

A PERSPECTIVE ON ICT PORTUGUESE TEACHER'S LIFELONG TRAINING

Patrícia Sampaio¹, Clara Coutinho²

¹ *Bolseira da Fundação para a Ciência e Tecnologia (PORTUGAL)*

² *Universidade do Minho (PORTUGAL)*

patisampaio@gmail.com, ccoutinho@ie.uminho.pt

Abstract

This paper reports the findings of a study conducted on an interactive whiteboards lifelong training program. A questionnaire evaluating ICT literacy, as well as the level of satisfaction of teachers regarding the type of training program they had attended was driven at the end of the training program. After nine months of its implementation, twenty Mathematics teachers were contacted again to conduct another survey on the applicability of the training program they had attended in order to know/understand the possible changes in their teaching practices. The goal of the study was to investigate the influence of ICT training in changing the teachers' practices in primary and secondary education, analyzing the effectiveness of the program in the integration of technologies as learning tools in the classroom. This study aims at an improvement of the practices adopted by trainers and the search for effective training models implemented in the lifelong education of teachers. We conclude that most teachers without specific training according TPACK's model only used interactive whiteboard as *supported didactic*, replicating the more traditional education. As main reasons reported for not using ICT in the classroom relate to inadequate training in the use of technology, lack of technical knowledge and lack of time to plan activities which integrate ICT. Teachers pointed very high theoretical component and after-work schedule as the most significant disadvantages for lifelong training. After this experience, teachers reported as useful or very useful the training, an increase in their self-esteem to use educational technologies and it was reported a small increase in the number of teachers who always use ICT in the classroom.

Keywords: ICT training, lifelong education, ICT integration in schools, interactive whiteboards.

1 INTRODUCTION

The lifelong education in a workshop context was the training model implemented in the study reported in this article. The training program was implemented in five groups of around 20 teachers each, in a total of 97, consisting of teachers who were attending professional development programs in Guimarães, Celorico de Basto, Braga e Paredes (2 classes), all from the north of Portugal. After nine months of its implementation, we chose to carry out an evaluation study aimed at mathematics teachers who attended the workshop, using a questionnaire as the instrument for data collection. This study was intended to assess the satisfaction level of teachers who underwent the training and their use in everyday school work.

As considered by Coutinho and Bottentuit_Junior (2008) teacher education programs often view technology as a subject to be added to the training rather than a tool to be integrated into current curriculum but if we want changes to occur teachers need to be introduced to new activities with technologies, then given time to practice and reflect about them (Paiva, 2002; Hokanson & Hooper, 2004). Teachers do not adopt new pedagogy simply because they think they possess the skills and knowledge to do so (Silva & Miranda, 2005), but because they believe in its effectiveness for pedagogical purposes, depending on students and the curriculum topics.

This article is organised into four sections. In the first we explain a recent theoretical framework of ICT integration in schools, denominated TPACK, reflecting about lifelong training teachers need and how it should integrate three components: content, pedagogy and technology. Then we refer the method used in this study, report the results and finish discussion findings and pointing out some guidelines for the design of ICT training for the professional development of teachers

2 ICT INTEGRATION IN SCHOOLS

Integration technology in schools has been the subject of interest from many researchers who analyzed this issue from different perspectives and viewpoints. Researchers have been trying to find reasons to justify success or failure of ICT curriculum integration and some conclude that an effective integration of ICT into the curriculum requires investment in two areas - attitude of teachers and an adequate training for its use (Silva & Miranda, 2005; Costa & Peralta, 2007). However, these empirical findings detonate lack of a theoretical framework to support the research and to unify the terminology used by investigators.

In order to bridge this gap, Punya Mishra and Matthew Koehler presented, in 2006, a new theoretical framework called Technological Pedagogical Content Knowledge or, abbreviated, TPACK (Mishra & Koehler, 2006), based on the formulation of Shulman (1986) pedagogical content knowledge (PCK). To Niess et al (2009, p. 7) it is a total package that truly integrates three components (content, pedagogy and technology) in the construction of the curriculum. The elementary principle behind the concept of TPACK is that the attitude of a teacher with regard to technology is multifaceted and that an ideal combination to ICT integration into the curriculum results from a balanced blend of knowledge to the scientific or content level, the educational level and also the technological level (Koehler & Mishra 2008). "The relationships between content (the actual subject matter that is to be learned and taught), pedagogy (the process and practice or methods of teaching and learning), and technology (both commonplace, like chalkboards, and advanced, such as digital computers) are complex" (Mishra & Koehler, 2006, p. 1025). This theoretical framework emphasizes the connections between content, pedagogy and technology and context (figure 1). Teachers must understand the complex way as the three domains, and the contexts in which they are formed, coexist and influence each other.

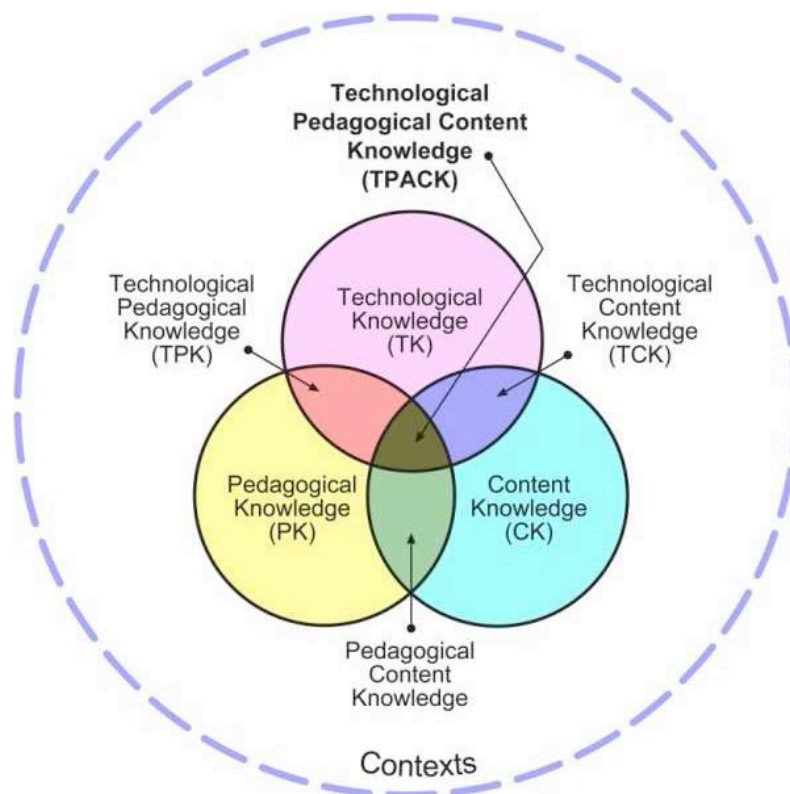


Figure 1: TPACK conceptual framework model (Mishra & Koehler, 2006).

According to Koehler and Mirsha (2008), TPACK results from the intersection of three different types of knowledge: Pedagogical Content Knowledge, PCK (the ability to teach a particular curriculum content), Technological Content Knowledge (the ability select the most appropriate technological resources to communicate a specific curriculum content) and Technological Pedagogical Knowledge (knowing how to use these resources in the teaching and learning process). PCK is consistent with Shulman's idea (1986) that pedagogical knowledge is applicable to specific content teaching, including teachers' knowledge about what teaching approaches should adjust the content. TCK is related to how the content can be changed by the application of technology and teachers should have a good

understanding of ICT for selecting those that best fit with specific objectives and content. TPK allows the teacher to know how the teaching/learning process can be transformed by the use of specific technologies, being able to adapt ICT for the purpose of teaching specific aims.

To Harris and Hoffer (2009) the concept of TPACK revolutionized the understanding we have today of how it handles the professional development of a competent teacher in his curriculum area. Teachers should be able to make informed decisions in the design of their teaching activities with technology: choice of educational goals; decision making, at the pedagogical level, given the nature of the learning experience; selection and sequence of learning activities; selection of appropriate strategies for assessment; selection of the best resources and tools to help students benefit from the learning activities planned (Koehler & Mishra, 2008). This involves training teachers and it must necessarily go through the design of training models that meet the integrated development of teaching skills in accordance with the reference of TPACK (Coutinho & Bottentuit Junior, 2009). Amiel and Reeves (2008) strength this same idea:

If anything should have been learned from research in the field of educational technology by researchers and practitioners alike, it is that a tool itself will not change the educational system or even implicitly encourage new pedagogy. If the Internet and computers are going to reach their much-lauded potential as truly revolutionary tools, then something fundamental in the way educational technology research is done must change — and we believe this can occur. First, this change requires a shift in our concept of technology. Technology is much more than hardware. (Amiel & Reeves, 2008, p. 31)

According to Cox (2008), a teacher will only be able to make informed decisions to integrate ICT into the classroom, if he knows how to handle technologies, in a curricular framework, through a teaching strategy, encouraging the construction of student's knowledge and contributing to the achievement of a certain specific goal.

3 METHOD

In this investigation we used a survey in an attempt to describe the reality of the teachers' lifelong training, in particular on the use of ICT and the level of satisfaction regarding the type of training they had done. Mainly, we intended to get information about teachers use of ICT and specifically for interactive whiteboards; how ICT can influence their teaching practices; the reasons for not using ICT with students and future needs for training. The questionnaire consisted of six personal questions relating to the identification of the respondent, fifteen multiple choice questions and seven open questions of short answer.

The questionnaire was applied to 97 teachers, 62 of Mathematics and 35 of other subjects. After nine months of its implementation, 20 Mathematics teachers were again contacted to conduct another survey on the applicability of the training they had participated in order to know/understand the possible changes in their teaching practices. We tried to understand the influence of training in the classroom of primary and secondary school teachers. In this case, the questionnaire was answered online, anonymously, and consisted of six closed questions and three open questions of short answer.

4 RESULTS

It was applied a questionnaire to teachers of different subjects, different schools and with very different in service time, a total of 97. Just a third (33%) of teachers had already used an interactive whiteboard and of these almost half (46,9%) had used for handwriting, more than a third (37,5%) had only used as a blank screen for a projector and only 15,6% had made full use of it, pointing out that four of these five are Mathematics teachers. Of the 97 teachers, sixteen had already attended a workshop about interactive whiteboards. They all stated that the school has two or three different trademarks of interactive whiteboards and that this technology is still not available in all classrooms. It was found that over half (50,5%) of teachers often use ICT in the classroom, having considered all that the use of ICT in education and training is important because it's a way of motivating students (37,1%), it's essential to the quality of education (19,6%), because we live in an information society and we need to be constantly updated (14,4%), the way the lesson is exposed by using, for example, the slide show (14,4%) and the research that can be achieved (13,4%). Only half (53,6%) believe they have a good level or reasonable competency in the use of ICT in their teaching. All teachers considered that ICT can contribute significantly or at least influence and improve the quality of education. As main reasons reported for not using ICT in the classroom relate to: inadequate training in the use of technology

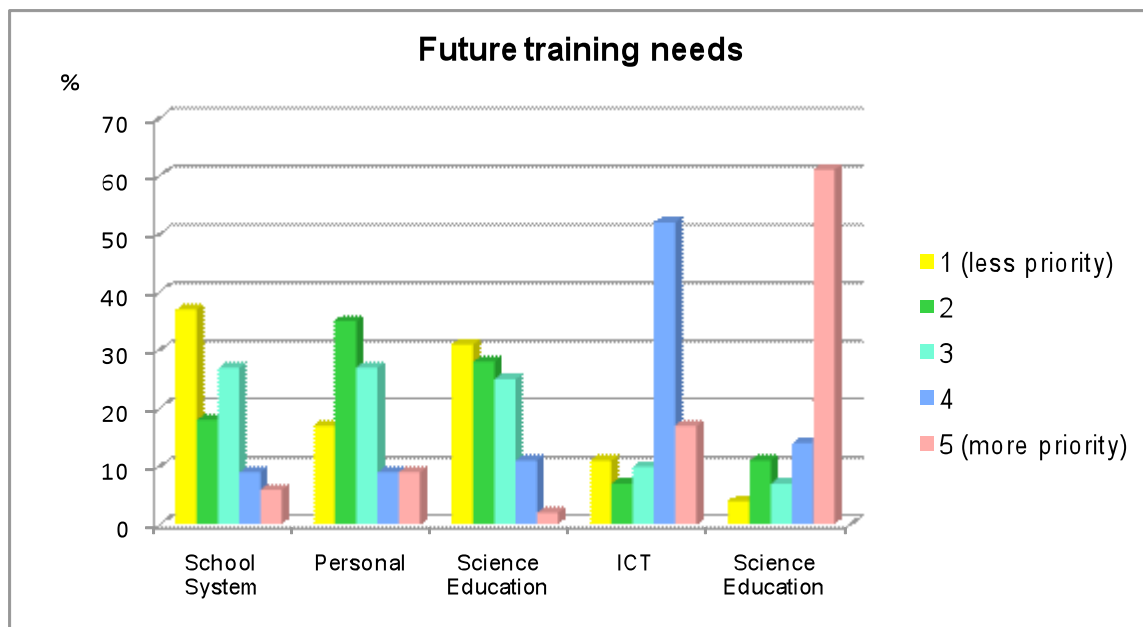
(79,4%), lack of technical knowledge (63,9%), lack of time to plan activities which integrate ICT (62,9%), lack of time to experiment with ICT (44,3%) and difficulty in planning activities with the use of ICT (44,3%).

For the training they had previously attended (n=75), teachers stressed the following advantages: learning and development of knowledge/skills (73,3%), acquiring new teaching methods (12%), reflection about teaching practice (8%), sharing experiences (4%) and the following disadvantages: little practice of training and/or a very high theoretical component (25,3%), after-work schedule (21,3%), poor preparation of the sessions (5,3%), others (6,7%) and 41,3% had pointed no disadvantage. On the last training they participated, it took place in person (85,3%) or already had an on-line component (14,7%) and were mainly in ICT (40%), about the specific teaching of the disciplinary group (40%) or in science education (17,3%), others (2,7%). Still, on the last training course attended, the teachers evaluated twelve different aspects, most positively, as we can see by the analysis of Table 1. For most teachers, the training program corresponded to their initial expectations (77,3%), was suitable to the level of knowledge of each one (80%), was about topics relevant to the functions they perform (78,7%), has improved knowledge and/or skills (80%), was in keeping with the objectives set initially (81,3%), was important for improving skills as a teacher (70,7%), contributed more or less to improve student learning (38,7%) and to improve student performance (48%), had an adequate length (64%), was well oriented by the trainer (82,7%), was accompanied by very relevant documentation and of considerable quality (69,3%) and was carried out in facilities with very suitable resources (72%).

Table 1: Evaluation, in %, about twelve aspects of the last training attended by teachers.

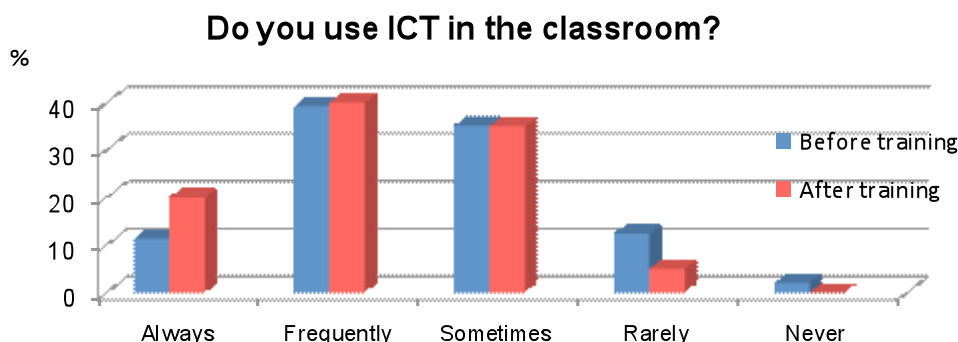
| | 1 Nothing | 2 A little | 3 More or less | 4 A lot | 5 Fully |
|---|--------------|---------------|-------------------------|-------------|-------------|
| Did it correspond to your initial expectations? | 4 | 4 | 14,7 | 56 | 21,3 |
| Was it adequate for your actual level of knowledge? | | 6,7 | 13,3 | 40 | 40 |
| Did it cover matters relevant for you training needs? | | 5,3 | 16 | 46,7 | 32 |
| Did it increase your knowledge and/or skills? | | 2,7 | 17,3 | 45,3 | 34,7 |
| Was it structured according to the objectives presented by the trainers at the beginning of the training program? | | 4 | 14,7 | 42,6 | 38,7 |
| Was it important to improve your professional development as a teacher? | | 4 | 25,3 | 50,7 | 20 |
| Did it contribute to enhance your students' learning performance? | 1,3 | 9,3 | 38,7 | 36 | 14,7 |
| Did it contribute to enhance your students' learning outcomes? | 5,3 | 16 | 48 | 26,7 | 4 |
| Was it long enough? | | 6,7 | 29,3 | 34,7 | 29,3 |
| Was it well organized and implemented by the trainer? | | 4 | 13,3 | 46,7 | 36 |
| Was it sustained by adequate documents that had quality and that were relevant to the learning goals? | | 2,7 | 28 | 30,7 | 38,6 |
| The classroom was equipped with adequate technological resources? | | | 28 | 29,3 | 42,7 |

About the teachers needs in lifelong training, for the coming years (Graphic 1), the majority considers to be a priority in themes of their subject area (61%, level 5) and in ICT (52%, level 4), rather than in personal training, ethics or socio-cultural (35%, level 2), management and organization of schools and the education system (37%, level 1) and in science education (for example, curriculum and curriculum management, assessment, philosophy and history of education, special education, ...) (with almost no difference for the three lowest levels).



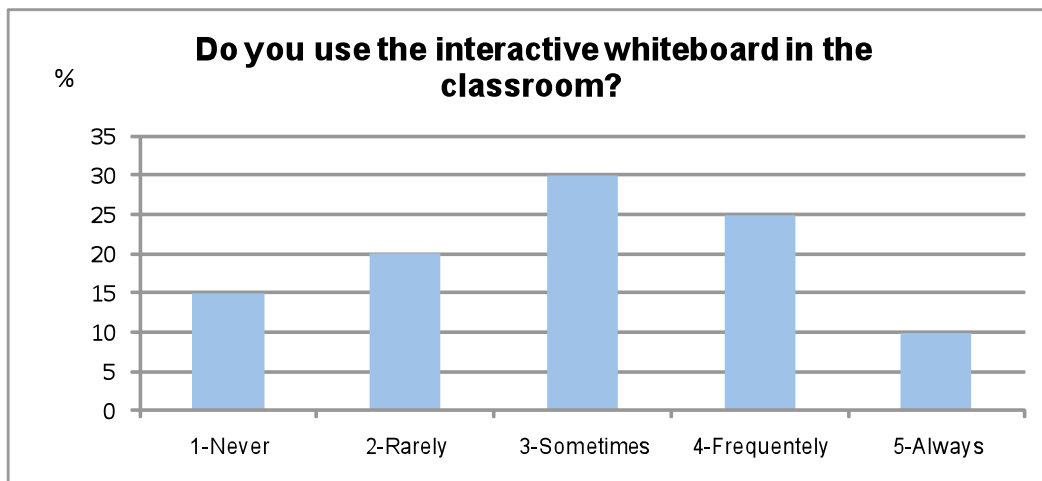
Graphic 1: Expressions of future training needs.

At a later stage, after nine months, 20 Mathematics teachers that frequented the course about Mathematics interactive whiteboard integration were again contacted to answer a new questionnaire on the applicability of this training in order to know the possible changes in their teaching practices. By analysis of Graphic 2, it can be seen that over half (60%) of the teachers often use ICT in the classroom, a little bit higher compared with the percentage obtained before the training (50,5%) and it should be noted that there was a small increase in the number of teachers who always use ICT in the classroom. No teacher now feels that their level of competence in ICT use is bad or very bad, 85% have even considered having a good or very good level of competence in using the ICT in their teaching, showing an increase in self-esteem of teachers towards the use of educational technologies.



Graphic 2: ICT use by teachers in the classroom before and after training.

On the use of interactive whiteboards in the Mathematics classroom context (Graphic 3), about one-third usually use them quite often, and about a third doesn't use it regularly. Almost half (45%) stated that there are still many classrooms that are not equipped with interactive whiteboards and 15% stated that there are several models of such equipment that difficulties its use.



Graphic 3: Use of IWB by teachers in the classroom after training.

For this training, the teachers marked as advantages: the acquisition of skills for working with interactive whiteboards (70%), improvement of skills in the use of ICT (15%) and preparation of educational materials more motivating for students (15%), and noted as disadvantages: the after-work schedule (40%), the different models of interactive whiteboard (20%), the training being too short (15%) and none (25%).

Finally, teachers were asked about the degree of usefulness of training in their teaching practice and it was obtained an average of 4.1 on a scale from 1 (nothing useful) to 5 (very useful). However, on the possible contribution to improve students learning we only obtained an average of 3.5.

5 FINAL REMARKS

Like in a previous study carried out by the authors (Sampaio & Coutinho, 2011), we verified that only a small part of teachers had used interactive whiteboards and mostly not with its full potential, but as *supported didactic* (Miller, Glover & Averis, 2004). "Without appropriate training, support and advice IAWs can be used in a way that replicates the use of more traditional presentational media (whiteboard, OHP, computer with data projector) thereby failing to exploit the power of interactivity" (Miller, Glover, Averis & Door, 2005). As main reasons reported for not using ICT in the classroom relate to inadequate training in the use of technology, lack of technical knowledge and lack of time to plan activities which integrate ICT. "Difficulties encountered by teachers who are new to the technology usually include lack of competence in basic skills, the sourcing and selection of appropriate materials and a failure to appreciate the full potential of the IAW as a force for change in approaches to teaching and learning (Miller, Glover, Averis & Door, 2005).

For the training they had previously attended, teachers stressed learning and development of knowledge/skills as the most relevant advantage, little practice of training and/or a very high theoretical component and after-work schedule as the most significant disadvantages such as Boavida (2009) had noted, "Continuous Education of Teachers should exist outside the after-work schedule, provided in the workspace of the teachers, or school, in the teachers' working hours, in a hour destined only to Continuous Training." Teachers still prefer to take in person lifelong training, mainly in ICT or about the specific teaching of the disciplinary group (Sampaio & Coutinho, 2011).

When asked about the lifelong training, teachers refer a lot of positive topics, but more than half still doesn't consider that teachers' training contributes to improve student learning and student performance. Beside the access difficulties and lack of training, we need to reinforce the strong resistance to change because the use of technology may implicate the change of acquired routines and habits and demand more dedication preparing class activities (GEPE, 2007, p. 51). Boavida (2009) also conclude that teachers consider that lifelong training usually doesn't influences student performance.

In an attempt to understand whether the training of teachers it becomes an indispensable tool for professional development, allowing constant updating of knowledge and improvement of teaching and learning, two questionnaires were produced before and after training in some groups of Mathematics

teachers under the guidance of four different training centers. The training was more directly related to ICT, for the use of interactive whiteboards in the context of the Mathematics classroom, having been regarded as useful or very useful by most respondents and increased self-esteem of teachers towards the use of educational technologies. After nine months of this training, it was reported a small increase in the number of teachers who always use ICT in the classroom. In accordance to Miller, Glover and Averis (2005, p. 16), “teachers need time to develop their technological fluency, apply pedagogic principles to the available materials or to the development of materials, and then to incorporate the IAW seamlessly into their teaching”. Research shows that effective integration of ICT in the context of the classroom requires the teacher to develop TPACK, an integrated set of skills to the level of content, pedagogy and technology and the results of our study point in this direction. Teachers should have time to attend ICT training, to plan curriculum activities which integrate ICT and knowledge to do so.

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