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Factors affecting school teachers' perceptions of the instructional benefits of educational digital media

Factores que influyen en la percepción de los profesores de los beneficios instruccionales de los medios educativos digitales

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Abstract

This study aims to identify the factors that affect primary and secondary school teachers' perceptions of the potential benefits of digital media for teaching and learning in schools. Various studies have shown that when teachers believe that the use of digital media is valuable for instruction and learning, they are more likely to incorporate their use into teaching practice. Three sets of factors were used as independent variables: the general profile of the school and the teacher, the technological profile of the school, and the technological profile of the teacher. This study used survey data gathered from 702 teachers at 356 primary and secondary schools in Spain. Correlation and hierarchical regression analyses were performed to examine the relationship between the independent variables and teachers' perceptions. The results show a strong relationship between these perceptions and the technological profile of teachers. The factors that best predict the dependent variable are the area of study, digital literacy, ICT training, and the frequency of Internet access, both inside and outside the school. Finally, we suggest that the integration of digital media in the classroom is not an isolated objective to be achieved separately from pedagogical goals, but is closely interrelated with teachers' educational aims.

Keywords: Educational digital media, computer assisted learning, teacher competencies, teacher beliefs, schools

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Resumen

Este estudio pretende identificar los factores que influyen en las percepciones de los profesores sobre los beneficios de los medios educativos digitales para la enseñanza y el aprendizaje. Varios estudios relevantes han indicado que cuando los profesores creen que los medios educativos digitales son valiosos para la enseñanza y el aprendizaje, son más propensos a incorporarlos en su práctica docente. Se han considerado tres conjuntos de factores como variables independientes: las características de la escuela y del profesor, las características tecnológicas de la escuela, y las características tecnológicas del profesor. Se recogieron datos de 702 profesores de unas 356 escuelas de educación primaria y secundaria en España con un cuestionario. Mediante análisis de correlación múltiple y de regresión jerárquica examinamos la relación entre las variables independientes y las percepciones de los profesores. Los resultados muestran una fuerte relación entre estas percepciones y las características tecnológicas del profesor. Los factores más predictivos son el área de enseñanza, la alfabetización digital, la formación en tecnología educativa y la frecuencia de acceso a Internet, dentro y fuera de la escuela. Por último, sugerimos que la integración de los medios educativos digitales en el aula no es un objetivo aislado que debe ser alcanzado por separado de los objetivos pedagógicos, sino que es un objetivo totalmente interrelacionados con las finalidades instruccionales de los profesores.

Palabras clave: Medios educativos digitales, Aprendizaje asistido por ordenador, competencias del profesor, creencias del profesor, escuelas

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Over the last decade the identification of the factors that can influence the use of digital media in education has become a central area of interest in the field of technology-based learning (Badia, Meneses & Sigalés, 2013; Tondeur, Valcke, & Van Braak, 2008; Van Braak, 2001; Wastiau, Blamire, Kearney, Quittre, Van de Gaer, & Monseur, 2013).

One of the most frequently cited factors is the teachers' perception of the educational benefits of digital media (Inan & Lowther, 2010; Knezek, Christensen, & Fluke, 2003; Van Braak, Tondeur & Valcke, 2004). According to Petko (2012, p. 1355), the effectiveness of technology in learning is "the belief that student learning is improved with the help of digital media […]. The use of digital media could improve the quality of teaching, learning outcomes, interest, and creativity, collaborative work and learning strategies for the students".

The relationship between the teachers' perception of the benefits of digital media in education and the frequency with which they are used in the classroom has been demonstrated in various studies. Van Braak et al. (2004) included this aspect within a broader variable which measured the attitudes of teachers to computers in education. The items used by these authors included: "The computer increases the level of creativity of students", "The use of computer helps students to achieve better text writing", and "The computer used as a learning tool, increases student motivation". The results showed the existence of five variables which affect the frequency with which computers are used in the classroom: the attitudes of teachers to computers in education, technological innovation, the intensity of computer use, IT training, and gender. The variable measuring the attitude of teachers to computers in education was heavily influenced by the attitude of teachers to computers in general.

Inan and Lowther (2010) also included perception of the potential educational benefits of digital media in their analysis, which consisted of an examination of the influence of the individual profiles of teachers and their perception of contextual factors in the integration of technology in the classroom. The results showed that various factors had a significant influence: competence in the use of computers, the overall standard of support, technical support, the availability of computers, and teachers' beliefs regarding technology. This last aspect was defined as teachers' perception of the influence of technology on teaching and learning.

Wastiau et al. (2013) also pointed out that the teachers' perception of the influence of digital media on pupils' motivation and performance and on the processes and results of learning is an important variable for understanding the use of technology in the classroom. Other influential factors are the type of leadership and the strategy for integrating technology, the technological infrastructure and access to technology, and teachers' and pupils' self-perception of their digital competence.

The relationship between perceived benefits and frequency of use of technology and digital media in learning has been confirmed by a line of research which has contributed to the development of an explanatory model called "will, skill, tool", initially proposed by Christensen and Knezek (2001) and pursued in later studies (Christensen & Knezek, 2008; Knezek, Christensen & Fluke, 2003; Morales, 2006; Petko, 2012). Three groups of factors related to desire to use, competence in use and the availability of technology explain much of the variation in the frequency of use of technology and digital media in the classroom. The *will* factor is based on the perceived effectiveness of digital technology and includes all the teachers' beliefs about the usefulness of technology. The *skill* factor includes the teachers' ability to integrate digital technology in education while the availability of the technological *tools* includes conditions of access and the characteristics of the technological infrastructure.

This relationship has also been shown in comparative studies between teachers who integrate technology in the classroom and those who do not. According to Mueller, Wood, Willoughby, Ross and Specht (2008) there are two groups of discriminating variables. The first group is related to teachers' previous experience of technology and computers and includes having had positive teaching experiences with computers, feeling comfortable and enthusiastic about working with computers, having received training and having received help from others. The second group of factors is connected with the attitudes of teachers to technology and includes their appreciation of technology as an effective educational tool, their perception of the usefulness of digital media in education and their motivation to use them, and the belief that the activity of the teacher can influence pupils.

The relationship between the potential benefits of the Internet and digital media and their use in the classroom can also be seen in groups of teachers well trained in ICT who are teaching in classrooms which are technologically very well equipped. Badia, Meneses and Sigalés (2013) pointed out that one of the factors most influencing the educational use of the Internet and digital media by this type of teacher and in this type of classroom was the teachers' perception of the usefulness of technology for learning. This factor measured teachers' perception of the extent to which technology improves the quality of learning, academic results and the achievement of learning goals.

While the above studies have focused on establishing the relationship between the teachers' belief that technology brings about benefits in learning and its use in the classroom, there has been little research into the main factors influencing teacher perception of the usefulness of technology in learning.

To date, only Perrotta (2013) has studied how some aspects of the education system, such as the profile of the educational institution, the classroom and the teacher, can influence the benefits teachers perceive in the use of technology. In his study various educational benefits of technology were assessed by teachers and pupils, including better access to learning resources and content, better motivation and attention when learning, and the increased likelihood of pupils learning more actively and independently. The results showed that teacher perception is influenced more by the institutional profile of the school than by the profile of individual teachers. Consequently, Perrotta maintained that certain factors related to socioeconomic and institutional conditions were more influential than the characteristics of the classroom and the profile of individual teachers. These factors are the nature of the conditions in the educational institution, the features of the real contexts in which the teachers work, and the cultural expectations surrounding each area of the curriculum.

Our research aims to extend current thinking in this field through the development of an explanatory model of the factors affecting perception of the effectiveness of digital media in the work of educators in primary and secondary schools. To achieve this, we first propose to determine which groups of factors have significantly greater positive effects. In line with the approach taken by Tondeur (2007), on a strictly analytical level we will group the factors in three categories, which we will call: a) the structural profile of the school and the individual profile of the teacher; b) the technological profile of the school; and c) the technological profile of the teacher. Secondly, we propose to identify the factors that have the greatest influence on teachers' perceptions of the potential benefits of technology.

Method

Data collection

Data were compiled as part of a more extensive research project carried out between 2007 and 2009, which analysed the use of the Internet in Spanish schools (Sigalés, Mominó,

Meneses & Badia, 2009). In a first stage, a team of interviewers were trained to collect data. At the same time, schools were contacted by letter and asked to participate. A week later the head teachers were contacted by phone to arrange a first visit. The second stage consisted in the collection of data in schools. Two written questionnaires were used, one for head teachers and the other for teaching staff, who participated on a voluntary, anonymous basis. Each centre was visited 3 or 4 times to complete the collection of data. Finally, the data were refined and entered in a database.

Participants

A sample of 356 primary and compulsory secondary schools in Spain took part. In each school, the head teacher and staff selected at random a classroom used by pupils in the last year of a cycle (aged 11-12 in primary and 15-16 in secondary). With the help and guidance of the research team, all the head teachers and staff who gave classes in that classroom answered the questionnaire. The final total of respondents was 356 head teachers and 702 teachers. Fifty-nine percent of participants were women and 41% men. Their average age was 41.

Measuring instruments

Structural profile of the school and individual profile of the teacher

Teachers were asked to give information about their age, sex and main subject area. They were also asked to provide information about various aspects of their school: the level of education (primary or secondary), type of school (public or private), and the population of the town or city in which the school was located.

Technological profile of the school

The heads of schools were asked to give information about the centre's policy on the use of technology, technological infrastructure, the number of computers per pupil, and the availability of support for teachers in the use of technology and digital media for education.

To evaluate the centre's policy regarding technology, teachers were given a list of six dichotomous (yes/no) items dealing with teaching and management. The three items concerning teaching policy provided information on the existence of measures to promote changes in educational goals and syllabi, to encourage new teaching methods, and to improve methods of assessment. The three items relating to management policy were designed to gather information about the existence of measures to promote the use of technology by pupils and their families outside the school, measures to give teachers incentives and rewards for promoting the use of technology as part of their pedagogical work, and measures to develop skills in the educational use of technology. In view of the non-metric nature of the input, a PCA with polychoric correlation was used, which generated a two-component structure (KMO=.714 and a significant Barlett test, p=.000). The total variance was 65.32%, of which 48.35% related to teaching policy and 16.97% to management policies. The rotated solution (direct oblimin) gave loading components ranging from .763 to .905 and from .726 to .745, respectively. Both components showed acceptable levels of reliability, with a Cronbach's α of .901 and .790, respectively.

To analyse the technological infrastructure of the school, four yes-no dichotomous items were presented concerning the technological infrastructure available there: maintenance of the school's website, access to broadband Internet, the presence of Wi-Fi, and the availability of a school intranet. The principal component analysis showed a one-factor structure (KMO=.688 with a significant Barlett test, p=.000), with factor loadings ranging between .594 and .827. This solution represented 50.63% of total variance with an acceptable degree of reliability and a Cronbach's α of .675.

Technological profile of the teacher

Teachers gave information concerning computer literacy, level of training and the frequency with which they accessed the Internet inside and outside the school.

To evaluate computer literacy, teachers gave information about their level of ability in six common Internet tasks: browsing, downloading a file, sending an e-mail, using instant messaging applications, publishing information on the Internet, and developing a website. Four responses were available corresponding to four levels of competence, ranging from (1) "I don't know what it is or what it means" to (4) "I can do this by myself". The principal component analysis showed an acceptable one-component solution (KMO=.843 with a significant Barlett test, p=.000), with component saturation between .771 and .903. This solution represented 72.33% of total variance with a Cronbach's α of .921.

Teachers' technological training was measured by an item reflecting both the quantity and quality of the training received by teachers in the last three years. The three possible responses were: "No training was given", "A training course was given but it was of little use" and "A training course was given and it was useful".

Finally, to measure the frequency of access to the Internet in school (i.e. in the staff room, the library or the computer room) and outside school in out-of-school hours (e.g. at home, in a public library or a cybercafé), two items were used with four levels of response, ranging from (1) "never or hardly ever" to (4) "every day".

Perceived benefits of digital media in education

Teachers responded to five items referring to the benefits that digital media bring to their teaching work. The items referred to both curriculum development and aspects related to teaching and student learning. The items were: 1) The communication and cooperation developed with my pupils through digital technology is useful for my work as a teacher; 2) The educational resources available on the Internet meet the needs of my subject area; 3) Technology improves the quality of my pupils' learning experience; 4) Technology helps my pupils to attain educational objectives; 5) Educational resources designed with technology are suitable for my teaching. Teachers were asked to assess each item on a five-point scale ranging from (1) "strongly disagree" to (5) "in complete agreement". Exploratory factor analysis using principal component analysis (PCA) showed a one-component solution (KMO=.857 and a significant Bartlett's test, p=.000), with component saturations ranging from .770 to .847. This solution represented 64.50% of total variance with a Cronbach's α of .861.

Analysis of data

Data analysis was carried out using the SPSS 21 program. First we verified compliance with all the suppositions that would enable us to conduct the statistical tests envisaged. Secondly, we correlated all the variables with each other to obtain a first index of validity for the hypotheses and to test the independence of the factors influencing the outcome.

Thirdly, with a view to evaluating bivariate correlations and estimating the relative contribution of explanatory variables, a three-step hierarchical regression was conducted. This type of regression enables one to examine the influence of independent variables sequentially, so that the researcher can determine, step by step, the extent to which the inclusion of new variables helps to improve the variance explained compared with the preceding models. This type of regression was chosen in accordance with the objectives of the research. As well as verifying the influence of each independent variable, we propose to determine the influence of each of the three groups of variables. The first model shows the influence of the control variables, which refer

to the structural profile of the school and the individual profiles of teachers. The second model reveals the influence of the previous group of variables together with the variables related to the technological profile of the school. Finally, the third model shows the influence of the two previous groups of variables together with the technological profile of the teacher.

Results

Descriptive data and correlations

Table 1 shows descriptive data and correlations between all the variables.

Table 1 - *Means, standard deviations and correlations between the variables observed*

		M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Perception of benefits [e]	2.49	0.64	-														
2	Digital literacy [f]	2.35	0.53	.28[d]	-													
3	Training in educational use of technology [g]	1.12	0.88	.26[d]	.23[d]	-												
4	Access to the Internet at school [h]	1.97	1.06	.25[d]	.33[d]	.24[d]	-											
5	Access to the Internet outside school [i]	2.13	1.08	.20[d]	.49[d]	.14[d]	.30[d]	-										
6	Policy on teaching with technology	0.33	0.35	.07[b]	.03	.02	.09[c]	-.13	-									
7	Policy on management with technology	0.48	0.29	.05	.02	.06	.04	.00	.36[d]	-								
8	Technological infrastructure	0.61	0.27	.06[a]	.02	.11[c]	.05	-.03	.07[a]	.22[d]	-							
9	Ratio of computers per pupil	0.45	1.02	-.02	-.04	.09[c]	.13[d]	-.05	.04	.05	-.04	-						
10	Support for use of technology [j]	0.63	0.48	-.09	.06[a]	.10[c]	.12[b]	.02	.08[b]	.14[d]	.11[c]	.02	-					
11	Age	41.09	9.86	-.03	-.33[d]	.05	-.06[a]	-.20[d]	-.02	.05	.13[d]	-.00	.03	-				
12	Gender [k]	0.41	0.49	.11[c]	.11[c]	.05	.11[c]	.07[b]	-.03	.02	.03	-.06[a]	-.03	.13[d]	-			
13	Subject area [l]	2.94	2.01	.09[c]	.16[d]	.00	.13[d]	.10[c]	.04	.01	-.02	.03	.01	-.04	.11[c]	-		
14	Standard of education [m]	0.20	0.40	.04	-.01	-.08[b]	-.04	-.01	.11[c]	.00	.13[d]	-.10[c]	-.00	-.05	.12[d]	.07[b]	-	
15	Type of school [n]	0.37	0.48	-.01	-.02	-.11[c]	-.13[d]	-.00	.10[c]	.05	.20[d]	-.15[d]	.00	-.04	.14[d]	.03	.61[d]	-
16	Population of town/city [o]	1.82	1.37	-.00	-.02	-.02	-.12[d]	.02	.01	.10[c]	.11[c]	-.14[d]	.07[b]	.06[a]	.08[b]	-.01	.19[d]	.33[d]

[a] p<.10; [b] p<.05; [c] p<.01; [d] p<.001.

[e] 0=strongly disagree, 4=strongly agree; [f] 0=I don't know what it is or what it means, 3=I can do it by myself; [g] 0=None, 1= Yes and it was not very useful, 2= Yes and it was very useful; [h] 0=Never or hardly ever, 3=Every day; [i] 0=Never or hardly ever, 3=Every day; [j] 0=No, 1=Yes; [k] 0=Woman, 1=Man; [l] 0=Spanish language, 1=Co-official language in each autonomous community, 2=English, 3=Mathematics, 4=Social Sciences, 5=Natural Sciences, 6=Visual Arts, 7=Technology; [m] 0=Primary education, 1=Secondary education; [n] 0=Public, 1=Private; [o] 0=Less than 10,000, 4=500,001 or more.

Only a few variables have a significant positive correlation with the perceived benefits of digital media in education. The strongest correlations are found in variables related to the technological profile of the teacher, such as the level of computer literacy (r=.28, p <.001), training received and assessment of its usefulness (r=.26, p <.001), frequency of access to the Internet at school (r=.25, p <.001) and frequency of access to the Internet outside school (r=.20, p <.001). Other variables which also have a significant positive relationship, albeit less pronounced, are gender (r=.11, p <.01), subject area (r=.09, p <.01), and policy on education and technology (r=.07, p <.05). Lastly, the variable for technological infrastructure also shows a positive correlation, although it only exhibits a certain tendency to significance (r=.06, p <.10).

Hierarchical regression analysis

Table 2 shows the results for the three models. In order to respond to the two objectives of the study, we will first comment on the influence of each category of variable, and then specify the effects of each independent variable on each model.

Table 2 - *Models of hierarchical regression for the factors influencing teachers' perception of the educational benefits of digital media*

.	Model 1			Model 2			Model 3		
	B (SE)	**Beta**	**t**	**B (SE)**	**Beta**	**t**	**B (SE)**	**Beta**	**t**
Constant	2.404 (0.136)	-	17.674[d]	2.277 (0.146)	-	15.594[d]	1.534 (0.210)	-	7.302[d]
Level of education									
Primary	-	-	-	-	-	-	-	-	-
Secondary	0.66 (0.081)	.040	0,813	0.052 (0.081)	.032	0,648	0.035 (0.076)	.021	0,459
Type of school									
Public	-	-	-	-	-	-	-	-	-
Private	-0.085 (0.071)	-.063	-1,206	-0.124 (0.072)	-.092	-1.731[a]	-0.037 (0.069)	-.027	-0.533
Population of town/city									
Less than 10,000	-	-	-	-	-	-	-	-	-
10,001 – 50,000	0.023 (0.077)	.016	0.302	0.060 (0.078)	.041	0.778	0.053 (0.074)	.036	0.727
50,001 – 100,000	0.091 (0.099)	.041	0.920	0.109 (0.101)	.049	1.080	0.130 (0.095)	.059	1.370
100,001 – 500,000	0.017 (0.076)	.012	0.218	0.022 (0.076)	.015	0.286	0.033 (0.072)	.023	0.454
500,001 or more	-0.025 (0.096)	-.013	-0.257	-0.004 (0.098)	-.002	-0.042	-0.005 (0.092)	-.003	-0.059
Age	-0.004 (0.003)	-.056	-1.375	-0.005 (0.003)	-.068	-1.639[a]	0.000 (0.003)	-.006	-0.131
Gender									
Women	-	-	-	-	-	-	-	-	-
Men	0.144 (0.054)	.110	2.664[c]	0.146 (0.054)	.111	2.689[c]	0.077 (0.052)	.059	1.479
Subject area									
Spanish Language	-	-	-	-	-	-	-	-	-
Language in Autonomous Community	0.121 (0.118)	.046	1.026	0.120 (0.118)	.046	1.022	0.067 (0.112)	.026	0.605
Foreign Language	0.305 (0.084)	.195	3.628[d]	0.309 (0.084)	.198	3.685[d]	0.229 (0.080)	.146	2.859[c]
Mathematics	0.117 (0.085)	.073	1.372	0.126 (0.085)	.079	1.479	0.063 (0.081)	.039	0.777
Social Sciences	0.250 (0.100)	.120	2.500[c]	0.251 (0.100)	.120	2.514[c]	0.205 (0.095)	.098	2.158[b]
Natural Sciences	0.306 (0.105)	.138	2.930[c]	0.313 (0.104)	.141	3.005[c]	0.287 (0.099)	.129	2.902[c]
Art	-0.012 (0.106)	-.005	-0.110	-0.010 (0.107)	-.005	-0.094	-0.057 (0.101)	-.026	-0.571
Technology	0.509 (0.128)	.176	3.981[d]	0.506 (0.128)	.176	3.955[d]	0.255 (0.123)	.088	2.064[b]
Policy on teaching with technology				0.153 (0.077)	.085	1.986b	0.109 (0.073)	.060	1.497
Policy on management with technology				0.023 (0.098)	.010	0.235	0.052 (0.092)	.023	0.561
Technological infrastructure				0.180 (0.101)	.075	1.793[a]	0.040 (0.096)	.017	0.420
Ratio of computers per pupil				-0.016 (0.024)	-.026	-0.645	-0.014 (0.023)	-.023	-0.598
Support for use of technology									
No				-	-	-	-	-	-
Yes				-0.018 (0.054)	-.013	-0.335	-0.062 (0.051)	-.046	-1.215
Computer literacy							0.170 (0.058)	.137	2.910[c]
Training in educational use of technology									
None							-	-	-
Yes, not very useful							0.002 (0.069)	.001	0.025
Yes, very useful							0.248 (0.058)	.191	4.281[d]
Access to the Internet at school									
Never or very rarely							-	-	-
Monthly							-0.070 (0.094)	-.041	-0.751
Weekly							-0.015 (0.090)	-.011	-0.169
Every day							0.148 (0.090)	.113	1.650[a]
Access to the Internet outside school									
Never or very rarely							-	-	-
Monthly							0.141 (0.105)	.059	1.334
Weekly							0.228 (0.086)	.150	2.669[c]
Every day							0.199 (0.082)	.153	2.427[b]
Summary of model									
R2 (R2 adjusted)	.261 (.046)			.286 (.052)			.451 (.165)		
F for model	3.027[c]			2.744 [c]			5.328[c]		
Change of R2	.068			.014			.121		
F for change of R2	3.027[c]			1.835			10.243[c]		

[a] p< 0.10; [b] p< 0.05; [c] p< 0.01; [d] p< 0.001.

The data provided by the summary of each model allow us to verify the influence of the variables in each category on the independent variable. Model 1, composed of the control

variables which include the structural profile of the school and the individual profile of the teacher, is statistically significant (F=3.027, p<.01) and provides an acceptable degree of explained variance (R^2=.261). Model 2, which incorporates the variables relating to the technological profile of the school, is statistically significant (F=2.744, p<.01) and exhibits somewhat higher explained variance (R^2=.286), but the change with respect to Model 1 (F for the change of R^2=1.835) is not significant. These results make the development of a third model advisable, focusing on the effects of all variables included in the study and thus constituting the final stage in hierarchical regression analysis. This model has an acceptable overall fit (F=5.328, p<.01) and exhibits a statistically significant change (F for the change of R^2=10.243, p<.01) with respect to Model 2, with a substantial improvement in R^2 to a value of .451.

In line with the effects observed in Model 1, Model 2 shows a significant positive effect for gender and some subject areas. In particular, both models indicate that men (Beta=.111, p<.01) whose subject area is Foreign Language (Beta=.198, p<.001), Technology (Beta=.176, p<.001), Natural Sciences (Beta=.141, p<.01) and Social Sciences (Beta=.120, p<.01) have a greater perception of the educational benefits of digital media than their colleagues. In line with the bivariate analysis the level of education and the population are not statistically significant in either model. Model 2 shows a significant negative effect for age (Beta=-.068, p<.10) and private ownership of schools (Beta=-.092, p<.10), which was not visible in Model 1. Finally, regarding the variables related to the institutional aspects of schools introduced in Model 2 and not included in Model 1, we find that only the policy on teaching with ICT (Beta=.085, p<.05) and the infrastructure (Beta=.075, p<.10) have a significant effect, positive in both cases, on the perception of the benefits of digital media in education.

Model 3 shows that, in connection with the variables for the structural profile of the school and the individual profiles of teachers, only subject areas are significant and these have a positive effect in the case of Foreign Language (Beta=.146, p<.01), Natural Sciences (Beta=.129, p<.01), Social Sciences (Beta=.098, p<.05) and Technology (Beta=.088, p<.05). However, unlike the previous models, other control variables such as the ownership of the school, gender and age no longer make a significant contribution to explaining the model. We also find that none of the variables related to the technological profile of schools predicts the dependent variable to a significant degree. Unlike Model 2, factors such as the policy on teaching with ICT and infrastructure are not significant in Model 3. Finally, if we consider the effects of the variables related to the technological profile of the teacher introduced in step 3, the fact of having higher levels of computer literacy (Beta=.137, p<.01), having received very useful training in the use of technology in education (Beta=.191, p<.001), accessing the Internet at school every day (Beta=.113, p<.10) and outside the school every week (Beta=.150, p<.01) and every day (Beta=.153, p<.05) are factors which have a significant positive effect on perception of the educational benefits of digital media.

Conclusion

The results of this study examine more closely the information available about the factors which influence the perception of primary and secondary school teachers of the benefits of digital media for teaching and learning. The results show that the structural profile of the school and the individual profile of the teacher (Model 1), taken in isolation, have a significant influence on teachers' perception. Moreover, when new variables are included (Model 2), related to the technological profile of the school, the model is still significant, although it does not give substantially better results than Model 1. However, the last model (Model 3) shows that, when we consider all the variables included in the study, the technological profile of the teacher is the most influential variable.

This model is significantly better than the other two and also provides significant, much greater explained variance.

Model 3 shows the significant influence of factors related to the teachers' technological profile, such as computer literacy, training in educational technology, and frequency of access to the Internet inside and outside the school. The results also highlight the influence of the teachers' subject area, especially in the case of Foreign Language, Natural Sciences, Social Sciences and Technology. They also show the lack of influence of the remaining variables related to the structural profile of the school, the individual profile of the teacher and the technological profile of the school.

Like Perrotta (2013), we have identified a significant positive influence by certain variables related to the school, such as the teachers' subject area. However, our study supports the view that the most influential factors are not part of the profile of the school as an institution but are more closely related to the technological profile of the teacher. Our results confirm some of the findings of the study by Inan and Lowther (2010), but they contradict others. Both papers put forward the view that the computer literacy of teachers is one of the variables most influencing their perception. However, in contrast to the findings of these authors, we have not found that other factors connected with the technological profile of the school, such as the ratio of computers per pupil and the availability of technological support, have a significant influence.

These results point to the need for further lines of research in the future. If the main factors influencing the teachers' perception of the usefulness of digital media in education are closely related to the technological profile of the teacher and the content of the curriculum, other individual characteristics of the teacher connected with technology could be involved, such as the teachers' beliefs about computer-assisted learning (Kordaki, 2013) and approaches to teaching (Rosario, Núñez, Valle, Paiva & Polydoro, 2012).

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