Computers & Education 68 (2013) 380–387

Contents lists available at SciVerse ScienceDirect

Computers & Education

journal homepage: www.elsevier.com/locate/compedu

Developing a typology of teacher beliefs and practices concerning classroom use of ICT

Maria Mama*, Sara Hennessy

Faculty of Education, University of Cambridge, 184 Hills Road, Cambridge CB2 8PQ, UK

ARTICLE INFO

Article history:
Received 22 January 2013
Received in revised form
22 May 2013
Accepted 24 May 2013

Keywords:
ICT
Teachers
Beliefs
Practices
Typology

ABSTRACT

The study explored uses of educational technology as echoed in teachers' beliefs and practices with ICT. The research is situated in Cyprus where ICT in education is still at an early stage, and is premised on the argument that teachers' limited use of technology in the classroom can be explained by the lack of incorporation of an effective pedagogy. On the basis that understanding teachers' rationales and behaviours in depth is crucial for the successful implementation of an ICT initiative, a multi-case study of primary teachers was conducted. Following within- and cross-case analyses, four distinct foci were identified across the sample in terms of the value of technology that resulted in varied aims for practice. Synthesis of the findings led to the development of a typology depicting a relationship between beliefs and practices and adding to our knowledge about teacher response to the introduction of ICT in schools.

1. Introduction

Numerous studies, both small- and large-scale, have been conducted over the last decades investigating or evaluating the so-called 'impact' of information and communication technology (ICT) on the quality of teaching and learning (Livingstone, 2012; Reynolds, Treharne, & Tripp, 2003). Research findings, although not strongly contradictory, are characterised by inconsistencies and unconvincing inferences that undermine the generalisability of the conclusions and significantly decrease the status of this impact. Even where the available data demonstrate statistical association, they cannot prove causality. At the same time the complexity underlying the effective integration of ICT into education is apparent. For example, some results reveal that ICT use can improve pupil attainment, especially in the major subjects (Wood, 2010). However, other findings suggest a rather weak link between the two variables (Albaaly & Higgins, 2011), or they undermine that link based on the fact that ICT use has been context-specific, and is in no way consistent and extensive (Condie, Munro, Seagraves, & Kenesson, 2007; Cox & Marshall, 2007). Moreover substantial research evidence showing that ICT enhances pupil motivation (e.g. Condie et al., 2007; Papastergiou, 2009) conflicts with the view that the exciting and fancy tools might also distract students from learning (Schmid, 2008). In addition, international research findings point out that use of ICT can facilitate self-directed student learning (Smeets, 2005), and that ICT use may have an impact on the curriculum and on classroom strategies (Webb & Cox, 2004). Yet, the use of ICT has been relatively low and confined to occasional and supplementary activities having limited impact on the curriculum whereas the pedagogically innovative practices with ICT of individual teachers remained isolated from the rest of the school and the system (Kozma, 2003; Law, Pelgrum, & Plomp, 2008). Overall, it is acknowledged that "ICT has supported and enhanced practice but has failed to transform education" (Munro, 2010, p. 46). It is in fact unsurprising that ICT use has sometimes 'produced' disappointing results in education where it is considered in isolation from its wider pedagogical and sociocultural setting (Derry, 2008). We argue that educators and policymakers need to understand the benefits within particular modes of teaching, for particular phases of education and student groups, within particular social, cultural and political contexts, and for particular educational purposes.

* Corresponding author. Present address: 5B Ko street, Strovolos, 2060 Nicosia, Cyprus. Tel.: +357 97720046.
E-mail addresses: mamatimo@cantab.net (M. Mama), sch30@cam.ac.uk (S. Hennessy).

0360-1315/$ – see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.compedu.2013.05.022

These realisations have triggered lengthy discussions on the factors that obstruct the successful integration of ICT in education and supposedly impede the anticipated 'transformation'. Factors/barriers cited as the most prominent ones in literature include: the unavailability or inappropriateness of technological equipment in schools; lack of ongoing technical support; lack of time to integrate technology in the lesson; problematic communication of the policy to school leaders and negative school culture on the innovation; teachers' lack of technological knowledge and skills; insufficiency of ICT training programmes; and teachers' beliefs about ICT, especially in terms of their compatibility with their teaching philosophy (Bingimlas, 2009; Inan & Lowther, 2010; Unal & Ozturk, 2012).

A special interest has developed in the literature and our study in the last factor reported above, namely teachers' beliefs about ICT and their impact on pedagogy, driven by a variety of evidence confirming that teachers' beliefs are strong predictors of classroom behaviour (Pajares, 1992). With specific regard to ICT use, the 'construct' of beliefs has been fundamental in several theoretical frameworks exploring pedagogy with ICT to indicate how teachers' beliefs and perceptions of the role of technology 'interact' with and influence pedagogical reasoning (Cox et al., 2004; Loveless, 2003; Webb, 2002). Even models focussing primarily on the 'knowledge' aspect, such as the Technological Pedagogical Content Knowledge model (TPACK), highlight that teachers' knowledge and understanding (and thus their applicability) are influenced, among others, by their pedagogical beliefs and personal appreciations and values (Koehler & Mishra, 2009).

The theoretical significance of beliefs is certainly confirmed by empirical research. Study conclusions reveal that teachers' beliefs about ICT as supportive in (and transforming of) teaching and learning may, indeed, impact upon its uptake in practice (e.g. Prestridge, 2012), with positive beliefs and attitudes towards ICT often encouraging higher classroom ICT integration, and negative attitudes discouraging it (e.g. Jimoyiannis & Komis, 2007). Further evidence portrays different teacher responses to similar technical barriers (Ertmer, Addison, Lane, Ross, & Woods, 1999). For instance, some teachers, despite limited access to technology, still try to exploit the available resources in a pedagogically effective way compared with others who make no attempt to use them; the essential difference between the two groups of teachers lies with their appreciation of technology's role in teaching and learning (Ertmer, 2005; Mama & Hennessy, 2010). Moreover, the notion that teachers' pedagogic philosophy affects their practice with ICT is illustrated by findings suggesting that teachers, albeit exposed to a massive range of technological applications, activities and approaches, chose those that will help them accommodate their own perspectives on teaching and learning (Niederhauser & Stoddart, 2001).

Nevertheless, while teachers' beliefs are important, they do not always reflect what is practiced. For example, even when they held positive perceptions of ICT, teachers' practice has often been limited to small additions to the conventional practices of teaching (Gillen, Staarman, Littleton, Mercer, & Twiner, 2007; Hennessy, Deaney, Ruthven, & Winterbottom, 2007; Webb & Cox, 2004). Also, despite teachers stating that their philosophy fits with the employment of specific tools, inconsistencies between reported and observed practices have been identified, although only a few studies (Chen, 2008; Judson, 2006; Levin & Wadmany, 2006) have addressed this.

On the basis that understanding teachers' pedagogical beliefs and practices in depth is crucial for the successful implementation of any initiative, we have investigated teachers' beliefs and practices with ICT. Our approach differs from that of most other research with similar scope in that it explores the relationship between these two aspects and attempts to actually associate specific types of beliefs with types of practice. The result is the development of a typology that, it is hoped, will prove insightful in understanding ICT integration.

The empirical arena of this study was Cyprus primary education, where an ICT policy addresses new technologies as tools in support of existing curriculum subjects but the initiative remains in its infancy.

2. Methodology

In view of the overabundance of survey studies measuring self-reported attitudes and practices (Albirini, 2006; Fong & Holland, 2011; Hermans, Tondeur, van Braak, & Valcke, 2008), direct evidence of practice beyond self-reports that would allow the exploration of the relationship between beliefs and practices, expecting to bridge research with school reality, became an imperative. Therefore, without underestimating the methodological or informative value of the above studies, we conducted a multi-case-study of 11 primary teachers across all grades (1–6), serving in St. Nektarios School. Most of the participants were in their mid-30s, each with more than 10 years of teaching experience and moderate/high self-perceived ICT competence. Most of them were in their second year of service at the school.

At the time this research was undertaken, St. Nektarios was a state primary school in central Cyprus which was equipped with uniquely advanced technological infrastructure, compared to the rest of the state schools on the island. In each class there were three PCs (instead of the usual one) connected to broadband Internet, and an interactive whiteboard (instead of the conventional board). There was also a computer laboratory. Finally, it should be mentioned that teacher assignment and student intake at the school were fulfilled rather randomly, with no assignment/admission criteria.

The data collection was undertaken in four stages. Complying with Yin's (2003) recommendation for the development of a database for each case and the establishment of a chain of evidence to support the construct validity and reliability of the study, a brief questionnaire-based survey was first conducted. This was not meant to be the primary data collection method but it rather aimed at gaining a very first insight into the participants' idiosyncrasies and sketching a profile for everyone. Both closed and open-ended questions addressed some demographic information, teachers' teaching philosophy, ICT competence and confidence levels, attitudes towards ICT and goals for technology use in the classroom.

Following an overview of the questionnaire data, a round of semi-structured interviews was then undertaken to provide data on teachers' beliefs about the value and level of integration of ICT in the lesson along with the barriers they confronted in their practice with ICT and their general teaching philosophy. A peripheral purpose was to obtain information about the practice with ICT from the teacher's perspective-. Although the broad interview themes were to some extent informed by the literature and common to all interviews, data from the survey addressing specific opinions or individual characteristics were taken on board to a considerable extent, personalising parts of the interview schedule.

Employing data triangulation (Robson, 2002) and combining approaches to produce "complementary strengths and nonoverlapping weaknesses" (Johnson & Onwuegbuzie, 2004, p. 18), unobtrusive semi-structured classroom observations were conducted during the third stage of the study. Lessons in several curriculum subjects were observed including Greek Language, Mathematics, Science, History and Geography. Following a brief analysis of the interview data, the purpose of the observations was to obtain data on the same teachers' practice with ICT. Moreover, it offered the opportunity to identify any convergent and divergent points among teachers' responses in the