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Teacher Development and ICT: The Effectiveness of a Training Program for In-Service School Teachers

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Abstract

Information and Communications technologies (ICT) are becoming crucial tools for teaching because they improve students' performance and motivation. For this reason many education programs start to include them as essential grounding for teachers' repertory. Eighty-five teachers participated in a year-long program in which they learnt to use ICT with the purpose to apply that knowledge into their teaching. The program consisted of three training modules: information and operating systems (i.e. programs for teaching –word, ppt, etc.-, use of internet); Interactive tools (i.e. Digital boards, Android Systems); and multimedia materials and teaching strategies (i.e. web designing, web 2.0). As part of their training they completed a Likert type questionnaire (154 items) about (a) ICT uses, (b) attitudes in classroom and (c) satisfaction with the training received (Cronbach alpha = .89). Descriptive statistics, Factorial Analyses and ANOVA were applied to data. Main findings from the third part of the questionnaire indicate that teachers were highly satisfied with the course syllabus: specially the methodology and the resources. A second reading shows that the learning of teaching strategies and creation of new materials for classroom (module 3) was better valued than the learning of technical skills to manage the suggested programs and technologies.

Conclusions point out that advancing towards an effective use of ICT in classroom would further require guided mentoring in practice and peer collaboration besides traditional training.

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Introduction

In the last two decades, schools have experienced a massive incorporation of technological resources. Many studies confirm that basic programming, internet use and the application of tools 2.0 such as instant messages, wikis, blogs, online discussions or tweets are present in today's classrooms (Schoepp, 2005; Selwyn, 2000; Drenoyianni, 2004; Morris, 2010). This increasingly complex change wave in schools is gradually challenging traditional views on teaching. Networked structures (Collins & Clarke, 2008), self-organized policies (Davis *et al.*, 2000) and uncertain scenarios call for a renewed teacher capable to adapt to multifaceted situations and be proficient in taking fast decisions. Teacher Educators admit that the incorporation of Information and Communication Technologies (ICT) as a teaching skill seems to enclose one of the answers to fit for that role (Sime & Priestley, 2005; Bowes, 2003) since they provide opportunities to constantly renovate materials and methods and allows to improve innovative and quality education in classroom (Song, 2003). Additionally, these technologies can motivate students and prepare them to face new social changes (Balanskat *et al.*, 2006) in ways that traditional methods have been evidenced to fail (Pack, 2003).

1. Framework

However the fact of introducing ICT in class does not necessarily account for changes in instructional design of teaching (Song, 2003; Meyer, 2002). The effective use of technology is an intricate process that requires time (Baron & Harrari, 2005), equipment, institutional support (Ertmer, 1999), and positive attitudes towards them (Liu, 2006; Zhao, 2005). Besides, it is also important for teachers to interiorize their technological skills and move rapidly from low-level ICT knowledge to high level technological knowledge (You, 2010).

This state of affairs has led to the need for systematic teacher training on ICT in many educational programs worldwide (Schoepp, 2005; Donnelly, 2010).

Nevertheless most of the studies focus on prospective teachers rather than in-service teachers and few of them evaluate their attitudes towards the usefulness of ICT training. The Beijing Academy for Educational Sciences reported that 87% of the 4,000 elementary and high school teachers do not use ICT in classroom as daily basis and this is mainly explained by the lack of training (LIZT, 2006). Similar results are shown in Zhao (2010) who states that, despite the fact that computers and whiteboards are being increasingly incorporated in schools and Teacher Education programs, teachers still use traditional methods.

Bearing in mind the before, this study aims at valuing the effectiveness of the training received in a year-long training course experience on ICT for in-service teachers using a quantitative research approach. More specifically, it is appraised the degree to which expert teachers are satisfied with ICT Teacher training courses by responding a questionnaire. Three domains are under scrutiny: (1) Usefulness of the ICT courses contents; (2) Adequacy of the instructional plan and methodology; and (3) Human and material resources utilized.

2. Methodology

This research is part of a bigger project which design was mainly based on a quasi-experimental approach and on psychometric tests to perform the process of validation of instruments. However the data reported in this paper (i.e. teachers' level of satisfaction towards the training program) come from a descriptive design based on the application of a questionnaire.

2.1. Sample

Ninety in-service teachers (5 to 25 years of experience) from kindergarten to high school participated in ICT training courses offered by the International Centre of Advanced Technologies (ICAT) in 2010. The ICAT is an acknowledged institution in the field of application of advanced technologies in rural areas and it is sponsored by the Germán Sánchez Ruipérez Foundation (Peñaranda de Bracamonte, Salamanca, Spain). Co-financed with funds from the European Interreg III program, a section of the Excellence cross-border regions Project between Spain and Portugal, the ICAT is annually developing training programs for non-university teachers since 2006 with the aim of creating technological services applied to education.

Eight courses were organized in a ten-month program (26 lessons overall) in which the teachers learnt to use ICT with the purpose to apply that knowledge into their teaching. The courses were organized in three increasingly complex training modules: (1) information and operating systems (i.e. programs for teaching –word, ppt, etc-, use of internet), (2) Interactive tools (i.e. Digital boards, Tablet PCs and Android Systems) (3) multimedia materials and teaching strategies (i.e. web designing, web 2.0, Maintenance, safety and repair of computer equipment, teaching strategies and materials based on ICT).

2.2. Data collection

Eighty-five teachers voluntarily completed an *ad hoc* survey of 154 items about the use of ICT in classroom (Cronbach alpha = .89). Answers were arranged in a five degree Likert scale from 0= totally disagree to 5= completely agree. Ten questions were open-ended. The survey contained three sections: (1) general information, (2) use of computer resources in the classroom and attitudes towards ICT, and (3) level of satisfaction towards the training. The results of the present work are focused on part 3.

2.3. Data analysis

In the present study we analyzed descriptive data and main variables for the structured Likert Type questions. Frequency analysis, measures of central tendency, dispersion and corresponding graphical analyses were calculated with the statistical program SPSS 19.0. Exploratory and confirmatory factor analyses were also conducted in order to validate the questionnaire.

3. Findings

Overall, teachers' general satisfaction towards the training was regarded high: 4.42 (in a scale from 0 to 5). They declared that the training courses optimize the application of ICT in their day-to-day teaching (mean=4.5) and, as a consequence of that, many of them voluntarily participated in innovation school projects related to the use of ICT at their schools (mean=4.5).

More specifically, the level of satisfaction towards the courses was also appraised in three different dimensions: Usefulness of the contents of the ICT courses; effectiveness of the instruction and methodology followed in the courses and resources used.

3.1. Usefulness

Teachers were asked to value the effectiveness of the different contents they learnt from the instruction. Generally speaking, they thought the contents were up to standards but the general mean score was below 3.

As shown in table 1, main results indicate that teachers found particularly of their interest the use of digital whiteboards (82.5% rated that content from 4 to 5); the use of web 2.0 (i.e. creation of classroom blogs) (51.9% rated it from 4 to 5); and learning practical features of e-mail programs and servers (46.3%). Less valued were the contents of interactive chats such as the use of interactive virtual communities of students and teachers (4.5% gave scores of 4 to 5); Learning Management Systems (LMS), such as Moodle (14.3%), and forums of discussion (14%).

Items	Mean	SD	1	2	3	4	5
1. E-mail	3.33	.971	7.4	5.6	40.7	38.9	7.4
2. Use of web 2.0 (i.e. blogs, wikis, etc.)	3.50	.672	1.5	5.8	42.3	48.1	3.8
3. Databases learning (i.e. excel)	3.12	.807	4.1	12.2	53.1	28.6	2.0
4. Digital Library Management	2.83	1.01	10.4	27.1	33.3	27.1	2.1
5. File Transfer Protocol (FTP)	2.60	.993	14.9	29.8	38.3	14.8	2.1
6. Interactive Chat	1.98	.920	32.5	45.0	17.5	2.5	2.5
7. Forums of discussion	2.30	1.12	27.9	32.6	25.6	9.3	4.7
8. Use of digital Whiteboards	3.95	.789	1.8	3.5	12.3	63.2	19.3
9. Web Design	2.43	1.12	20.5	40.9	18.2	15.9	4.5
10. Use of tablet Pc and android systems.	3.58	.846	3.7	8.3	39.6	37.5	14.6
11. LMS platforms (i.e. Moodle)	2.24	1.03	23.8	45.2	16.7	11.9	2.4
12. Learning basic and advanced features of	2.74	1.11	16.3	25.6	27.9	27.9	2.3

word processors, power point and pdf.

13. Advanced internet features. 2.71 1.10 17.8 24.4 26.7 31.1 7.8

Table 1. Usefulness of the contents according to the teachers’ opinion. 1= totally disagree; 2= Disagree; 3=Neutral, 4=Agree and 5= Totally agree. Data showed in percentages.

3.2. Instruction and methodology

The teaching instruction (i.e. lesson plan) and the methodology used were also evaluated by the teachers. The first reading indicates that they scored highly the three modules of the course with mean scores over 4 (see table 2). However, special interest was shown in the third module of training: “multimedia materials and teaching strategies”, which mean-score was over 4.5. Teachers highlighted the easiness of implementation of the contents due to the methodology followed with a mean score of 4.4 in all modules and 4.8 in the third one. The less attractive aspects were the organization of the second module and the materials provided in module 1.

Items	Global		Module 1: Information and operating systems		Module 2: Interactive tools		Module 3: Multimedia materials and teaching strategies.	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. The program of the courses and the criteria for the activities and evaluation was available from the beginning.	4.3	0.65	4.4	0.74	4.0	0.00	4.5	0.50
2. The contents programmed allow for its quick implementation in my daily practice	4.4	0.59	4.4	0.58	4.0	0.80	4.8	0.43
3. A wide set of materials have been provided to the participants.	4.1	0.92	3.1	0.89	4.0	0.00	4.6	0.49
4. The methodology used was appropriate.	4.3	0.63	4.3	0.65	4.0	1.20	4.6	0.48
5. The training course was well organized	4.2	0.74	4.1	0.69	3.7	0.47	4.8	0.43
6. The course responded to my professional needs.	4.3	0.65	4.2	0.61	4.0	0.00	4.6	0.48
7. The methodology followed showed a high level of innovation.	4.2	0.77	4.1	0.64	4.0	0.93	4.6	0.48

Table 2. Level of teachers’ satisfaction towards the instruction and methodology of the ICT courses. 1= totally disagree; 2= Disagree; 3=Neutral, 4=Agree and 5= Totally agree. Data showed in percentages.

3.3. Human and material resources

With regard to the trainers and the material resources employed in the course, the teachers considered instructors’ guidance as effective and available throughout the year (mean=4.6). They also highly valued how the trainers responded to the teachers’ technical difficulties when using the technologies (mean=4.5) and the utility of the workshops (mean=4.5).

Items	Global		Module 1: Information and operating systems		Module 2: Interactive tools		Module 3: Multimedia materials and teaching strategies.	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1. We teachers were encouraged to actively participate in class by asking questions.	4.2	0.92	4.4	0.67	4.0	1.00	4.6	0.48
2. The course trainers responded clearly to technical issues.	4.5	0.60	4.5	0.60	4.0	0.89	4.6	0.48
3. The trainers’ lesson methodology	4.3	0.67	4.4	0.59	4.3	0.47	4.6	0.48

facilitated learning.

4. Guidance has been available at all times.	4.6	0.53	4.6	0.48	4.3	0.47	4.8	0.43
5. The course trainers has managed to keep my interest.	4.3	0.81	4.3	0.86	3.7	0.47	3.5	1.12
6. The management of training times has been adequate.	3.9	1.11	4.1	1.23	3.7	0.47	3.5	1.12
7. Presentations favoured the understanding of the contents.	4.4	0.73	4.6	0.49	4.3	0.47	4.6	0.48
8. Workshops helped to better understand the contents.	4.5	0.66	4.6	0.49	4.3	0.47	4.5	0.50
9. I have co-worked with my colleagues to have activities done.	4.0	0.90	3.9	0.76	3.7	0.47	4.3	0.66
10. Infrastructure and equipment was up to standards.	4.3	0.68	4.2	0.77	4.0	0.00	4.6	0.48
11. Classroom materials were adequate.	4.3	0.83	4.3	0.73	3.7	0.47	4.6	0.70
12. The course methodology has allowed me to contrast other educational experiences	3.8	0.92	3.8	0.53	3.0	1.00	4.3	0.75
13. I put into practice the results achieved in the course.	4.0	0.81	3.8	0.81	3.7	0.47	4.4	0.49

Table 3. Teachers' satisfaction towards the human resources and materials. 1= totally disagree; 2= Disagree; 3=Neutral, 4=Agree and 5= Totally agree. Data showed in percentages.

However, participants were less satisfied with regard to the training times (mean=3.9) and the possibility of contrasting the knowledge learnt with other experiences (mean=3.8).

4. Implications

Results suggest that teachers displayed high levels of satisfaction towards the ICT courses because the training contributed to the development of their own teaching skills. As a first reading, we can assert that our training allowed teachers to use many basic functions of ICT in class: i.e. internet, email, blogs and other advanced features. This last is in consonance with other studies (Kocak Usluel *et al.*, 2007). On a second hand, the module based on teacher strategies through ICT (Module 3) was deemed to be more useful for teachers than the mere learning of technical features (module 1).

However, our previous research revealed in a quasi-experimental study that the impact of traditional training on ICT uses is very low and not significant (García *et al.*, 2012). Other studies attribute this difficulty to the content overload of the courses (Zhang, 2004) and, as a consequence, the lack of a repertoire of basic skills to be directly implemented in schools (Zhang *et al.*, 2012). The real challenge therefore is not mastering digital tools but accumulating technological knowledge (i.e. teaching strategies) that allow to improve students' learning.

5. Conclusion

We can state that advancing towards an effective use of ICT in class cannot only rely on traditional teacher training courses, understood as a learning set of non-contextualized training contents. Despite the eligibility and exhaustive organization of many ICT teaching programs, such as the one shown in this study and corroborated by the participant teachers, it is crucial to know to what extent the knowledge learnt is likely to have impact in governing actions in the classroom (Fenstermacher, 1994) and tell what to do in specific situations (Kvernbekk, 2001). Consequently we suggest that the effective use of ICT would depend on in-practice mentoring (i.e. guided practice) and peer collaboration that responds to specific real situations and not just be grounded in general non-contextualized teaching.

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