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Article:

Do school-level factors influence the educational benefits of digital technology? A critical analysis of teachers' perceptions

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Abstract

The supposed benefits of teachers' use of information and communications technology (digital technology) are well-reported throughout the academic literature – most often involving issues of enhanced learning outcomes, increased pupil engagement and more efficient management and organisation of learning. This paper uses survey data from 683 teachers in 24 secondary schools across the UK to analyse the factors influencing how these benefits are being experienced. In particular, the paper explores the complex relationships between teachers' perceptions of technology-related benefits and a range of individual, classroom, school and system-level issues. A number of mediating issues and influences are identified and discussed throughout these analyses. In particular, it is suggested that teachers' perceptions of the benefits of using technology are influenced more by institutional rather than individual characteristics. A number of possible reasons are discussed, highlighting the importance of social and cultural contexts of digital technology use in education.

Introduction

Innovative Teaching and Learning (ITL) is a 2-year international project that investigates the conditions leading to innovation in formal learning contexts (see Langworthy et al., 2010).

The aim of the ITL project is to understand what "innovative teaching and learning" means and how it can be fostered in a variety of national contexts with differing educational traditions and experiences of educational technology. For this reason, seven participating countries which arguably reflect different facets of global education in the 21st century were chosen: the US, Senegal, Mexico, Finland, Russia, Australia and England.

The project is based on a survey completed by secondary school teachers and on in-depth school visits during which interviews and observations are carried out. An important aim of the survey is the analysis of how individual-level and school-level characteristics influence teachers' perceptions of the benefits of ICT use. This paper is based on the results from England that relate to the survey strand of the study, as other strands are still in progress. The paper rests on the assumption that England represents and interesting case on its own merit, due the prominent role in the field of educational technology the country developed over the last decade or so, thanks to significant investment and political commitment (Adrian Mee, 2007). The paper also takes the opportunity to critically re-examine some of the theoretical assumptions underlying the project against the findings that are beginning to emerge from the analyses.

The overall project adopts a theoretical perspective about the nature of educational innovation that builds on previous large scale studies on ICT use in schools, most notably the SITES study and the related literature (Law et al., 2008; Kozma, 2008), and on the literature on ICT integration in formal learning contexts (Voogt and Knezek, 2008). According to these views, whilst the issue of ICT integration is influenced by a range of systemic

factors that operate at different levels of an education system, the primary enabler of "innovation in education" remains the initiative of individual teachers who are expected to appreciate the benefits afforded by ICTs. The "systemic" perspective is hence brought to bear to explore the reasons why investment in ICT does not guarantee its effective use amongst practitioners. In fact, even in countries where systemic commitment has been significant and ICT equipment appears to be ubiquitous, its use in classrooms is variable and often underwhelming. For instance, the IEA's 2006 SITES survey of 35,000 teachers in 22 countries found no correlation between pupil-computer ratio and use of ICT in classrooms (Law et al., 2008). Within these views, concerns continue to be raised that many teachers still do not see the educational value of digital technology use in their classrooms (Wikan and Wolster, 2011). This focus on the shortcomings of individual teachers and the related lack of innovative behaviours reflects a theoretical standing that emphasises rational and benefit-maximising choices, albeit mitigated by influences throughout the educational "ecosystem": from the broad political level to the school level, down to the classroom level (Zhao and Frank 2003). Thus, for the most part, teachers' uses of digital technologies are still understood as a matter of individual agency – as Zhao and Frank (2003, p. 817) reason:

"When teachers are given the opportunity and resources to experiment with computers, they may improve their technology proficiency and see how computers further their goals, that is, reduce perceived costs and increase perceived benefits".

As suggested by the quotation above, models of rational choice see human agency as essentially normative and mostly aimed at maximising individual or collective advantages. There is in this literature a tendency to use conceptual tools borrowed from systems theory or ecology to illustrate relations between rational actors and contexts that influence innovation in schools (Barab and Roth 2006, Knapp et al., 2003; Tytler 2007; Valke et al., 2007; Zhao and Frank, 2003). While resulting in seemingly comprehensive and in some cases visually interesting "frameworks" and "schemas", these models might give the impression that the above-mentioned relations, albeit multidirectional, are more linear than they actually are. As a result, "blame" for the restricted use of digital technology in schools still tends to be attributed most readily to the perceived shortcomings of teachers, who fail to see the "obvious" benefits of ICT even in conditions of high technological provision and support.

While a minority of teachers appears able to effortlessly "assimilate" and incorporate digital technologies into their teaching and are more inclined to see the benefits of technology use in their classrooms, many others are seen to reach a stubborn "accommodation" of technology into existing modes of working. In this sense, some teachers have been said to display a sometimes reluctant use of technology (John and La Velle, 2004). More seriously still, some teachers have been said to display outright negative reactions to the perceived "threats" of technology to "teachers' existing practices and to the perceived maintenance of control" (Williams 2008, p.220).

Within all these descriptions and reports, the prevailing consensus amongst academic researchers and writers is that some schoolteachers are more likely to perceive the benefits of technology use than others. For example, many teachers have been deemed to be too old, disinterested or incompetent to integrate digital technology into their teaching. In terms of age, for example, some educational commentators have described many teachers as

being noticeably digitally disadvantaged in comparison to their "digital native" students. In this sense, many "digital immigrant" adults have been described as being largely out of the loop of technological change, leaving little opportunity for schoolteachers to alter their practices or modes of provision to fit with their students' digital native way-of-being (see Thomas 2011).

All of these descriptions and analyses therefore position particular groups and "types" of teachers as having rather uneasy relationships with technology, while at the same time representing technology use as the most rational and obvious choice for all teachers, irrespective of social and cultural differences. Of course, criticisms of reluctance and recalcitrance are not confined to the technological aspects of teaching – teachers have long being described as conservative and generally resistant to many aspects of change in their work (see Lortie, 2002). Yet many of the recent accounts of teachers' professional relationships with digital technology convey a sense that digital technology certainly seems to exemplify and even exacerbate these general tendencies within the teaching profession. At best, then, the fear remains through the recent educational technology literature that a great number of teachers remain "cautious onlookers" as opposed to being "enthusiastic innovators" when it comes to digital technology (Crook, 2008, p.34).

This paper attempts to move beyond the "discourses of deficiency" that characterise some schoolteachers as lacking individual attributes, capabilities and the required rational mindset to appreciate the "compelling potential" of ICTs. In particular, the paper explores in more detail the complex relationships between the benefits of technology use as perceived by schoolteachers and the various individual, classroom, school and system-level issues that may underlie these perceptions.

Against this background, the following research questions are addressed:

- What perceived benefits of digital technology use are reported by teachers?
- How does the reporting of these benefits differ according to individual-level factors (such as gender, age, subject area, professional background)?
- How does the reporting of these benefits differ according to school-level factors (such as the school size, organization, effectiveness, socio-economic background)?

Research methods

The research questions outlined above were addressed through the analysis of survey data collected in the 2010/11 academic year from 683 secondary school teachers working in schools in England. As already mentioned, these data derive from the international "Innovative Teaching and Learning" project. In particular, the analysis concentrates on data derived from the first phase of the research project, which involved the administration of a standardised questionnaire to teachers featuring items relating to teacher background, their digital technology access and use in class, the nature of their teaching and learning activities in class, professional development activities and experiences, and the nature of the school organisation and leadership.

The questionnaire, involving 44 items, was initially evaluated by a small number of volunteer teachers (six in total) external to the project, in order to adapt questions to the English context, and ensure definitions were accurate (e.g. "Key Stages", "D&T" - Design and Technology - and so on). An online version of the questionnaire was developed and a Web link was sent to head teachers and assistant head teachers in the sampled schools, who agreed to disseminate the link amongst the teacher population.

A sample of 24 secondary schools in England was selected. The schools were identified after discussions with the project partner in England (the Schools' Network, former SSAT - Specialist Schools and Academies Trust) on the basis on their degree of "innovation" and the willingness to take part in the project.

Before delving into the results, it is important to acknowledge from the outset the intrinsic limitations of the methodological approach just outlined. Compromises were made in order to accommodate the tight project schedule involving also other countries. In particular, an "opportunistic" sampling procedure based on the self-selection of participants was preferred - with however one overriding criterion as to why a specific subset of teachers was targeted: all those responsible for teaching classes of students between Year Groups 7 to 10 (i.e. students aged between 11 and 14 years). To maximise response rate, it was decided to focus on these teachers as they arguably have more latitude to experiment with technology-aided and "innovative" approaches to teaching and learning in a secondary context, before the influence of restrictive assessment requirements becomes pervasive, as high-stakes examinations draw near for older students. The response rate achieved was sixty per cent. It is within these methodological constraints and parameters that the results and related discussion should hence be viewed.

All teachers were asked to complete the survey questionnaire. The following table will provide descriptive information about the sample.

TABLE ONE HERE [Survey respondents by individual characteristics (total number of respondents = 683). NB. The table reports frequencies relating to responses to a range of multiple choice questions]

As can be seen in table one, *individual characteristic*s were evenly distributed across the sample – i.e. gender, age, years of teaching experience. A slight disproportion can be noted in terms of subject area, with an over-representation of teachers from the sciences and humanities. For the purposes of analysis a number of variables were created to describe *school-level characteristics*. Using government statistics, the schools were divided into three equal groups relating to the population density of the areas in which they were located. Dichotomous variables were created from the following data in terms of "below average", "average" and "above average".

- Average school size: 1176 pupils (range: 573 to 1566 pupils);

- Average number of pupils achieving GCSE grades A*-C: 55.2 percent (range: 27 to 91 percent);
- Average number of pupils eligible for free school meals: 10.5 percent (range: 2.7 to 58.1 percent);

Another variable acted as a measure of perceived school culture. Here respondents were asked whether they felt that their school leadership "encouraged teachers to try new things". This item was agreed with by 59.4 percent of respondents (n=365). School leadership was defined in the questionnaire as "the head-teacher and other members of the SMT (Senior Management Team)". The SMT generally involves the deputy head and, depending on the size and type of the school, other teachers with special responsibilities (e.g. heads of subjects).

Of course, any findings drawn from the analyses reported in the next section should be seen within the limitations of the data – not least as self-report data from a non-random sample of 24 schools. With this caveat in mind, it was felt that the survey data were best analysed in a relatively straightforward manner. Thus, quantitative analysis of the survey data is described in terms of frequencies and cross-tabulations. This conservative approach to data analysis is arguably preferable to avoid inferences from more sophisticated statistical analyses which may not be warranted by the nature of the data.

Results

What perceived benefits of technology use are reported by teachers?

The majority of teachers (89.6 percent, n=575) reported that digital technology provided some sort of significant benefit in their teaching. As can be seen in table two, the most prevalent benefit identified by teachers related to digital technology giving access to a wider range of learning content and resources. Notably fewer teachers reported benefits related to all the other areas of benefit explored by the survey – especially relating to students' understanding of subject matter.

TABLE TWO HERE [Teacher beliefs about the benefits of using digital technology. *NB. Data are percentage of teachers 'agreeing' with each statement*]

How does the reporting of these benefits differ according to individual-level factors?

As can be seen from table three, there were no clear differences in terms of these reported benefits of digital technology use as far as gender, years of teaching experience and educational background are concerned. It should be noted that teachers who experienced digital technology-specific training in the last two years were slightly more inclined to report

benefits of digital technology use compared with those who did not have such training. However, these differences were relatively small.

The clearest and most consistent differences related to the role of school leadership, as perceived by teachers, in encouraging innovative practice and in particular use of ICT. More specifically, teachers who perceived their school leadership to be supportive of innovative practice were also more inclined to report benefits (e.g. 45.8 percent of teachers reporting a supportive leadership were more likely to think that digital technology use is associated with increased student motivation, as opposed to 29.1 percent of teachers who reported a less supportive leadership).

TABLE THREE HERE [Perceived benefits of using technology by teacher individual characteristics. NB. Data are percentage of teachers in each group 'agreeing' with each statement]

Variations can also be noted in the relationship between subject specialism and beliefs about educational benefits, as also reported in table three. Although these variations are not wholly consistent, two broad patterns can be identified. Firstly, a rather strong consensus, amongst all subject areas, that digital technology can give students access to a wider range of content and resources. Secondly, a general scepticism as to whether digital technology use is associated with deep understanding of a subject matter. Apart from these clear trends which mirror the broad-level benefits reported in table one, specific differences have also emerged. Some of these nuances are clearly related to whether subjects have a technological element. For instance, 93.2 percent of computer science, technology and digital technology teachers believe that digital technology use is associated with increased access to content and resources, and 54 percent of the same group of teachers believe that ICTs are associated with increased student motivation.

Other results deserve however closer scrutiny; for instance, the fact that Physical Education teachers have the highest prevalence of positive responses to the item "Students are more attentive when using digital technology"; or that Art Music and Drama teachers (alongside Computer Science teachers) have the highest positive responses to the first item, "Digital technology gives students access to a wider range of learning content and resources". Similarly, the fact that Special Education teachers are very likely to think that digital technology makes learners "more active and independent" and "more motivated to learn" calls for further comment. The next section will attempt to shed some light on these results by reporting frequencies for different uses of technology by teachers.

Teachers' actual uses of ICT

Respondents' use of digital technology within their teaching varied according to the type of activity. As can be seen in figure one, the most prevalent use of technology was for lesson preparation – with all but a handful of teachers using ICTs to research information and/or prepare handouts and other lesson materials. Other prevalent uses related to presenting information (for example through interactive whiteboards and data projectors), and the collection and management of student data. A majority of teachers also reported using digital technology to collaborate with colleagues within the school. Interestingly, the less frequent uses of technology related to activities that could be classed as communal and/or

collaborative in nature. For instance, only a minority of teachers reported using ICT to communicate with students or parents outside the classroom, or for sharing resources online with the wider educational community.

FIGURE ONE HERE [Teachers' reported uses of ICTs for school activities (%ages)]

Although not subject specific, these results clearly suggest that ICTs are embedded within the day-to-day practices of most teachers. However, while some teachers appear to be making use of ICTs in diverse and innovative ways, the majority of ICT use is less ambitious in nature - concerned with supporting teachers in the carrying out of practical and procedural tasks such as lesson preparation, presenting and disseminating content, collecting and managing data. Accordingly, the benefits that teachers see as arising from ICT use tend to be related to supporting the provision of learning, chiefly through increased access to content and resources, rather than influencing the nature of the actual learning itself. For many teachers, ICTs are associated with what could be described as "logistical" benefits rather than "intellectual" benefits, except seemingly for a number of teachers of specific subjects (e.g. PE and special education), who reported increased motivation and attention.

In order to fully appreciate these variations, and to tease out more effectively the nature of the relationship between technology use and perceived benefits in different subject areas, a more in-depth and possibly qualitative insight would be required. Notwithstanding this caveat, some tentative suggestions can be made, which try to account for the relationship between specific subjects and ICT use. For instance, the findings seem to offer a confirmation of the literature highlighting the creative opportunities that digital media provide in the area of the visual and performing arts (e.g. Peppler and Kafai, 2007), something that is arguably reflected in the belief expressed by Art, Music and Drama teachers in terms of increased access to resources. Similarly, the findings can be seen as a confirmation of the studies that highlighted the increased interest of PE teachers in educational technologies (Thomas and Stratton, 2006), and possibly the increased availability of commercially available tools that allow "active" interaction and play (motion-based video-games, dance mats, motion-capture and so on), which are gaining interest in formal learning contexts and in PE in particular (Papastergiou, 2009). Unfortunately the survey did not provide insights into the specific technologies used in different subject areas. While this is certainly a limitation of the study, the data allow us to infer that that ranges of ICT uses in the schools surveyed lean towards the mundane and unimpressive end of the spectrum. This seems to suggest that in some cases expectations and beliefs about the benefits of ICT may reflect an optimistic view, which is not warranted by the actual reality of ICT use. This paper cannot offer an answer as to why this seems to be case in certain subject areas more than others, and can only propose that this ought to be the focus of further research.

How does the reporting of these benefits differ according to school-level characteristics?

As can be seen in table four, reports of the benefits of digital technology use differed according to a small number of school-level characteristics. The analysis suggests that teachers from schools in more "challenging" circumstances were more likely to associate digital technology use with specific student benefits.

In particular, it appears that teachers in schools that scored higher on proxy measures of deprivation (in particular and most significantly the percentage of pupils in receipt of free school meals), and with less students achieving "good" grades tended to see more benefits of digital technology use compared with teachers from schools that were better performing and serving less deprived communities. This was particularly the case in terms of perceptions of improved student attentiveness and, to a lesser extent, active/independent learning. Otherwise, the general patterns remained regardless of the size, success or locality of the school.

TABLE FOUR HERE [Perceived benefits of using technology by institutional characteristics. NB. Data are percentage of teachers in each group 'agreeing' with each statement]

The results reported in table four suggest that school-level circumstances and cultures may play an important role in shaping teachers' experiences and expectations of technology use, perhaps more so than teachers' individual demographic characteristics such as age, gender and teaching experience. As mentioned in the introductory section of the paper, individual characteristics and traits are often seen, in a large part of the academic literature, as the determining factors influencing teachers' perceptions. Even when systemic influences are considered, these are mainly concerned with unproblematic "enablers" or "barriers" that influence in a linear fashion the ability to appreciate the "obvious" and rational benefits of ICT use. For instance, in one Dutch study teachers who were categorised as "personal entrepreneurs" were found to be important for the integration of ICT, while school level factors were seen to be of limited importance (Drent and Meelissen, 2008). In contrast with these views, the findings discussed here seem to point to a more problematic relationship between contextual factors and perceptions, namely, that the social milieu of a school, as defined against socio-economic criteria, seldom considered in the literature on ICT integration in schools, determines perceptions in ways that warrant further investigation and analysis.

Similarly, the findings highlight the apparent significance of the belief that digital technology is beneficial to underachieving students or students from disadvantaged backgrounds (cf. Passey and Rogers, 2004; Reynolds et al., 2003). However, they also point to the existence of a complex dynamic: whilst deep understanding of a subject matter was all around the weakest of all benefits associated with digital technology use (see table three), regardless of individual and school-level characteristics, teachers in more "challenging" circumstances were more likely to think that ICT can foster students' attention and "independence in the learning process". This raises a number of questions about the expectations and values surrounding ICT in different socio-economic contexts. It is possible that a focus on these expectations and values might illuminate why ICTs historically did not "transform" pedagogies and the "core" nature of instruction, but may instead be used, in specific socio-economic conditions, to support less academic forms of provision, specifically aimed at socialising "difficult" students and minimise disruptive behaviours.

As it will become clear in the following section, these findings contribute to a tentative explanatory framework which highlights the importance of institutional factors over individual ones in influencing the attitudes of teachers towards the benefits of digital technology.

Discussion and conclusions

This paper has drawn on survey data from 683 teachers in 24 secondary schools across England to analyse the factors that may be associated with the perceived benefits of digital technology use. The findings highlight the importance of contextual and cultural dynamics in influencing teachers' perceptions. This societal angle arguably represents the main contribution of the paper to our collective understanding of the factors influencing technology use in formal education.

More specifically, the paper points to the need to consider more nuanced theoretical explanations that account for the social arrangements and the social relations that lie behind the use of educational technologies. Such a theoretical stance should arguably draw on the notion of "social shaping", i.e. the idea that there is no pre-determination associated with educational technologies; instead, technologies should be viewed as being immersed at all times in a milieu of relations that involve social, economic, political and cultural factors (see Bijker et al. 1987; Selwyn, 2011). Without doubt this is a theoretical stance that wishes to reassert the often neglected role of broader societal influences in the dynamics of educational technology.

The paper's contribution can be further qualified as a critique of the theoretical view that emphasises the rational, benefit-maximising choices of individual teachers in relation to technology use. The findings suggest instead that broader contextual and cultural dimensions, *especially* those relating to socio-economic conditions, may mediate and significantly alter these individual perceptions.

There certainly appears to be a link between teachers' perceptions of supportive school leadership and their perceptions of beneficial technology use. This is in keeping with studies that have investigated the factors impacting on technology-enhanced teaching practices in formal schooling, highlighting the many levels of actors, resources and interests determining opportunities and barriers, including the broad political aspects and, indeed, the type of school leadership (Law et al*.,* 2008; Zhao and Frank, 2003). Notwithstanding this clear result, the data presented here point towards the need to develop a more rounded understanding of the links between teachers' perceptions of digital technology and the different individual and social conditions within schools.

This understanding would complement rather than replace current views on how to enable a more meaningful and effective use of ICTs in formal education. Certainly teachers still need technical and pedagogical support tailored to individual abilities. Similarly, we cannot ignore the needs highlighted by teachers themselves such as technical help, administrative support, consistent training specific to teacher's needs, and informal networks for learning. (cf. IEA, 2006).

The importance of informal networks is particularly relevant as it is supported by an established body of research about the role that social configurations such as communities of practice, with or without the support of technologies, play in dynamics of professional development, thus potentially influencing the perceptions of teachers in relation to educational technologies. Such networks have been found to increase teacher learning in terms of subject-specific and pedagogic knowledge and skills, to strengthen motivation, and encourage teachers to actively try out new practices (Mujis et al 2011; Kerr et al. 2003).

Notwithstanding these factors which are undoubtedly related to teachers' feelings of effectiveness and the perceived usefulness of ICT, it is argued here that equal attention should be paid to the relationship(s) between the broader social contexts that surround schools, teachers and technology use. Indeed, there is arguably a need to move beyond individualising and "blaming" certain groups of teachers for not making best use of technology (i.e. those who are older, female and so on). As such the data presented here support the emerging argument to move beyond placing "dangerous moral imperatives" onto individual teachers to change their practices and processes in line with the assumed "affordances" of digital technology (Convery, 2009, p.30). It is all too easy for enthusiastic academic commentators to indulge in "teacher bashing" and portray teachers as outmoded, obstructive or ignorant. At worst such thinking can lead to an unhelpful set of rejectionist conclusions where traditional forms of teaching and teachers are branded irrelevant to contemporary digital society. We should therefore think more carefully about how teachers encounter digital technologies within the wider contexts of schools as organizations and the "job" of being a teacher (Selwyn, 2011).

Conversely, this paper argues for the development of a more critical line of enquiry which may lead to more challenging, but ultimately more satisfactory, accounts of how "innovation in education" is appropriated, contested and symbolically constructed, focusing on the more discursive and "lived in the world" manifestations of teaching and learning in real school environments. By focusing on this level of analysis we may be in a better position to highlight the tensions and contradictions that surround technology-enhanced teaching, most notably that teachers are subjected to many conflicting demands and expectations, while at the same time acting according to their own ambitions, values, and predispositions, appropriating technology in different ways to achieve differing and sometimes contradictory goals. Clearly, these suggestions are far-reaching, and beyond the explanatory power of the "snapshot" self-report data presented here. It is clear that much more work is required in the future to explore these issues further, and additional work is being carried out to triangulate the findings from the survey with a range of qualitative data from observations and interviews from the qualitative strand of the study. For the time being, it is perhaps safe to conclude that while the use of digital technologies in schools is linked to some beneficial outcomes, the nature of these benefits would appear to pertain more to the organisational processes of engaging students with learning activities, rather than the intellectual processes of learning itself. Perhaps more importantly, variations in the benefits are not patterned by individual teacher characteristics, but explained better by the nature of the institutional conditions and contexts within which they work, and possibly by the cultural expectations that surround different subject domains.

It is not an easy task at this point to derive from this study recommendations to secondary teachers and school-level management teams on how to extract educational benefits from using digital

technologies, especially after having argued at length about the need to contextualise and problematise the overall discourse about "benefits". One important suggestion could however be advanced, namely, that practitioners could draw on the social shaping perspective and the findings presented in this paper to articulate a more critically minded set of responses in relation to digital technologies in their contexts, resisting individualising and blaming discourses that unfairly position them as the weak link in an otherwise linear, robust and unproblematic chain of deterministic assumptions. As such, it is hoped that this paper will contribute to a pragmatic *and* reflective approach that aims to help teachers recognise and address the issues, as well as the opportunities, brought about by a number of systemic and local factors that influence meaningful technology use in formal schooling.

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Tables

	N	%age
Gender		
Male	252	36.9
Female	431	63.1
Age		
under 25 years	58	8.5
25-29 years	124	18.2
30-39 years	246	36.0
40-49 years	130	19.0
50-59 years	114	16.7
60+ years	11	1.6
Subject area		
English literature/English language	95	13.9
Humanities (history, geography, politics)	93	13.6
Modern Foreign Language	51	7.5
Art, Music, Drama	63	9.2
Mathematics	102	14.9
Computer science/ Technology/ ICT	81	11.9
Science (physics, biology, chemistry, earth sciences)	91	13.3
Physical education	42	6.1
Special education	4	0.6
Religion	29	4.2
Vocational/ business	13	1.9
Design technology	19	2.8
Educational Background		
Educated to Bachelor's degree level	538	78.8
Educated to Masters degree level or higher	145	21.2
Professional development and training		
Taken part in training related to digital technology use in the last 2 years	449	71.8
Had not taken part in training related to digital technology use in the last 2 years	176	28.2

Table one: Survey respondents by individual characteristics (total number of respondents = 683).

	Percentage
Digital technology gives students access to a wider range of learning content and resources	87.1
Students are usually more motivated to learn when using digital technology	39.3
Digital technology usually helps students become more active and independent in their learning process	38.2
Students are usually more attentive when using digital technology	36.1
Students usually understand subject matter more deeply when they use digital technology	17.0

Table two: Teacher beliefs about the benefits of using digital technology. NB. Data are percentage of teachers 'agreeing' with each statement.

	Digital technology gives students access to a wider range of learning content and resources	Digital technology usually helps students become more active and independent in their learning process	Students are usually more motivated to learn when using digital technology	Students usually understand subject matter more deeply when they use digital technology	Students are usually more attentive when using digital technology
Gender					
Male	88.3	37.4	38.3	18.3	38.3
Female	86.3	38.6	39.9	16.3	34.9
Age					
40 + years	88	34.2	38.1	16.2	33.2
under 40 years	86.5	40.6	40.1	17.5	37.8
Subject area					
English literature/ English language	88.6	33***	35.2***	9.1***	30.7***
Humanities (history, geography, politics)	83.3	31	27.4	12	25
Modern Foreign Language	90	48	56	18	42
Art, Music, Drama	93.2	32.8	31	16.9	28.8
Mathematics	87.6	30.9	37.5	15.5	35.1
Computer science/ Technology/ digital technology	93.2	55.4	54.2	32.4	51.4
Science (physics, biology, chemistry, earth	77.5	33	30.7	12.4	29.5
Physical education	92.5	62.5	53.7	35	60
Special education	66.7	66.7	66.7	-	33.3
Religion	85.2	29.6	38.5	11.1	40.7
Vocational/ business	84.6	38.5	61.5	15.4	46.2
Design technology	82.4	35.3	35.3	17.6	29.4
Years of teaching experience					
Less than 10 years	86.4	41.0	38.3	17.0	37.2
10 years or more	88.0	34.0	40.9	17.1	34.5
Ed. Background					
Educated to Bachelor's degree level	88.3	37.4	38.6	16.6	36.2
Educated to Masters degree level or higher	82.2	41.0	42.1	18.5	35.8
Prof. dev and training					
Taken part in training related to digital technology use in the last 2 years	84.0	32.6	33.0*	10.3***	29*
Had not taken part in training related to digital technology use in the last 2 years	88.2	40.1	42.1	19.9	39*
Perceived school culture					
School leaders encourage teachers to try new things – YES	90.6***	44.5****	45.8****	20.2*	40.5**
School leaders encourage teachers to try new things – NO	81.9	27.8	29.1	12.9	29.3

Table Three: Perceived benefits of using technology by teacher individual characteristics.
NB. Data are percentage of teachers in each group 'agreeing' with each statement

* χ^2 significant at p<0.05

** χ^2 significant at p<0.01

*** χ^2 significant at p<0.005

**** χ^2 significant at p<0.001

	Digital technology gives students access to a wider range of learning content and resources	Digital technology usually helps students become more active and independent in their learning process	Students are usually more motivated to learn when using digital technology	Students usually understand subject matter more deeply when they use digital technology	Students are usually more attentive when using digital technology
Size of school					
1176 pupils or less	89.8	39.8	40.2	19.4	40.6
More than 1176 pupils	85.7	37.4	38.9	15.9	33.9
FSM					
10.49% of pupils or less on free school	86.1	35.8*	39.0	17.4	33.6*
More than 10.49% of pupils on free school	89.6	44.2	40.0	16.0	42.3
GCSE A*-C					
Less than 55.2% students with GCSE A*-C	87.2	41.0	37.9	18.7	41.7*
55.2% or more students with GCSE A*-C	86.9	36.5	40.1	16.0	32.8
Location					
City (area with High-population density)	87.6	43.1	42.8	21.4	41.0
Town (area with Medium-population density)	88.0	37.0	41.0	15.8	34.1
Rural (area with Low-population density)	85.6	34.6	34.3	14.0	33.3

Table Four: Perceived benefits of using technology by institutional characteristics.

NB. Data are percentage of teachers in each group 'agreeing' with each statement

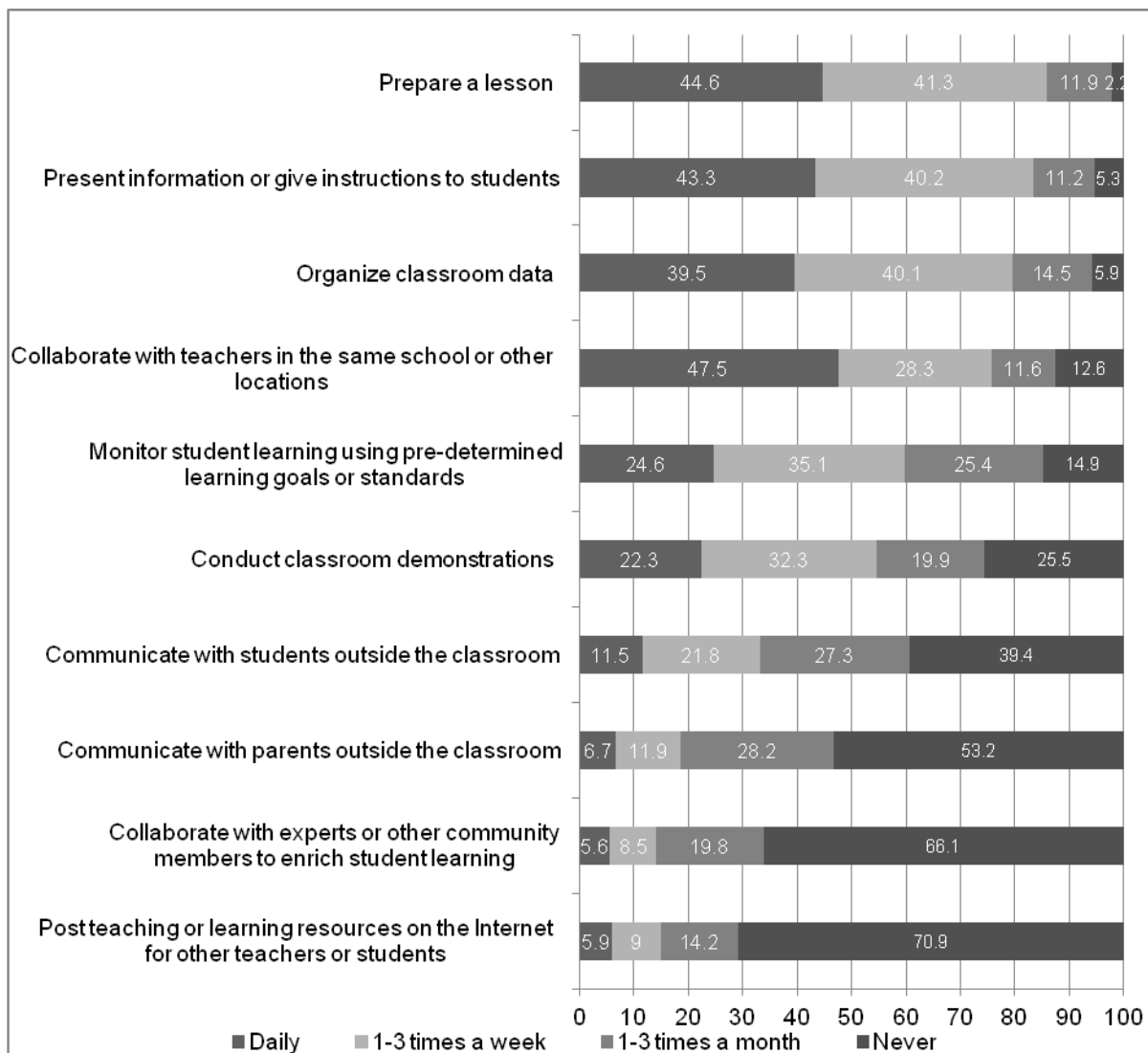* χ^2 significant at p<0.05

Figures

Figure one: Teachers' reported uses of ICTs for school activities (%ages)