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Information and Communication Technology in initial teacher education in Portugal: An analysis of first cycle degree courses in basic education

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In a period of constant allusions to the reform of education systems and to models of professional teacher training, with the aim of adapting to the Europe of Knowledge, we have set out to perform an analysis of the curriculum plans of the various teacher training institutions, both public and private, which in Portugal deliver the course of Basic Education. The results are analysed in the light of the professional teacher profile and the respective competencies which bibliographic research permits us to characterise.

This work has as its objective the realisation of a critical reflection on the introduction of competencies in Information and Communication Technologies (ICT) into the Licence's Degree in Basic Education (1st cycle of Bologna), in the area of initial teacher training in Portugal. This type of training began functioning in the 2007/8 school year, in different public and private institutions of Teacher Training.

For the present reflection, curriculum plans of the respective degrees were analysed, which were consulted on the Web sites of the institutions. In addition, the decree-laws and ordinances which approved the study plans were considered and the Portuguese legislation related to the creation of these degrees was analysed. We have sought to carry out the analysis in accordance with the professional teacher profile which the thematic bibliography today enables us to identify.

In this text, we begin by describing the context of professional training in the contemporary information society. We enumerate, in what follows, in a general way, the competencies necessary for this new professional profile and we identify those which are found in the Portuguese legislation. Following a presentation of the more relevant indicators and their interpretation, we emphasise the need for training in ITC before the professional life of the future teacher begins.

A new context of professional training

The information society, as a paradigmatic organiser of western society, is based on a new vision of a globalised society, supported by the development of ICT. These technologies enable the rapid production and distribution of information and of scientific knowledge, accelerate change and stimulate, therefore, the need for permanent training. The utilisation of ICT in all fields of life, both personal and professional, alters social and cultural coordinates, causing society to become more mediated in the processes of communication, interaction, socialisation, work, learning and training. This framework of reference must necessarily have repercussions in the updating of education systems and professional training.

It is enough to bring to mind some of the European Union, UNESCO or OECD documents, because these international organisations seek to guide educational policies and the

corresponding teacher training, in order to see ICT constantly associated with the development of a new culture of learning and training. In this new social context it would be unthinkable to separate processes of learning and training from ICT. It is a fact that we are seeing today a degree of linking or interdependence of the processes of learning and training with the innovating potential of ICT, aiming at the creation of new spaces or new educational scenarios which are capable of substituting contemporary ones. These appear incapable of giving adequate answers to the new demands and challenges of the information society.

We are witnessing the appearance of new functions for the school, for the teacher and for those who learn. In the ubiquitous Bologna process, beyond the politics of convergence which the plans of training and professional mobility between the various European countries aim for, there is a strong undercurrent of orientation. This makes the continuous development of competencies a priority, associated with a process of learning and training centred on those who learn, in contrast with the mere acquisition of information and also in opposition to the traditional passive role of the person responsible for the learning. It was in this sense that the ECTS (European Credit Transfer System) was created, defining the base of work which each student must develop in each Unit of Credit (UC).

Europe aims at developing the European Space for Higher Education, seeking to achieve and consolidate the Europe of Knowledge by 2010, respecting diversity, but increasing compatibility and comparability between the European education systems. In the attempt to adjust their educational systems to the new necessities of education and training, the western countries have sought to implement successive reforms. One of those reforms which appear to be fundamental is the reform of the systems of teacher training, teachers being catalysing agents of educational change who seek to develop a new professional profile which is better adjusted to the new educational and training challenges of the Europe of Knowledge.

The introduction of reforms in teacher training systems is not a recent process nor is it free of corrections. Marcelo (2002) highlights that one of the criticisms of the programs of teacher training is its poor adaptation to the changes which are made. Esteve (2003) refers to the misalignment of the training systems, pointing out that teacher training has directed him-/herself towards social contexts and education systems which have now ceased to exist or have lost much of the sense of their existence. Without a doubt, these are important aspects for reflection, which should be present at the moment of implementation of any serious reform, and which aim at giving the professionals of education the capacity to update education systems in the current social context.

It would be too utopian nowadays to think of initial training as a stage capable of furnishing a baggage of knowledge and competencies for the entire professional teaching life. Initial teacher training is a way of preparing future teachers for the challenges of their career throughout their professional development (Mingorance, 2001). "The training of a teacher is a long way from ending at initial training, this being, however, a fundamental stage because it gives perspective on and largely orients the pathway which follows" (CRUP, 2000, p. 12-13). In fact, what is aspired to, at this stage, is the provision of the basis of a profession. Canário (2001) approaches initial training as the first stage in a life-long project of continuous training. Also Roldão (2001) approaches initial training as a first step in a structured base for autonomous professional pathways, the activity of teaching becoming a professional activity which is socially structured in a process of continuous development and permanent contextualisation. In this sense, initial and continuous training constitute a continuum, with the initiation to the teaching

profession following to initial training, in a dynamic and evolving process of professional development, constantly reaching for excellence.

A new professional profile in relation to ICT

One aspect which is often referred to in the training of teachers has been the need for teachers to develop capacities for the use of digital technologies. From the moment of their appearance on a wide scale in society, these technologies have always put pressure on the school and the personal development of the teacher, thus provoking diverse reactions among education professionals.

In terms of time, this pressure appears to have begun in the second half of the 80s, with the evolution of personal computers. A second phase, which reinforced the pressure exercised by the first, began in the first years of the 90s, with the growth of hypermedia documents. And a third phase, which intensified still more the pressure on systems of education and training, began in the second half of the 90s with the educational applications of telematics (Osório, 1997). This phase continues with the development of e-learning platforms, the dissemination of Web 2.0 tools and the generalization of mobile informatics, which permit communication and interaction based on new spatial and temporal coordinates.

Machado (2001) points out the relevance of training in Information and Communication Technologies for the acquisition of a new attitude towards these, as well as a greater capacity to deal with new educational challenges. In this way, the technologies appear to function as promoters of the educational transformation. In general terms, it seems to be well evidenced that there are three levels of competence: i) technical training; ii) technical and pedagogical training; iii) learning and training in the new environments of long-distance communication.

Technical training is related to the dominion of the technical instrument and the computing tools, in a more instrumental perspective. This dominion of technology is of the utmost importance. According to Carnoy's opinion (2004), the biggest obstacle to the extension of learning and the altering of processes of work based on ICT in the schools is the lack of computing knowledge of the teachers. The lack of computing knowledge, according to the same author, is also manifested in an attitude of resistance because the teachers do not feel comfortable in its use, except in some rudimentary functions. The appropriation of technology and its effortless or transparent utilisation on the part of the teachers is a necessary condition for the development of pedagogical competencies related to ICT and the ability to place the technologies at the service of education and training.

The second level is related to the development of technical and pedagogical competencies, necessary for the use of the technologies in contexts of learning. As Lessard and Tardif (2004) have shown, ICT can transform the function of the teacher. Facing an inescapable reality, teachers increasingly need to learn to utilise such technologies for pedagogical ends. What is needed is to furnish teachers with the capability to use and implement these tools in order to promote learning, which many authors call curriculum integration of the ICT. This is a truly important vision, centred on the promotion of learning and the cognitive growth of the student, in disciplinary, interdisciplinary and extra-disciplinary contexts, making use of the potential of ICT as cognitive tools. According to Raby (2005), the development of these competencies is not achieved with a university course or with a training course, but is a long-term process with demands time and effort. The lists referring to the competencies which

teachers should possess in relation to the specific dominion of technologies¹² in educational contexts put much weight on this second perspective. As an example, the list of Majó and Marquès (2002) can be referred to, this with 11 items and that of Gallego et al (2003) with 12 items.

In addition to the relevance attributed to the second level of competencies, the competencies referring to the third level are also beginning to be clearly evident. For example, Majó and Marquès (2002) refer, in their last item, that the teacher should be capable of: “applying the ICT to teaching as an instrument of didactic innovation: the creation of Web pages, the organisation of virtual tutorials with their students, using the resources of the Internet for their classes and to propose activities to the students...” (p. 325-326). “...the future teacher will discover in ICT vital aids which will help him or her to continue with professional development and to create situations of learning and teaching which are a part of a spirit of pedagogical renovation” (Loiselle et al, 2006, p. 83). These competencies for training in the network involve various measures. They are necessary for the teacher, as an education agent, to the extent that he or she can also create conditions for his or her students to learn by using the new distance learning environments. On the other hand, they are also necessary for the teacher as a trainee, one predisposed towards continuous improvement, who can thus promote his or her own professional development in distance learning environments, supported by training technologies. They are also necessary in order to work in a team and to enable the school to go beyond its walls and establish a new school-family relationship.

The professional profile according to Portuguese legislation

In Portugal, the main principles regulating the instruments for the creation of the European Space for Higher Education were established by the Decree-law no. 42/2005. In its turn, the judicial regime for the degrees and diplomas of higher education was established by the Decree-law no. 74/2006, in accordance with the Basic Law for the education system and with the above Decree-law no. 42/2005. In the meantime, the Decree-law no. 43/2007 (February 22) approved the judicial regime of professional studies for teaching in pre-school, primary and secondary institutions. The qualification for pre-school and basic education teaching is attributed through getting a first degree in Basic Education (180 ECTS) and by a master’s degree in the speciality (90 ECTS for pre-school teachers and 120 ECTS for the primary and intermediate-level cycles of education). The intermediate-level teachers (second cycle of Basic Education) become generalist teachers in the areas of Portuguese language, mathematics, history and geography and natural sciences. It is emphasised in this decree that “the fundamental reference of the qualification for teaching is the performance expected from the teachers in the beginning of their professional practice, as well as the necessity for adaptation of their professional practice to the changes occurring in emergent transformations in society, in the school and in the role of the teacher, to scientific evolution and to the relevant contributions of educational research”.

The training leading to qualification with the Licence’s degree in Basic Education includes, as established by the Decree-law no. 43/2007, the following components: i) General Educational Training (FEG); ii) Specific Didactics (DE); iii) Initiation in Professional Practice (IPP); iv) Cultural, Social and Ethical Training (FCSE); v) Training in Methodologies of

¹² These competencies can vary, be more general or more specific, according to the disciplinary areas and levels of learning.

Educational Research (FMIE); vi) Training in the Area of Teaching (FAD). This final component is divided into four categories: Portuguese, Mathematics, Environmental Studies and the Expressions (which include art, music, drama and physical education).

In respect to the general profile of professional performance of the pre-school teacher and the teachers of basic and secondary education, the most recent legislation is found in the Decree-law no. 240/2001 (August 30). This profile is based on four dimensions: i) the professional, social and ethical dimension; ii) the dimension of the development of teaching and learning; iii) the dimension of participation in the school and its relationship with the community; iv) the dimension of professional development throughout life. However, the specific profile of professional performance for the pre-school teacher and the teacher in primary education (the first cycle of basic education) is found in the Decree-law no. 241/2001 (August 30).

Without making thorough references to them, both profiles contemplate competencies related to the use of ICT: i) the general profile refers, in its dimension of development of teaching and learning, to the fact that the teacher “uses, according to different situations, and adequately incorporates in the learning activities different languages and various aids, namely the information and communication technologies, promoting the acquisition of basic competencies in this latter dominion”; ii) in the respective specific profile, and in the area of the conception and development of the curriculum, the pre-school teacher “mobilizes and manages educational resources, namely those connected to the information and communication technologies”; iii) in what refers to the specific profile of the teacher of the first cycle of Basic Education, it is stated that, in the area of the conception and development of the curriculum, the teacher: “the teacher]... encourages the integrated acquisition of methods of study and intellectual work in learning, in particular at the level of research for, organisation, treatment and production of information, putting to use information and communication technologies”. There is no reference to the profile of the teachers of the second cycle of Basic Education, where a more dramatic change is found, in as far as the conception of a generalist teacher is abandoned and a profile of a specialist teacher is adopted.

ICT in the new degrees of initial teacher training: presentation and analysis of data

The new degrees are taught in 20 public institutions and in 13 private institutions (14 institutions according to the official Web sites of the institutions, because the Instituto Superior de Ciências Educativas (Higher Institute of Educational Sciences) offers the degree in its schools in Odivelas and in Mangualde).

Institution	Units of Credit (UC)	Year/ Semester	ECTS	Training Component
ESE of Castelo Branco	Information and Communication Technologies in Education	2 nd / S1	3	FEG
ESE of Porto	Multimedia Information and Communication Technologies	2 nd / S1	2.5	E
ESE of Portalegre	-	-	-	-
ESE of Leiria	-	-	-	-
ESE of Viseu	Information and Communication Technologies	1 st / S2	4	DE
ESE of Viana	Computers, Technologies and Education	1 st / S1	2	DE
	Multimedia Communication	1 st / S2	2	FEG
	Technologies in the Teaching of Mathematics	3 rd / S2	5	MAT

Institution	Units of Credit (UC)	Year/ Semester	ECTS	Training Component
ESE of Setúbal	Education for the Media	2 nd / 3 rd / S	5	FEG(optional)
	Production of Multimedia Materials	2 nd / 3 rd / S	5	FEG(optional)
	Production of Web Contents	2 nd / 3 rd / S	5	FEG(optional)
	Organisation and Management of Information	2 nd / 3 rd / S	5	FEG(optional)
	Portuguese Language and Information and Communication Technologies	3 rd / S	5	FAD compulsory
ESE of Bragança	Information and Communication Technologies in Education	1 st	6	FEG
ESE of Santarém	Informatics Laboratory	1 st / S2	5	FAD LP optional
	Laboratory of Multimedia Expressions	3 rd / S2	5	FAD EX optional
ESE of Coimbra	Information and Communication Technologies	1 st / S2	2	INF
	Educational Technology	3 rd / S1	2	CE
ESE of Beja	Technologies in Educational Environments	3 rd / S1	2	IPP
ESE of Lisboa	-	-	-	-
ESE of Guarda	Information and Communication Technologies	2 nd / S1	3	CE
	Technology in Mathematical Education	3 rd / S2	5	M
University of Minho	Information and Communication Technologies in Professional Practice	2 nd / S1	5	IPP
University of Algarve	Information and Communication Technologies at School	1 st	4	CT
University of Trás-os-Montes and Alto Douro	Communication and Educational Technology	3 rd / S1	4.5	
University of Évora	Education and Technology	3 rd	5	
University of Aveiro	Didactics and Technology of Mathematics	3 rd / S2	4	DTE
University of Madeira	Technology and Innovation at School	3 rd / S1	4	Edu
University of Azores	Expressions and Multimedia Communication	2 nd / S2	6	Exp

Table 1 – Public Institutions of Higher Education

For the 20 institutions of Public Higher Education, 1223 vacancies were opened and, for the 13 institutions of Private Higher Education, a total of 1634 vacancies were made available¹³. Table 1 was created based on the obtained data, with reference to the data from the institutions of Public Higher Education and Table 2, with reference to the data from Private Higher Education. We can verify that there are degrees in public institutions without courses in the area of ICT, such as those in the Schools of Higher Education (ESE) of Leiria, Lisbon and Portalegre¹⁴. In the ESE of Santarém, there are two optional Curricular Units (UC), which could mean that the students are able to not choose to have training in the area of ICT. In the private sector, the ESE of Maria Ulrich (Lisbon) does not present any UC in this area. For the ESE of Fafe, it was not possible for us to establish any data, because the curriculum plan was not made available on the web site of the institution. The ESE of João de Deus (Lisbon) only presents the plan for the 1st year, so only this was taken into account for the analysis.

Institution	Units of Credit (UC)	Year/ Semester	ECTS	Training Component
ESE of Almeida Garrett	Educational Technology	2 nd / S2	2.5	
ESE of Fafe	Information not available on the Internet			
ESE of Jean Piaget (Almada)	Principles of Multimedia Educational Communication	2 nd / S1	3	

¹³ Data obtained from: <http://www.acessoensinosuperior.pt/indcurso.asp?letra=e>

¹⁴ On the site of the ESE of Portalegre there is presented an optional discipline with 5 credits, integrated in the 4th semester, with the name Education and Internet. However this discipline does not appear in the approved plan of the Ministerial Order nº 1617/2007.

Institution	Units of Credit (UC)	Year/ Semester	ECTS	Training Component
ESE of Jean Piaget (Macedo de Cavaleiros)	Principles of Multimedia Educational Communication	2 nd / S1	3	
ESE of Jean Piaget V. N. Gaia (Arcozelo)	Principles of Multimedia Educational Communication	2 nd / S1	3	
ESE of Jean Piaget Viseu	Principles of Multimedia Educational Communication	2 nd / S1	3	
ESE of João de Deus	Information and Communication Technologies	1 st / S1	1.5	
ESE of Paula Frassinetti	Research, Informatics and Education	2 nd / S1	?	
ESE of Torres Novas	Applied Informatics	3 rd	?	
ESE of Maria Ulrich	-	-	-	-
ISCE of Odivelas	Information and Communication Technologies Applied to Education	2 nd / S2	3	
ISCE of Felgueiras	Information and Communication Technologies Applied to Education	2 nd / S2	3	
ISCE of Mangualde	Information and Communication Technologies Applied to Education	2 nd / S2	3	
ISEC	Educational Resources and Technologies	1 st / S	2.5	

Table 2 – Private and Public Institutions of Higher Education

The most common designation for the UC is Information and Communication Technologies. At times, this designation appears associated with expressions or terms such as professional practice, education or school. Various UC also appear which are associated with the concept of multimedia. A tendency to associate the ICT with education seems clear in the designations given to the UC.

The incorporation of the UC over the ICT in the components of training referred to above is rather varied. In other words, it is difficult to find a pattern of integration, perhaps because of the fact that many education institutions have not adopted the terminology established in the legislation for the components of training. This difficulty derives also from the fact that the private and cooperative institutions of higher education have their degrees approved by decree and not by ministerial order (at least up to the date of the conclusion of this study), a fact which blocked us from consulting the components of training used and the respective lists of courses.

Of the institutions which make use of the components considered in the Decree-law no. 43/2007, only the in the components of FCSE and of FMIE do not include UC referring to ICT. For the others, the areas of FEG, DE, IPP and FAD, in one institution or the other, contribute with ECTS for the UC of ICT. Within the FAD component, it is possible to find UC incorporated in the areas of teaching of Mathematics, Portuguese and the Expressions. No UC appears associated with Natural Studies. In the absence of rules which establish the introduction to the ICT, each institution appears to have made their own options. There are even institutions, such as the ESE of Viana, with three UC, integrated in the components of DE, FEG and Mathematics.

Despite the legislation not having established clear and formal orientation, the majority of the institutions have chosen to create UC in the area of ICT. There have been designed UC with activities of a theoretical and practical nature as well as, although rarely, laboratory activities, tutorial orientations and seminars.

UC/Degree	Public Institutions		Private and Cooperative Institutions	
	Compulsory	Optional	Compulsory	Optional
0	4	18	1	13
1	13	0	12	0
2	2	1	0	0
3	1	0	0	0
4	0	1	0	0

Table 3 – Number of UC per degree

The greater part of the institutions, in the public sector as much as in the private, presents one UC per degree (Table 3). The compulsory average of ECTS per UC is 3.8 for the public sector and 2.8 for the private. Some institutions in the public sector (Table 1) present more than one UC per course, such as the ESE of Viana, Coimbra and Guarda. This fact is not a guarantee of a greater number of ECTS, as occurs in the ESE of Coimbra, where, in spite of presenting two UC, only awards a total of 4 ECTS. The highest number of ECTS can be found in the ESE of Setúbal, with 25 possible ECTS (five UC), although only one UC is compulsory. The private sector does not present any optional course, according to the data collected.

In relation to the distribution of the UC by the years of the degree, we have found that there is a distribution across the three years, with the greater concentration in the UC which are compulsory in the third year in relation to the public sector and in the second year for the private sector (Table 4).

Years of the Degree	Public Institutions		Private and Cooperative Institutions	
	Compulsory	Optional	Compulsory	Optional
1 st	6	1	2	0
2 nd	5	4	9	0
3 rd	9	1	1	0

Table 4 – Distribution of the UC per years of the degree

An attempt to develop technical and pedagogical competencies or those of learning and training online, when the students have not yet developed pedagogical competencies, suggests that the introduction to ICT in the first years of the degree involves the development of competencies in the technological dominion. Thus the development of more specific technical and pedagogical competencies would centre more upon the final years of the degree, a tendency which does emerge in the occurrence of 9 UC in the 3rd year of the degrees of the public sector. The highest value of ECTS is 6 per UC (ESE of Bragança and University of the Azores). Five UC possess less than 2.5 ECTS, the category from 4-4.5 being that which registers the greatest occurrence (Table 5). In the private sector, the number of ECTS per discipline is found in the category 2.5-3, and there are no UC with a number superior to 3 ECTS.

ECTS	Public Institutions		Private and Cooperative Institutions	
	Compulsory	Optional	Compulsory	Optional
<2.5	5	0	1	0
2.5-3	3	0	9	0
3.5-4	4	0	0	0
4.5-5	7	4	0	0
5.5-6	2	0	0	0

Table 5 – Number of ECTS per UC

Excluding the degrees with 0 ECTS for ICT, and considering the compulsory UC, the average of ECTS per UC is 4.8 for the public sector and 3.8 for the private sector, for a total of 180 ECTS which are necessary for the completion of the degree. What leaves us surprised is the weak valuation given to the competencies associated with ICT, in spite of their importance in the context of education for the information society. It is surprising that, in a context in which all the indications of Europe, of the OECD, of UNESCO and of the diverse specialised bibliography point towards the interdependence between the ICT and the processes of learning and training, in Portugal, they are not highlighted as important in the training of those who will be the givers of stimulus to educational reform.

As we mentioned above, the ICT are not made explicit in the components of training and their mention is very tenuous in the professional profile of pre-school teachers and teachers of the first cycle of Basic Education.

In essence, if we take away the component of research, the professional profile of the teacher which is being defined for the Europe of Knowledge is, paradoxically, a rather conventional one. In the study plans we consulted, the new technologies are given a very limited importance, there even being curriculum plans which do not approach, not even in a minimal way, the development of competencies in ICT.

Conclusion

It is surprising to see the reduced prevalence of the competencies in ICT which are proposed to the teacher who wants to join the information society. As Esteve (2003) asks, are we not training teachers for a school that has already lost much of the sense of its existence? We can ask ourselves if the stimulators of educational reform will be able to promote the change from the contemporary school to a school adapted to the challenges of the information society, without dominating the basic competencies needed in order to live in this type of society. In this sense, it appears important to us to quote the commentary of ANECA (2004) after having analysed the proposals of the various institutions for teacher training in Spain: “It would be very fitting that, in future study plans, if we want to promote an important qualitative change and not a mere redistribution of credits, that specific measures should be contemplated to carry out reforms in the direction of the introduction in depth of ICT in the classroom and in all the curriculum materials for primary education, in such a way that the interdisciplinary training of our students is a reality and not a declaration of good intentions (...)” (p. 201). In the case of the Portuguese legislation, it doesn't even reach the level of good intentions. If there is some credit given to ICT in the curriculum plans of Basic Education, it is because the institutions themselves recognise this necessity. Some institutions have not done this yet and what we surprisingly find is that the legislation permits this. It is true that we could believe that these competencies could be developed at the level of the master's degree (necessary to join the profession). However, none of the training components, according to Decree-law no. 43/2007, refers to competencies related to ICT. In-service training could be the solution for those teachers already at work, but if the initial training wishes to prepare the teachers for the challenges of their career, could it be that teachers with weak competence in ICT are ready to constantly develop competencies in an area which is in permanent evolution? This situation brings us back to the words of Esteve (2003) about the misalignment of the systems of training in relation to contemporary educational contexts. Are we not preparing teachers for yesterday?

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