



**Internet navigation and information search strategies:
how do children are influenced by their participation in an intensive ICT project**

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Abstract

- The purpose of the study was to explore whether students who usually worked with ICT in their classrooms, had better knowledge and management with computing tools, and if they are better prepared to research and select information.
- 在课堂上经常使用ICT的学生，是否能够更好的使用计算机工具，并能够更有效地搜索信息。
- All these students show better knowledge and control of the computer as well as presenting better Web literacy skills.
- 实验证明这些学生能够更好地操控计算机，同时也有较好的网络技术素养。
- Although they found, organized, used and assessed the information better, their literacy in Web information is missing key skills, especially in analyzing, assessing and summarizing information.
- 但是他们仍然缺乏分析、评价以及汇总网络信息的关键性技巧。

Background

- Digital literacy and ICT skills (Consell Superior d'Avaluació del Sistema Educatiu 2004)
 - **Knowledge on computer systems**
 - **Use of operative system**
 - **Search and selection of information through the Internet**
 - Interpersonal communication and work in collaborative network
 - Text processing
 - Image management
 - Use of data sheet
 - Use of data bases
 - Amusement and learning with ICT
 - General attitude before ICT

本研究聚焦前三个维度，前两个是使用ICT的基础知识，第三个是学生对于网络的使用情况，与本研究直接相关

Background

- Search process and information selection
- 4 stages:

formulation of the demand and preparation of the search
performance of the search and access to resources

information processing and assessment

presentation of results or communication of the research

关于信息搜索，许多研究者给出了不同的模型，但是
这些模型基本上都包括这四个步骤

Background

- **three kinds of Internet users**

Beginners: have basic knowledge on ICT tools, but do not manage on information selection and search systems. they do not successfully solve the information needs presented to them.

Advanced users: have knowledge for using tools, but they are not strategic in searching. Most of the time, they can complete the searching tasks but, by being low in strategic terms they take more time and effort to achieve them.

Experts: handle searching tools and moreover, they do it strategically (Fuentes2001), performing such tasks with full domain and comfort on the Internet, performing consciously intended searches, in a complex and flexible way.

Introduction

- This study is based on PdBP.

provided technological equipment to the participating centers consisting of didactic resources, digital interactive whiteboards, audiovisual systems, scanners, computers, printer and a series of connectivity points to the Internet.

提供基础设施、网络连接、教学资源

training activities are undertaken intended for teachers with the idea of introducing changes adjusted to the social and cultural context of each school, to encourage reflection and collaboration of teachers in the introduction of innovative teaching in the classroom with ICT.

提供有针对性的教师培训

Research questions

- What is the impact of the PdBP on the achievement of students' basic skills of ICT?
- Is there any difference between children who participated in PdBP, gender and kind of Internet user in searching and selecting the information?
- Which are the students' self-perception related to their ICT skills, and development process while solving information problems on the Internet?

methodology

- N=190(107 boys and 83 girls)
- AGE: 11.5(EE), 13.5(OSE)
- PHASE1:between 2005 and 2006 academic period
- PHASE2:between 2006 and 2007 academic period

Research object

Table 1 Sample groups in terms of Phases 1 and 2

Phase	Group	Level	School	Age	<i>N</i> Boys	<i>N</i> Girls	<i>N</i>
1	Control	1st OSE	IES Pastoriza	12.50	33	21	58
	Experimental	6th EE	CEIP Ponte dos Brozos	11.41	11	11	22
	Control	4th OSE	IES Pastoriza	15.56	27	16	43
	Experimental	3rd OSE	IES Pastoriza	14.64	24	21	45
2	Control	6th EE	CEIP San Xosé Obreiro	11.49	7	8	15
	Experimental	6th EE	CEIP Ponte dos Brozos	11.51	3	10	13*
	Control	3rd OSE	IES Manuel Murguía	14.52	3	4	7
	Experimental	3rd OSE	IES Pastoriza	14.64	11	4	15*

* Student groups not considered in the sum of the total sample for having participated in both phases

Research instruments

- Challenging test applied in phase 1 and phase 2 (EE: alpha of 0.85 and 0.70 OSE: alpha of 0.81 and 0.78), one point was assigned to the right ones
- self-perception questionnaires about performance applied at the end of phase 2

Table 2 Variables, educational level and challenging items

ICT basic skills: instrumental use of ICT tools

EE Phase 1: File creation, kind of font, save file, font properties, paragraph properties, insert image

Phase 2: Title format, list creation, insert image, save document, print, make poster

OSE Phase 1: File creation (Impress/PowerPoint), save file, slide numeration, background colour, insert template, create slide, background different to previous ones, element animation

Phase 2: File creation, title format, page format, list creation, insert image, save document, print, make diptych

ICT skills: ICT basic skills plus search and selection of information through challenging questions solving (translated from spanish)

EE Phase 1: What dynasty king Tutankhamen belonged to?

Who discovered king Tutankhamen's grave?

How many years did Tutankhamen's grave discoverer lived?

What valley king Tutankhamen's grave is located?

In what year king Tutankhamen's grave was discovered?

Phase 2: Poster confection to promote responsible acting of citizens about production and treatment of domestic residues. Write title with keyword, write proper introduction, create list adequate to content, insert proper image, choose proper headline, indicate copyright of both image and information consulted

OSE Phase 1: When and how United States constitution was signed?

In what year declaration of rights in the United States constitution was introduced?

Draw a *bar* chart in which population of cities from the Philadelphia and New York States cities according to census on 2000

Phase 2: Confection of a brochure intended to promote responsible acting of citizens about production of domestic residues. Writing of title with keyword, writing proper introduction, creating list adequate to content, inserting proper image, choosing proper headline, indicating image and information copyright. Indicating at least 3 "R" ("R's rules" relating to the treatment of household waste), indicating at least 3 pieces of advice, and Indicating copyright of both information and image consulted

Search and selection of information: web literacy

EE and
OSE

Phase 1 and Phase 2

Internet navigation: accessing strategies

Interrogation of the search engine through this interrogative phrase, phrase with verb, phrase without verb, keywords, copy the question exactly, use of unnecessary signs, use of advanced search signs, add or change of words from previous search, wikipedia searching, recover of previous search

Internet Navigation: Information selection

Number of sites opened; opening of first link automatically, copy of response directly from google, use of image search engine

Self-perception on performance

EE and
OSE

Phase 2

Assessment on the degree of difficulty in: Comprehension of instructions, performance of instructions, search for information on internet, comprehension of information, selection of information, design of the brochure and/or diptych and distribution of time

Indicate difficulties found: Not enough time, connectivity problems, and computer problems, others

Answers assessment: see Challenging questions resolution, Phase 2, EE and OSE

- 4 point Likert scale (very easy, easy, difficult and very difficult)
- closed answer
- 4 point Likert scale (fail, pass, good and excellent)

Research process

- 测试过程中有两名研究者在场
- 测试开始前告知被试此研究的目的
- 测试过程中SMART系统自动记录被试者的一切操作
- phase 1: 30 min phase 2 : 50 min
- 实验组在自己的教室中进行测试，控制组在机房里进行测试。
- 操作系统windows xp IE6.0或以上

Research results

Table 3 *T* test results of ICT Skills between control (CG) and experimental (EG) groups

Variable	Level/ phase	<i>N</i> CG	CG Mean (SD)	<i>N</i> EG	EG Mean (SD)	<i>T</i>	<i>P</i>
ICT basic skills: instrumental use of ICT tools	EE 1	58	2.04 (1.99)	22	2.98 (1.38)	1.942	0.054
	EE 2	15	5.13 (2.33)	13	7.15 (1.82)	2.576	0.016*
	OSE 1	30	3.63 (2.25)	23	5.70 (1.74)	3.634	0.001***
	OSE 2	7	5.05 (1.77)	15	6.36 (2.28)	1.332	0.198
ICT skills (ICT basic skills and search and selection of information)	EE 1	58	2.39 (2.18)	22	5.89 (1.51)	8.124	0.000***
	EE 2	15	4.85 (1.79)	13	6.09 (1.25)	2.092	0.046*
	OSE 1	30	3.01 (1.78)	23	4.56 (1.41)	3.416	0.001***
	OSE 2	7	4.50 (1.33)	15	6.33 (1.29)	3.070	0.006**

Statistical significance * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

- ICT basic skills: 小学实验组和控制组在两个阶段的表现都有显著差异，中学实验组和控制组只在第一阶段有显著差异。
- ICT skills: 中、小学的实验组和控制组在两个阶段的表现均有显著差异。

Research results

Table 4 *T* test results of search and selection of information between control (CG) and experimental (EG) groups

Variables	Level/ phase	<i>N</i> CG	CG Mean (SD)	<i>N</i> EG	EG Mean (SD)	<i>t</i>	<i>P</i>
Reporting of search results	EE 1	58	2.76 (2.76)	22	8.81 (2.31)	9.224	0.000***
	EE 2	15	4.58 (1.41)	13	5.03 (1.15)	0.948	0.352
	OSE 1	30	2.39 (1.62)	23	3.42 (1.96)	2.078	0.043*
	OSE 2	7	3.95 (1.25)	15	6.30 (0.89)	5.064	0.000***
Web literacy: accessing strategies	EE 1	58	3.22 (3.44)	22	5.73 (3.30)	2.939	0.004**
	EE 2	15	2.73 (2.15)	13	5.46 (3.13)	2.720	0.011*
	OSE 1	30	3.83 (3.24)	23	5.35 (3.93)	1.539	0.130
	OSE 2	7	11.29 (5.62)	15	16.67 (8.20)	1.563	0.134
Web literacy: information selection	EE 2	15	3.37 (1.90)	13	4.76 (1.18)	2.215	0.036*
	OSE 2	7	4.10 (1.23)	15	5.84 (0.94)	3.645	0.002**

Statistical significance * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

- 测试结果的得分，实验组高于控制组，只有小学第二阶段测试结果没有显著差异。
- 搜索过程（策略），小学生组在两阶段均称显著差异，中学生组在两阶段均无显著差异。
- 信息的选择与组织能力，中小學生均有显著差异。

Table 5 Means of Web literacy in Information selection categories between control (CG) and experimental (EG) groups in Phase 2

Categories	Level	EG		CG	
		<i>N</i>	<i>M</i>	<i>N</i>	<i>M</i>
Recognizing and articulating informative needs	EE	13	2.54	15	2.33
	OSE	15	3.44	7	2.02
Understanding how information is stored and organized	EE	13	6.92	15	5.00
	OSE	15	7.33	7	7.14
Identifying and selecting the most accurate search or retrieval systems	EE	13	9.62	15	7.78
	OSE	15	9.67	7	8.57
Identifying, locating and retrieving information	EE	13	3.08	15	2.89
	OSE	15	4.56	7	2.86
Analyzing, evaluating and synthesizing information	EE	13	1.79	15	0.89
	OSE	15	3.24	7	1.14
Using information efficiently in order to achieve a specific purpose	EE	13	4.62	15	1.33
	OSE	15	6.78	7	2.86

Table 6 Means and standard deviations of reporting of search results on challenging test per gender

Variable	Level/phase	Boys			Girls		
		<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
Reporting of search results	EE 1	44	4.72	0.56	32	4.84	0.58
	EE 2	10	4.95	1.67	18	4.70	1.08
	OSE 1	29	3.05	1.99	23	2.69	1.56
	OSE 2	15	5.81	1.28	7	5.00	1.87

- EE: phase 1 $t(73)=0.515$, $P=0.608$, phase 2 $t(26)=0.497$, $P=0.623$
- OSE: phase 1 $t(50)=0.726$, $P=0.471$, phase 2 $t(20)=1.203$, $P=0.243$
- 学生使用ICT的能力无性别差异

- 各组研究对象都认为网络信息的搜索、选择、理解是最简单的部分，但是设计海报和小册子有些困难。
- 通过对屏幕录像的分析，在测试过程中，学生的困难主要表现为时间的分配（71.4%）和鼠标闪烁（57.1%）。

Discussion and conclusion

- 学生有能力运用搜索引擎在网络中寻找特定的信息，有清晰的搜索目标，能够完成既定任务。也能够辨别信息的可信度。
- 高年级学生比低年级学生更有搜索技巧。不仅因为他们的认知水平、词汇量和使用工具的能力更强，也因为他们接受了更多关于ICT的训练。
- 学生使用ICT的能力无性别差异。
- 学生在搜索信息的过程中倾向于使用一种固定的搜索引擎、网络导航系统、在线百科全书。
- 实验组的学生倾向于使用关键词、非动词短语、疑问短语进行搜索，而控制组的学生则更多地直接将问题复制粘贴。
- 尽管实验组学生的得分比控制组高，能够较为熟练地使用网络，但是他们的网络素养水平仍然不高，但是缺乏高级技巧。
- 实验组学生的较好表现归功于长期处于网络学习环境中，使得他们更有经验，并且有更多的训练机会。
- 为学校提供基础设施、网络连接，以及师资力量的支持，能够创造更好的教授、学习网络技巧的环境。

Reflection

- 长期处于网络环境中，对学生网络素养的影响
- 样本量大，与网络环境相关，定量研究
- 得出了一些不同于以往研究的结论
- 分析讨论部分的表述不是很清楚，可能是语言问题