Educational Technologies: analysis of Master dissertations carried out in Portugal

FERNANDO ALBUQUERQUE COSTA
f.costa@fpce.ul.pt
Faculty of Psychology and Educational Sciences of the University of Lisbon

ABSTRACT:
Acknowledging the importance scientific research may have in terms of the foundation, orientation and evaluation of the use of technologies in an educational context, it is only natural that there should also be greater knowledge on the research carried out in this particular field. This is what we set out to achieve in a recent conference held in Portugal on the theme Research in Education[1].

Using the theme of the conference itself – Research in Education between 1960 and 2005 – as our basis, we decided to focus on what has actually been the object of research in our country within the framework of Educational Technology.

We realised, at a very early stage, that there were hardly any studies in this field before Portuguese universities took on a more active role, nor in the field of educational technologies, particularly after the appearance of the first Masters courses at the University of Minho in 1987. Even though we are not aware of any in-depth study to characterise scientific research developed in Portugal in this area, several Portuguese authors have referred to this issue in some way or another (Abrantes, 1981, 1998; Blanco & Silva, 1993; Caldas, 2001; Fernandes, 1969; Ponte, 1994; Silva, 2000).

On the other hand, since we have stated that a considerable part of research, in this particular field, focuses precisely on this academic qualification, we have decided to construct our analysis around this aspect. Therefore, in this article we present the result of the studies on Masters dissertations carried out in Portugal, with a view to furthering understanding of the studied themes, their theoretical and methodological frameworks, and to finding out where they are carried out, who does the research, what the collection techniques are and the type of data analysis used, just to mention some of the aspects around which our analysis is centred.

This is an exploratory analysis within a restricted context, however, we hope that it may contribute to the acquisition of more profound knowledge regarding research practices in this specific field of Educational Sciences in Portugal.

KEYWORDS:
Educational technology, Scientific research, Masters dissertations, Paradigms, Tendencies, Portugal.

Costa, Fernando Albuquerque (2007). Educational Technologies: analysis of Master dissertations carried out in Portugal. *Sísifo. Educational Sciences Journal,* 03, pp. 7-24.
Retrieved [month, year] from http://sisifo.fpce.ul.pt

INTRODUCTION

Research in the area regarding the integration of technology in an educational context is recognisably conditioned by a series of varied factors, as, indeed, is the case in other fields and areas of Educational Sciences.

Since one of the aims of the Conference was to contribute to the historical overview of research, carried out in the different areas of Educational Sciences, and given the importance that this very research may have in overcoming ambiguities and insufficiencies as far as the integration of technology in schools is concerned, it is, perhaps, appropriate to consider some of the challenges scientific research has to face in this particular area.

One of the first points we would like to consider is directly related to the results of the research, itself, in the field of educational sciences which, according to some analytical studies, are not conclusive. In fact, they are, rather, quite the opposite. Modest positive effects in learning (Pelgrum, 2001; Pelgrum & Law, 2004; Plomp & Pelgrum, 1991; Walker, 1994) and the non-existence of "significant differences", with or without the use of technologies, are some of the more obvious conclusions of an analysis of the set of studies in which computer use is compared with other traditionally used learning means (Russell, 1999).

Secondly, there also continues to be some confusion as to what is really worth researching and how the process should be carried out which, in some situations, questions the actual credibility of the studies performed. Weaknesses, as far as restrictions of the supporting theoretical framework are concerned, lack of clarity in the definition of study objects, inadequacy and insufficiency in methodological terms are some of the main areas of criticism (Coutinho, 2000a; Reeves, 1995, 1997, 2000) which contribute to better or poorer research quality.

From an epistemological perspective, weaknesses may be found on two levels (Salomon, 2000, 2002): On the one hand, since there is still the belief that the use of certain means over others produces better results in learning, thus, leading to positivist research practices. According to the author, the latter are inadequate since, more often than not, the final results are disappointing and provide no contribution to the valorisation and acceptance of the revolutionary potential (Walker, 1994) of technology in Education. On the other, these weaknesses are due to insistence on evaluating the same types of products and results that are traditionally prioritised by the school. In Salomon's opinion, this is precisely where the main error lies, since owing to the potential of these technologies to become powerful tools for a wide range of more demanding purposes, in cognitive terms, research should be focusing on other empirical objects and adopting more suitable methodologies, consistent with these new study objects[2].

From this perspective, as several authors suggest, it would, indeed, make sense if research shifted its focus to centre on the study of contexts in which

learning has a place, mainly with a view to understanding how these contexts should be structured, so as to motivate the students to use their cognitive potential to the full (Corte, 1996) and, subsequently, to enable them to accomplish the best results at school.

This way of looking at the problem of integrating computers in the teaching and learning process suggests that observation and data collection, from an ecological perspective, should be based on the use of technology's potential by pupils and teachers and its implications in the activities of both. It is an observation in action, where a more inductive and ethnographical approach makes sense and one which has, in fact, been accompanying movements in this direction since the nineties, both in research in general and, particularly, in Educational Sciences.

Therefore, instead of the techniques of quantitative analysis used in co relational and classic experimental studies (based exclusively on quantifiable and measurable data), the use of techniques and methods is more justifiable, since it furthers understanding of the complexity of reality and the subjectivity of the actors (Figueiredo, 2005). Instead of explaining the phenomena (construction of laws and theories), it is more important to understand them (identification of regularities, patterns, contradictions, etc.) in light of the meaning attributed to them by individuals and the way they are perceived at a given moment, in a given context by the agents (Pourtois & Desmet, 1988). More than a strict, standardised plan, it is a perspective that demands great flexibility from the researcher and a clinical attitude, with the support of a wide range of collection techniques and data analysis (including quantitative procedures). The researcher's ability to create a personal and suitable strategy for approaching the problems in question, according to the context and the study's aims, is put to the test (Pourtois & Desmet, 1988; Taylor & Bogdan, 1984).

Although it is not appropriate to focus, here, on aspects related to doubts and questions on the growing attention given to qualitative data or to reservations regarding the credibility of qualitative approaches, in terms of validity, objectivity and neutrality, for example, it does, however, make sense to draw attention to what this might mean to the researcher, in terms of the increasing need for rigour in the process and a guarantee of the scientificity of the methods used.

The afore-mentioned dissatisfaction with the overall results of the research, as well as movements, in the related subjects, towards a methodological openness, end up encouraging the creation of favourable conditions so that this opposition may also disappear here, giving rise to a commitment and conjugation between the two underlying philosophies, and thus, creating a personal methodological reference system which is better adapted to research in learning contexts enriched with the potential of new technologies (Coutinho & Chaves, 2001).

Indeed, this aspect leads us to the final question which is worth considering, since it may be linked to the stronger or weaker impact and influence of research on educational practices. Even though we accept that this aspect is not directly related to the researcher, it is still important to refer to it since it may affect the decision on "what" to research and "why" (pertinence and social relevance of the research) and the resulting justification in terms of the costs involving its accomplishment (cost-benefit analysis).

In fact, according to some authors, the effects of research on educational practice are, in most cases, slow and indirect (Atkinson & Jackson, 1992; Holloway, 1996), even though this might occur for a number of different reasons. It may depend not only on greater or less quality and credibility of the research carried out, but also *if* and *how* it is used afterwards (Holloway, 1996). As far as research in the field of educational technology is concerned, there has been very little change in the classroom, in spite of very few systematic and in-depth studies on its use in the daily practices of teachers and students (Costa & Peralta, 2006).

On the one hand, there seems to be a link between the scope of the studies carried out and the degree of influence such a variable is likely to have on political decision and, consequently, although indirectly, in micro terms, on specific teaching and learning practices. According to Holloway (1996), studies with a view to describing and characterising reality (understanding the degree of diffusion and explaining the what, where and why of acceptance or rejection of technologies in education), usually performed on a large scale by means of surveys, tend

to have greater influence on decision makers than research studies on more restricted realities (what goes on at school or in the classroom, for example), which are far less widespread in general and less considered (acknowledged) in terms of political decision (Holloway, 1996). Based on the revision of a recently accomplished research study, the author defends the idea that most of these studies create a vision of the problems that is more "focused on equipment", on the "potential of technologies" and technical issues. This approach provides little information on the changes in schools and on how the research study, itself, affects these changes (Holloway, 1996).

On the other hand there is concern, mentioned by Thomas Reeves (2000), due to the fact that literature revision and meta-analyses in this area do not provide sufficiently clear, practical guidelines, owing, mainly, to the insufficient quality of the studies on which they are based. According to the author, despite the fact that more and more researchers have started to monitor interpretation aims, the understanding of phenomena and the resolution of practical problems, having also adopted methodologies of a more qualitative nature, there is still little evidence that the quality of research has improved, with natural implications resulting from this.

In his opinion, this is also due to the fact that most research in this field is performed by isolated researchers. It is rarely connected to the more solid lines of research and developed within the framework of academic assignments (Masters dissertations or PhD theses) such as those we have analysed, or to progress in their academic careers. A rather sterile type of research, not only in terms of the results achieved (see what was said on the inconclusiveness of the results), but mainly in terms of practical use and objective influence in the contexts in which it was developed, will generally not go beyond possible individual changes, on the part of the researcher(s) in question.

RESEARCH AND AIMS

As a contribution to the characterisation of scientific research activity in Portugal, within the field of Educational Technology, between 1960 and 2005, we are of the opinion that certain central issues should be discussed, around which analysis criteria and the presentation of results are organised: What are the themes being studied? Which reference tables are used? What research methodologies are used?

As far as an analysis of the studied themes is concerned, we were primarily interested in finding out whether the research study is determined mainly by practice needs, in other words, a study based on the problems and issues the use of technology has brought to the teaching and learning process, or, on the other hand, whether it is determined more by the way the different perspectives and ideologies (explicit or implicit) interpret the educational act and the subsequent role of technological resources. Our aim, furthermore, was to identify the themes in which research, empirical objects and the purpose for their study are raised: whether the studies focus mainly on the analysis and description of reality, whether the intention is to intervene or if they are mainly concerned with the conception and accomplishment of material or any other kind of support resources for communication or knowledge acquisition.

As regards the identification of theoretical reference tables, we tried to find marks that would enable us to classify them within the main perspectives traditionally used in this field, namely behaviourist, cognitive, constructivist, systemic, communicational, multimedia perspectives, etc…Without undermining explicit references to other approaches, our aim was to try to understand the extent to which research carried out in Portugal follows the main tendencies of research carried out internationally and its specificities in terms of the theoretical support on which it is based.

As for the characterisation of research methodologies, and since it is directly related to the epistemological status of the research undergone, particular attention should be drawn to this fact in articulation with the aspects that have just been mentioned. Indeed, this is a crucially important aspect, since it is on this very level that many authors find sufficient reasons to harshly criticise the quality of research carried out in this field. However, as Reeves affirms, although not worse than research in education in general (Reeves, 2000), the effective quality of research developed in this area is still one of the main sources of controversy and, according to the author,

is mainly the result of confusion between basic research and applied research. Although it is clearly not our most urgent aim to evaluate the quality of the research produced, especially in view of the afore-mentioned limitations, we will continue to pay attention to this issue and try to collect data that will allow us to come back to the subject at a later stage.

Therefore, in order to be able to address the issue in terms of the research methodologies used on a more global level, we believe it is necessary to: distinguish the research aims set out in terms of "explanation" versus "understanding" of the phenomena versus "problem solving"; to characterise the methodological designs used within the "experimental" versus "non-experimental" binomial; to characterise the type of data analysis ("qualitative" versus "quantitative"); to identify the analysis techniques used and, finally, to characterise the scope of the sample on which the studies are focused (macro, *meso, micro).*

METHODOLOGY

It is not our immediate aim to carry out an exhaustive historical analysis and so, we have decided to adopt an exploratory attitude which will enable us, above all, to understand the evolution that has been registered, while trying to highlight the main research areas and tendencies. We are aware of the complexity of such a task which is, for the most part, a result of the actual complexity of Educational Sciences, from both the perspective of the multiplicity and interpenetration of theoretical reference frameworks and the strictly methodological perspective, from which we can not detach ourselves. Nevertheless, it is our aim to be attentive to articulation between the evolution registered in the different related areas (from the perspective of an evolution of the theoretical reference frameworks), and the tendencies that were affirmed internationally in terms of actual research methodologies (evolution of the research paradigms).

Documental corpus

As already mentioned, the results of the analysis of Masters dissertations, supervised by Portuguese universities for almost a decade and a half, will be presented in this article. The reviewed documentation up to the present moment consists of 254 dissertations (see Table 1 – Reviewed documentation).

Table 1

Reviewed documentation

Type of publication	*No of texts**
Dissertations Master	254
PhD	23

** Data reviewed until December 2005 (activity in progress)*

Analysis Criteria

Given the nature of the "corpus", we used the normal procedures of documental analysis in our initial approach for the classification and indexation of the identified texts. This also allowed for the organisation of a referenced data base in this area, thus, facilitating access and data up-dating at a later stage.

The second phase involved a qualitative analysis of the collected texts' content, with particular emphasis on a summary of them, so as to identify the characteristics that help to "contextualise" each research study, based on pre-established criteria. These criteria, which will be presented in more detail in the next section, are directly related to and stem from the afore-mentioned aims of this study.

Without undermining some adjustments we made, as a result of the need to accommodate some of the emerging categories, an analysis structure was constructed around three of the above-mentioned central themes: studied themes, theoretical reference frameworks and methodological options.

Criterion 1 – Studied themes. With a view to identifying the main themes under study, this criterion is essentially applied to the formulation of the central research question (influential in the selection of the study object, mobilisation of a theoretical reference framework, definition of aims or formulation of research possibilities and the drawing up of a plan for the collection of empirical data). In order to better understand the scope of the developed research, we have set out some aspects of this criterion in order to identify not only the *central theme* under study, and the empirical field from where the data is collected (*object of study),* but also the *origin* of the research itself (research lines, reality problems) and its ultimate purpose (analysis of reality, intervention, conception and development). We have also included a criterion referring to the *context* studied, with a view to understanding the type of study distribution between the professional and school context and, as

regards the latter, through the different educational levels (see Table 2 – Identification and characterisation of the studied themes).

Criterion 2 – Theoretical Reference Tables. With a view to identifying the theoretical frameworks used as research support, this criterion applies to the references made by the researcher to the scientific areas, theories or specific authors, in terms of clarifying the research question, supervising the collection of data and serving as the basis for interpretation (Table 3 – identification and characterisation of theoretical reference frameworks).

Criterion 3 – Methodological Options. Finally, with a view to characterising the research methodologies used, this criterion applies to the description that is made, in each individual work, of the nature, arguments and collection of data techniques, as well as the methodological procedures adopted in the planning, analysis and interpretation. As with the previous criterion, we have considered the different aspects for the characterisation of the methodological options: the *research aims* (search for explanation, search for understanding, description of reality, problem solving); the *methodological plan* (experimental, non-experimental); *data analysis* (quantitative, qualitative); the *techniques and instruments* used and the scope of the *sample* (see Table 4 – Characterisation of the methodologies).

Table 2

identification and characterisation of the studied themes

Aim: To identify the main themes studied	Main theme	Image, Audiovisuals Information Technologies Teaching and Learning Teacher Training Others
	Origin	Lines of Research Specific Problems of reality Other
	Purpose	Analysis Intervention Conception and development Other
	Object of Study	Pupil Teacher Materials Teaching and learning process Teacher training Other
	Context	School (educational level) Professional Other

The frequencies of each category of analysis and respective percentages were calculated with the SPSS. In order to guarantee the validity of the categorisation process, a second classification was drawn up for a random sample of dissertations, having achieved a coefficient of 83.50% in the equivalence test between the two classifications obtained.

Table 3

identification and characterisation of the theoretical reference frameworks

Aim: To identify the main theoretical reference frameworks used as research support.	Theoretical references*	Behaviourist Perspective (Skinner, Gagné, Bloom…)
		Communicational, Multimedia Perspective (Shannon e Weaver, Mayer…)
		Systemic Perspective (Bertalanfy, Romiszovsky…)
		Cognitive and constructivist perspectives (Bruner, Piaget, Giardina, Papert…)
		Hypermedia Approach and cognitive flexibility (Nelson, Spiro…)
		Other

* Classification systematised by Chaves (1998) and Pereira (1993).

Table 4

characterisation of methodologies

Aim: To characterise the research methodologies used	Research Aims	Search for explanation Search for understanding Problem solving Other (mere description…)
	Methodological Level	Experimental Non-experimental Mixed
	Type of analysis	Quantitative Qualitative Mixed
	Techniques	Statistical Analysis… Observation, non-structured interviews, documental analysis… Mixed
	Scope of the sample	Macro *Meso* Micro

PRESENTATION AND DISCUSSION OF RESULTS

Where is the research carried out?

In order to better understand the overall panorama of the research carried out, we will begin by present-

ing the information regarding the distribution of the dissertations in the universities where they were carried out. As may be observed in Table 5 (Dissertations per University), the dissertations included in the analysis (226) are concentrated in just five Portuguese universities[3].

Table 5

Dissertations per university

Distribution of frequencies and percentages

UNIVERSITIES	*f*	%
U. Aberta [Open Uni.]	41	18.1
U. de Aveiro [Aveiro Uni.]	25	11.1
U. de Lisboa [Lisbon Uni]	54	23.9
U. do Minho [Minho Uni]	98	43.4
U. Nova de Lisboa	8	3.5
Total	*226*	*100.0*

The University of Minho stands out from the rest as it was there that almost half of the dissertations carried out were analysed (43.4%), followed by the University of Lisbon with 23.9%. We may, indeed, conclude that three quarters of academic research for Master courses carried out in Portugal in the field of Educational Technology are held at these two universities. If, in our analysis, we exclude the *Universidade Aberta*[4], it is only fair to associate the more recent universities (Aveiro, Minho, Nova) and the greater amount of research carried out there: Around two thirds, against around one third in the University of Lisbon, the only representative of the so-called "Classic" Universities among those considered. This fact may be interpreted in support of the possibility that the appearance of new universities, from the 80's onwards has been a contributory factor in the development of this scientific area.

How does the number of dissertations evolve?

We have tried to understand how the dissertations are distributed over the four periods of five years in which we have divided the last two decades, in order to verify the evolution of time since the appearance of the first studies of Master[5] courses, up to the present day.

Therefore, based on Table 6 (Evolution of the number of dissertations), it is possible to observe an overall crescendo in research, which is particularly clear in the transition from the 80s (with only 8 dissertations concluded) to the 90s with more than half of the analysed theses (136), or 60.2% of the total.

Table 6

Evolution of the number of dissertations

Distribution of frequencies and percentages

PERIODS	*Freq.*	%
1986-1990	8	3.5
1991-1995	77	34.1
1996-2000	59	26.1
2001-2005	82	36.3
Total	*226*	*100.0*

In the last period taken into consideration which includes the years between 2001 and 2005 in the new millennium, there are 82 dissertations (36.3%). The set of results seems to point towards a continuation of the research rhythm at this academic level, with the possibility of even stronger reinforcement with the scientific production of other courses which have opened in the meantime, such as the *Mestrado em Informática Educacional* [Master in Educational Computer Technology] offered by the Portuguese Catholic University and which, as is already known, perhaps for its accomplishment mainly by distance-learning, achieved a remarkable number of enrolments in its first edition.

These results, coupled with the high demand for post-graduations in this field, namely on the part of teachers, may represent more favourable settings in terms of the actual use of technologies for educational purposes as well as providing strong evidence of the amount of research carried out in our country,. This is mainly due to the critical mass these teachers and other participants in the educational phenomenon become a part of, and also the impact their action may have in the near future, namely if appropriately integrated in specific intervention projects created for this purpose.

What themes are studied?

As we were able to explain earlier on, we used a set of diversified criteria as the reference for the characterisation of the studied themes, with a view to highlighting the research carried out. Thus, we were able to contribute to the acquisition of more profound knowledge on what is researched, why it is researched, the context and purpose. The idea is,

then, that the analysis of these arguments may provide an overall perspective of the effort deposited in the research carried out in academic contexts and, eventually, open new horizons, at least in terms of social relevance, as a contribution to the innovation and alteration of ways of teaching and learning in our schools. The following tables refer specifically to each one of these analysis bases, in other words: to the main themes handled; to the root of the problems that instigated the research; to the purposes set out by the authors of the research studies; to the specific study objects and, finally, to the observed and studied contexts.

Main themes handled

Based on the analysis of Table 7 (Themes handled in the research study) it may be said that there is a predominance of studies of themes related to "information technologies" as a tool and resource, subject to being studied regardless of their connection (or not) to specific study objects. In other words, they are at the service of learning on the part of the pupil, at the service of the teacher, at the service of the teaching and learning process itself, in general (41,1%). Whenever they are not connected to other study objects, "information technologies" emerge as the object of analysis themselves (evaluation of software, for example), object of development, such as the studies leaning towards the creation and development of new applications for specific purposes (a multimedia application for Children's Drawing, to give a specific example).

Table 7

Themes handled in the research

Distribution of frequencies and percentages

MAIN THEME	*Freq.*	*%*
Audiovisuals	39	17.8
Information Technologies	90	41.1
Teaching and Learning	47	21.5
Teacher Training	20	9.1
Other	23	10.5
Total	*219*	*100.0*

There is, indeed, a great distance between the study of "audiovisuals" (with just 17.8%), confirming the growing interest in digital technologies and the importance adopted by the latter in terms of the audiovisual and analogical technologies with which they are associated. As may also be understood, they are only predominant up to the point where computers take on effective and generalised expression in more recent, modern-day society.

Only 9.1% of the studies focus on the theme "teacher training" (20 dissertations), but around a quarter focus on the observation and analysis of teaching and learning". These are two interesting results, especially in terms of what each one means in itself, but also since they each point in opposite directions. If, on the one hand, it is crucial that attention be shifted to the study of the ways in which technologies are integrated in the teaching and learning process, it is worrying that little attention continues to be given to the contexts in which teachers should be expected to be professionally prepared, which implies the integration and use of these same technologies in their teaching practices.

Although we are aware that it is not in the context of academic studies of an individual nature that this should be done, it is still an indicator of the critical situation in which we find ourselves and which is characterised by the complete absence of an integrated and articulated vision of the professional development of teachers in this field. Interestingly, as the few studies on this theme clearly show (Costa & Peralta, 2006; Matos, 2005; Ponte & Serrazina, 1998; Ponte *et al.*, 2000), this also occurs in terms of initial personal training which, in our opinion, is one of the most worrying factors within the national context. Despite being in harmony with what happens internationally in terms of the impact of initial training among the new generations of teachers (Brett *et al.*, 1997; ITRC, 1998; Makrakis, 1997; Willis & Mehlinger, 1996), what is worse is that in Portugal this is not by any means an object of structured and consistent intervention, deriving from previous, in-depth reflection on the role of technologies in learning.

From a "geographical" perspective of the themes, in other words, of their distribution around the universities in which the dissertations were carried out, observation of the results suggests some preferences that may be interesting to explore: in the University of Minho "information technologies" are, by far, the most preferred theme (22.83%); the case is the same in the University of Aveiro, although on a smaller scale

(5.94%); in the Open University, the most studied theme is "image audiovisuals" (8.22%), closely followed by "information technologies" (7.31%); in the University of Lisbon the main interest is "teaching and learning" with "teacher training" in second place.

Origin of the Research

As far as the selection of the studied themes is concerned, it is possible to observe through Table 8 (Origin of the research), that the "problems of reality" are what determine what is going to be the research focus. Indeed, they are clearly predominant, in almost all the studies (94.2%), which is why they can be associated with the interest of authors in acquiring greater knowledge on the issues or problems which they have encountered, in some form or other, in their professional activity.

Table 8

Origin of the research

Distribution of frequencies and percentages

ORIGIN	*Freq.*	*%*
Lines of Research	2	0.9
Problems of reality	213	96.8
Other	5	2.3
Total	*220*	*100.0*

As, perhaps, was expected, given the type of sporadic relationship established with the universities in order to obtain this academic level, there are hardly any research studies in which their insertion in a particular "line of research" is clearly and expressly adopted, such as, in a certain centre or research unit.

Main Purposes

In accordance with the results in Table 9 (Research purposes) and in harmony with what has been said on the origin of the research, it may be affirmed that the main motivation for the accomplishment of the research developed in the analysed dissertations is clearly the understanding of the observed phenomena, situations or contexts. Indeed, in almost two thirds of the studies (70.4%) the dominant purpose is "analysis", followed by "conception and development" which emerges in second place, even though at a great distance with 25.5% of the cases, in other words, a third of the research considered.

Table 9

Research purposes

Distribution of frequencies and percentages

PURPOSE	*Freq.*	*%*
Analysis	152	70.4
Intervention	9	4.2
Conception and	55	25.5
Total	*216*	*100.0*

Both figures seem to make sense, in that we are referring to something very recent, in constant evolution and whose outlines, as we have already seen, are not very clear, at least not for those confronting the difficulties and inherent implications of the use and integration of machines for the first time, in an environment that had previously been exclusively reserved for human action and interaction. Indeed, it could be a good indicator of development in this field and of its practical applications, if the impact of the set of research studies carried out in order to obtain an academic level were different.

Perhaps owing to the fragile position of the authors of these research studies who, as we have already mentioned, are mainly teachers who individually go in search of an academic qualification that will allow them to progress in their career, the number of dissertations with a view to "intervening" is not expected to be high. However, a structured intervention with a specific institutional support, for example in terms of a school or a set of schools would be expected. The high degree of this area's applicability contrasts with the low percentage found in studies with this purpose (4.2%, in other words only 9 dissertations), which still corresponds to what was said in the previous paragraph.

As regards the association between universities and aims, the results point to a preference for "analysis" and an understanding of reality in the cases of the Universities of Minho (26.39%), Lisbon (24.55%), Aveiro (8.33%) and Nova (3.70%), and for the "development" of materials in the Open University (11.57%), but also in the University of Minho (10.65%).

Main study objects

The analysis of the results presented in Table 10 (Study objects) show that the "materials" are the main focus of the research developed among the analysed Masters dissertations, with 37.1% of the studies, or 79 dissertations[6].

Focus on the "teaching and learning process" appears in second place, with 22.5% of the studies (48 dissertations). Conjugating this figure with the set of theses that concentrate more specifically on the "pupil" (considered individually and directly related to learning), with 11.3% (24 theses), and on the "teacher" (studies primarily related to attitudes towards technologies or with a view to discovering the kind of use made of technologies), with 15.5% (33 dissertations), it is also possible to observe the special interest that the related topics deserve, not exactly technology itself, but the context in which it is supposed to be used, with its more direct users and with the role it may have in learning.

Table 10

Study objects

Distribution of frequencies and percentages

STUDY OBJECT	*Freq.*	*%*
Pupil	24	11.3
Teacher	33	15.5
Materials	79	37.1
Teaching and Learning	48	22.5
Teacher Training	13	6.1
Other	16	7.5
Total	*213*	*100.0*

On the other hand, only 6.1% of the studies focus on "teacher training" which is, indeed, the lowest figure in this category. Corroborating what has already been said on teacher training and pointing in the same direction, it is interesting to see that only three dissertations have the process and practices of teacher training as their main focal point, which is rather curious since the former is, recognisably and unavoidably, a touchstone here and in other areas of Educational Sciences.

In terms of the geography of the study objects, it is interesting to note the preferences of the Universities of Minho (18.78%), the Open University (11.74%) and Aveiro (5.63%) for studies focusing on "materials". As far as the University of Lisbon is concerned, preference is shared in the same way for two of the study objects that are more directly related to the didactic situation itself, in other words the "teacher" (7.98%) and the "teaching-learning" process (7.98%).

Research focus

As already mentioned on a number of occasions, it is mainly teachers who go in search of obtaining post-graduate qualifications in the field of Educational Sciences, particularly in those areas which may be directly related to the structured reflection on the relationship between technology and its use for educational purposes, namely in terms of a Masters degree . Perhaps because of this, the "school" context, in the *corpus* considered here, represents almost all the research studies carried out (200 dissertations, 95.7%), with only one residual figure (3.3%) of dissertations developed in a "professional" context outside the school (See Table 11 – Contexts in which research is carried out).

Table 11

Contexts in which research is carried out

Distribution of frequency and percentages

CONTEXT	*Freq.*	*%*
School	200	95.7
Professional	7	3.3
Other	2	1.0
Total	*209*	*100.0*

Main theoretical reference frameworks

The sturdiness of the theoretical support is one of the fundamental attributes of scientific research and, as it would have to be, is a guarantee of the quality and credibility of the studies carried out. As far as the dissertations are concerned for obtaining an academic qualification such as those we have already analysed, it is important to know the theoretical references used in the research process so that it is possible to evaluate which are the more predominant tendencies at a particular moment and how they are distributed around the universities where the research is being supervised.

According to the results presented in Table 12 (Theoretical reference frameworks), it is possible to conclude that most of the dissertations (53.6%) do not use what we had originally considered the basis of our analysis as their theoretical references and which, as has already been mentioned, were founded on the perspectives that are traditionally stimulated to study the theme of Educational Technology. In addition to our initial difficulty in

some research studies in identifying the theoretical reference framework, whether through a lack of clarity in its specification or a lack of clarity in the option for just one of the perspectives considered in our analysis, we also included the studies that presented other frameworks of theoretical structures in this category ("other references") in addition to those we had defined *a priori*.

Table 12
Theoretical reference frameworks
Distribution of frequency and percentage

THEORETICAL REFERENCES	*Freq.*	*%*
Communication and Multimedia	32	22.9
Cognitivism and Constructivism	16	11.4
Hypermedia and Cognitive Flexibility	17	12.1
Other	75	53.6
Total	*140*	*100.0*

A possible interpretation of this result, in terms of the last alternative, may be related to the loan sought in other scientific areas, particularly those directly linked to specific themes and study objects, such as teacher training. If a certain dissertation has teacher training as its main study object, it is natural that the researcher will try to construct the respective theoretical framework in light of current knowledge on teacher training models, for example. In our opinion, this would be extremely beneficial from an interdisciplinary perspective and the broadening of scope to include scientific related areas, in order to study issues that are frequently confined to researchers from the area of technology. This could have profound implications in terms of the impact and relevance of the research carried out, both in general terms and in strictly scientific ones.

Since it was only possible to clearly classify the dissertations analysed in only three of the five previously defined categories of analysis, it is through them that the rest of the theoretical reference figures are distributed. The dissertations that were theoretically supported by a "communicational and multimedia" approach were at the top with 22.9%, closely followed by dissertations based on an approach we have referred to as "hypermedia and cognitive flexibility" (12.1%) and the studies that were based on a "cognitive and constructivist" approach (11.4%). Interestingly, or maybe not so, the number of studies based explicitly on both the behaviourist perspective and the systemic approach was insignificant, which may, in some way, also be connected to a paradigm inflection to which some authors refer (Coutinho, 2000b, 2005; Pereira, 1993,) in terms of the understanding of the educational phenomena in light of more up to date approaches which are more in touch with the challenges that digital and network technologies have brought to the teaching and learning process.

Methodologies

Although the methodologies used in any research study should result from what is intended to be studied and the foreseen purposes, the selection and adoption of methodological procedures, or the establishment of a research plan, or the selection of collection techniques and data analysis are not always exclusively determined by the in-depth analysis of what is most appropriate and consistent from an epistemological perspective with the specificity of the study object. Indeed, there are often more circumstantial factors that end up conditioning both the design of the research and the instruments used. In the specific case of the Masters dissertations, many of them will represent these contingencies, and so, the results we obtain may also serve as a source of reflection , namely as far as the research quality is concerned, and as we have previously mentioned, should arouse concern for the educational community in general, and for each researcher in particular.

Research Aims

As regards the research aims explicitly set out in the dissertations and based on the results presented in Table 13 (research aims), it is possible to conclude that "understanding" of the phenomena or problems is the most frequent category, with a total of 168 dissertations (78.9%), followed, at a large distance, by the category "others" (13.6%), in which both the aims that did not correspond to the criteria considered and the dissertations in which more than one of these aims would be expected were included. Only 15 theses (7.0%) refer explicitly to the aim of "problem solving" and the intention to "explain" the studied phenomena is hardly visible at all in the dissertations (0.5%).

Table 13

RESEARCH AIMS

Distribution of frequency and percentages

RESEARCH AIMS	*Freq.*	*%*
Explanation	1	0.5
Understanding	168	78.9
Problem Solving	15	7.0
Other	29	13.6
Total	*213*	*100.0*

It is also worth mentioning that the above-mentioned setting clearly occurs in all the universities where the dissertations were carried out.

Methodological Design

With a view to understanding how the dissertations are situated in terms of methodological design, a clear "non-experimental" predominance was registered with 78.7% of all the studies performed (140 dissertations), over the designs organised according to a more "experimental" logic, with only 34 dissertations (19.1%), and over the "mixed" plans, with just 4 studies (see Table 14 – METHODOLOGICAL DESIGN).

Table 14

METHODOLOGICAL DESIGN

Distribution of frequency and percentages

METHODOLOGICAL DESIGN	*Freq.*	*%*
Experimental	34	19.1
Non Experimental	140	78.7
Mixed	4	2.2
Total	*178*	*100.0*

As regards the methodological design, itself, the results enable us to conclude that, on the one hand the "non-experimental" methods are preferred in all the universities and only the University of Minho also appears in the "experimental" designs.

Type of Data

As with the previous results, it is possible to observe in Table 15 (TYPE OF ANALYSIS) the preference of most dissertations for a "qualitative" type of data analysis (56.0%), over a "quantitative" analysis used in only 45 dissertations, in other words, 30.0% of all the cases in which this information is given explicitly.

Table 15

TYPE OF ANALYSIS

Distribution of frequency and percentages

TYPE OF ANALYSIS	*Freq.*	*%*
Quantitative	45	30.0
Qualitative	84	56.0
Mixed	21	14.0
Total	*150*	*100.0*

In a small percentage of these studies (14.0%) combinations of both types of analysis are used ("mixed" analysis). However, the option for qualitative data is clear in all the universities in whose dissertations it was possible to discover this information.

Techniques

Based on the results presented in Table 16 (TECHNIQUES), in accordance with previous results, it is possible to verify the predominance of "non-statistical" data collection techniques (observation, non-structured interviews, personal notes…) with 57.8% of all the studies in which this information is supplied, over the so-called "statistical" techniques in just 31.3% of these studies. In similarity to what was observed in the above section, dissertations where "mixed" techniques (10.9%) were used are also identified here.

Table 16

TECHNIQUES

Distribution of frequencies and percentages

TECHNIQUES	*Freq.*	*%*
Statistical Analysis	46	31.3
Observation, non-structured interviews, registers…	85	57.8
Mixed	16	10.9
Total	*147*	*100.0*

The preference for "statistical" techniques (25.85%) is only noticeable at the University of Minho, even though "non-statistical" techniques are also used there in a relevant way (14.97%). The option for "non-statistical" techniques is clearly an option of the University of Lisbon (27.21%), the Open University (8.84%) and also the dissertations carried out at the New University [*Nova*] (4.08%).

Scope of the sample

As for the scope of the sample, Table 17 (SCOPE OF THE SAMPLE) shows that in 68.0% of the dissertations where this information is explicit, they focused, as perhaps was to be expected, on small-scale studies ("micro" sample). Only 28.4% are part of studies with considerable scope ("*meso*") and 3.6% of large-scale studies ("macro").

Table 17

SCOPE OF THE SAMPLE

Distribution of frequency and percentages

SAMPLE	*Freq.*	*%*
Macro	7	3,6
Meso	55	28,4
Micro	132	68,0
Total	*194*	*100,0*

In this particular criterion, the option is clearly for samples of a weak range in all the universities, even though there is also a percentage of dissertations with relatively larger samples, such as in the University of Minho (14.95%) and in the University of Lisbon (6.19%).

SUMMARY AND PERSPECTIVES

With a view to highlighting the more salient aspects of the scientific research in question here, we will end on some of the main arguments already presented, and which, to a certain extent, may serve as a systematisation of the main tendencies of what is researched in this field in Portugal in terms of Masters degrees.

It is worth mentioning that, as has been the case internationally over recent years, first of all, interest in the study of themes related to audiovisuals has shifted to the study of themes more directly related to "new" information and communication technologies, in other words, digital technologies. As a study object in itself (studies with a technological slant), but also, even though on a lesser scale, in its direct relationship with the agents, contexts and learning objectives (pedagogical studies).

On the other hand, the little attention given to training contexts (initial training and continuous training) and to the preparations of professionals (teachers, trainers) for the integration of technologies in their practices is also worth mentioning.

Even though universities may have research lines with preferred themes and approaches which might, to a certain extent, influence what is studied in terms of dissertations, it is the school setting and the issues or problems of reality that motivate their authors, most of whom are teachers, who focus, primarily, on analysing and understanding the observed phenomena, situations and contexts. Therefore, it is not the priority to stimulate the interest of these research teachers since, as may be easily understood, their intervention is strongly restricted to individual action.

Studies regarding the conception and development of materials take second place, as far as the research aims are concerned, and are of considerable relevance since they represent a third of the analysed dissertations.

In terms of the theoretical framework, different signs seem to lean towards what some refer to as a paradigmatic inflection towards the use of more up to date and adjusted approaches to the new ways of equating learning and that which educational policies have introduced in the official curriculum. In other words, it refers to the pupil as an active agent in the construction of his/her learning, the latter being socially constructed, etc…There is also inflection towards greater attention being given, not so much to technology, itself, but rather to its direct relationship with the actual teaching and learning process and its implications in terms of its openness and stimulation of other knowledge. Thus, it is granted an interdisciplinary status and involves other, traditionally ignored scientific areas, which are of the utmost importance, such as Curriculum, Assessment and even Teacher Training, itself.

Finally, an inflection may also be spoken of in terms of methodology (methodological inflection), since there is a clear withdrawal from the traditionally preferred classic methods (experimental method, co relational studies, the comparison of means…), as some authors had already mentioned, and which is obvious in the tendency to use "non-experimental" research designs, the preference for "non-statistical" data techniques and the option for a qualitative type of data.

In short, it may be said that the research presented here represents a relevant part of the research

developed over the last two decades in Portugal. The high demand for post graduation courses at universities from the nineties onwards, particularly in this field, indeed, corresponding to the strong appeal of new technologies and their potential for use in Education, is perhaps, one of this period's main characteristics and influences what is researched in Portugal in this field. In fact, as we have already observed, teachers are the ones who are more interested in taking a Masters course in this area, even though their motivations are directly related to the study of integrating technology in education, but also for reasons to do with the development of their professional career.

Owing to an increase in the supply of Masters courses at some universities which are directly related to educational technology, the tendency over the last fifteen years has been for demand to also increase. Despite being a good indicator of the amount of research carried out, this fact sheds very little light on the direct contribution of research to educational practices, namely in terms of clarification of ways of using the technologies, their implications for the organisation of contexts, their impact on learning, just to mention a few of the crucial aspects regarding which there is no systematic information.

However, it is still an important contribution on the part of the teachers who are involved in it, for the emerging critical mass and the impact it may have in the near future, for example, in the schools where they work. As previously discussed, it could have a positive impact, especially if it is duly considered and employed in structured intervention projects that are suitably supported by the educational projects of the same schools.

The little research carried out beyond the academic context and the absence of systematic evaluation studies on the introduction of technologies in schools are two characteristics that we may also associate with the second period in consideration. In accordance with international tendency, they lead us to assume that the results of the scientific studies will have a weak impact on the practices of those who, for a wide range of mainly circumstantial reasons, were able to use the available technology, at a given moment, for educational purposes.

Even though the scientific and methodological support to the introduction of technologies in an educational setting is apparently of vital importance, where research is expected, as is the case in other areas of knowledge, to precede the respective professional practices, in educational technologies the opposite seems to happen. Technologies reach the schools, are used, generally by the teachers who are more sensitive to their integration in the teaching and learning process, and only much later does a possible reflection emerge (when it does emerge) on their possible benefits for learning. This reflection depends, more often than not, on circumstantial factors (such as carrying out studies to obtain a Masters degree) and is only sporadically integrated in a broader project or research line, with a view to equating new forms of teaching and learning with technologies and to bringing about specific support for different types of use and practice of these same technologies.

This is a crucially important aspect, especially as far as new technologies are concerned, not only because of the challenges they represent (may represent) in terms of the innovation of conception and teaching and learning practices, but also because of the need to strictly and systematically monitor their implementation, or evaluate their impact and respective effects on a number of different levels of schooling.

Endnotes

1. XV Conference of the Portuguese Branch of AFIRSE – Association Francophone Internationale de Recherche en Sciences de l'Education (Lisbon, February 2006).

2. "There are literally hundreds if not thousands of studies that keep repeating this horse-racing paradigm, a paradigm that was condemned and sentenced to death years ago when discovery learning, educational television, and CAI were compared with their traditional competitors" (Salomon, 2000). Basically, it is like trying to measure a certain object without a valid measurement unit, since it was not constructed in view of the nature and characteristics of such an object.

3. Even though we are aware that there are Masters dissertations in other Portuguese universities, resulting from research connected, in some degree, to the area of Educational Technology, we were unable to gain access to the respective information from the data bases we consulted. We were also unable to gain access to the respective libraries or documentation centres in time. We have been informed that the Universities of Coimbra, Porto and Algarve are members of this group, even though the figures are not very significant, due to the lack of Masters courses in this specific area at these Universities.

4. Exclusion of the *Universidade Aberta* [Open University] can only be justified by its marked difference in relation to the other universities, at least in terms of the means it uses to accomplish its mission. However, in this specific case, only as a way of testing the possibility of the decisive contribution of the surge of new universities after April 25th 1974.

5. The first Master of Education courses of which we know, specialising in the area of Educational Technology were held at the University of Minho in the academic year 1991/92 (Chaves, 1998), although there had already been a specialisation at this University in *Informática no Ensino* [Computer Technology in Education] (since 1987). During the academic year 1991/92 a Master course also opened at the *Universidade Aberta* on Multimedia Communication.

6. This fact seems to tie in with the results observed in relation to the "main theme", in which interest in the more technological aspects was much higher, reaching a percentage of 58.9% of the studies when considered in conjunction with "information technologies" and the "audiovisuals" (it is worth mentioning that the set of themes that are not directly related to the "technologies" – "teaching and learning" and "teacher training"- represent only 30.6% of the cases).

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Translated by Tânia Lopes da Silva