WEBQUEST AS A SUPPORTING TOOL FOR THE TEACHING-LEARNING PROCESS: NEUROPSYCHOLOGICAL IMPLICATIONS FOR STUDENTS AT GRADE 6 OF PRIMARY SCHOOL AND TEACHERS

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ABSTRACT

In recent years, technology has enveloped the classroom and is key to adapting the methodologies and incorporating new scientific progress in Neuropsychology related to learning processes. However, for its adequate implementation, it is necessary to know the effects produced on the acquisition of knowledge for students; hence the importance of teacher education. The aim of this research was to analyse the use, preferences, and training with WebQuest using a sample composed of students and teacher. We also wanted to analyse the neuropsychological basis of the use of this tool. The methodology was carried out with a descriptive quantitative study with 1700 students in classrooms of 6th Primary Education, in 50 Centres of Primary Education (CEIP) in Madrid (Spain), and 136 teachers that used two questionnaires validated expert PhD judges and the value of the Cronbach's Alpha was analyzed from the group of items with a value equal to: 0.860. The results demonstrate a low use of the methodology by teachers when using WebQuest tools with students in the classroom, due to their lack of knowledge about the tool and failure to develop this technology with students in an adequate and orderly manner. This research has to do with practical implications for the incorporation of the Webquest, working with students and improving higher thinking strategies in their work and learning processes, from their neuropsychological base contributing to improve teaching and educational quality and the formation of teachers.

Keywords: Technology, Education, Psychology, WebQuest, Primary School

INTRODUCTION

In the current digital society, the presence of technology grew more and more and its effects have become more relevant by modifying the processes (Jonassen, 2000), in which we can incorporate new knowledge about brain functioning in parallel with the transition of the Web from 1.0 to 2.0 and subsequently from 2.0 to 3.0, focused on building knowledge and methodologies based on cooperative and collaborative learning (Goig, 2013).

These new developments can offer both teachers and parent's new ITC tools for use in the education centre to see whether their use can bring about a positive change in educational practice. However, the most important aim is to produce a shift in culture and mentality, along with the need to have the necessary and sufficient resources (Alonso, 2014) and the ability of the teachers to implement the principles of these new technologies into the teaching-learning process (Resta, 2004). The latest data published by the Statistical National Institute (Spain) regarding the use of technologies in the classroom by the students refer to the academic year 2014/2015. These data suggest that the number of students per computer in the classroom is 3 (a figure that remained unchanged from the previous year). This indicates that this ratio is not

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optimal for the satisfactory use of technology in the classroom. Further, the use of tablets in schools is emerging slowly and it accounts for only 3.5% of the equipment used, in spite of the fact that it offers a more suitable technological instrument from a neuropsychological perspective (e.g. simultaneous visual-auditory-touch technology). This progress can be achieved by the development of both ICT and the knowledge of neuropsychological processes and the application of this knowledge at different educational levels (García, 2016; López, 2016; Martín-Lobo, 2016; Pradas, 2016). During the learning process, some brain structures undergo certain modifications (Posner & Rorthbart, 2005; Bransford, 2003). These modifications have been demonstrated using brain neuroimaging techniques applied to learning and education (Goswami, 2004; Munakata, 2004; Posner, 2004; Postner & Rothbart, 2005; Sereno & Rayner, 2000; Voets, 2005). The WebQuest tool entails a complex self-directed process, and several brain processes are involved, such as language processes, memory, gnosis, praxis, and brain asymmetry. Further, the use of the WebQuest tool is motivating and innovative for the development of the teaching role, as well as being a facilitator for the student´s curiosity to explore new ways of learning. Curiosity facilitates learning of both incidental and significant material (Martínez, 2010) and some studies show the activation of cerebral structures related to the brain circuitry involved in reward (Gruber, Gelman & Ranganath, 2014).

The WebQuest is an informatics tool for self-directed processes, an activity oriented towards research where almost all or all the information that is used comes from Web resources (Dodge, 1995). The WebQuest is organised around an attractive task that facilitates high-order thinking processes related to creative or critical processes, and it involves problem solving, enunciation of judgements, and personal analysis and input, and can be carried out from a neuropsychological perspective.

The studies carried out to assess the WebQuest show that the results, in general, are adequate for competency-based teaching and for effective educational mediation, such as in the acquisition of a second language (Perez García, 2016). On the other hand, there is a general problem in education today that is the lack of motivation of students in the studies (Abellán, 2016; Alemany, 2015) and it is necessary to provide methodologies and technological tools such as WebQuest that favor their desire to learn, in accordance with the scientific advances and the digital technology of the current generation (Prensky, 2010). According to Arango, Botero & Jurado (2015), the WebQuest makes possible the motivation and in the analyzes carried out after 20 years of its use, it has been proven that it favors the superior cognitive thinking and favours the educational quality.

In addition, the WQ facilitates quality teaching work, although it requires several progressive stages: in-depth knowledge for its use as a didactic tool, definition of common criteria of what, how, for what of its implementation; parameters for the selection of internet and the generation of spaces for reflection and valuation (Alvarez, 2015). If the teacher knows how the information is processed in the student´s brain during the thinking process engaged when conducting the task, he or she would know how to guide the student more efficiently during the process and facilitate the optimal conditions for learning (Martín-Lobo, 2006, 2016). It comprises six parts, which are the Introduction, the Task, the Process, the Resources, the Evaluation and the conclusions.

This establishes the framework to work, it generates expectations and uses experiences and knowledge, activating memory processes related to previous knowledge that are being selected (Brod, 2013). These are carried out by engaging processes that require the activation of the hippocampus, connected to different cerebral areas such as the frontal medial areas (Kumara et al., 2009, 2012; van Kesteren et al., 2010a,b). Priming facilitates the search for previous information and activates the related regions in the neocortex and perceptive areas to access the meaning (Portellano, 2014). In addition, occipital and temporal cortex areas are activated, which give a global meaning to the information in the right hemisphere, storing specific words in the left hemisphere, the hippocampus, the amygdala, whilst parietal and frontal areas are activated to retain recent information (Smith y Squire, 2009) along with the basal ganglia, the cerebellum,

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the amygdala, and the prefrontal cortex (Portellano Perez y Garcia Alba, 2014; Soprano y Narbona, 2007).

The Task

The task requires the integration of information as the student navigates through the web while using WebQuest, and input routes and the optimum neurological conditions are needed to receive the information from different channels. The exceptions are those students diagnosed with Autism (diagnosed with TEA test), or those who have a general delay in development (TGD). In these cases the information is processes through only one sensorial modal channel and the student has difficulties in integrating all the information and becomes disconnected from the context (Artigas & Palleres y Narbona, 2011). In addition, the frontal cortex participates in the planning task, and the cerebellum sends information to the motor cortex for the execution and adjustment of the actions, postural control, balance, and coordination required to process the information (Burk et al., 2014). When following the stages of the WebQuest it is convenient to organise tasks and subtasks that facilitate planning and the execution of the process and this requires the executive functions to activate the relevant mental processes.

The Process

These functions are necessary in the task, and they include complex and coordinated mental processes, depending on the specified goals (Tirapu-Ustárroz, Ríos-Lago y Maestú-Unturbe, 2011). These executive functions begin to develop during childhood, though they are not completely mature until adulthood (Bausela-Herrera, 2014; Roselli, Jurado y Matute, 2008). These functions involve attention, planning, working memory, inhibitory control and decision making (Fuster, 2008), as well as updating, inhibition, and flexibility (Verdejo-García & Bechara, 2010); processing speed, semantic memory, and dual execution of information (Tirapu-Ustárroz & Luna-Lario, 2011). These functions also involve cognitive, emotional, decision-making, and behavioural control processes (Chan, Shum, Toulopoulou & Chen, 2008; Prencipe et al., 2011; Zelazo y Carlson, 2012). The neuropsychological bases of the executive processes are located in the frontal lobes and receive sensory information from cerebral areas, the limbic system, and the hippocampus to integrate information from internal and external sources (Stuss & Alexander, 2000; Valiente et al., 2012). Moreover, the frontal-subcortical circuits are related to executive functions (Jódar, 2004; Suchy, 2009; Verdejo-García & Bechara, 2010) along with emotions and decision-making (Petrices, 2005; Suchy, 2009; Tanabe, Thompson, Claus, Dalwani, Hutchison & Banich, 2007).

The Resources

The searching and processing of information requires a website containing relevant information, along with the activation of both visual and perceptive processes that begin with eye movements for the visual fixation and capture of the information that is being read, including saccadic movements, the eye crystalline, and visual convergence (Leong, Master, Messner, Pang, Smith & Starling, 2014; Sterner, Gellerstedt, y Sjöström, 2006; Goldstein, 2006). The use of graphic organisers such as Concept maps are effective for learning (González, Pardo Palencia, Umaña, Galindo & Villafrade, 2008) whilst the activation of language brain areas, comprehension and auditory mechanisms are also required (Carboni-Román, Del Río Grande, Capilla, Maestú y Ortiz, 2006), along with sub-cortical structures, and specific areas of the cortex such as the temporal lobes (Steinbrink, Groth, Lachmann & Riecker, 2012; Sun, Lee y Kirby, 2010).

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Creativity is necessary in order to apply the resources and areas situated in the frontal, parietal, and temporal areas, whilst occipital areas of the brain are specifically activated, particularly those involved with creativity (Gonen-Yaacovi et al., 2013).

The Evaluation

During evaluation, the criteria adopted were applied in the assessment of each student´s work. At a neuropsychological level, they require attention during the first phase of the task in order to guide the student´s activity towards meeting the specified criteria by facilitating analysis, critical judgement, and planning.

The WebQuest have a clear potential for motivation and the application of research techniques in the learning processes of students; In addition, they favor the training and updating of professors to acquire technological and investigative skills. Students increase motivation (Adell, Mengual & Vila, 2015), interest in collaborative learning and assume critical positions that develop superior thinking skills to think and make decisions.

On the other hand, it facilitates a teaching context centered on the student and the transversality of work for personal development through higher order strategies (Feito, 2010; Pozo y Monereo, 2017; Sarramona, 2014).

Regarding the limitations, few generalizable empirical studies have been found on the use of WebQuest in classrooms of school age and in the effects it has on motivation and learning at the higher level of students. In this sense, this study can contribute to a greater knowledge of the WebQuest, its potential and, consequently, to a greater impulse for its application and for the realization of future research.

METHODOLOGY OF RESEARCH

The current study follows both a descriptive and quantitative methodology, and is non-experimental. The sample analysed for this study were Spanish teachers and students from grade 6 primary level. The sample was composed of teachers and 6 grade primary school students from CEIP (Infant and Primary schools) in Madrid (Spain). The sample was homogenous, obtaining participants from different districts around Madrid: north, south, east, west and centre. The centres selected share the following characteristics: they are located in Madrid county (from different districts), they are public schools, and include both female and male students (grade 6 of Primary school) and teachers (different age ranges). The procedures used in this study received full approval from the ethics committee of the University Complutense Madrid. For participants under the age of 16, informed consent from the next of kin, caretakers, or guardians was obtained in the form of a signature after explaining the full details and purpose of the study. The sampling method was random (the sampling error can be measured in probabilistic terms). According to Berenson each element or individual has the same probability of being selected as any other, and the selection process does not affect this probability (Rojas, 2003). The target sample in our study was composed of 137 teachers and 1770 students (see Table 1).

Table 1
DESCRIPTION OF THE SAMPLE

District	Students	Teachers
Centre	314	33
North	414	22
South	453	28
East	322	29
West	267	25
Total	1770	137

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The random sampling method was a stratified sampling method. We first divided the population into groups. The elements of the sample were then selected with a systematic method for each stratum, that is, the number of elements from each group was divided by the target number of the sample. Thus, the ratio will indicate the number of the population that will be extracted for each group. In order to obtain the sample for our study, we targeted 5 districts in Madrid: north, south, east, west and centre. The selection of schools by district was obtained using the data in the registry in Madrid, where all the schools listed for Madrid are grouped by district. We calculated the total number of schools in each district and divided it by 10 (which was the number of centres used per district). The total number of schools included in the study was 50 (10 per district). The location of each centre was not relevant for their selection since we based this study on a systematic sampling method, which was strictly followed. Thus, the results of the sampling method are as follows. For Central District, we had 244 schools available, 24 of which were selected (total number of centres available divided by 10). There were 142 centres available in the Eastern District, of which 14 were selected. A total of 8 schools were selected from the Western District, which had a total of 80 schools. We selected 7 schools from the Northern District (of a total of 78 available). Finally, there were 238 schools available in the Southern District, of which we selected 23 schools.

Regarding the selection of the students, all the students from the selected schools participated in the study. Finally, we invited all the teachers from the schools selected, and they voluntarily agreed to participate in the study. We constructed two questionnaires: one to measure the knowledge of the teachers about WebQuest, and a second designed to know the preferences, use, distraction, participation, attention, comprehension, homework performance, confidence, and learning level of the students when using the WebQuest methodology. We created a questionnaire with dichotomous and open questions, which had been validated using the expert-judge validation procedure. The judges were PhD experts that are part of the instrument developing process (Skjong, et al., 2001). We used the following criteria for the validation process: experience of the experts (background, previous research, publications, current role, etc.), expertise on the topic, availability, motivation, impartiality, and other inherent qualities. The technological tool analysed in this study was WebQuest, given that it has gathered increasing importance over the last few years, and that the neuropsychological process that it entails is still relatively unknown by the teachers.

Thus, the general aim of this study was to analyse the use, preference, and training with Webquest, using a sample of 6 primary school grade students and teachers. In particular, our objectives were to know the degree of training of teachers in ICT, to analyze the relationship between years of teaching and ICT training, and to evaluate the relationship between the professional specialty and ICT training. A further aim of this study was to test if there is generalised knowledge of this tool, and to consider the implications of using this methodology in the classroom, for both teachers and students.

Statistical Analysis

Hypotheses

The following hypotheses were considered in the present study:

1. The majority of teachers of our sample will have undergone ICT training.
2. There is an association between teaching experience (measured in years) and ICT training.
3. There is an association between the professional specialty of the teachers and ICT training.

In order to address the objectives and hypotheses, descriptive and inferential analyzes have been carried out. The statistical analysis was carried out using the SPSS Statistics 13 package for Windows. As a first step we ran a descriptive analysis of the student sample. For each of the tests we only considered valid cases, excluding cases with lost values. The absolute

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frequency of the valid cases for each measured variable (Frequency), the percentage frequency (Percentage), the percentage frequency calculated for valid cases (that is, excluding lost values – Valid Percentage), and the accumulated percentage frequency (accumulated percentage) is described in the frequency tables and graphs. A Chi squared test was then conducted in order to explore the relationships between the variables in question and the value of the Cronbach's Alpha was analyzed from the group of items with a value equal to: 0.860, that is, we obtain a 99.8% reliability. Therefore satisfactory, since they exceed the acceptable minimum necessary to refute the validity in this type of tests that is 0.800.

RESULTS

The teachers that participated have different teaching specialities, which are described in the personal information space. From the 137 teachers that completed the questionnaire, 71 of these did not include information regarding their profession. Thus, there were a total of 66 teachers participating in the research. One explanation for the other 71 teachers not including information regarding their speciality could be that their speciality is out-dated due to changes in the different specialities that have taken place since the General Educational Law was established in 1970.

A higher percentage of the teachers from the sample belong to the foreign language speciality (19%). The less frequent specialities in the sample were Geography and History, Religion, and language. One possible reason for this distribution is that Foreign Language is currently one of the most in-demand teaching specialities, given that the impact of ICT has involved the development of a common “lingua franca” (Vehicular language). We are currently expected to be able to communicate in a global language such as English (Table 2).

Table 2
SPECIALITIES OF THE TEACHERS

Profession of Teachers	Frequency	Percentage
Foreign Language	26	19
Physical Education	14	10.2
Primary Education	10	7.3
Pedagogy	2	1.5
Music	7	5.1
Human Sciences	6	4.4
Geography and History	1	0.7

Before the questionnaire,

Before the participants began to answer the questions about WebQuest training, they were required to answer a general question regarding their knowledge of ICT training: “Have you received any training on ICT? To this question, 83.2 % (114 of 137) of the participants answered that they had received general training on ICT, whereas only 16.1 % (23 of 137) answered that they had never received any ICT training (Table 3).

In terms of the teachers’ knowledge according to years of experience (see Figure 1), although the percentages are similar across different age categories, the highest percentage of teachers with knowledge of ICT fell within the categories of 3 to 15 years of experience.

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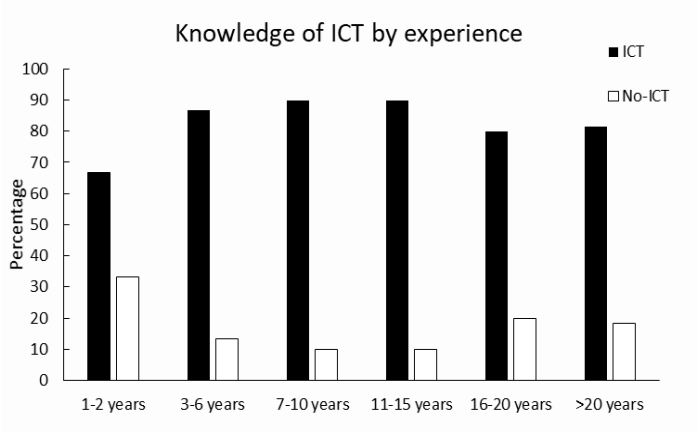

FIGURE 1
KNOWLEDGE OF ICT BY EXPERIENCE

In terms of the teachers' knowledge of ICT according to specialization (see Figure 2), it is clear that for almost all specialties, 100% of the teachers have knowledge of ICT. The lowest percentage of teachers that report having ICT knowledge was found in Human Sciences, followed by Primary Education, Foreign Languages, and Social Sciences.

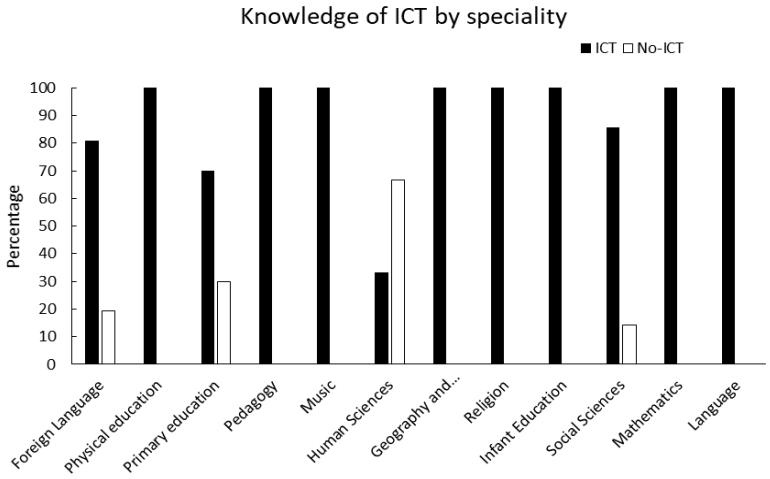

FIGURE 2
KNOWLEDGE OF ICT BY SPECIALITY

To analyze whether or not there is an association between the variables of experience and knowledge of ICT, and between specialization and knowledge of ICT, the Chi- Pearson's square for independence (see Table 3) was conducted, since the three variables are categorical in nature and measured on a nominal scale.

Table 3
RESULTS OF THE CHI-SQUARE TEST

	Variables	Value	(df)	Significance (Sig)
Pearson's Chi-square Test	Years of experience knowledge of ICT	2.941	5	0.709
	Specialty-Knowledge of ICT	19.183	11	0.058

This test revealed that neither of the variables (Years of experience and specialty) are related to knowledge of ICT and so the null hypothesis is accepted.

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Results of the Questionnaire for the Teachers

Regarding the first question of the survey for the teacher: Which tools do you consider to be more relevant to improving training? The teachers' answers revealed the most requested ICT training to be WebQuest, since 29.2% (40 of 134) of the teachers responded that they required training on this tool. WebQuest is one of the novel tools that have emerged for use in the classroom context over the last few years, and its benefits are directly related to the training received to use it. Therefore, this tool should be described to the teaching staff and training for its use should be offered. With respect to question 2: Do you use WebQuest in the classroom? Only 8% of the participating teachers answered positively. This aspect of the results is particularly surprising, given that Webquest should be one of the most common techniques used in the classroom by teachers, since it can be used for any subject, can be used for different features of learning, to search information, and to examine a wide range of opportunities to find information related to any subject or a particular task. This result is also surprising if we consider the teachers' answers regarding the availability of materials to use WebQuest in the classroom (59.1% of the teachers reported that they had Internet access in the classroom).

Regarding the third question of the survey: Do your students use WebQuest in the classroom? The results indicate that the use of WebQuest to prepare the lessons was reported by only 8% of the participants. This result was expected, given that the percentage of teachers using this tool in the classroom context was also low. However, 51.8 % of the participants did show a tendency to use the Internet to prepare the lessons (90 of 137). We could possibly attribute these results to the same reasons as those advanced by Domingo and Fuentes (2010).

In relation to the final question: Do your students use WebQuest in the classroom? The results show that according to the teachers, the percentage of students that use the WebQuest in the classroom is 9.5% (13 of 137). This result is not highly surprising given the lack of knowledge of the teachers regarding the Webquest tool.

Results of the Questionnaire for the Students

The second questionnaire in this research was given to the students. This survey included nine questions related to their preferences, use, distraction, participation, attention, understanding and confidence related to the use of WebQuest by the teacher in the classroom context. We describe the percentages for the Internet and WebQuest in order to discriminate between them in terms of their level of use (differentiating between infrequent use due to lack of knowledge and lack of access). Further, the questionnaire includes a second part where we describe the use that students make of this tool, depending on the subject of study.

In relation to the first question: Do you like using WebQuest in class? The results demonstrate a low percentage (3.80%), similar to that shown by teachers, given that they almost never use it and do not have good knowledge of the tool. This result could be explained in terms of a lack of implementation of the tool in the classroom context, and a lack of information and training given to the teachers.

In relation to the second question: Do you use WebQuest in class? The results revealed that 97.9% of the students answered no and 2.10% answered positively. The Internet is used in preference to WebQuest by 30.30% of the students (536 of 1770). The Internet is an application that can be used along with any tool such as WebQuest, thus, the percentage of the use of WebQuest is significantly lower. This outcome supports the one described in relation to the previous question, and shows again the lack of training on the use of this tool.

For the third question: Do you get distracted more when using WebQuest in class? The results from this question support those obtained in question five, which refers to attentional processes of the students in the classroom (2%). In this question we measured the level of distraction that ICT produces in the students, and WebQuest was revealed to be a distractor for 3.60% of the sample. Despite the fact that both percentages are low, this should be regarded as relevant

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information given that it is related to a common problem produced by tools if their use is not participative and collaborative. This way of using the tools is also related to the training that the teachers have received.

With regard to the fourth question: Do you like participating in class using WebQuest? The results show that the preferences of the students for using ICT tools are in accordance with the level of use in the classroom context. Only 1.80% of the students reported to enjoy participating in class using the WebQuest, whilst 98.20 % of the students do not prefer to use this tool because they are not familiar with it, and do not use it in the classroom. However, 24.20% of the students reported using the Internet in the classroom.

With regard to question number five: Do you pay more attention in class when you are using WebQuest? The results again revealed a low percentage, suggesting that WebQuest tools do not attract the student´s attention in class *i.e.*, they are not sufficiently appealing to the students. It is worth noting that it is relatively easy to catch the student´s attention in the classroom at this age (pre-teen age).

For question number six: Do you understand the lessons less when the teacher uses WebQuest? The results show that 4.60% of the students do understand the subjects when the teacher uses WebQuest in the classroom, and 4,40% when the teacher uses the Internet. Again, these results could also be affected by the lack of use of this tool in the classroom context. For question number seven: Do you use WebQuest to do your homework in class? The results show that 31.60% of the students in the sample use the Internet to do homework in groups, whereas only 1.80% uses WebQuest (although this is a tool designed to work in groups while using the Internet). In relation to question number eight: Are you more confident when using WebQuest? The confidence that the students show towards the use of ICT is important because if they are familiar with the instrument they are using, they will be more confident when using it. The results showed that 25.40 % of the students answered that they are confident while using the Internet, but only 2% reported that they are confident while using WebQuest.

For question number nine: Do you remember better what you learn when using WebQuest? The results show that, as in previous questions, only a low percentage of the students answered positively. The students responded that they remember better what they have learnt when using the Internet (19.20%). Only 2.50% of the students reported that they were better able to remember what they learnt in the classroom when using WebQuest, which could also be due to the low usage of this tool in the learning context (Figure 3).

Figure 3. Student´s opinions towards the use of WebQuest and Internet in the classroom

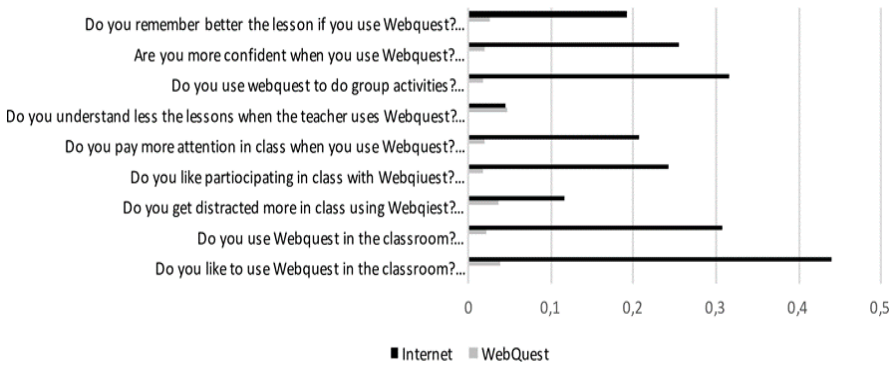

FIGURE 3
STUDENT´S OPINIONS TOWARDS THE USE OF WEBQUEST AND INTERNET IN THE CLASSROOM

Considering the low usage of WebQuest by teachers and students in the classroom context, we now present its use depending on the different subjects of grade 6 in Primary Education. For Natural Sciences subjects, 34.5% of the students reported using the Internet as a

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supporting tool. However, although WebQuest is a tool that could easily be combined with the use of the Internet, only 3.20% reported its use. For Arts, Music and Physical education, the students showed a low percentage of Internet use (13.70% for Music; and only 0.90% use WebQuest). By developing the use of WebQuest in combination with the Internet in the classroom, this could become a useful tool to create interesting tasks to reproduce and observe different instruments, games, songs, readings, and shows for both teachers and students.

For the Language subject, 18.1% of students reported use of the Internet whereas only 2.10% reported using WebQuest. The lack of knowledge of this tool could explain this low usage, even though this could be a potentially interesting tool to improve active and selective reading comprehension, using reading as a channel rather than a target. For both Foreign and mother Languages, WebQuest was reported to be used by only 2.60% of the students, whereas use of the Internet was reported by 21.10% of the students in the sample. For Mathematics, only 2.20% of the students reported the use of WebQuest, whereas 11.70% of the students in the sample reported using the Internet as a tool (Figure 4).

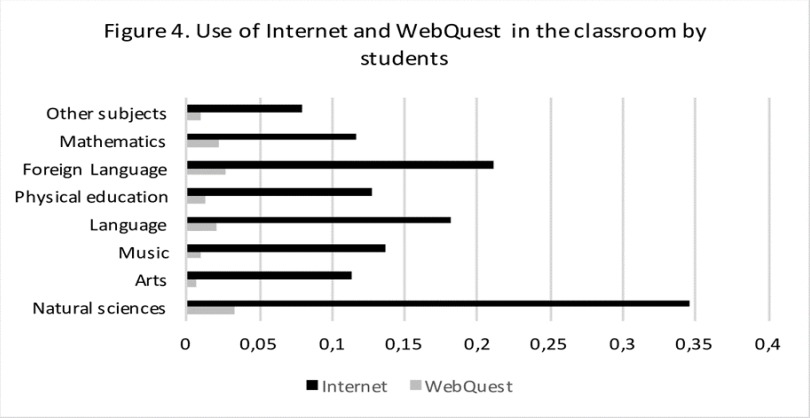

FIGURE 4
USE OF INTERNET AND WEBQUEST IN THE CLASSROOM BY STUDENTS

DISCUSSION

The general objective of the research was to know the use, preferences and training in WebQuest in a sample of students of 6th grade of Primary Education and a sample of teachers of 50 CEIP. In the results section, you can see the detailed study of a large sample of professors and students belonging to 50 CEIP. The analyzes carried out and the results obtained allow us to comply with the general objective of the study, namely, Among the answers obtained, both in students and teachers and the various components that affect their responses, such as training, staffing, dedication time to the WebQuest, the use in the classroom, the use in the preparation of the subjects. It should be noted that the sample of teachers we have is in a period of age considered as a mature stage or average adulthood that ranges from 40 to 65 years (Wittrock, 1990).

The sample of teachers included in the study was aged between 40 and 65 years (Wittrock, 1990). Regarding the answer to the first questions), the implication of the new teaching role is fundamental in the current knowledge society (Gisbert, 2002). WebQuest has been used in every school subject over the last 20 years, given that it can be adapted to each classroom or centre. WebQuest represents an Internet space where both the teacher and students can work in a constructive, cooperative, and collaborative way. Dodge (1995) described a good WebQuest as that which creates situations in which the students are made to depend on each other to improve, and it promotes the “learning to learn” process. Considering the current results, we can conclude that the implementation of this tool is necessary in educational institutions, given that it can promote a student´s motivation to learn in a way that is rather

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different from conventional methods (Martínez, 2010) and that it can favour the neuropsychological development of the students by activating and synchronising neural networks for learning, as demonstrated using brain imaging techniques applied to education (Goswami, 2004; Munakata, 2004; Posner, 2004; Postner & Rothbart, 2005; Sereno & Rayner, 2000; Voets & Matthews, 2005). Thus, one of the reasons for the infrequent use of WebQuest in the classroom could be the lack of awareness on the part of the teachers. The latter suggestion is in accord with Domingo & Fuentes (2010). These authors suggested that when the use of the didactic ICT model is not as high as expected, it usually means that the teachers find it difficult to use or because they lack the resources needed (either software or hardware), or that they lack the technical and didactic training required. Additionally, it is also necessary to offer the teachers some training on neuropsychology applied to education in order to exploit the potential of WebQuest for the neurodevelopment of the students, and to prevent failure in school (Martín-Lobo, 2015).

Once again, this result could be explained in terms of a lack of information and technical-pedagogical training that guides the teachers to incorporate the use of this tool in the classroom as part of their teaching techniques (Gutierrez, 2006). At a neuropsychological level, if teachers had the required neuropsychological and technical training, the students could practise the activation of memory processes of previous knowledge by using a more efficient searching technique (Brod, Werkle-Bergner & Shing, 2013). In particular, activation of the hippocampus could be achieved by using different connections to different brain areas such as the frontal-medial areas that are relevant during the learning process (Kumara et al., 2009, 2012; van Kesteren et al., 2010a,b) and those related to the executive functions that require complex and coordinated mental processes to achieve cognitive goals (Tirapu-Ustárroz, 2011).

Respect the answers to question 4 of the questionnaire, the lack of knowledge about the WebQuest tool is a problem related to the initial training on ICT that the teachers receive. If the teachers became more familiar with the use of this tool and understood that WebQuest is a useful and easy to use tool, this could help the teaching-learning process within the classroom context and establish network resources to work on the subjects of interest. The aim here could be the implementation of basic training in order to be able to adequately use the methodology (Area, 2001). This initial training could include explanations about the brain processes that are active when using different parts of the tool, which could make it motivating and make the most of the students' abilities. In addition, this could also make them aware of the implications of processes such as attention, planning, working memory, inhibitory control, decision making, updating information, inhibition, and flexibility that the use of this tool involves (Fuster, 2008; Verdejo-García & Bechara, 2010).

Respect the answers to question 5 of the questionnaire, the studies in neuroscience suggest that attention requires focusing and neuropsychological skills that affect behaviour during the learning process (Bluestones, 2000; Martín-Lobo, 2003) and the use of WebQuest could favour attention given that it requires visual and perceptive abilities to be exercised, such as visual accommodation and convergence for efficient reading (Sterner, Gellerstedt, & Sjöström, 2006; Goldstein, 2006), language for comprehension and expression (Carboni-Román, Del Río Grande, Capilla, Maestú & Ortiz, 2006), and creativity (Gonen-Yaacovi et al., 2013).

In the answers to question 6 of the questionnaire, the attention in the classroom is a matter of concern for teachers, given the fact that the students are easily distracted when using ICT tools to work in groups in the classroom to search for materials, etc. Considering this factor, WebQuest therefore appears to be a suitable methodology for engaging their attention and generating knowledge, and thereby increasing their motivation (Pérez Puente, 2007). The answers to question 7 of the questionnaire, they related to the studies of Dodge (1995), who suggested that WebQuest involves a research activity where almost all the information that is used comes from web resources. WebQuest includes the use of guided and structured activities and the tasks are well defined and the resources to do them are provided.

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In the case of the answers to question 8 of the questionnaire, this could be due to the lack of knowledge and the low level of implementation of the tool in the classroom context. Further, if the students could have access to this tool, they would be more curious and motivated about discovering new ways of learning (Martínez, 2010) and they would, in turn, achieve a significantly higher level of learning (Gruber, Gelman & Ranganath, 2014). In the answers to question 9 of the questionnaire, this finding is consistent with some studies that suggest that when teaching facilitates curiosity, there is superior recall of the learned information (Gruber, Gelman & Ranganath, 2014).

CONCLUSIONS

Our analysis of this relationship and the use of the WebQuest methodology in the classroom context for grade 6 of Primary School prompt us to suggest that the use of this tool is low for both teachers and students, a finding that is consistent across all subjects. The teachers, regardless of their speciality, appeared to have a high level of training on ICT, although this was incomplete. Such training is clearly insufficient if we observe the results obtained from the questionnaire. One of the consequences of this lack of training is reflected in the fact that teachers do not use the new technologies in the classroom context. According to the Annual Report from the Digital Agenda in Spain, implementation of the Connected Schools project would provide high-speed connectivity for more than 16,500 centres (primary and secondary schools) and would benefit more than 6.5 million students. This project would improve the current situation and the pedagogical use of technology in the learning process. Whilst knowledge of the WebQuest tool is mentioned in the results, its use in the classroom is almost non-existent due to the lack of training provided for teachers.

The absence of training for the teacher leads to a very low rate of use of the WebQuest methodology in the classroom, which also implies that students will not learn about this technology, thus aggravating the situation in spite of the fact that the centres do have access to computers and the Internet. If we compare the opinions of the students and teachers about the use of the WebQuest tool and the Internet in the classroom, the use of the Internet is clearly higher than the use of WebQuest in all of the subjects, although having Internet access is required to access WebQuest. This study also aimed to analyse the neuropsychological mechanisms involved in the use of this tool. To achieve this, we have analysed different skills, structures, and brain functions that are required in each of the phases of the applications of Webquest (introduction, task, process, resources, and evaluation). The use of the Webquest offers an opportunity for the development of higher cognitive and brain processes. During the introduction phase, both the basic brain circuits (e.g. basal ganglia, cerebellum, hippocampus, perception areas or amygdala) and frontal areas (involving more complex processes such as connecting new knowledge with previous knowledge, or selecting information) are engaged. During the task phase, other brain areas also play a role, such as the motor cortex and the frontal lobe, which facilitate the planning and execution of executive functions. During the process phase, further areas are activated. Such areas are related to cognitive skills located in the frontal lobe that are linked to the limbic system. During the resources use and application phase, subcortical areas are activated along with visual, auditory (occipital and temporal), language (Broca and Wernicke), frontal, and parietal areas. The activation of these areas will play a role when applying the resources available through creative processes. During the evaluation phase, at the end of the process, other areas (attentional, frontal and prefrontal) are activated in order to analyse, judge, prevent, and plan future actions.

Our results also allow us to meet the specific objectives of our study, that is, to obtain precise information regarding the training of teachers with Webquest, to test if the lack of knowledge of the tool is generalised amongst the participants, and to analyse the implications of using the Webquest methodology in the classroom for both students and teachers. Taken together, the results reported here suggest that in order to apply the WebQuest methodology

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correctly using the resources available in the centres, more training is needed for teachers that can encourage them to introduce this tool in the classroom as part of their teaching practice. Further, by using this tool in the classroom, the teacher could also encourage the students interest in using the WebQuest tool, given that they show interest in the use of the Internet in the classroom, which is the basis for using the WebQuest methodology.

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