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Analysis of Difficulties of Spanish Teachers to Improve Students' Digital Reading Competence. A Case Study within the PISA Framework

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Esteban Vázquez-Cano

The National Distance Education University, Faculty of Education, Department of Didactics and School Organization, Juan del Rosal 14, 28040 Madrid, Spain, evazquez@edu.uned.es

Abstract. Digital technologies have changed the ways texts are produced and displayed, and those changes have a profound impact on how students read. In Spain, the results in digital reading competence are below the OECD average, which proves to be a handicap for Spanish students. This article presents a case study in which we investigate, through a quantitative methodology, teachers' perceptions on the main constraints for the effective development of a teaching methodology to improve digital reading competence of secondary students in Spain. The findings show how learning processes based on digital reading are still underdeveloped and teaching staff in a large majority expresses lack of preparation, training, and resources available in the school for the effective development of a teaching that encourages successful digital reading proficiency of students. It is important for governments, teachers, and students to meet these challenges as they affect almost every aspect of our daily routines.

Keywords: *digital reading, digital competencies, digital reading assessment, PISA, teachers' competences.*

As education systems, increasingly incorporate computers and related information technologies into pedagogical processes, educators and policy makers need to know which activities and policies will lead to the most effective learning. The past decade has also seen the explosion of mobile technologies, with laptops, tablets, smart phones and other portable digital devices being sold in increasingly large numbers. Information and communication devices based on digital technologies are used in a wide range of

contexts and for many different purposes. Their most important common characteristic is that they all permit the display and perusal of text. Indeed, most applications of computer technologies, including videogames, smart phones, tablets, etc., involve some type of textual information. As a result, whatever their purposes, tasks or goals, users of computers and networked digital technologies are compelled to read digital texts. In this context, the assessment of digital reading competence is necessary and essential to complement the indicators and descriptors of communicative competence, which has led to its inclusion in PISA-ERA, 2009 (Programme for International Student Assessment-Electronic Reading Assessment).

At present, teachers are making great strides in integrating new methodologies for treatment and development of digital reading processes, but it is also true that much remains to be done (Linnakyla et al., 2004). The appropriate use of ICT (Information and Communication Technologies) requires that students, who are now becoming critical citizens, learn new ways of reading and writing on digital environments. For this purpose, it is required to integrate new communication competencies and a specific teaching of a specific training in digital linguistic aspects in order to improve capabilities of encoding and decoding digital text (Salmerón, et al. 2006; Coiro, 2009; Coe & Oakhill, 2011; Vázquez-Cano, 2012; Vázquez-Cano, 2013). For that purpose, it is important to generate new "information skills", and "media communication skills" (Lawless & Schrader, 2008; Kemp, 2011; Agudo, Pascual, & Fombona, 2012; Vázquez-Cano & Calvo, 2016; Vázquez-Cano, 2016) and combat the general lack of understanding of critical digital readings (Lin, 2003; Madrid & Cañas, 2008).

One of the main findings of PISA 2009 international assessment is that there is no direct relationship between the time of use of digital devices and the Internet browsing time on improving competence in digital reading. Therefore, one of the main aspects to consider is that a teaching methodology based on promoting digital reading skills is one of the key elements to reinforce in relation to teachers' training. The Spanish students' results in digital reading are below the mean of OECD countries. For this reason, the main objective of this research is to analyze the difficulties and challenges that teachers have to develop to improve teaching practices in order to foster students' digital reading competence in coherent relation with the social and media context of this century.

New technologies for text, new ways of reading

Over the past ten years, there has been a discussion as to whether the people who have been exposed to information technology from a young age, so-called "digital natives", might readily possess the skills and abilities required to make use of digital devices, compared to older people, the so-called "digital immigrants" (Prensky, 2001). There is significant evidence that mere exposure to technology is not sufficient for becoming a

skilled user. The new digital world requires new skills so that students develop their full potential. The school continues to face the biggest challenge: to ensure that all young people acquire an adequate basic training, in which, as always, reading and writing skills are some of the most important competencies (Akir, 2006; Pazzaglia, Toso, & Cacciamani, 2008; Mills, 2010). The school has to bet on digital innovation and changes in methods for integrating the new digital scenarios and virtual tools in teaching.

The advent of digital technologies has had a profound impact on the design, production, dissemination, and uses of text (Leino, 2006). Digital texts are conceived as a subset of written texts. For the purposes of PISA 2009, digital text is synonymous with hypertext: a text or texts with navigation tools and features that allow the reader to move from one page or site to another. We are all surrounded by a digital written text; we can just cite just a few examples: more and more taxpayers fill in online forms; students search the web for information; jobseekers look up ads on employment websites; consumers order goods in online stores; electronic advertisements or public communication signs, information booths in railway stations, airports and people build and maintain social communities on line. All these activities, and many others, require the production, dissemination, and reading of some type of text (Burke & Rowsell, 2005). Besides the access to digital text occurs on multiple devices (tablets, smartphones, e-readers, game consoles, laptops, etc.). In fact, the use of these mobile digital devices is changing the ways in which students are approaching digital reading (Bennett & Maton, 2010; Vladar & Fife, 2010). These devices enable a new stage of dynamic and enriched reading from the principles of portability and ubiquity. The language proficiency of students in reading dimension not only means descriptors from reading on paper, but from digital competence associated with the interpretation of digital multimedia and hyperlinked text, and within this framework, the cognitive processes of accessing, retrieving, interpreting, integrating, reflecting, and evaluating are called upon for both text processing and navigation (UNESCO, 2008; Bertschy, Cattaneo, & Wolter, 2009).

Texts originated across media are similar to printed texts, but have a main differentiating characteristic: whereas printed texts have a relative permanence, digital texts are potentially dynamic and can be constantly completed, edited, and updated. These differences have consequences for the access, comprehension, and uses of text in a wide variety of situations, ranging from education to work to personal and civic purposes. It is therefore crucial to understand and assess the new forms of reading literacy that come with the practice of reading on digital displays (Naumann, 2008; Coiro, 2009; McEneaney et al., 2009; Vázquez-Cano, Mengual-Andrés, & Roig-Vila, 2015).Therefore, digital reading is involved in a great variety of social and personal activities and situations; for this reason, digital texts need a change in methodological approaches in order to improve the competence of digital reading of students (Rouet, 2006; Kennedy et al., 2008; Kemp, 2011; Coe & Oakhill, 2011).

Recent studies have identified how proficiently students navigate is a strong predictor of their learning and performance when reading digital texts (Naumann & Salmerón, 2016; Hahnel et al., 2016). Furthermore, it seems likely that attitudes towards ICT and digital reading proficiency have a reciprocal relation, as has been claimed for reading engagement and print reading proficiency (Guo et al., 2015; OECD, 2015). These results imply that teachers digital didactic activities in and outside the classroom could represent important benefits for improving students digital reading competence.

Spanish teenager digital context

The habits of use of digital devices of Spanish students at home and school were analyzed in PISA report (PISA, 2009). Students were asked to report how often – "never or hardly ever", "once or twice a month", "once or twice a week" or "every day or almost everyday" – they use a computer at school for the seven following activities: *chat on line at school; use e-mail at school; browse the Internet for schoolwork; play simulations at school; practice and drilling such as for learning a foreign language or mathematics; do homework on a school computer; and use school computers for group work and communicating with other students.* Students' responses to these questions were combined to make an *index of computer use at school* (Figure 1).
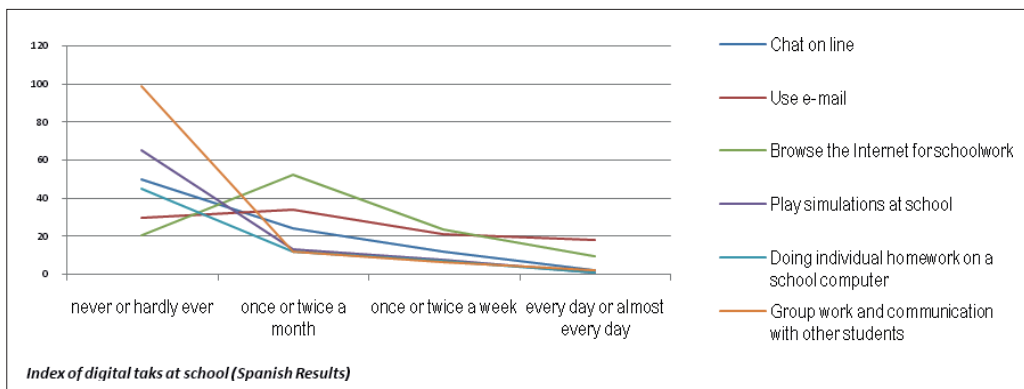

Fig. 1. *Index of digital tasks at school (Spanish Results)*

In PISA 2009 students also reported for the first time how much time – "no time"; "0–30 minutes"; "30–60 minutes" or "60 minutes or more"; they spend during a typical school week using a computer in three different subjects: *language of-instruction, mathematics and science.* Students who spend no time using a computer during school lessons perform the best, and the more time students spend using a computer during school lessons, the lower their scores in all three core subjects. This finding should be

interpreted with care: it does not necessarily suggest that spending more time using a computer in lessons results in poorer performance. The findings in this index suggest that access to computers at school is not the sole determinant of performance; students who use computers at school must also develop the knowledge and skills needed to locate and use the range of information available through the computer or digital devices.

In addition, students were asked to report how often they use a computer at home for the following activities: *play one-player games; play collaborative online games; use e-mail; chat on line; browse the Internet for fun; and participate in online forums, virtual communities or spaces*. Students' responses to these six activities: "never or hardly ever", "once or twice a month", "once or twice a week" or "every day or almost every day"; were combined to make an *index of computer use at home* (Figure 2).
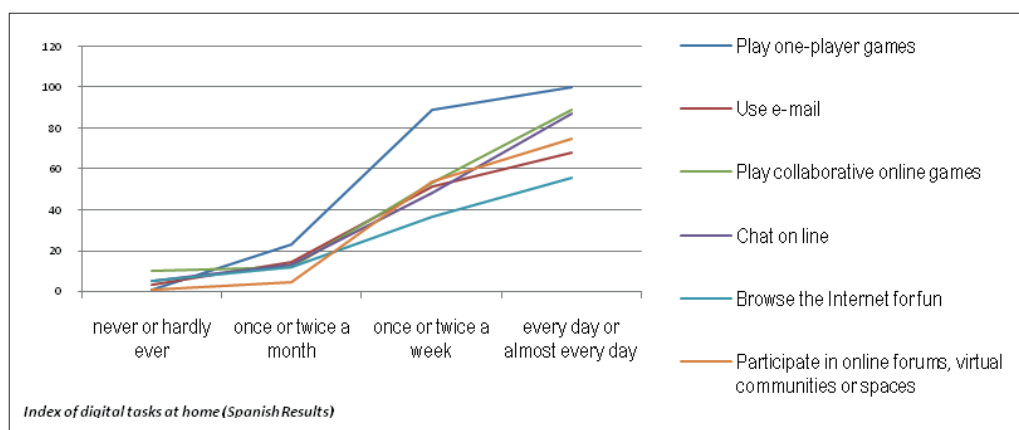

Fig. 2. *Index of digital tasks at home (Spanish Results)*

There is a positive linear relationship between performance in digital reading and computer use at home, particularly computer use for leisure, while there is no significant relationship to computer use at school (Postlethwaite, 1995). The frequency of computer use at home for leisure is positively related to navigation skills, which is an essential and unique part of digital reading, while the frequency of computer use at school is not. These findings suggest that students are developing digital reading literacy mainly by using computer sat home to pursue their interests. It can also result from variations in how digital technologies have or have not been integrated into curricula and instructional systems.

The findings suggest that access to computers at school is not the sole determinant of performance; students who use computers at school must also develop the knowledge and skills needed to locate and use the range of information available through the computer. Thus, it is essential to assess how teachers are developing activities to improve students' digital reading competence and analyze the difficulties in performing new methodological approaches.

PISA-ERA: assessment of digital reading in Spain

PISA defines reading literacy as understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society. The PISA 2009 reading framework (OECD, 2009; 2011) points out that, while many of the skills required for print and digital reading are similar, digital reading demands some new emphases and strategies to be added to the reader's repertoire. Critical thinking, therefore, has become more important than ever in reading literacy (Halpern, 1989; Warschauer, 1999; Shetzer & Warschauer, 2000). It is important to find out which specific dimensions of tasks and students' characteristics explain students' proficiency in digital reading, accounting for print reading proficiency (Korat & Shamir, 2008). The international report (PISA-ERA, 2009) presents the results of a first attempt to get a comparative view of digital reading skills of students in 15 years, the population surveyed and the total number of participating countries was 19, including Spain.

PISA develops a set of generic descriptors of competence in digital reading and sets the definition of "digital reading competence" when the student is able to understand, use, reflect, and interact with texts in digital format for a specific purpose, develop their knowledge and participate in society. The Spanish sample was composed in 2009 by 2.300 students from a total of 170 schools. These tests require access, understanding, assessment, and integration of digital texts in a range of contexts and reading assignments. Special attention is paid to the domain of processes, understanding of concepts and the ability to handle different situations in the recent forms of digital reading and the different requirements in terms of access to the texts. Digital tests involve reading, interpretation and reflection, and an ability to use reading to achieve one's goals in life. The average score of the competition is set to 4 levels, the following table shows the data obtained in 2009 by participating countries.

Table 1. **Student performance in digital reading (sorted from lowest to highest test score)**

Level 1 (–420)	Level 2 (420–490)	Level 3 (490–550)	Level 4 (550–600)
Colombia (368)	Chile (435)	France (494)	Korea (568)
	Austria (459)	Norway (500)	
	Poland(464)	Belgium (507)	
	Hungary (468)	Ireland (509)	
	Spain (475)	Sweden (510)	
	Denmark (489)	Iceland (512)	
	Maco-China (492)	Hong Kong-China (515)	
		Japan (519)	
		Australia (537)	
		NewZealand (537)	

Source: *OECD, PISA 2009 Database* (Average punctuation: 499 points).

From data derived from Table 1, Korea is the top-performing country by a significant margin, with a mean score of 568. This indicates that, on average, 15-year-olds in Korea perform at Level 4 in digital reading. Two European countries have mean scores significantly higher than the OECD average: Ireland (509) and Belgium (507). On average in all of these countries except Korea, 15-year-olds perform at PISA proficiency Level 3 in digital reading. Students in the remaining five OECD countries perform, on average, at Level 2: Spain (475), Hungary (468), Poland (464), Austria (459) and Chile (435). According to this research, the same agency has announced the following points as fundamental criteria to establish a definition of digital reading competence:

– A good understanding of electronic texts requires effective navigation, i.e. to develop routes through the pages with information relevant to the task demands.

– When navigation is not required, good readers avoid being distracted by irrelevant pages.

– When you need to compare information from different pages and navigation becomes more complex, good readers often make multiple visits to the same page, and ignore irrelevant pages.

– Best readers know how to control time available.

– A low number of visited pages before deciding whether the information is relevant or not, usually correspond with a reading inefficient.

– Good readers begin the task with an effective navigation path.

– Before embarking on a particular path, students should know why they are reading that particular text, and what they are looking for; they should understand that sometimes they need to check more than once the same page in order to discriminate and exercise critical thinking.

Therefore, the skilled reader of digital texts must be familiar with the use of navigation devices and tools. These results imply that, contrary to what is often assumed, many "digital natives" do not know their way easily in the digital environment, and it becomes thus necessary for teachers to help them acquire it at school. For this reason, good methodological approaches have to be experimented in order to improve digital reading competence of students and, at the same time, main difficulties have to be analyzed to improve the didactics on digital reading.

Research design

The objective of this study is to analyze the difficulties that Spanish teachers have to face to improve their teaching in the promotion of digital reading competence of students in secondary schools. Specifically, the research will identify difficulties of Spanish teachers to improve students' digital reading, and determine what proportion of those difficulties can be improved in the future. The expectations are that the study will provide evidence

of the present difficulties (dependent variable) by identifying general characteristics of the teaching-learning process.

The survey tool used to measure technology acceptance contained 37 items. This survey tool was electronically administered to 675 teachers in different high-schools from Spain with similar size, between 500 and 625 students. The survey instrument contained questions addressing each of the main digital reading areas. The eight variables considered were: *performance expectancy (teachers' digital competence), effort expectancy, attitude toward using digital devices to develop digital reading, resources and facilitating conditions, self-efficacy, anxiety, behavioral intention, and training.* Survey participants were asked to indicate their response to each statement using a 7-point Likert scale with 1 representing a strong disagreement and 7 being a strong agreement with the statement. Data were collected from teachers of different subjects including Maths, Spanish Language, English Language, Biology, Social Sciences and Physical Education. From the participant pool of 675 individual teachers, the database recorded responses from 450 participants resulting in a response rate of 66.6 %.

Data analysis methodology

The method used in this study for identifying interactions between digital reading uses and difficulties in teaching has been regression analysis. The statistical analysis method used for this research was partial least squares, a system developed through statistical techniques of covariance based on structural equation modeling (Venkatesh et al., 2003). The tool used for the analysis was "PLS Graph3.0". The software was used to determine the validity of the various measurements or questions. The questions contained in the survey instrument were evaluated for variance (R^2) and retained if the variable had a variance greater than 0.7. PLS-Graph was used to study the assessment of latent variables and can also weigh the relationship between the questions used to determine unobservable model constructs.

The research model was evaluated to measure the inclusion of the various statement response variables used to contribute to the model constructs (MacKenzie & Podsakoff, 2003). A complete analysis of the model required an examination of both the goodness of fit criteria and the factor loading indicators. The goodness of fit indices measured how well the variable parameter estimates were able to reproduce the sample covariance matrix. The technique did this by taking the presented model as true and modifies the parameter estimates until the covariance difference between the parameter estimates and the sample is minimized.

Data analysis

Three moderating factors include (gender, age, and experience) each having varying influence on the primary constructs are presented in the following tables (2–3–4):

Table 2. **Gender distribution of the sample**

	Frequency	Percent
Female	231	51.33
Male	219	48.66
Total	450	100.0

Table 3. **Age distribution of the sample**

Gender	>25	25 30	30 35	35 40	40 45	45 50	50 55	55 60	<60	P.'s R.	P. Val.
Male	10.3	14.5	13.5	11.6	13.0	10.8	11.8	9.2	5.3	.009	.871
Female	9.7	18.1	14.0	10.8	14.5	11.7	10.5	8.7	2.0	.071	.113

Table 4. **Years of experience**

Years of Experience	>5	5 10	10 15	15 20	20 25	<25	P.'s R.	P. Val.
Male	10.3	34.5	23.5	21.6	10.1	0.00	.007	.851
Female	7.7	38.1	20.0	15.8	10.0	8.4	.061	.101

Construct Validity and Reliability

The research model used for this research measures the interaction effects between separate variables or constructs of the model via regression analysis. Though they cannot be directly measured, the eight latent variables interact to identify two direct determinants of difficulties to develop digital reading competence of students (training and resources and facilitating conditions). Three moderating factors include (gender, age, and experience) each having varying influence on the primary constructs. To prove construct validity, both convergent and discriminate evidences are measured. The statements contained in the survey instrument were evaluated for internal consistency (IC) and retained if the question had an IC greater than 0.7. This is consistent with current articles outlining technology adoption research (Venkatesh, et al., 2003). PLS-Graph weighed the relationship between the questions used to determine unobservable model constructs. PLS-Graph does this by examining the loading factors and the standard error estimate (Segars, 1997). Statements with IC scores less than 0.7 were removed from the model. Table 5 indicates the variables retained for each of the constructs with their

internal consistencies and loading factors. Discriminate validity is the degree to which any single construct is different from the other constructs in the model.

Table 5. **Loadings, weights, and internal consistencies (IC)**

Construct	Number of questions	Construct IC factor
Performance Expectancy (Teachers' digital competence)	7	0.85
Effort Expectancy	6	0.95
Attitude toward using digital devices to develop digital reading	5	0.88
Resources and facilitating conditions	3	0.87
Self-efficacy	4	0.85
Anxiety	3	0.90
Behavioral intention	4	0.87
Training	4	0.93

The criteria for measuring discriminate validity is to measure the average variance extracted (AVE), which indicates the average variance shared by a construct and its indicators (adequate when greater than 0.5). In addition, discriminate validity is confirmed if the diagonal elements are significantly higher than the off-diagonal values in the corresponding rows and columns. The diagonal elements are the square root of the AVE score for each construct. Table 6 contains the AVE scores and a correlation matrix for the constructs. All constructs have AVE scores greater than 0.5, indicating successful validation. The instrument has achieved acceptable levels of validity. The instrument demonstrates adequate discriminate validity because the diagonal, in bold, values are greater than the corresponding correlation values in the adjoining columns and rows (Chin, 1996).

Table 6. **AVE Scores and Correlation of Latent Variables**

	TDC	EE	AT	SE	AN	BI	TR
TDC	0.77						
EE	0.28	**0.88**					
AT	0.30	0.23	**0.80**				
SE	0.09	0.23	0.23	**0.81**			
AN	0.44	0.25	0.45	0.29	**0.79**		
BI	0.53	0.31	0.34	0.23	0.15	**0.89**	
TR	0.67	0.45	0.75	0.51	0.65	0.88	**0.93**

Performance Expectancy (Teachers' digital competence) TDC; Effort Expectancy EE; Attitude toward using digital devices to develop digital reading AT; Self-efficacy SE; Anxiety AN; Behavioral intention BI; Training TR.

Table 6 contains the measures of scale reliabilities for the various construct variable groups. Generally, reliability numbers greater than 0.7 are considered acceptable in technology acceptance literature (Zhang & Li, 2007). All the variables used to determine the various constructs, except facilitating conditions, met this level of reliability. The items used to measure "Resources and Facilitating Conditions" were left in the model with alpha values (raw and standard) of 0.67 and 0.73 because of the importance of "Resources and Facilitating Conditions" for the development of digital reading competence.

Structural model analysis

The research model was evaluated with R-squared calculation for dependent latent variables using PLS-Graph. The PLS-Graph provides an indication of how well the model fits the hypothesized relationship by means of the squared multiple correlations (R^2) for each dependent construct in the model. The R^2 measures a construct's percent variation that is explained by the model (Wixon & Watson, 2001). The R^2 values for each dependent variable are: "attitude toward using digital devices to develop digital reading", "resources and facilitating conditions", "training" and "self-efficacy" (0.68).

The interpretation of these factors indicates that the model explains 68 % of the variance of the dependent variable "difficulties" toward adoption of digital devices to improve digital reading. "Resources and facilitating conditions" explains 37 % of the variance of the whole construct as a determinant variable. To determine the strength of the relationships between two dependent constructs (training and resources and facilitating conditions) in the model, bootstrap method was implemented. The positive coefficient values for all constructs indicate that participants in this particular study had different difficulties to develop didactic activities for fostering digital reading competence of students.

Results

This study aims to understand the difficulties of teachers for developing digital reading competence. The results show that most of variables established in the model influence the correct development of activities to support digital reading activities in the classrooms. The study suggests that 68 % of the variance in the model is explained by a negative "teachers' digital competence" (13 %); negative "self-efficacy" (21 %) and negative "training" (34 %). The resources and facilitating conditions represent a 37 % of the whole construct with a high R^2 of 0.221 which suggest that teachers' development of didactic digital activities is directly conditioned by this variable.

Main difficulties observed according to the coefficient of the model were in relation with the following variables: "enable me to accomplish the curriculum" and "make it

easier supported with a positive path coefficient of 0.194 of the "Performance Expectancy" construct. In "Effort Expectancy" the variables which account for 0.192 of the construct are: "Operate with mobile devices takes too much time from my normal activities in class" and "Working with mobile devices is so complicated and difficult to understand". Regarding "Resources and Facilitating Conditions", the most significant difficulty is the lack of hardware (digital devices) in schools for developing digital reading activities which account for 0.181 of the construct.

The three categories in relation with attitudes, self-efficacy and behavioral intention represent 0.270 of the construct and the most remarkable difficulties are: "I have the didactic knowledge to use digital devices" (–0.071), "I know how to use digital devices to develop digital reading activities (–0.151), and "I plan to develop activities to develop digital reading activities every month" (–0.048).Finally "Training" is the most significant category; the four subcomponents account (0.372) of the construct. The need for specific training of teachers for the development of teaching activities in promotion of digital reading obtained a positive and statistically significant influence ($p < 0.01$) on the independent variable. Digital reading activities will have a much higher probability of success if teachers receive specific training for the proper use of digital devices and methodologies. This training has to be focused on general uses of digital devices, specific uses for developing curriculum activities, and software and didactic approaches to develop students' digital reading competence.

Figure 3 establishes the relationship between dependent variables as difficulties and their weight in the construct.
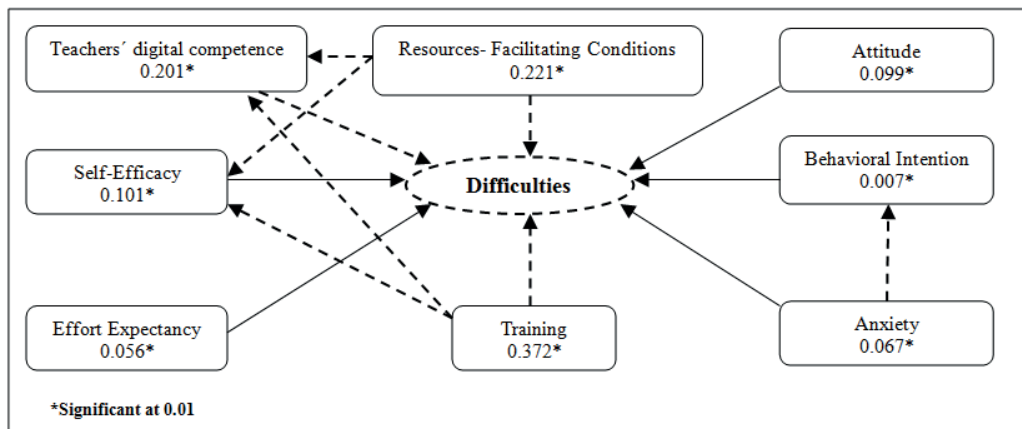

Fig. 3. *Difficulties for improving students' digital reading competence*

Figure 3 shows the main relationships between dependents variable in relation with difficulties to improve students' digital reading competence. We can infer a higher influence in discontinuous lines affecting the independent variable and between the

dependent variables. "Lack of training and Resources" affects significantly "Teachers' digital competence" and "Self-efficacy". Therefore, the two dependent variables which account for the highest influence in main difficulties for developing students' digital reading competence are "Lack of training and Resources" and "Facilitating Conditions."

The results show that younger teachers (<35) are more confident of their skills in using ICT and digital devices for promoting digital reading. They also consider these devices and reading applications are better suited to improve digital reading comprehension. Teaching experience is found to influence the perception of the utility of digital devices and specific software in classrooms. Teachers are more confident about the use of digital devices after the first year of teaching and no more than seven years of teaching experience, and if they use ICT resources at home more than 4 hours per week. There is a direct relationship between age, years of teaching experience and use of digital resources for promoting digital reading comprehension in classrooms (Pearson's $r = 0.17$; $p < 0.01$). Young and less experienced teachers are more willing to use ICT in their work, whereas female teachers appear to be less favourable than their male counterparts (Pearson's $r = 0.15$; $p < 0.01$). In addition, a significant relationship was found between the use of digital devices and the hours of in-service, and at home training in ICT (Pearson's $r = 0.40$; $p < 0:001$). To ensure effective didactic approaches in digital reading, a substantial shift is needed from the highly theoretical component of the subjects towards more dynamic didactic techniques involving testing of the proceedings and online activities. The new context of digital information requires continuous monitoring of the virtual processes in the following dimensions: *Digital reading activities in all subjects, a permanent training of teachers, development of teachers and students skills, new ways of creating contents by using 2.0 tools, and new ways of interpreting and processing information in digital devices and Internet.*

Derived from these results, we can propose that students should be encouraged to define their reading task before they start to navigate. They need clear purposes for reading, encouragement to clarify these purposes before embarking on navigating, and practice in evaluating and selecting both the links they choose to follow and the material they will then be able to read. They should learn to recognize and use whatever guidance is available to help them to locate relevant or critical pages. Students should be encouraged to avoid undirected navigation; clicking on numerous pages in the hope that one of them might yield useful information.

Discussion

The advent of information and communication technologies has sparked a revolution in the design and dissemination of texts. Online reading is becoming increasingly important in information societies what implies new approaches in teaching. Therefore, digital

reading also requires different skills, such as the deployment of new knowledge about the unique structures and features of digital texts. It also requires heightened proficiency in prediction, integration and evaluation that are even more emphatically called upon in digital than in print reading, because the amount of text visible at any one time is small, its origin often unverified and its extent often unknown. There is thus a clear need of a specific methodological approach that encourages "cyberlinguistic" student competencies in reading and creating digital texts, in order to develop these teaching tasks effectively.

The discussion should not only revolve around the effectiveness, but how to manage to introduce ICT with didactic approaches into classrooms and schools. In this research, derived from the quantitative analysis of the perceptions of teachers about difficulties and challenges for the improvement of teaching activities based on digital reading, we can highlight three main difficulties: the lack of resources and facilitating conditions, and lack of teacher training. Teacher training must be a priority of educational administration in order to give instruments and competencies to teachers to improve students' skills in digital reading, all of which are essential for an adequate use of digital devices in this knowledge society. The main teachers' difficulties lie in the fact that they do not know how to help students to make multiple inferences, comparisons and contrasts that are both detailed and precise. This study suggests that deeper analysis is required, a specific one that looks into the quality of ICT use at school, rather than its frequency. Such analysis will need to consider a wider range of factors that can influence the effectiveness of ICT use at school. For example, schools could offer more project-based activities using ICT – particularly those that do not impose constraints on how to accomplish tasks – but, rather, allow students to explore various approaches to problem-solving using ICT, much as they do when they use ICT at home. This would help students improve their navigation skills. At the same time, teachers could develop reading methodologies that improve students' ability to distinguish between relevant and irrelevant material, and to structure, prioritize, and summarize text.

Study Limitations

The findings of this study should not only be applied to the Spanish context. The conclusions must be carefully evaluated before any attempt is made to project these findings on other countries but teachers' digital reading difficulties could share a common didactic context that future researchers and teachers could take into account for the adequate development of digital reading activities in schools.

Acknowledgments

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APPENDIX A: Questionnaire

These are the statements included in the questionnaire. It was organized using a point Likert scale where 1 represented strong disagreement and 7 corresponded to strong agreement to the statement.

A. Performance Expectancy (Teachers' digital competence) – TDC-
   Using digital mobile devices in my classes would:
   1. Enable me to accomplish the curriculum.
   2. Would increase my productivity.
   3. Deter my effectiveness in class.
   4. Make it easier to prepare my classes.
   5. Make my students perceive me as competent.
   6. Would enhance a good atmosphere in class.
   7. Would increase students' productivity.
B. Effort Expectancy – EE-
   1. Operate with mobile devices is easy for me.
   2. Operate with mobile devices takes too much time from my normal activities in class.
   3. I can interact with mobile devices easily.
   4. My interaction with software is easy for me.
   5. My interaction with 2.0 tools is easy for me.
   6. Working with mobile devices is so complicated and difficult to understand.
C. Attitude Toward using digital devices to develop Digital Reading – AT-
   1. Using digital devices is good for promoting digital reading.
   2. I dislike the idea of using digital devices.
   3. Digital devices make classroom activities more interesting.
   4. I like working with digital devices.
   5. I have the didactic knowledge to use digital devices.
D. Resources and Facilitating Conditions – RF-
   1. I have the hardware necessary to develop digital reading activities.
   2. I have the software necessary to develop digital reading activities.
   3. I can access the ICT room to develop digital reading activities.
E. Self-Efficacy – SE-

1. I know how to use different digital devices.
2. I know how to use digital devices to develop digital reading activities.
3. I know how to use programs to develop digital reading activities.
4. I know how to evaluate digital reading activities.

F. Anxiety – AN-
1. I feel apprehensive about using digital devices in classrooms.
2. It scares me to think that I could lose information using digital devices.
3. I hesitate using digital devices for fear of not controlling the classroom.

G. Behavioral Intention – BI-
1. I already design/create activities to develop digital reading activities every month.
2. Within my ability, I would develop digital activities to promote students' competence.
3. Within my ability, I would use digital devices to develop digital reading activities.
4. Within my ability, I would use digital devices to perform normal activities in my classrooms.

H. Training – TR-
1. I receive training courses to improve my didactic use of digital devices.
2. I receive specific training on digital reading activities.
3. I receive specific training on the use of digital reading devices.
4. I receive specific training on how to develop curriculum with digital reading devices.

Ispanijos mokytojų patiriamų sunkumų ugdant mokinių skaitmeninio raštingumo kompetenciją analizė: atvejo studija pagal PISA tyrimą

Esteban Vázquez-Cano

Nacionalinis nuotolinio mokymo universitetas, Edukologijos fakultetas, Didaktikos ir mokyklos vadybos katedra, Juan del Rosal 14, 28040 Madridas, Ispanija, evazquez@edu.uned.es

Santrauka

Skaitmeninės technologijos pakeitė tekstų kūrimo ir sklaidos būdus ir tie pokyčiai turėjo didelės įtakos mokinių skaitmeninio raštingumo gebėjimams. Ispanijos mokinių skaitmeninio raštingumo kompetencijos rodikliai yra žemesni negu ekonominio bendradarbiavimo ir plėtros organizacijos (angl. OECD) nustatytas vidurkis. Kas trukdo mokiniams siekti geresnių rezultatų? Šiame straipsnyje yra pateikiamas atvejo tyrimas, kuriame, remiantis kiekybine

tyrimo metodologija, nagrinėjamos mokytojų išskirtos kliūtys, trukdančios plėtoti veiksmingus metodus mokinių skaitmeninio raštingumo kompetencijai ugdyti Ispanijos bendrojo ugdymo mokyklose. Tyrimo rezultatai rodo, kad skaitmeninio raštingumo mokymosi procesas vis dar yra nepakankamai išplėtotas ir dauguma mokytojų nurodė, kad jiems trūksta pasiruošimo, mokymų ir mokykloje prieinamų išteklių, kad galima būtų organizuoti tokį ugdymo procesą, kuriame mokiniai sėkmingai plėtotų skaitmeninio raštingumo kompetenciją. Svarbu, kad valstybių valdžia, mokytojai ir mokiniai galėtų sėkmingai pašalinti šiuos trukdžius, kadangi jie veikia beveik visus mūsų kasdienio gyvenimo aspektus.