms a matrix with six components: political vision, curriculum and assessment, pedagogy, the use of technology, organization and school administration, and professional development.

In a study commissioned by the Ministry of Education to a group of Portuguese researchers, in the field of ICT in education, a framework for the training and accreditation of ICT skills, for teachers and non-teaching staff was elaborated. The

plan was later adopted by the Ministry of Education through the ministerial order No 731/2009. The training curriculum was only a plan with good intentions and it does not go further than the beginning of its implementation. The authors have created a framework based on three levels of skills (Figure 2).

For the relation of our study we use the information and the context created by this group of researchers and we seek to specify multiple skills for each of the three levels.

The authors sought to develop a framework of ICT skills, based on international models, in particular that of the UNESCO, which adjusts to the Portuguese reality and allowed to give consistency and coherence to the other elements of the system itself, that is, the training and skills certification. The model should be seen not only as a support to the organization and development of training of the educational agents and to the skills certification, but also, more broadly, as a basis for reflection and support for their professional development. This facilitates the analysis process of the needs of individual and institutional training, the decision-making about the processes and training pathways, the direction of investments, the evaluation of the results, the investigation about the change of practices or the improvement of the school system" (Costa *et al.*, 2008, p. xviii).

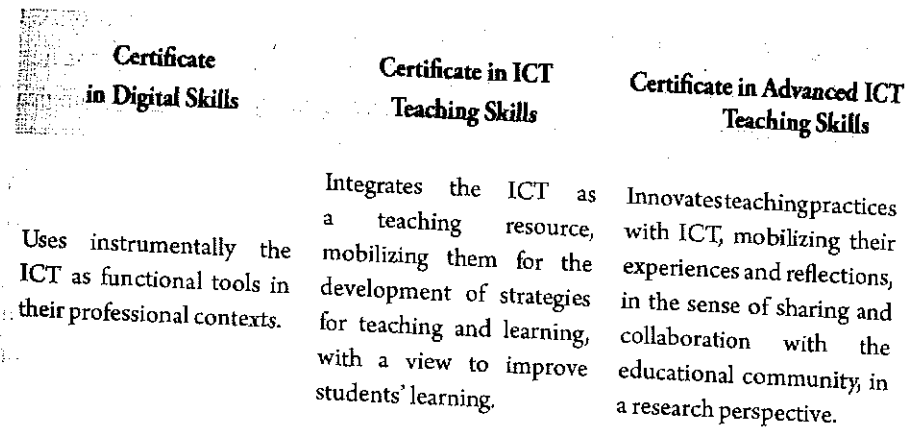


Figure 2. *Levels of ICT skills for teachers* (Costa *et al.*, 2008)

The framework focuses mainly on the training and skills certification through the training of teachers for the curriculum integration of the ICT in an innovative way.

In the study a proposal for training actions, with the skills to be acquired is also presented. Like any other model, this is also questionable with regard to the global development of skills in digital literacy.

The lists of skills are required because they guide the skills and competences to be developed in a more concrete way, but they need to be constantly updated. They cannot be viewed in a static way, but its dynamic and evolutionary nature must be kept. Also, to certify ICT skills, we should be aware of its relative valuation, since what we can consider as basic skills currently, may be considered insufficient, or even unnecessary, in the future. In this logic, the certification of ICT skills would be subject to an "expiry date". Teachers cannot fall in the called "technological imprisonment", in the sense that after mastering a technology, that would be seen as the only, or the best and they feel no need to evolve into other more appropriate ones and with more potential.

For a more comprehensive digital literacy

The model presented in Figure 3 aims to show globally the digital literacy and needs of the teachers. The model is based on two aspects: educate for the media and educate through media. The three core levels, adopted by the Ministry of Education of Portugal (based on the study of Costa et al 2008) for the certification of ICT skills, should not be viewed statically. It is true that to develop the skills of the next level the previous ones are required. However, the technological and pedagogical developments make that the skills change in each level. Some may no longer be relevant and new ones may emerge. In this sense, the certification of skills of a teacher, in the first level, does not guarantee the technical skills (or of other level) for their entire working life.

These three core levels of skills aimed at qualifying the teacher for the integration of ICT in the learning processes, through an innovation that leads to a change of practice in order to obtain better results.

This aspect is headed for what many researchers call educate through the media for decades, aiming at the use of new technologies to promote the learning.

In a society completely mediatised, the need to acquire other skills became evident, as the administration skills with ICT and skills for the training with ICT.

This qualification is necessary for the teacher, while a professional, although it is not directly oriented towards the students' learning processes. (Figure 3). Nowadays, ICT administration skills are necessary for the teacher to manage administrative procedures within the disciplinary groups and the school. The schools are increasingly networked, they are also required to provide information to the community and to the parents, including to sharing information with parents and collaborate with these in the online resolution of some of the educational problems of their children. In the future, the parents can follow their children more effectively, without the need to go in person to the school. The training skills with the ICT are already very evident in our days. In addition to the technical domain of remote communication tools, are required skills not only of self-learning, but essentially of networked collaborative learning, in order to participate effectively in virtual communities of learning, practice or distance education aimed at the professional development, in formal or informal learning environments. The success achieved by some communities of practice comprising teachers from several institutions and even from different countries, where they share experiences, solves problems in mutual aid, discuss practices and problems of the profession, are a clear example of one of the following paths for the professional development.

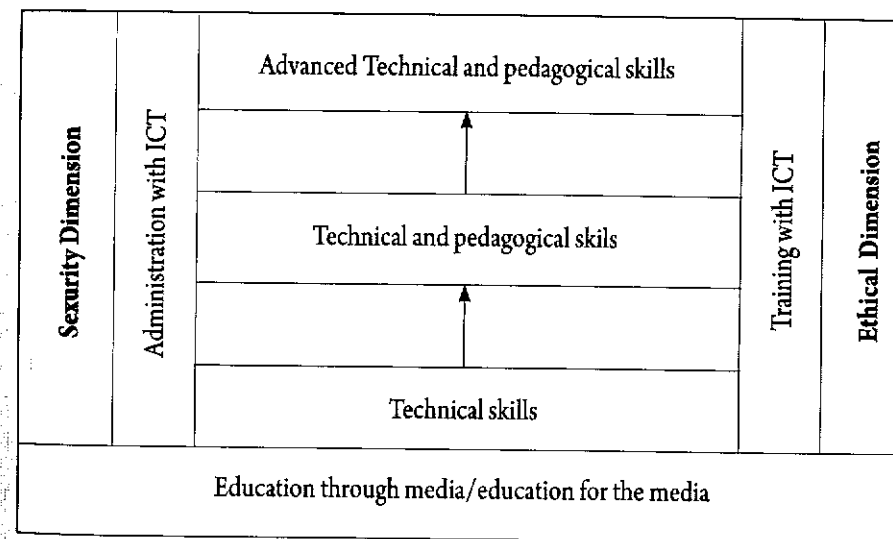


Figure 3. Model for a new teachers' ICT literacy

In the professional and pedagogical use of ICT, we can already envision the need of developing skills in two dimensions: the security dimension and the ethical dimension, which will be addressed below. These dimensions fit within the line of thinking of many researchers, known as education for the media or media education. An expression widely used in the era of the mass media. In the era of digital convergence and predominance of the internet, the communicative process has changed: people are no longer a passive receiver and became active communicators. The possibility of being creators and authors, in a mediatised world, are today very incremented.

If we accept that the school prepares the students for the use of the ICT in a critical and reflective way, the teachers must be trained for this purpose.

As Buckingham (2006) says:

The internet, computer games, digital video, mobile phones and other contemporary technologies provide new ways of mediating and representing the world, and of communicating. Outside school, children are engaging with these media, not as technologies but as cultural forms. If educators wish to use these media in schools, they cannot afford to neglect these experiences: on the contrary, they need to provide students with means of understanding them. This is the function of what I am calling digital literacy (p. 264).

Pérez Tornero and Varis (2010) addressed the concept of media literacy. According to these authors, media literacy should offer concepts, rules and competences to help people to properly use the information disseminated by the media (p. 79). Also, according to Gutiérrez and Tyner (2012), it is not just about educating as recipients of the press, radio and television, but farther more about providing skills for the critical use of ICT (mobile tools, the internet, videogames, social networks, webTV, interactive digital boards, virtual communities, etc).

According to Gutiérrez and Tyner (2012) "the dichotomy of educating with media or on media has been maintained in institutions clearly stressing the first one" (p. 33).

The security dimension and the ethical dimension

The need to develop skills related to a conscious and critical use of the technologies is now becoming very obvious for a new digital literacy of the teachers. The massive use of a new technology entails the creation of new realities, which require the change of habits, behaviours and ways of thinking. It changes our paradigm. What we do and how we do it in a face-to-face world is different from what we do in a virtual world.

We are immersed in a new technological, social and cultural environment. Many of our daily experiences are experiences with artefacts which act as mediators that offer us a symbolic representation of the reality, with different degrees of iconicity. It is in fact a new experience for mankind. The influence of the technology is such that changes what we know, the way we think, the way we see the world and how we relate and act with each other. Many dilemmas have arisen in this new context of the information society: the Internet security problems, addiction, piracy, plagiarism, cyber-bullying, among others.

The security dimension became evident through the fact that emerges from a social problem: the safety of children on the Internet. How social problems are transformed into educational problems? This is one more problem to be solved by the school. The teachers need to be trained to solve this dilemma that the school faces. The Portuguese Ministry of Education created the week of the "Safer Internet", where schools carry out activities with the objective of informing teachers, parents and students about the results of the risks of a bad or less conscious use of the Internet, reflect on risk behaviours, as well as about the procedures to be followed to eliminate or decrease the probability of occurrence of such risks.

The new digital technologies sometimes allow the creation of new procedures, new action models, whose rules are not clearly defined in the "modus operandi" of the previous paradigm. Take the case of the copyright, where just now began to be developed new rules to manage the intellectual property (Creative Commons licensing and GPL licenses, among others) and the case of copy-paste and the availability and quick access to information, which is transforming the way of carrying out the schoolwork by the pupils. The emergence of a technology capable of creating new realities and that increases our potential should not mean a use with

the absence of rules and values. The latest information technologies, such as the above, are not good or bad in it. Everything depends on the use we make of them. This practice is now at a "distance of a click". Plagiarism has always existed. Now it is much facilitated by the technology we use.

In the same way as already spoken before the emergence of the Internet in "educating for the image", taking into account primarily the effects of the television and video games, we should talk now in "educating for the Internet", in order to avoid falling into the same mistakes. The convergence of the digital media has led some authors to talk in the new media. In this sense there is also talk on "educate to the new media" and "media literacy".

Resorting to plagiarism, in this case to cyber-plagiarism, such as the security issues in cyberspace, is a social problem. The problem is quite evident at the level of higher education, where a lot of research has been developed at this level. However, the problem seems to be less conscious at the level of basic education and secondary education, where it is not so visible socially, maybe because it is circumscribed to the academic environment. Usually, they are the social problems which become school problems. In the case of cyber-plagiarism, it is closer to a school dilemma that turns into a social problem.

Regarding the practice of plagiarism, it becomes urgent to assess the level of consciousness of the several school actors (students, teachers and principals) and to study the causes and consequences and to prepare the teachers for the scourge that overwhelm the schoolwork in our days.

Teachers should be aware of what is plagiarism, of its different forms and the ways to detect it. A plagiarized work is a thoughtless work, without any meaning. This habit of using technologies in a less ethical way, acquired by the students in the basic and secondary levels of schooling, ultimately continue to higher education, where it becomes more visible. As every educational problems, also this, the use of ICT in a less ethical way, should not be a matter exclusively for teachers, but also of the educational policies of the Ministry of Education and the internal policies of each school.

Conclusion

Nowadays, it is urgent to develop critical and reflective thorough knowledge about the digital media, related with the advantages and consequences of a less conscious use. If the development of skills for educational ICT education is unquestioned, if we want to have a school that fulfils its functions in the information society, we must not fall into an unthinking technological determinism, where technology is seen with absolute power (Postman, 1993). It is necessary to add a fundamental vision: to analyse the implications of the use of the Internet in people's everyday life, reflect the practices and the ways of use. That is, we should not look to the Internet (and its communication languages) only as a means of learning, but also as a subject of study.

The digital literacy in the context of the initial and in-service teacher professionalization should not only focus on the skills development to the use of ICT in the school context. By their condition of mediatisation in the today's world and the consequent presence and importance of the ICT in the society, teachers also need to develop skills in the security dimension and ethical dimension, framing these dimensions in the approach, often neglected, in the teacher training curriculums, called education for the media. The professional development of teachers in ICT should avoid this duality educate through the media and educate to the media. Both aspects should be part of the curriculum of initial and in-service training. In fact, nowadays, this duality should be merged into a new digital literacy of teachers, in an integrated and coherent way, because only in this way teachers can be qualified to develop in students the skills that they need to live in the information society.

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