Impact 2007: Personalising Learning with Technology

Other

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1. Executive summary

1.1 Context

The Impact 2007: Personalising Learning with Technology project was commissioned by the British Educational Communications and Technology Agency (Becta). This report presents the findings from Impact 2007: Phases One and Two. The findings are based on both quantitative and qualitative data collected from the 67 Impact 2007 schools. All of the schools contributed to the teacher and pupil online surveys. This provided 450 teacher and more than 1,300 primary and 2,000 secondary pupil questionnaire responses being available for analysis. In addition, senior managers and ICT co-ordinators were interviewed from 30 schools and 24 case study schools provided illuminative data from observations and researcher/teacher discussions.

Quantitative analyses of the data included the use of cluster and factor analysis, analysis of variance and regression, and also multilevel modelling in order to tease out the complex relationships within the educational environment.

1.2 Outcomes

The research tools

- The research tools designed and tested in Phase One of the project have proved fit for purpose (see Section 3.5).

Impacts on performance

- E-maturity is linked to higher school performance and also to greater investment in learning by pupils. The latter is a crucial factor in pupil school performance.
- E-maturity shows a clear, positive relationship to school performance in Key Stage 3 mathematics and science and GCSE level 1.
- Higher pupils' perceptions of personalisation are linked to better Key Stage 2 school performance, but this pattern is reversed at Key Stage 3. The latter is a reflection of the greater need to support low-performing pupils compared to pupils who are coping well within the educational system at secondary level.
- Personalising learning (also referred to as p-learning) does not always relate to improved performance, particularly in high-performing schools.

Personalising learning – The staff perspectives

- Teachers have taken on board the personalising learning agenda, although there are problems of operationalising this concept in that there are disparities in what it means to be personalising learning and also in what this looks like in action.

- There are role differences in staff perceptions of personalisation in their schools, with managers reporting the highest levels of personalisation and mathematics teachers being least convinced that the personalising agenda is occurring in practice.
- There are sector differences in responses to ICT and personalising learning. Primary staff are more positive than their secondary peers.
- The teacher's role in developing a p-learning culture can be enhanced through the use of ICT.
- In teachers' perceptions, it is clear that ICT is strongly associated with personalising learning.
- Over two thirds of teachers reported that either their laptop or interactive whiteboard was now an essential tool for them.

Personalising learning – The pupil perspectives

- Pupils' perceptions of the level of personalisation of their learning are linked to work ethos including self-efficacy.
- There is a decline in pupils' perceptions of personalisation of learning at both primary and secondary level as the pupils move through their schools.
- Male pupils across the sample record a higher level of perceived personalisation than their female counterparts.
- Primary pupils with a greater opportunity to use ICT and also with more positive attitudes towards computers recorded a more personalised learning experience.
- For both primary and secondary pupils, the learners' overall experiences of personalisation were associated with higher levels of pupil work ethos and greater opportunities to use ICT.

Personalising learning in action

- Allowing content choice is the most frequent way of personalising the learning experience. Learner goal-setting and self-monitoring is far less prevalent.
- Personalising learning is constrained by the National Curriculum.
- While computer use and e-maturity are associated with personalising learning within the primary school, this relationship is stronger and more prominent at secondary level.
- In many classroom observations, even though pupils were productively engaged in learning, personalisation was conspicuous by its absence.

Individual differences

- The study identified a set of characteristics describing virtuous learning. Pupils within this virtuous set – expressed as work ethos – recognised the personalisation of their learning.
- While male pupils and the number of statemented children were anticipated negative associates of pupils' investment in their own learning, the negative relationship between increased choice in modes of working and learners' investment is less explicable. There are two possible reasons for this association. First, some pupils who are struggling to achieve might find it difficult to deal with choice. Second, an equally valid hypothesis would be that teachers have made a pedagogic decision to teach some pupils in less innovative ways because they assess that either the pupils will not benefit from such practices or they are concerned about maintaining discipline.
- Male pupils show more disengagement from the learning process compared to females in the primary years, but there is no such observable difference in the secondary age phase.
- Investment in learning by pupils – the trade-off between goal-directed activities and disengagement – declines across the age range, with rising disengagement in both the primary and secondary phase of schooling.
- The decline in learners' investment over the primary phase is worrying and suggests that problems that were once associated with secondary schools are now occurring within primary schools.
- Pupils' attitudes towards computing technology are positive, although at secondary level female learners hold less positive attitudes and also have less positive self-efficacy.

E-maturity and virtual learning environments (VLEs)

- From the case studies there is increasing evidence of widespread and effective technological support for work both at school and in the home. For some schools this is confined to a combination of the school intranet and external email while for others fully functioning VLEs are available.
- VLEs, when used appropriately, support personalisation (see Case studies 13 and 14).
- There is still confusion over what constitutes an external VLE and what is an adequate level of service provision for such a system.
- While the development of fully functioning VLEs can be seen as a first step, embedding this new technology into teaching and learning is not a trivial matter. It should be noted that VLEs are technologically and pedagogically high-maintenance developments.

- There is concern in primary schools about the ‘anytime, anyplace, anywhere’ agenda because the VLE facility might lead to unnecessary attention to school work at home.
- An issue that needs to be grasped by the educational establishment is the entrenchment of the digital divide as VLEs take learning into the home. The ‘have-nots’ must be catered for.
- Electronic communication between home and school increases with growing e-maturity.

One size does not fit all

- There is a range of interpretations of the personalisation agenda and a variety of technological solutions to support that agenda.
- The findings show strong individual learner differences as opposed to school differences within the data. This makes the case for future pupil-level analysis incontrovertible.

2. Outline of the Impact 2007 study

The Impact 2007: Personalising Learning with Technology project was commissioned by the British Educational Communications and Technology Agency (Becta). This report presents the findings from Impact 2007: Phases One and Two.

Phase One sought to establish agreed definitions for e-maturity and associated problem terminologies, such as virtual learning environments (VLEs) as well as personalising learning (or p-learning), in order to facilitate the design and pilot testing of appropriate research tools.

The aims of Phase Two were: to conduct a national survey using the amended tools from Phase One; to model the data captured via those tools to establish any relationship between e-maturity, personalisation and outcome performance of schools; and to conduct illuminative case studies to add to our understanding of how the personalisation agenda is being acted out within the schools.

2.1 Background

As learning becomes more individualised, learner-centred, situated, collaborative and ubiquitous across the lifespan, new technologies are becoming more personalised, user-centred, mobile, networked, ubiquitous and durable. The synergy between these two developments – one learner-centred and one technology-centred – sets the stage for effective e-learning environments. It is taken as read by many that these changes will be for the better and embedding ICT into teaching and learning practices is a priority of the UK Government. “I see ICT and its potential to transform how we teach, learn and communicate as crucial to our drive to raise standards.” (Ruth Kelly 2005). This potential to transform is implicit in the key themes identified in the DfES strategic approach for ICT (DfES 2005):

- to transform teaching and learning
- to engage ‘hard-to-reach’ learners
- to build an open, accessible system
- to achieve greater efficiency and effectiveness.

There is a conflict, however, between the political ambition for e-learning to be a driver of educational change and the failure to demonstrate clear performance benefits, leading to an imperative to identify and measure the specific changes and benefits that the technology can deliver. A clearly specified aim of Impact 2007 is the identification of appropriate measures and the development and testing of tools based on those measures in order to fill the current evidence gap, allowing robust and practical policies for future development of e-learning. It is within this context that Impact 2007: Personalising Learning with Technology is framed.

2.2 Overarching aims

The Impact 2007 project was a 10-month pilot project established to design and test a set of robust and usable research tools which allow a national-level investigation of the conditions under which e-learning is effective in schools. There are two phases to the project: the first focusing on tool production; the second on the collection of evidence across a stratified sample of schools. The aims of this study were:

- to define the terms ‘personalisation’ and ‘e-maturity’ in consultation with policy-makers and leading thinkers in order that baseline measures and measures of change can be developed
- to develop a methodology for investigating both terms and carry out a pilot survey which will test and provide data on a sample of e-mature and e-novice schools
- to reassess the tools in response to participant feedback
- to conduct a more extensive national survey using the redesigned tools
- to finalise a set of robust measurement indicators of e-maturity and p-learning and to identify key relationships between e-maturity and p-learning and pupil performance.

3. Impact 2007: Phase One

3.1 Key goals

The primary focus of Phase One of the project was on methodological concerns rather than data capture per se, drawing on existing approaches to e-maturity. The aims of Impact 2007: Phase One were:

- To establish an agreed definition of e-maturity and p-learning in consultation with policy-makers and leading thinkers and practitioners in order that baseline measures and measures of change can be developed.
- To test the understanding of the agreed terminology within the school structure.
- To identify other terms that give rise to confusion when conducting research into technology-led learning. Such terms would include virtual learning environments.
- To develop methodologies, including appropriate research tools, to investigate key aspects of e-maturity and p-learning.
- To carry out pilot testing of the research methodologies and instruments on a stratified sample of schools. The primary classification criteria for schools were age phase and level of e-maturity with type of locality as a secondary criterion.
- To refine, through participant feedback and also statistical analyses, the research instruments for use in the larger-scale survey exploring links between e-maturity, p-learning and learner outcomes, the central question of Phase Two of the Impact 2007 project.

3.2 Methodology

Research design

The research questions set by Becta were of two main types: an audit of e-maturity and p-learning support within the collaborating institutions; and a survey to ascertain the extent that policies on e-learning and p-learning are apparent at individual staff and pupil levels.

Sample

Thirty-six schools from an initial contact list of 133 schools agreed to take part in Phase One of the project (Table 3.2.1). Primary classification criteria were age phase (primary: secondary school) and level of e-maturity (high: low) as defined in the PLASC database (DfES 2006a) with type of locality (rural: urban) as defined in EduBase (DfES 2006b) as a secondary criterion. The evaluation team had some concerns about the designations of e-maturity and rurality as they did not equate to known data from the field. Each school's designation will be reassessed once all data has been collected (see Section 4.1)

Table 3.2.1: Distribution of sample schools by level of e-maturity, age phase and location

	Primary		**Secondary**	
	Rural	**Urban**	**Rural**	**Urban**
High e-maturity	4	5	4	10
Low e-maturity	2	6	2	3

Table 3.2.2: Phase One response rates by school, teacher and learner for each of the research tools

	Primary schools Total sample: 17 P.MAX pupils: 425	**Secondary schools** Total sample: 19 P.MAX pupils: 475	**Total** Total sample: 36 P.MAX pupils: 900
Maturity model for headteachers/ senior members of staff: Appendix C	14 headteachers	16 headteachers	30 headteachers
Headteacher/senior member of staff interview schedule: Appendix D	13 headteachers	14 headteachers	27 headteachers
Interview schedule for ICT co-ordinators: Appendix E	14 co-ordinators	16 co-ordinators	30 co-ordinators
Questionnaire for staff: Appendix F	13 teachers	14 teachers	27 teachers
Questionnaire for pupils: Appendix G	255 pupils 11 schools	324 pupils 14 schools	589 pupils 29 schools

NB: P.MAX = projected maximum of pupils if all schools contribute a class of 25 pupils

Each of the schools agreed access to the headteacher or a senior staff member, to the tutor in charge of ICT and also to one classroom teacher and one class of pupils (Year 5 or Year 8 as appropriate). This provided responses from a maximum of 36 headteachers, ICT tutors and classroom teachers. Pupil responses were more difficult to calculate but a guide of 25 pupils present in the target class at the time of response gives a projected target sample of 425 primary pupils and 475 secondary pupils. Table 3.2.2 shows the response rates at the end of Phase One.

Research instruments and procedure

The audit of key terminology and of contextual data relating to e-maturity and p-learning required detailed responses from key members of each institution's staff, namely the headteacher or member of the senior management team and the tutor responsible for ICT. For this we used an e-survey, the maturity model for headteachers and the ICT co-ordinator questionnaire, followed by a telephone or face-to-face interview with each target individual (Appendices D to F).

The survey to ascertain the extent that policies on e-learning and p-learning are apparent at individual staff and pupil levels was conducted by an online questionnaire (Appendices G and H).

We also requested feedback on all instruments from the relevant staff. This feedback from staff was to focus on language levels and terminology, usability and relevance of the questionnaires.

3.3 Reclassifying the sample

As was anticipated, the DfES (2006b) categorisation of the schools' level of e-maturity does not agree with the data we are collecting from the institutions themselves. Specifically, the DfES criteria result in a large number of e-mature schools and few schools of low maturity. Using the responses to the maturity model and focusing on two submodels, namely, technical maturity and linkage, the data collated so far highlights a small number of highly mature primary and secondary schools and a much larger group of moderately e-mature schools. The extent of the discrepancy and the implications for research sample selection are dealt with in detail in Section 4.2.

A further methodological issue that has emerged as this project has progressed is the change of the DfES's classification of school locality type. The simple urban/rural division was changed in April 2007 to an 11-point classification based on population size and distribution. Based on this new classification, our schools fit into four categories. The implications of this reclassification on sample distribution are discussed in Section 4.2.1.

3.4 Participant response to key terminology

The definition of p-learning which emerged from our consultations and which frames this research (Appendix A1) is the tailoring of pedagogy, curriculum and learning support to meet the needs and aspirations of individual learners, irrespective of ability, culture or social status, in order to nurture the unique talents of every pupil.

Under this definition, personalisation is a desirable state which should be available to all students, giving them a degree of autonomy and ownership of their learning but within the local and national educational framework from which core learning goals emerge.

To what extent did the senior staff within our partner schools ascribe to this definition? Table 4.2.1 presents the senior managers' responses to potential descriptor terms of p-learning (taken from Sebba et al 2006).

The majority of senior managers were aware of the DfES policy of enhancing personalisation and thought that the policy was both educationally worthwhile and achievable within their own institutiions. While most headteachers were working towards embedding personalisation into the fabric of their everyday school activities, as is reflected in the staff questionnaire survey data (Section 4.4), there were differences across institutions as to the meaning, level and, to some extent, the need to foreground this concept.

There was foregrounding of the concept of personalising learning in those schools where senior managers saw the p-learning agenda as a need to provide individualised support for pupils with special educational needs. However, many senior managers saw personalisation as a basic tenet of their educational philosophy that should emerge from good pedagogic practice throughout their school. In such schools, personalisation is seen as process-variable and is not foregrounded in the overt way that other readily measurable variables such as performance outcomes are.

While the DfES believes individualisation of learning is not the same as p-learning, this was one of the most frequently chosen key words by headteachers and other senior mangers (see Table 3.4.1). Furthermore, while the DfES and indeed the expert seminar group saw a link between p-learning and widening range of provision, this was not an integral concept in school senior managers' perceptions of p-learning at both primary and secondary level.

The relationship between the perceptions of what constitutes personalisation of learning and schools' self-assessed levels of e-maturity and p-maturity were examined using hierarchical cluster analysis (using Ward's method). In order to conduct this analysis, the polarity of the two negative descriptors – from Sebba et al (2006): 'Bureaucratic and time-consuming' and 'An ideal – can't be done in real schools' – was reversed to give positive descriptors termed 'Worthwhile' and 'Achievable'. In addition, those descriptors marked by 20 per cent or fewer headteachers (shown in italics in Table 3.4.1) were removed from the analysis. This threshold was set at the breakpoint in continuum of response level and largely excluded those terms generated by individual headteachers and managers.

Table 3.4.1: Headteachers' and senior managers' ranked responses to potential descriptor terms of personalised learning

Level of response	Descriptor
More than 20% of headteachers and managers Highest first Included in further analysis	Worthwhile reversed polarity of Bureaucratic and time-consuming
	Achievable reversed polarity of An ideal – can't be done in real schools
	Every pupil fulfilling his/her potential
	Individualisation
	Every child matters
	Targeting particular pupils (SEN)
	Learners owning their learning
	Pupil choice
	Better target-setting
	Pupil voice – making sure everyone is heard
	Differentiation
	Collaborating – institutions, staff and students
	Flexible curriculum
20% of headteachers and managers or less Highest first Not included in further analysis	Embracing creativity
	Mentoring
	Learning to learn
	Assessment for learning
	A range of provision
	Inclusion
	Developing thinking skills
	New roles for a range of staff
	Pupil autonomy
	Tailored learning
	Sense of management
	Motivation
	Communication

Therefore, the variables inserted in the analysis were overall maturity, e-maturity and p-maturity and the 13 key descriptors of personalisation; 19 Phase One schools contributed to this analysis.

Table 3.4.2 shows that the clusters are partially ordered and distinct. Schools in the mature group (n = 7) showed higher levels of overall maturity, e-maturity and p-maturity in comparison to schools in the less mature group (n = 12). There was no significant difference between these two clusters on 11 out of the 13 personalisation descriptors; the less mature schools, however, were more likely to identify two descriptors – 'Every child matters' and 'Learners owning their learning' – as central to p-learning.

At first sight, this is a perplexing result for the more mature schools who are recording higher self-report scores on operationalising the p-learning agenda are less likely to identify the above descriptors as key although they are very much at the forefront of government policy. Our interpretation of this finding is that the less mature schools have identified the p-learning agenda as important and have aspired to meet it but the more mature groups have passed though this aspirational phase to a stage when they have actioned the p-learning agenda. These schools have no need to engage with the rhetoric of the personalisation debate because personalisation lies at the heart of their activities as is illustrated through the case studies (see Section 4.3).

Table 3.4.2: Levels of maturity and perceptions of p-learning – outcomes of the cluster analysis

		Mature schools	**Less mature schools**	
	Measures	**Mean (s.d.)**	**Mean (s.d.)**	**Significance p value**
From schools' maturity models	Overall maturity	4.029 (0.460)	3.028 (0.2636)	0.000
	e-maturity	4.116 (0.281)	3.073 (0.432)	0.000
	p-maturity	3.833 (0.616)	2.967 (0.445)	0.002
Senior managers' selection of p-learning descriptors	A flexible curriculum	1.714 (0.488)	1.417 (0.513)	n.s 0.233
	Attainable	1.000 (0.000)	1.000 (0.000)	At ceiling
	Better target-setting	1.571 (0.535)	1.417 (0.515)	n.s 0.541
	Worthwhile	1.000 (0.000)	1.000 (0.000)	At ceiling
	Collaborating – institutions, staff and students	1.714 (0.488)	1.750 (0.452)	n.s 0.874
	Differentiation	1.571 (0.535)	1.583 (0.515)	n.s 0.962
	Every child matters	1.857 (0.378)	1.250 (0.452)	0.008
	Every pupil fulfilling his/her potential	1.714 (0.488)	1.3333 (0.492)	n.s 0.121
	Individualisation	1.429 (0.5345)	1.250 (0.452)	n.s 0.448
	Learners owning their learning	1.8571 (0.3780)	1.333 (0.492)	0.27
	Pupil choice	1.174 (0.378)	1.333 (0.492)	n.s 0.121
	Pupil voice – making sure everyone is heard	1.714 (0.488)	1.333 (0.492)	n.s 0.121
	Targeting particular pupils (SEN)	1.714 (0.488)	1.333 (0.492)	n.s 0.121

That so few descriptors contribute to viable clusters should not be of concern. The descriptors ‘Every child matters’ and ‘Learners owning their own learning’ encapsulate many of the key concepts of the personalisation agenda (Table 3.4.3). The focus is very much on the child rather than on methods of operationalising the personalisation agenda.

Table 3.4.3: Key relationships between the core descriptors of p-learning

		Correlation (p)
Every child matters	Learners owning their learning	0.503 (0.024)
Learners owning their learning	Every child matters	0.503 (0.024)
	Pupil choice	0.704 (0.001)
	Targeting particular pupils	0.704 (0.001)
	Pupil voice	0.503 (0.024)
Pupils fulfilling their potential	A flexible curriculum	0.503 (0.024)
	Pupil voice	0.596 (0.006)
Pupil choice	Pupil voice	0.596 (0.006)

3.5 Participant response to the research instruments

A summary of the feedback on each of the research instruments is presented in Table 3.5.1. Feedback was received verbally for the maturity model and ICT interviews. Feedback on the online questionnaires was received through a structured form, which had a lower return rate.

Maturity model and interviews for headteachers

Responses from a clear majority of headteachers to the maturity model tool have been positive. They saw this as a tool that enabled them to reflect on the practices within their school. Several headteachers pointed to the overlap with Becta’s own tool (the self-review framework), an unsurprising observation as they both draw heavily on the maturity model designed for the ICT Test Bed project (Underwood and Dillon 2004). Two headteachers were unhappy with the tool because it placed significant demands upon them in terms of time and effort.

However, given the overwhelming positive response to this instrument, a decision not to change it was taken.

Interview schedule for ICT co-ordinators

The issue raised here by the co-ordinators was one of terminology. As a result, a descriptive paragraph with local exemplars was introduced to help pupils (and also staff) understand problematic terms such as intranet and VLE.

Table 3.5.1: Level and quality of participants' response to the research instruments

Research instrument	Type of research (n)	Description of response
Maturity model for headteachers/senior members of staff: Appendix C	Positive: 27	A useful self-reflective exercise.
	Negative: 2	Too long and cumbersome. Hard to collate all the information.
Headteacher/senior member of staff interview schedule: Appendix D	Positive: 24	Comprehensive checklist.
	Negative: 3	Difficulty over e-portfolio key words.
Interview schedule for ICT co-ordinators: Appendix E	Positive: 29	Covered appropriate material. Good length to complete.
	Negative: 1	Some confusion of terminology based on intranet and VLE.
Questionnaire for staff: Appendix F	Positive: 6	Easy to use. Questions covered range of areas. Online link was easy to follow. Clear instructions and answer scale user-friendly. 'No answer' option was reassuring.
	Negative: 3	Did not cover specific curriculum areas. No questions targeting specific software use. Unsure whether to answer at the individual, subject or school level.
Questionnaire for pupils: Appendix G	Positive: 6	The language was clear and the questions appropriate. Online link was easy to follow. Answer scale was suitable.
	Negative: 3	Too long and repetitive. Some confusing terminology. Questions needed numbering. Repetition of question material. Open-ended questions created some confusion and discussion in class.

Survey instruments

The feedback on the survey instruments shows a 2:1 ratio of positive to negative comments. The reliability of the teacher and learner questionnaires was examined using Cronbach's alpha and proved to be acceptable as was reported in the Phase One report.

Questionnaire for staff

The Phase One feedback on the staff questionnaire was largely positive: it is not seen as a burden on busy teachers and its usability is considered to be high. Changes to this questionnaire for deployment in Phase Two consisted of a small amount of additional data on classes taught that was required for advanced statistical analyses.

Questionnaire for pupils

The feedback to date on the pupil questionnaire is moderately positive. The usability of the questionnaire was deemed to be high, although the request to number questions has been noted and will be acted upon. The content of the questionnaire was not questioned but the length and repetitive nature of some questions was an area of concern. The general level of language was deemed appropriate although some key terminology remains problematic.

Changes to this questionnaire for deployment in Phase Two consisted of numbering questions, the addition of a descriptive paragraph with local exemplars to help pupils (and also staff) understand some problematic terms, and the removal of a question that had proved difficult to interpret by students in general.

4. Impact 2007: Phase Two

4.1 Key goals

The primary focus of Phase Two was that of quantitative and qualitative data collection and analysis including:

- a national survey of e-learning and p-learning using the redesigned tools
- investigating relationships between e-learning, p-learning and school performance measured by learner outcomes through advanced statistical modelling techniques
- developing a rich picture of activity associated with e-learning and p-learning within school through classroom observation.

An additional goal was to:

- finalise a set of robust measurement indicators of e-maturity and p-learning that would facilitate identification of key relationships between e-maturity, p-learning and learner outcomes.

4.2 Quantitative studies

4.2.1 Methodology

Standard online survey techniques using the Phase One instruments were undertaken. To date, we have data from 67 schools (Table 4.2.1).

Table 4.2.1: Distribution of sample schools by level of e-maturity, age phase and location

	Primary		**Secondary**		**Total**
	Rural	**Urban**	**Rural**	**Urban**	
High e-maturity	5 (2/3)	10 (8/2)	6 (6/0)	20 (15/5)	41
Low e-maturity	4 (3/1)	12 (8/4)	4 (3/1)	6 (5/1)	26
Total	9	22	10	26	67

An issue in specifying the sample for this project (raised in Phase One) revolved around the resource-led rating of e-maturity used by the DfES, as compared to the resource and usage measure emerging from the self-assessment by schools using the maturity model technique. There was little or no overlap between the two methods of assessment, suggesting that they are measuring fundamentally different attributes of e-maturity (see Appendix A2 for a more detailed description of this mismatch).

The measure of school locality type used in Phase One of the project was a simple dichotomy of rural versus urban settings. Belatedly, the DfES has revised this classification. The simple urban/rural division was changed in April 2007 to an 11-point classification based on population size and distribution. Our schools fit into four categories under the new classification. These are shown below with the comparison from the old classification.

Table 4.2.2: Measures of rurality

DfES pre-April 2007	DfES post-April 2007
Rural	Hamlet and isolated dwelling - less sparse Village - less sparse
Urban	Town and fringe - less sparse Urban > 10k - less sparse

The question of the value of these two measures of e-maturity and of locality as predictors of performance were a concern but the modelling process showed that the measure of e-maturity emerging from the maturity model process and the DfES's refined rurality measure were useful variables.

4.2.2. Survey findings – Staff

There were 425 responses to the teacher questionnaire, of which eight were removed as they provided incomplete data. Of the 417 usable responses, 57.8 per cent were female and 42.2 per cent were male. There were no measurable differences in the responses of male and female teachers (Table 4.2.3).

Table 4.2.3: Sample teachers by phase and sex

	Primary	Secondary	Total
Male	31	149	180
Female	94	151	245
Total	125	300	425

Teachers reported between 0 and 38 years of service with an average of 11.9 years (median = 9). They also reported on length of service in their current school and this varied between 0 and 35 years with an average of 7.3 years (median = 5). No relationship was observed between teaching experience and any of the other variables.

The sample was made up of 29.7 per cent responses from primary teachers and 70.3 per cent responses from secondary teachers. There were several measurable differences between the two sets of teachers with the largest effects being:

- Primary teachers (mean = 17.4, sd = 2.3) estimated the effect of ICT on learners as being greater ($F = 7.4$, df 1,404, $p = 0.007$) than their secondary counterparts (mean = 16.6, sd = 2.4).
- Primary teachers (mean = 11.9, sd = 2.1) were more positive about the potentialities of ICT in their schools ($F = 66.9$, df 1,395, $p < 0.001$) than their secondary counterparts (mean = 9.8, sd = 2.4).
- Primary teachers (mean = 78.2, sd = 8.3) perceived much more personalising of learning in their schools ($F = 30.2$, df 1,351, $p < 0.001$) than their secondary counterparts (mean = 72.7, sd = 8.7).

A review of the subscales showed that teachers who were positive about the ICT resources in their school were also positive about the impact of ICT on teaching ($r = .49$, $p < 0.001$), the impact on learners ($r = 0.34$, $p < 0.001$) and the outreach of ICT from the school ($r = 0.45$, $p < 0.001$). The resource score also associated strongly with the full personalisation scale ($r = 0.53$, $p < 0.001$). In the teachers' perceptions, it is clear that ICT is strongly associated with personalising learning.

Further analysis of the teacher data is covered in the section on modelling below.

Open-question responses

The open-ended questions on online resources and technology components produced diverse responses. The request to 'identify your three most-valued online resources' attracted 863 responses (from 417 teachers) with the most commonly cited by far being the BBC (24 per cent of all teachers). Other popular choices were general internet resources such as Google (17 per cent) and general content providers such as Espresso (eight per cent), and specific subject sites such as Linguascape (two per cent) and various mathematics sites (six per cent). There was considerable support for teacher sites (12 per cent) such as Teachernet and some school sites were identified such as Woodlands Junior School (three per cent).

The request to identify 'the piece of technology I couldn't do without' attracted 300 responses, of which over two thirds were either 'my laptop' (41 per cent) or 'interactive whiteboard' (29 per cent).

The number of teachers from a school that responded to the questionnaire varied from one to 38 (mean = 7.8) with an understandable bias towards ICT teachers. Future research might seek to collect responses from all teachers in the study schools to gather the full range of responses to ICT and personalising teaching.

4.2.3 Survey findings – Pupils

Primary pupils

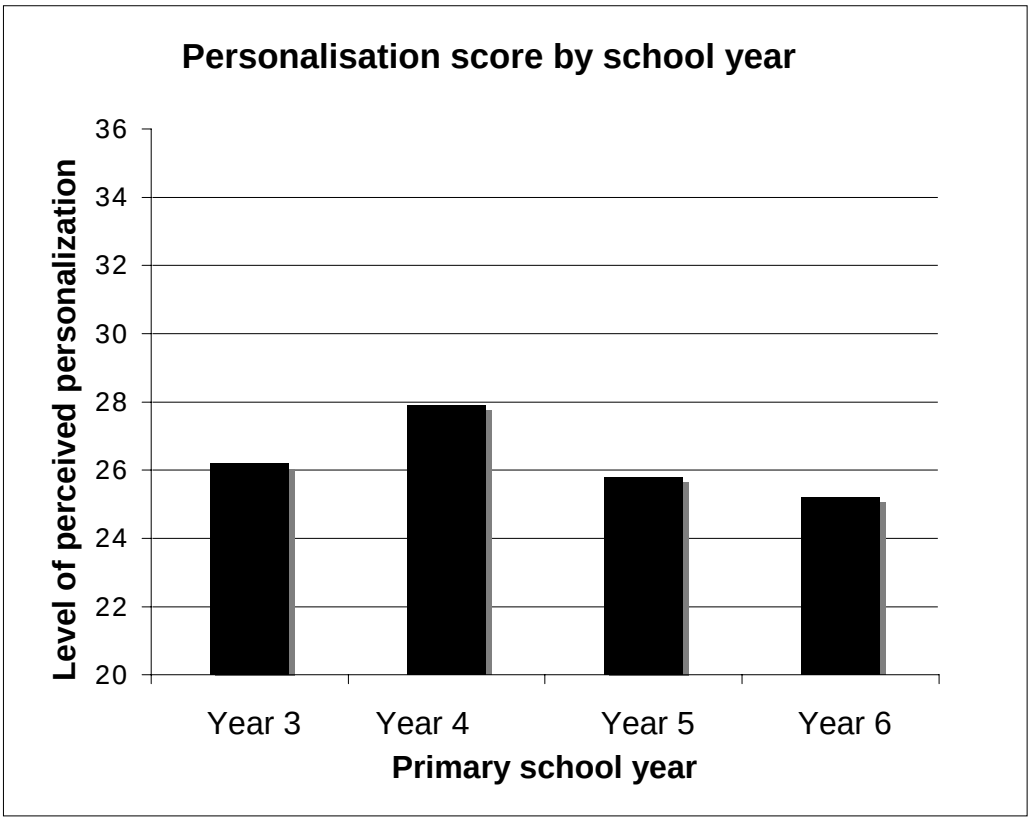
The primary schools within the sample delivered over 1,200 completed or partially completed online forms of which 1,056 were usable entries. There was a roughly even sex split across the sample with 507 girls and 533 boys submitting data. Sixteen pupils failed to record their sex. Although Year 5 was the original target year for sampling, it was not logistically possible to focus on this group only as many schools operated mixed-year classes (Table 4.2.4).

Table 4.2.4: Primary pupils' respondents by school years

School year	Number of pupils providing usable data	Percentage of sample
Year 3	223	21.1
Year 4	216	20.4
Year 5	251	23.7
Year 6	366	34.6
All years	1,056	100

Although perceived personalisation (scale range 0 to 42) reaches a peak in Year 4 (Figure 4.2.1), this peak does not reach statistical significance. Overall, there was a decline in pupils' perceptions of personalisation as they moved through the primary school ($F = 8.9$, df 3,994, $p < .000$). Other scales also show changes over the years but the largest effect is found in personalisation. We speculate whether it is significant that Year 4 is a school year in which national attainment targets are not at the forefront of teachers' and schools' goals.

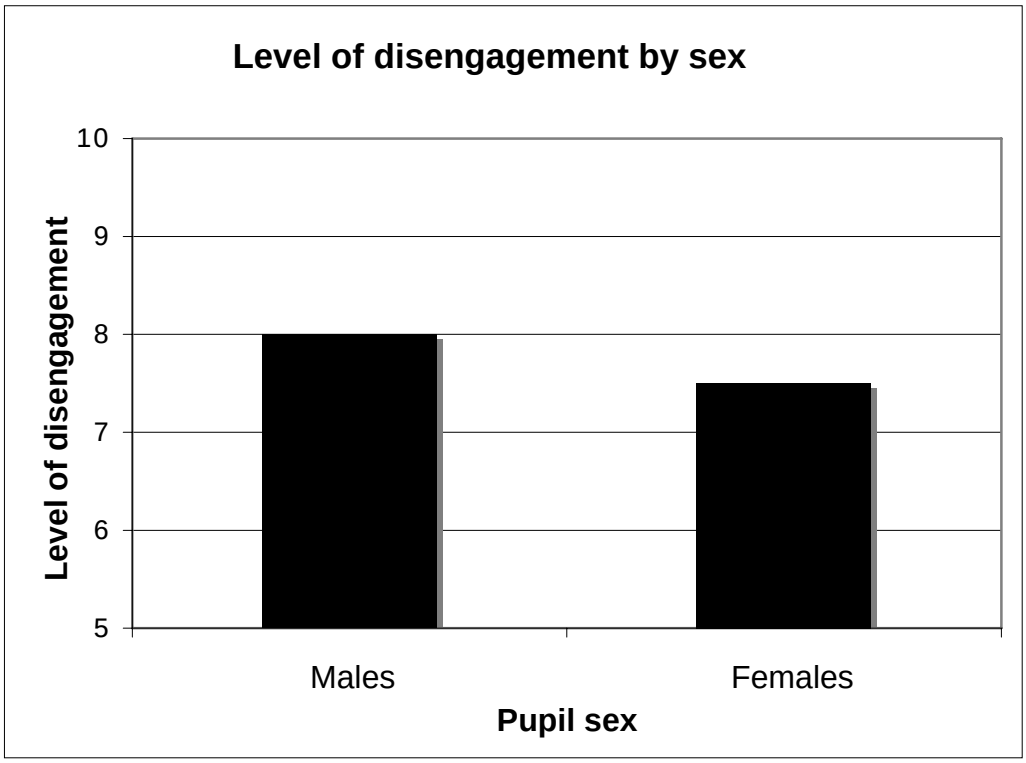
Figure 4.2.1: Pupils' perceptions of the level of personalisation across the primary school years (possible score from 0 to 42)



Examination of the personalisation scale shows that there is a positive relationship in other scale variables including self-efficacy ($r = +0.48$, $p < .001$), value ($r = +0.52$, $p < .001$) and persistence ($r = +0.48$, $p < .001$).

There were no observable sex differences with the one, unsurprising, exception of disengagement. Figure 4.2.2 shows that on a scale between four and 16, boys (mean = 8.0, sd = 2.8) showed more disengagement than girls (mean = 7.5, sd = 2.6) ($F = 8.5$, df 1,998, $p < 0.004$).

Figure 4.2.2: Pupils' self-reported level of disengagement by sex (possible score from 0 to 16)



Secondary pupils

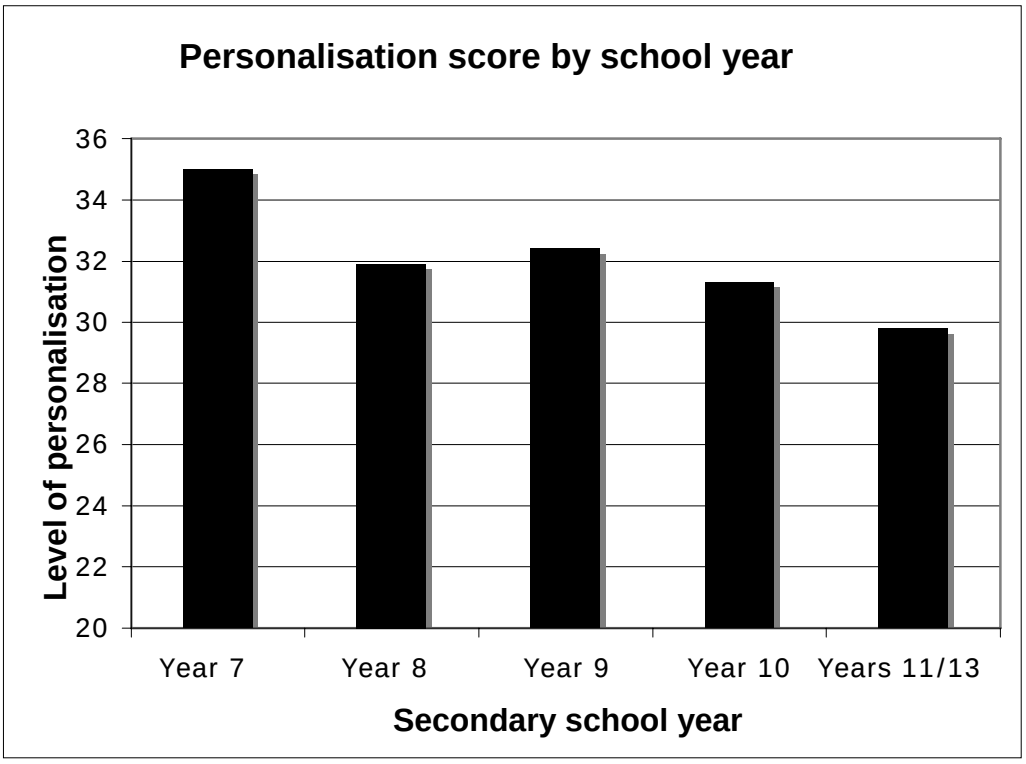
The secondary schools within the sample delivered over 1,900 completed or partially completed online forms, of which 1,822 were usable entries. There was a roughly even sex split across the sample with 887 females and 880 males submitting data. Fifty-five pupils failed to record their sex. Years 8 and 10 had been the target years for this survey but a wider range of pupils completed the questionnaires and there was a sufficient spread of pupils contributing across the compulsory secondary years for further analyses (Table 4.2.5).

Table 4.2.5: Secondary pupils' respondents by school years

School year	Number of pupils providing usable data	Percentage of sample
Year 7	226	12.4
Year 8	748	41.1
Year 9	272	14.9
Year 10	509	27.9
Years 11 to 13	67	3.8
All years	1,822	100

In a repeat of the findings from the primary data, we observed a change in personalisation scores with school year (Figure 4.2.3). The scale is between 15 and 60 and the data shows that perceived personalisation declines over time in school time ($F = 3.4$, df 6,416, $p < 0.002$). Other scales also show changes over the years but the largest effect is found in personalisation.

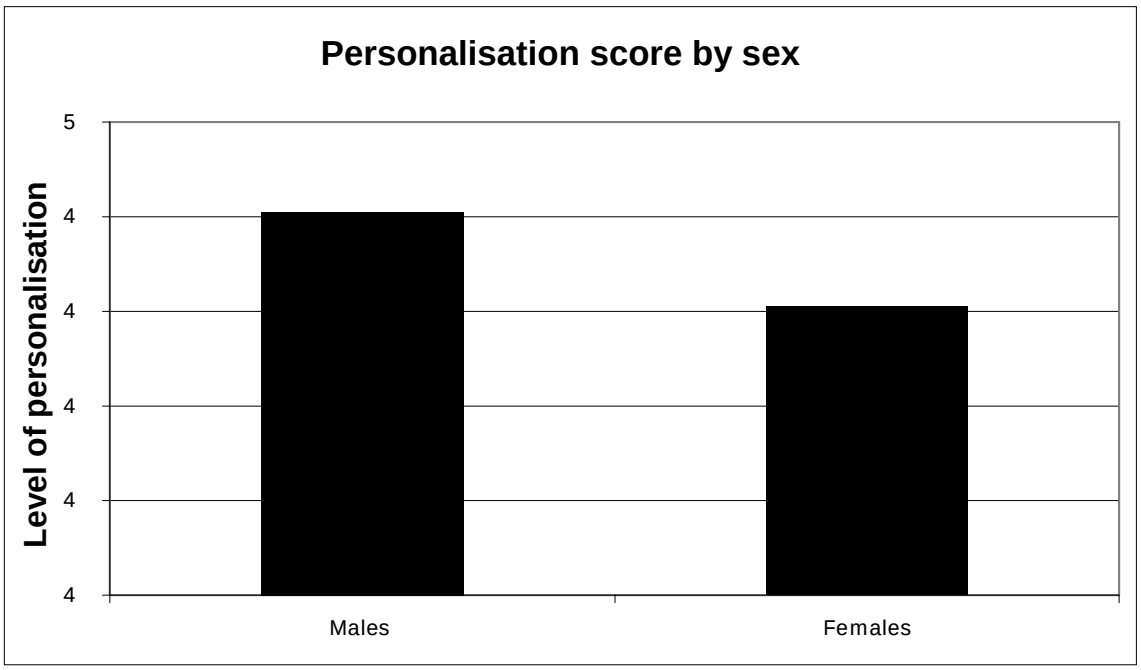
Figure 4.2.3: Pupils' perceptions of the level of personalisation across the secondary school years (possible score from 0 to 45)



Examination of the personalisation scale shows that it is related to other scale variables including self-efficacy ($r = +0.43$, $p < .001$) and use ($r = +0.35$, $p < .000$).

There were observable sex differences in pupil responses to a number of variables. Figure 4.2.4 shows that boys (mean = 48.1, sd = 10.5) perceive more personalisation of their learning experience than girls (mean = 46.1, sd = 10.1) ($F = 14.0$, df 1,1387, $p < 0.001$).

Figure 4.2.4: Pupils' perceptions of the level of personalisation by sex (possible score from 15 to 60)



There were also differences in other measured variables with female pupils reporting lower self-efficacy (mean = 15.3, sd = 3.0) ($F = 13.0$, df 1,1459, $p < .001$) and less positive attitudes to ICT (mean = 12.0, sd = 2.2) ($F = 32.0$, df 1,1608, $p < .001$) than their male peers (mean = 15.8, sd = 2.9; mean = 12.5, sd = 2.1).

The higher proportion of male disengaged pupils found at primary level was not apparent in these secondary schools.

The high degree of correlation between subscale scores for the pupil data suggested that factor analysis should be undertaken to identify relationships among the variables to see if these observed variables could be explained in terms of a much smaller number of variables, that is, factors.

Factor analysis of the primary pupil survey responses to 10 key variables produced three factors with eigenvalues greater than one and these explained 56.07 per cent of the variance. However, interpretation of Factor 3 was difficult as there were no strong components here. A second analysis removing attitudes to and level of use of computers was conducted which produced a two-factor solution with stronger loading values. This two-factor solution explains 55.10 per cent of the variance and produced two clear factors (Table 4.2.5). These two factors were 'Individual's work ethos and work practice' and 'Investment in learning' – the former encompasses positive personal attributes and modes of working within the learning environment; the latter captures the individual students' willingness to engage with the learning process or not. Here, disengagement is inversely related to positive goal-setting.

These solutions present a virtuous set of learner characteristics in which self-efficacy of the learner is related to persistence, goal-setting, perception of personalisation and overall appreciation of the value of education which are at odds with the pupil who is disengaged or is not engaged in effortful educational activities.

Table 4.2.5: Primary pupil data two-factor solution with eight variables

	Factor	
	1	2
Support and assistance at school	0.582	-0.135
Modes of working	0.492	0.213
Personalisation	0.711	0.082
Self-efficacy	0.549	-0.289
Personalised challenge	0.622	-0.046
Value	0.604	-0.318
Persistence	0.532	-0.309
Disengagement	0.028	0.559
Learning goals	0.140	-0.559

Factor analysis, with the secondary pupil survey responses to ten key variables, produced three factors with eigenvalues greater than one and these explained 59.58 per cent of the variance. Factor 2, termed ‘Investment in learning’, mirrors the findings from the primary pupil data and shows those pupils with high levels of disengagement lack engagement with their educational tasks. The single Factor 1, ‘Individual’s work ethos and work practice’, which emerged from the primary data, becomes two discrete factors for the secondary data. Factor 1 captures the work practice of each child and there is then a third factor, ‘Individual’s work ethos’ (see Table 4.2.6).

Table 4.2.6: Secondary pupil data three-factor solution with 10 variables

	Factor		
	1	2	3
Attitudes towards computers	0.277	-0.135	0.053
Computer use	0.474	-0.083	-0.092
Support and assistance at school	0.657	0.014	0.094
Modes of working	0.579	0.149	0.046
Personalisation	0.777	0.011	0.065
Self-efficacy	0.044	-0.107	0.663
Personalised challenge	0.406	0.111	0.382
Value	-0.052	-0.041	0.833
Persistence	0.069	-0.110	0.628
Disengagement	-0.038	0.561	-0.027
Learning goals	-0.028	-0.577	0.183

The two factors emerging from the data, ‘Individual’s work ethos’ and ‘Investment in learning’, are used to collapse across highly correlated data within the multilevel modelling. All other scales have been kept as discrete variables.

4.2.4. Multilevel modelling

The nature of the data meant that regression analyses were used for school level.

When the perceived personalised learning scores of teachers and learners were compared at a school level, there were no observed relationships between the perceptions of teachers and learners in the same school. This was confirmed by the multilevel modelling. Although this appears to be an interesting discrepancy, it is important to note that we are dealing with average scores from teachers and learners at a school level and the respondents to the two questionnaires might well have no contact with each other.

Focus on schools

An investigation of teacher perceptions of the personalising of learning in their schools revealed the following relationships.

School performance showed a different relationship with personalisation in primary and secondary schools. In the responses of primary teachers, Key Stage 2 performance showed a positive relationship with perceived personalisation; in the responses of secondary teachers, higher GCSE scores were associated with lower ratings of perceived personalisation.

Different subject specialisms reported different levels of personalised learning. In particular, mathematics teachers reported lower perceived personalisation than other teachers and staff with an assessment or management role report higher perceived personalisation than other staff.

An overall measure of perceived effectiveness of school ICT resources was strongly associated with increased perceived personalisation.

Preliminary findings of the school-level data suggest two interesting and surprising effects (see Appendix I for the full list of measures).

The first of these was that e-maturity shows a clear relationship to measures of school performances such as Key Stage 3 mathematics ($r = +0.45$, $p < .000$), Key Stage 3 science ($r = +0.40$, $p < .000$) and GCSE level 1 ($r = +0.46$, $p < .000$). School performance shows a complex relationship with personalisation, with Key Stage 2 performance showing a positive relationship with perceived personalisation; at Key Stage 3 and GCSE the reverse was true, with higher GCSE scores associated with lower ratings of perceived personalisation.

More surprising is the strong negative relationship between average scores of pupils' perceptions of personalisation and performance, for example, Key Stage 3 English ($r = -0.46$, $p < .000$), Key Stage 3 mathematics ($r = -0.45$, $p < .000$), Key Stage 3 science ($r = -0.51$, $p < .000$), GCSE level 2 including mathematics and English ($r = -0.56$, $p < .000$) and GCSE level 1 ($r = -0.51$, $p < .000$). This negative association at Key Stage 3 also applies to value-added scores ($r = -0.406$, $p < 0.05$).

At the school level there is a relationship between average personalisation scores and average learner self-efficacy scores ($r = +0.49$, $p < .000$).

Focus on pupils

A series of multilevel models were generated to explore the interrelationships within the data. (The basis of this technique is outlined in Appendix J.)

A consistent finding across the models generated was that most of the random variation appears to be at the learner level with little or no variation at year or school level. This suggests that further research at the individual learner level should be undertaken. All models presented below show significant differences and the summary statistical tables are presented in Appendix K.

Primary pupils

The learners' overall experiences of personalisation of their learning were predicted by a range of measures. The model showed that higher levels of pupil work ethos were associated with greater personalisation. Technology was also a significant associate: those pupils with a greater opportunity to use ICT and also with more positive attitudes towards computers recorded a more personalised learning experience. Pupils who are positive towards learning and able to support the benefits of technology also recognise the opportunities for personalising their learning. However, schools in towns and urban fringes, that is, suburbia, were associated with lower personalisation levels from pupils' perspectives as were schools recording greater school maturity. These negative associations at first sight appear puzzling but might be a result of higher expectations of pupils from suburbia.

The learners' investment in learning was associated with higher levels of pupil work ethos. The pattern of this relationship is not simple because of systematic individual differences between learners. The average effect of ethos on investment in learning is relatively large and positive, which suggests that it is even larger for some learners and smaller for others – with a negligible or negative effect for very few. The effects of work ethos are higher for learners with low investment in learning. In addition, greater school-level e-maturity is associated with increased investment in learning.

There were negative associations with learners' investment in their own learning. These included gender, with male learners (on average) having lower investment in learning than female learners. Furthermore, investment in learning was lower in schools with a high proportion of statemented children. Neither of these findings is unexpected. A third association, however, that greater choice in modes of learning was negatively correlated with learners' investment in their own learning, was not predicted. This latter finding might be a simple correlation of poorly motivated learners liking the predictability of a set way of working compared to more motivated pupils feeling comfortable with, and wanting to take, the risk of novel ways of working. The driver for this finding may not be pupil preference, however, it could equally be the outcome of a pedagogic decision by the teacher. In this case, the teacher, acting as a gatekeeper to modes of working, might select less innovative ways of teaching children seen as more difficult. In addition, investment in learning

decreases from Years 3 to 6. Neither of the first two of these associations is surprising and, in the case of statemented pupils, it reflects the complex downward spiral that many such children are on as they seek to get by within the educational system. The decline in learners' investment over the primary phase is worrying and suggests that problems that were once associated with secondary schools are now occurring within primary schools.

Secondary pupils

As for primary pupils the learners' overall experiences of personalisation was associated with higher levels of pupil work ethos and greater opportunities to use ICT. The positive effects of ICT use are higher for learners who record lower levels of personalisation. We speculate that this is more able or motivated pupils taking full advantage of the technology. Schools' self-reported p-maturity was positively associated with greater learner personalisation.

This model provides some level of evidence that personalising learning will have benefits. Schools with higher than average Key Stage 3 point scores tended not to be seen as highly personalising by pupils. Furthermore, levels of pupil-reported personalisation decreased (on average) from Years 7 to 10.

The learners' investment in learning was associated with higher levels of pupil work ethos. As for primary pupils, the pattern of this relationship is not simple because of systematic individual differences between learners. The fixed effect of pupil work ethos on investment in learning is relatively large and positive. This suggests that it is even larger for some learners and smaller for others, with a negligible or negative effect for very few. A positive but weak association of e-maturity with higher investment in learning was recorded. Again, this was tempered by individual differences, having a positive or negligible effect for most learners and negative only for a relatively few.

The importance of the pupil's investment in his or her own learning is borne out by the association of higher school GCSE exam scores (including mathematics and English) with increased investment in learning by learners.

Once more, greater choice in mode of learning was marginally associated with decreased investment in learning.

In summary

- Teachers commonly cite generic tools (such as the interactive whiteboard and laptop) and technology as core to their mode of working.
- Teachers associate the use of ICT with features of personalisation in their schools.
- Primary teachers are more positive than secondary teachers about personalisation and the value of ICT on learner outcomes.
- Technology enhances the learners' overall experiences of personalisation, particularly for those pupils who have low perception of personalisation. This is a prominent finding for secondary pupils. In primary schools, the relationship to attitudes and use of technology and personalisation is weaker.
- First-level analyses indicate a relationship between e-maturity of the school and school performance at Key Stage 3, but further analyses show that there are other mitigating factors such as school intake that influence this relationship.
- Better-performing schools at Key Stage 3 tend not to be perceived as having a strong personalising agenda by pupils. It might be argued that assessment-driven teaching restricts personalised learning or, at least, the pupils' perceptions that this is taking place. Equally, schools with lower performance levels may be using a more personalised approach to re-engage their pupils.
- In contrast to the learner response, Key Stage 3 performance is associated with personalisation by teachers.
- Pupils on the margin, that is, those not engaging with the educational process, find choice in modes of working difficult rather than liberating.
- At primary school level, boys are more likely to be disengaged than girls; secondary pupils show no difference between the sexes on disengagement, although girls have lower self-efficacy and are less responsive to technology.
- The findings above emphasise strong individual learner differences as opposed to school differences within the data. Pupils respond to many aspects of educational support in a variety of ways. For whom is choice a good thing and whom does it overload? When and for whom does technology have most effect? The questions raised by the findings here make the need for pupil-level analysis incontrovertible.

4.3 Case studies

4.3.1 Methodology

Much of the data collected by survey and from national and regional bodies has been analysed using multilevel modelling. However, the in-depth case studies, using both quantitative and qualitative analyses, provide detailed representations of selected students' experiences of working through an environment that is personalised and e-supported. These field evaluations provide a rich picture of the interplay of variables that lead to successful take-up of the personalised learning agenda.

Twenty-four schools contributed to the case studies. Researchers conducting school visits collected two classroom observations and interviews with participating teachers in each school. It is the data from these visits that is presented here (see Appendix H). The distribution of selected schools using DfES classificatory criteria is shown in Table 4.3.1.

Table 4.3.1a: Distribution of case study schools by level of e-maturity, age phase and location

	Primary		**Secondary**	
	Rural	**Urban**	**Rural**	**Urban**
High e-maturity	3	5	4	5
Low e-maturity	2	3	1	1

Table 4.3.1b: Applying the new measure of rurality

	Primary				**Secondary**			
	Hamlet	**Village**	**Town**	**Urban**	**Hamlet**	**Village**	**Town**	**Urban**
High e-maturity	1	1	1	4	0	0	4	5
Low e-maturity	0	0	2	4	0	0	1	1

In partial response to the Gilbert Review of Teaching and Learning in 2020, Becta has identified four areas of interest relating to the impact of p-learning on the future of education in England.

They are:

1 Fit-for-purpose technology and systems.
2 Capability and capacity of the workforce, providers and learners.
3 Outcomes and benefits for learners and children.
4 Efficiency, effectiveness and value for money across the system.

These areas of interest form a partial framework for the case studies undertaken under Impact 2007.

4.3.2 Findings

Fit-for-purpose technology and systems

E-maturity and the distribution of VLEs

The availability of a VLE within a school presents opportunities to personalise learning which are not always available in less well-endowed schools. These case studies show that home access to files and emails are provided by the VLE portals. However, the lack of a VLE does not preclude a school personalising learning. In the Impact 2007 sample, one low e-mature primary school is supporting home-school links through email facilities provided by the local authority.

Table 4.3.2: Distribution of case study schools by DfES level of e-maturity, age phase, location and VLE status

	Primary				**Secondary**			
	Rural		**Urban**		**Rural**		**Urban**	
	VLE	No VLE	VLE	No VLE	VLE	No VLE	VLE	No VLE
High e-maturity	2	1	3	2	3	1	5	0
Low e-maturity	0	2	1	2	0	1	1	0

Of the 24 case study schools, 63 per cent have a working VLE (Table 4.3.2.1). The vast majority of these schools are defined as e-mature by the DfES but 13 per cent of VLEs are in schools classified as being of low e-maturity and 26 per cent of e-mature schools do not have a functioning VLE.

The data shows that rural schools are less well resourced: 50 per cent have no VLE compared to 36 per cent in urban areas. While all secondary urban schools have a VLE, some primary schools still do not. In addition, the one urban primary school with a VLE providing home access points out that only 30 per cent of homes in its area have internet access, which is limiting the support it can provide for pupils.

While it might be anticipated that the local authority would be the main VLE provider, the case study schools did not adhere to this pattern. The local authority is a key provider at primary school level and within rural areas, but all of the urban secondary schools were either building in-house or seeking a commercial provider. In addition, all four primary schools currently using the VLE system provided by the local authority reported that they were not fully satisfied with the service and were seeking alternative VLEs.

It should be noted that the commercial provider being considered by one of these primary schools has been cited as unhelpful and unsupportive by another of the case study schools. This is not an isolated case. The following case study exemplifies the problem within a technically advanced secondary school.

Case study 1: Secondary – Dissatisfaction with the VLE

There was evidence of personalised learning in all the observations undertaken to varying degrees. The school has a VLE (Digital Brain) set up and have actively promoted it across the school. Using the VLE teachers are able to allocate worksheets, etc, to students personally, which means that they can target SEN and differentiate learning. However, teachers are not entirely happy with the present VLE and are considering moving to Moodle.

Case study 2: Secondary – Dissatisfaction with the VLE

The local authority supports Digital Brain as its VLE platform, but the school does not like it. The school has purchased Espresso and uses this as its VLE, but is still looking for alternatives.

Alongside the confusion that persists as to what constitutes a VLE (Case study 2), there is a very real issue here concerning the failure of some VLEs to be effective in the eyes of the school. The dissatisfaction with a current provider – whether a local authority or a commercial organisation – can be based on general failings to deliver an effective system, but equally it could be that the expectations of what such systems can provide is too high. Becta is well placed to resolve this issue by identifying both client needs and system realities.

Case study 3: Secondary – Creating a VLE

This school has been instrumental in setting up a consortium with some other local schools to develop content jointly for their VLEs. They are using Moodle. This sharing of content is in recognition of how time-consuming it can be to develop content.

Schools are joining together to share skills and knowledge with the aim of developing an effective tool while reducing some of the workload problems that accompany any innovation, particularly those that are technology-driven.

Every child matters…

One school gave an excellent example of how personalisation is not just about learning targets and learning styles but is also about making each pupil feel valued.

Case study 4: Years 1 to 6 – Valuing the individual

A rural primary school has a regular activity to recognise the individuality of each child. The observation took place on a Wednesday which is the day each week that a child is selected from each class to have a 'special day'. Those selected go to the staff room where the school caretaker gives them a drink and some cheery banter and they get to sit in the staff chairs. Meanwhile their classmates prepare a certificate that says why they are special. This activity made the children feel valued as individuals. This is surely a key component of personalisation?

…but some matter more than others

Another school provides an example of how a selective application of the personalising agenda can improve their standing in national league tables by setting targets and providing mentors for 'at risk' pupils.

Case study 5: Year 11 – Boosting results by setting individual targets

The school is focused on the target of five GCSEs for pupils and at the start of the year it identifies two groups of pupils: the hot list is a group of pupils who are currently performing below the target but might be able to be encouraged to improve; and the hit list is a group of pupils currently performing at the target level now but are at risk of slipping below it. The teachers identified what the issues were for each individual pupil and made suggestions on how to address these issues. Each child has a mentor to help them make progress. At present, the pupils are not involved in the individual target-setting but this might form part of future programmes.

Effective support requires the identification of individual strengths and weaknesses of the learner but those chosen to receive such support can prove to be divisive. Policy-makers should reflect on the negative consequences of policies designed to improve education for all.

Supporting the independent learner

A consequence of fostering independent learning is a shift in both the role and locus of control within a classroom. While the research literature suggests that this can be threatening to both teacher and learner (for example, see Marcinkiewicz 1993; Oppenheimer 2003; Selwyn 2006), it can also inspire both groups. In Case study 2, the teacher had embraced the role of facilitator allowing productive interaction between students. While Case studies 3 and 4 also show positive support for personalisation, the former raises the issue of compatibility of home and school resources and the limitations this places on the activities of the learner.

Case study 6: Year 6 – Using Espresso for peer collaboration

The goal of this history lesson for Year 6 mixed-ability children was to produce an electronic resource using Espresso The teacher opened the chat box facility which allowed communication within peer-to-peer communication without the need for children to move around the classroom, which can be a disruptive act even when children are focused on the educational goal. The teacher encouraged students to use each other as sounding-boards for ideas and as sources of information and evaluation. This was a valued resource as it promoted independent learning.

Case study 7: Year 11 – GCSE design

There was a strong autonomy over student learning. The brief was to design and produce a 3D replica of a product. There was a lot of use of ICT within their portfolios such as evidence of Google searches on previous product designs, the use of digital photos, the use of specialist software such as CAD, and the use of Excel spreadsheets to monitor their own performance. All of this was saved onto their own personal server space that was accessible from home. However, everything stored electronically was produced as hard copies and presented within each student's portfolio. There was strong sense of 'anytime, anyplace, anywhere learning', in that students not only worked within the class but also worked on projects at home in order to do research and create models. A limitation on this freedom was the non-availability of the specialist CAD software in the home.

Case study 8: Year 10 – Mathematics

Evidence of a wider use of ICT to support learning in class was observed in this case study. The pupils were encouraged to understand and reflect on their own learning styles via reflection within small collaborative groups (two to three). Pupils actively used different websites to aid their learning and used other activities (available on the VLE) to look for different examples of 3D shapes that were not initially shown to children at the start of the session. Therefore, there was a wider use of ICT to support the objectives set out initially by the teacher at the start of the session, showing autonomy on behalf of the learner.

The shift to a more equal learner teacher partnership exhibited in these case studies is encouraging.

Personalisation of learning by setting individual targets

Having access to information about individual learner progress, in particular on learners' reflection on their own progress, aids a teacher in setting individual targets.

Case study 9: Secondary – Quality information can change behaviour

This secondary school identified a deficit in the reports it was producing for pupils. It describes the initiative to deal with this as 'now and next' – identifying what level the student is at now and what they need to do next to move on. The ICT and systems manager was asked to develop an online self-assessment facility. From this work, an independent company was created with the systems manager as one director and a programmer as another. The pupils are believed to enjoy using the system because of the instant feedback coupled with details on what they need to do next.

JAS gives pupils access to a list of competency statements set at a number of levels that the pupils can review and endorse. When they have reviewed their performance, the system generates a report summarising where they are now what they need to do next. On one level it resembles an individual maturity model and the same system could be used to deliver an institutional e-maturity model. The pupil's review can be viewed by the teacher who is able to amend any response they do not agree with. The levels of responses are colour-coded to make them easy to see (green – not endorsed, blue – endorsed, red – changed by the teacher). JAS has a number of other facilities including simple quizzes and tests, which can be reviewed by the teacher at an individual and class level.

There is no substitute for quality information and that information is best shared between teacher, pupil and also parents.

Capability and capacity of the workforce, providers and learners

Making the best use of resources to support the personalising of learning

One striking observation concerned the entrepreneurial activities of teachers and schools in developing innovative strategies and new facilities. The personalising learning agenda has the potential to energise innovation by encouraging schools and individual teachers to develop new ways of working. For example, schools can enter into arrangements with publishers to develop teaching materials.

Case study 10: Year 10 – Latin lesson

This school has worked closely with a publisher to develop a suite of programmes to assist with learning Latin (such as spelling, vocabulary and comprehension exercises), linked to the texts used. These programmes can be used by the teacher as the focus of the lesson, or can be accessed by the students for revision or independent learning.

Another school actively encourages entrepreneurial activities in its pupils through a project to buy, grow and then sell seeds.

Case study 11: Year 8 – ICT lesson

The teacher in this rural middle school devised two tasks, which the learners could alternate between throughout the session. One was to develop routines for greenhouse control using FLOWOL software and a greenhouse simulation as part of their project running a business to buy seed and cultivate and sell plants. The second activity was the development of business literature – cards, flyers, websites and animated adverts to promote their business. This allows a wide use of ICT and an element of learner choice in tasks.

It is clear, however, that resources are not enough in themselves, though they can give the illusion of personalising learning. The observers saw several lessons where they struggled to identify anything from the personalising learning agenda even though ICT resources were being used.

The link between e-maturity and p-learning

While p-learning is undoubtedly facilitated by the availability of ICT tools, good practice is not confined to those schools that are e-mature as the following example shows.

Case study 12: Years 1 and 2 – Self-monitoring without ICT

Years 1 and 2 have a ‘target tree’ on the wall with each child’s name on a leaf shape with an individual target for them. The targets are changed as soon as they have been reached. In Years 3 and 4, wall target sheets were laminated so that the children could tick off when they had reached a target. This was really useful for

showing progression and also projected targets. The children of all ages showed great pride in achieving any personal target and were enthusiastic to have the next goal laid out before them.

However, many schools are directly using ICT tools to support p-learning. The following two case studies are from primary schools readily engaging with their VLEs.

Case study 13: Years 1 to 6 – VLE 1

The assessment system used in the school (the-educator.co.uk) is an online resource bought by the school. This is a valuable resource which allows teachers to mark at what stage the children are at in each subject. This can then be used to chart their progress and the programme sets realistic targets for the children in each subject. The teacher is able to view these targets and look at whether they feel that they are acceptable for that child. This software is then used to produce personalised targets for each child. Based on the findings of these predictions the children are given differing work dependent on their needs. This work is sent directly to the VLE.

Case study 14: Year 6 – VLE 2

Through the Birmingham Grid for Learning (BGfL), all students have their own individual log-on and passwords. At the start of Year 6 they are given their own email addresses for the school and they are encouraged to use email to send home homework activities and to allow teachers to email homework activities directly to the pupil (and receive homework back from the pupil efficiently and effectively). Despite needing regular monitoring of email content, this enables direct means of communication and provides evidence of personalising learning.

These primary schools are using their VLE systems efficiently to ensure that children are able to receive their homework and have a way of communicating with the school.

Into the home

The case studies show a number of ways in which home-school links have been forged and in doing so have supported the individual learner. Some 60 per cent (n = 15) of e-mature schools are contacting parents using email or the VLE and 40 per cent (n = 15) allow parents to look at pupil records via the VLE. While schools classified under the DfES criteria as being of low e-maturity may also contact parents through e-methods, none of the schools in this sample allow parents access to pupil records. The division here is between pushing information out to parents and more advanced systems which allow parents to pull down information they deem relevant to their child.

However, as Case study 16 shows, there remains a small but persistent cohort of pupils who have limited or no access to e-resources in the home. Developing ways of providing for these disenfranchised learners remains a concern for policy-makers.

Case study 15: Years 1 to 6 – Linking the school and the community

This inner-city primary school with a large ethnic intake has opted to forge strong links with the home. The local authority has provided funds to support the home study initiative (linked into the 90 computers at home) where parents are invited into the school to be trained in ICT skills. There is also an emphasis on children training parents and relatives in ICT, such as creating emails and using Word, Excel and internet search engines.

Case study 16: Years 1 to 6 – The 'have-nots' in a world of riches

This technologically advanced primary school has an in-house VLE system called Home School Learning (HSL). This is fully accessible from home and contains details of all of the children's classwork as well as homework assignments. This is very popular with the majority of parents who can keep track of their child's progress. However, some parents feel that this level of accessibility puts undue pressure on the children to work at home.

As identified elsewhere (Underwood and Dillon 2006), the thorny issue of the lack of home internet access for some 20 per cent of pupils remains and is being addressed largely through after-school access time for these pupils.

Nonetheless, there can be some difficulties with extending learning outside the school and into the home.

Case study 17: Year 8 – Inadequate levels of resource

In this school, students can transfer files home via Moodle (the school's VLE system with 24-hour access) – but this does not happen due to software licensing constraints (compare with Case study 3). There are also network problems. Students have very limited e-storage space but are using memory-hungry packages such as Photoshop. This restriction further limits ongoing learning.

While the benefits of developing classrooms without walls are obvious, care must be taken not to overburden learners – who, like their parents, need quality downtime – and also to support the technology-poor home.

Outcomes and benefits for learners and children

Pupil choice and voice

P-learning is most evident when the pupils have both a choice in setting their learning agenda and when their voice is heard and valued, as in this next example.

Case study 18: Mixed primary – French lesson

A class of pupils from Years 4, 5 and 6 worked in pairs to produce a podcast in French using laptops on a wireless network, desktops, microphones and speakers. The task was set by the teacher but the pupils decided on the content. The pupils were encouraged to listen to each other's podcasts and comment on them. Some of the older/more able pupils had the role of helping younger/less able pupils with the technicalities of recording and saving the podcasts. They were reminded that there role was to 'show and help, not to do'.

In many cases, however, choice is confined to content rather than goal-setting.

Case study 19: Years 5 and 6 – Producing a school newsletter

A club is run after school and pupils produce the school newsletter, which contains news, jokes, competitions, advertisements, etc. Pupils decide on content and discuss this with the editor (headteacher). Pupils then produce content using various generic tools. The editorial assistant (a boy from Year 6) collects the articles and converts them into Publisher files before checking them with the editor.

Case study 20: Year 6 – History lesson

The teacher started this lesson, part of a project on the Fire of London, by recapping and setting pupils the task of finding interesting facts about the fire and London at that period in history and sourcing pictures to illustrate their project. The pupils had a free choice of what they presented in their projects under the general theme but the goals were clearly set by the teachers.

Allowing a choice of content within the lesson should be seen as a first and not a final step in the personalisation of learning.

Going beyond the National Curriculum

There was clear evidence from the case studies of schools extending or indeed working outside of the National Curriculum.

Case study 21: Years 11 and 12 – In the media centre

The school has a radio station that has been running for 21 years which provides entertainment at lunchtimes. The school also makes a weekly television programme. In this lesson, Year 12 students are producing their radio dramas while Year 11 are focusing on short-film production. Each July the school has a commercial FM licence with internet rights, which provides students with the opportunity to interact with an audience outside the school. This allows parents to hear the media work throughout the year. The school also receives funding from local companies in order to create adverts for them.

Schools able to show such enterprise are exceptional but not unique. We have documented similar initiatives in both the ICT Test Bed and Broadband evaluations (Somekh et al 2004; Underwood et al 2003). It is the schools that respond to the flexibility of the National Curriculum in more modest ways that provide role models for the majority of schools.

Case study 22: Years 1 to 6 – Personalisation and the literacy agenda

The use of software packages such as Renaissance (for literacy) and Education City (for numeracy) has allowed a more personalised and individualised approach to learning than that currently encapsulated in the Literacy and Numeracy Hours. These packages give pupils appropriate responsibility for their own learning, encouraging them to monitor their own individual performance and helping to foster a sense of autonomy on an individual child basis rather than as a class. Immediate feedback on their performance makes this personalised in a manageable way. Teachers can also pull this information to track the progress of individual children. This works well for individuals that might be performing at very different levels. The school also operates SPOT (special pupil interest time) – one hour a week with no teacher direction when pupils search on individual topics they find interesting and use as they feel fit. The ethos is therefore on individual learning rather than teacher-directed learning. This normally occurs in the ICT learning suite (equipped with 35 computers networked to the server).

The allocation of children to classes in schools can create groups who are less focused on SATs and therefore able to work beyond the National Curriculum.

Case study 23: Years 4 and 5 – Between SATs

The unusual mix of Years 4 and 5 in this rural primary school has provided an opportunity to be bolder with the curriculum. In this class the teacher has chosen to design her lessons using the ‘mantle of the expert’. This is a particular style of teaching where pupils and teacher use drama and role play to learn together. The focus of the observed lesson was a charity endeavouring to save orangutans in Borneo led by Anna (played by the teacher) with the children acting as scientists and volunteers.

In the previous lesson it had been discovered that the charity was in financial difficulties so needed to develop some fundraising activities. Groups of children, working mainly in pairs, approached this issue in a wide variety of ways. These tasks allowed for a wide range of ICT skills to be employed. The range of activities included:

- writing letters to the Prime Minister asking for money to support the work
- making badges (using ICT paint programmes)
- writing news reports
- preparing a leaflet about the work of the project
- adding information about individual orang-utans to a database on the teacher's laptop
- making money boxes from an ICT-designed template.

Unconventional combinations of year groups can work together effectively producing ICT-rich projects, involving thought and care.

New learning outcomes: The challenge for the curriculum

ICT facilitates new ways of working and new ways of presenting work, providing students with an opportunity to create work that looks good in their eyes. There is an issue if this opportunity to personalise learning is not assessed as student and formal educational goals diverge. The question here is not whether we should value these pupil-set goals but rather to what extent they should form part of the formal assessment of pupils. This is a key question for the regulatory bodies.

Case study 24: Year 7 – The drive to design

A top set science lesson on the solar system had pupils producing a document on the planets. This was a continuation of a project started in a previous lesson. The task was to produce a Word document but some pupils had agreed with the teacher to present their work in PowerPoint. They used a variety of sources, the most popular being wikipedia, sciencemonsters and Google image search.

In this lesson the pupils were acting not only as information gatherers but also as information purveyors. The design of documents was often well-thought-out and the process engaged the pupils. They were producing work that looked good and would be judged to be of a high quality, but it is not clear whether this was included in the learning objectives for the lesson. The design element appears to be introduced and enhanced by the pupils as they personalise their learning but in ways that are unlikely to benefit their performance on any external assessment.

Another possible concern raised by the case study above is that appearance might lead over content. In the science lesson described in Case study 23, some students were cutting and pasting material from websites to put into their documents. The question here is whether this strategy actually requires the information to register in

cognition at all. The finished work will look fine but have the pupils learnt about the planets or about how to select and present appropriate information?

Divergent goals of learners and teachers

To take the argument presented in the previous paragraph further, we need to ask: What if personalising learning means not following the set tasks in the lesson? The focus on design in the previous case study is one example of this. Further examples come from learners who have little to gain from the objectives of the lesson.

Case study 25: Year 11 – Teaching the demotivated

A lower set science class was observed. Expectation of these pupils was that few would achieve a grade C in the coming GCSE examination, although they continued to follow the standard curriculum without enthusiasm.

The ambition of personalising learning is clearly something that most teachers would endorse but the reality of this Year 11 classroom is not encouraging. If personalisation means that pupils negotiate their own learning by, for example, agreeing targets, learning styles and taking responsibility, then how do you respond to pupils who are resisting education? In the observed lesson, the teacher was able to facilitate the learning of the keen while encouraging the learning of the more reluctant. The work was necessary because all the students will be assessed by GCSE examinations in the next few months.

The issue for personalisation is not about how best to encourage the student to do the set work but how to develop a curriculum that is appropriate for each child.

Efficiency, effectiveness and value for money across the system

Facilitating efficiency

The teacher's role in developing a p-learning culture can be enhanced through the use of ICT. In these next examples, the teacher is able to monitor and feedback to children on an individual basis while records of activity are automatically collected to aid the teacher's understanding of pupils' progress if needed.

Case study 26: Year 13 – Monitoring progress

The teachers use a programme called Imperata which allows them to use the interactive whiteboard and actively select any student's screen and display this on their whiteboard to help work through problems and demonstrate to others in the class. Imperata can also be used to: identify lesson plans for the session and exchange these to other computers in the room remotely; create activity logs for each session and send to individual pupils working at different levels; access the internet; and use a classroom facility mentioned above to see any student's screen at any time and to send messages to individual students rather than a group.

Another area of monitoring that can aid the general running of the school as well as individual work with pupils is the recording of behaviour events (both good and bad). One school has developed software to record this data.

Case study 27: Years 7 to 13 – Quality feedback for staff and pupils

Collaboration between this secondary school and a software house has resulted in powerful software to monitor and give feedback on performance and behaviour to staff, pupils and parents. The previous paper-driven system was cumbersome and not fit for purpose as it limited tracking of individual pupils and staff tended to record bad news rather than good. The 'i-behave' system allows easy recording of good and bad behaviour. It is set to allow five levels of record from minor to serious. Level 3 good or bad news triggers an email to parents and pupils and parents get a summary record at the end of each week. About 650 parents can be contacted by email (pupils, n = 1,000) and where there is no email access the system triggers a printout and letter. Staff are encouraged to operate a positive rather than a negative reinforcement regime.

Postscript

Are we too early?

If it is assumed that p-learning will be effectively supported through technology, there is an issue of timing in relation to both the instalment of key technology, such as high levels of connectivity and a working VLE, and the skilling of staff and pupils in its use.

Case study 28: A large secondary comprehensive

It was clear that the school is concerned about personalisation and that the staff generally believe in the value of p-learning and feel that it is important. In the two classroom observations carried out, both lessons were well taught and made good use of ICT; neither lesson, however, showed any evidence of personalisation. The school is making growing use of ICT to enable the development of personalisation by encouraging the use of Class Server, which allows pupils, teachers and parents access to the school curriculum network. The member of staff currently supporting this innovation has no time allowance for this and feels this is hampering progress.

The educational community has long asserted that technological developments come with an initial cost, that is, there will be a short-term dip in performance as the school, staff and pupils adjust to the new technology. Evidence from the ICT Test Bed project unequivocally confirmed that the technology innovation dip occurs, but this four-year evaluation also showed that the post-dip recovery can lead to important performance gains (Underwood and Dillon 2007). It is unsurprising that the full impact of VLEs has yet to be recognised by staff or pupils in schools that have only recently acquired a stable platform.

In summary

- ICT can provide opportunities for developing the personalising learning agenda but it can also provide the illusion of individual learning which actually restricts innovative work.
- The most innovative personalised lessons were observed in classes that were working outside the National Curriculum.
- In many classroom observations, even though pupils were productively engaged in learning, personalisation was conspicuous by its absence.
- ICT facilities in schools are personalised in that no two schools have the same set-up either in hardware or in the arrangement of their network. One consequence of this is that some schools deal with their individual ICT needs in innovative and entrepreneurial ways.
- The next step in personalisation through the incorporation of a fully functioning VLE is likely to be problematic if these schools are representative. It was only a minority that were able to successfully use a VLE, although most had tried to develop such a facility.
- Personalising learning poses a major challenge for the curriculum, especially for learners who are not likely to achieve the highest grades in national examinations.
- There is concern in primary schools about the ‘anytime, anyplace, anywhere’ agenda because the VLE facility might lead to unnecessary attention to school work at home. These schools are highlighting the need for a school-home balance which mirrors the current call for work-life balance in the adult world.
- The primary assessment criteria for schools are their national tests. If schools see the personalising agenda as facilitating this goal, then they are more likely to foreground it.

5. Outstanding issues

5.1 What is a VLE? From the interviews and surveys there is no clear and consistent interpretation of this term. For some, a VLE is an all-encompassing teaching and a learning environment; for others, it is personal space on the network and a facility to email the school from home. This makes the use of a survey tool difficult as these disparities emerge in interview.

5.2 Personalising learning suffers from the same problem of confused definition as with the VLE.

5.3 Classificatory criteria for e-maturity and for rurality need to be firmed up.

The DfES measure of e-maturity is based on resource levels and as these improve a ceiling effect is produced.

The NTU Maturity Model has been shown to have predictive power when constructed from data drawn from a variety of sources (see ICT Test Bed project, Underwood and Dillon 2007). In this project, data was limited to that from schools' self-reflection; nevertheless, the NTU Maturity Model continued to have predictive power.

5.4 Schools have proved hard (but not impossible) to recruit because of the large number of projects currently being undertaken by Becta and other agencies.

5.5 The timeline for the project was very challenging.

6. Messages for policy-makers

6.1 The data presented here confirms the complexity of the educational process and re-emphasises that a ‘one size fits all’ approach is unlikely to be successful. For example, choice in the classroom is a double-edged sword benefiting some but not all pupils.

6.2 Technology is a very useful enhancer of the educational process but it is not a cure-all.

6.3 There is discontinuity between managers, staff and pupils as to what personalising learning actual means in practice; this discontinuity also applies to policy-makers.

6.4 Personalising learning does not always relate to improved performance, particularly in high-performing schools.

6.5 Personalising learning does not require ICT, but where the personalising learning agenda and well-established e-maturity occur together, there is a synergy which has beneficial effects.

6.6 While the increasing use of VLEs and other technological support as tools to dissolve the barriers between home and school learning environments is to be welcomed, there is a persistent core of pupils which is unable to take advantage of these initiatives (see also Somekh et al 2007). These technologically disadvantaged learners are a challenge to meeting the Every Child Matters agenda.

6.7 Personalising learning is constrained by the National Curriculum.

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Appendix A1: Defining personalisation

Personalised learning involves the tailoring of pedagogy, curriculum and learning support to meet the needs and aspirations of individual learners, irrespective of ability, culture or social status, in order to nurture the unique talents of every pupil. Three levels of personalisation have emerged from the literature review and the expert seminar, which, we argue, build on each other rather than confuse. At the expert seminar, we presented an aspirant policy and outlined how that might be applied to schools. After the seminar, a set of operational statements were constructed and formed the basis of the teacher questionnaire. These operational statements are a summary of the concept of personalisation which underpins this research.

Personalisation – Political aspiration

The political aspiration for personalisation is that it will be a strategy for ensuring over time that:

- every pupil experiences success appropriate to their age and ability
- all pupils are engaged and excited by learning
- every pupil will have high aspirations for his/her work
- every pupil feels supported in making progress
- pupils know that they are valued
- parents know that their child is valued.

Personalisation – Objectives for education

As applied to schools, personalisation will offer learning which:

- reflects the most appropriate ways of learning
- takes account of any past performance or prior learning
- is presented in a way which is engaging and effective for that individual
- encourages learning anytime, anyplace, anywhere
- facilitates more ways to learn
- recognises the learner's short-term needs and longer-term aspirations
- encourages the learner to reflect on and self-regulate their learning
- helps the learner to achieve recognition for their achievements that enables them to progress within the wider community.

Personalisation – Operational measures

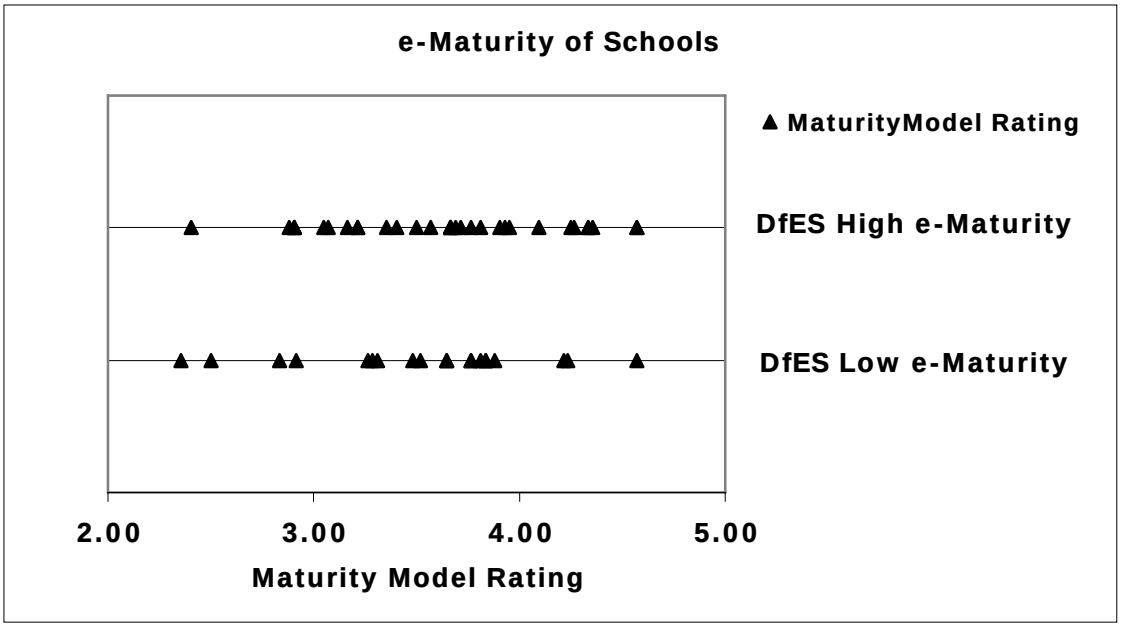
We believe personalisation can be observed in schools when they carry out some or all of the following activities:

- agree targets with pupils
- help pupils to understand their own learning
- give pupils appropriate responsibility for their own learning
- allow the learner's voice to be heard
- relate learning to pupils' out-of-school experience
- relate learning to contexts unfamiliar to pupils
- provide 'enrichment' activities beyond the core curriculum
- give appropriate feedback to pupils to enable them to make learning choices
- are flexible in the way teachers present the curriculum in order to meet pupils' individual needs
- get to know their pupils well as individuals
- offer their pupils pastoral care
- accommodate pupils' individual learning needs appropriate to their age and ability
- develop home-school partnerships
- work in community partnerships
- work with other agencies involved in the welfare of pupils.

Appendix A2: Defining e-maturity

An issue in specifying the sample for this project raised in Phase One revolved around the resource-led rating of e-maturity used by the DfES, as compared to the resource and usage measure emerging from the self-assessment by schools using the maturity model technique. The scale of the mismatch between these two definitions is shown in Figure A2.1. This compares DfES ratings of schools of high and low e-maturity against school self-assessments using the maturity model technique. While some discrepancy in the two modes of assessment was anticipated, the level of disparity suggests that the two measures are looking at fundamentally different attributes of e-maturity. There is little or no overlap between the two methods of assessment. While some of the discrepancy can be accounted for by schools overrating or – from our field observations – underrating their achievements, this cannot account for the lack of match clearly shown in Figure A2.1.

Figure A2.1: Comparison of DfES and school self-report levels of maturity



Appendix B: Contributing schools

We would like to thank all the Impact 2007 schools for their contribution to the project and for their cheerful tolerance of the demands of the research process.

Abbey Gates Primary School, Nottinghamshire

Archbishop Benson CE Primary School, Cornwall

Ashgate Primary School, Derby

Beech Grove CE Junior School, Shropshire

Betley CE Primary School, Cheshire

Beverley High School, East Riding of Yorkshire

Bournville School and Sixth Form Centre, Birmingham

Broadclyst Community Primary School, Exeter

Buildwas Primary School, Shropshire

Carbeile Junior School, Cornwall

Castle Hill Junior School, Basingstoke

Castle Vale School and Specialist Performing Arts College, Birmingham

Cherry Orchard Primary School, Birmingham

Chesterton Community College, Cambridge

Chyngton Primary School, East Sussex

Clifton with Rawcliffe Junior, York

Cromwell Community College, Cambridgeshire

Dame Elizabeth Cadbury Technology College, Birmingham

Djanogly City Academy, Nottingham

Eastbourne Technology College, Eastbourne

Eastbury Secondary School, Barking

Fowey Primary School, Cornwall

Garibaldi College, Nottinghamshire

Grange Junior School, Shrewsbury

Grange Technology College, Bradford

Greythorn Primary School, Nottingham

Holmfirth Junior, Infant and Nursery School, Holmfirth

Impington Village College, Cambridge

Inkpen Primary School, West Berkshire

Jessie Younghusband Primary School, Chichester

John Davies Primary School, Nottinghamshire

John Hanson Community School, Hampshire

Lightwoods Primary School, West Midlands

Lincoln Christ's Hospital School, Lincoln

Linton Village College, Cambridge

Market Drayton Junior School, Shropshire

Newall Green High, Manchester

Ninestiles Community Technology College, Birmingham

Perins School, Hampshire

Phoenix Primary School, Liverpool

Pool Business and Enterprise College, Cornwall

Prince Albert Junior and Infant School, Birmingham

Prospect House School, London

Pudsey Grangefield School, Leeds

Radstock Primary School, Liverpool

Rainford High Technology College, St Helens

Ripple Junior School, Barking

Robert Arkenstall Primary School, Cambridgeshire

Roydon Primary School, Norfolk

Sawtry Community College, Cambridgeshire

Saxmundham Middle School, Suffolk

Serlby Park, Doncaster

Soham Village College, Cambridgeshire

St Peter's Secondary School, Cambridge

St Wilfrid's CE High School and Technology College, Blackburn

Staunton Park Community Sports College, Hampshire

Stoke Damerel Community College, Plymouth

The Academy of St Francis of Assisi, Liverpool

The Benjamin Britten High School, Suffolk

The Romsey School, Hampshire

Tideway School, East Sussex

Treviglas Community College, Hampshire

Waterside Primary School, Hampshire

Waverley School, Birmingham

Westbourne Primary School, Surrey

William Parker School, East Sussex

Wootey Junior School, Hampshire

Appendix C: Maturity model for headteachers/senior members of staff

Our grateful thanks go to all those who have contributed to the project and to the NCSL for the release of its Strategic Leadership in ICT matrices (after Underwood and Dillon 2003).

Model 1: Technological maturity				
1. Connectivity				
Most computers are stand-alone. External link by low-speed connection.	There is a networked central resource or some clusters which are networked with low-speed connection shared across the network.	Most computers are networked with a shared broadband institutional access but there are impediments to the flow of data between the management and curricula sectors.	All systems (management and curricula) are networked together allowing the sharing of resources and data. Regular back-ups made.	All systems (management and curricula) are networked together allowing the sharing of resources and data. Differential internal and external access to the network. Awareness of need for security. Options such as wireless networks are used in addition to, or as a replacement of, fixed networks.

Model 2: Curriculum maturity				
1. Curriculum ICT policy				
The institutional strategic or planning documents have no clear function for ICT.	ICT is incorporated into institutional strategic plans but without a clear focus.	There is a draft policy identifying support and usage but no action plan. The policy has been developed through consultation across the institution. Focus on establishing effective ICT systems.	There is a clear written policy and action plan. Developed through consultation. Focus on effective learning outcomes rather than technology per se. There are clear areas identified for curriculum development and ICT solutions.	There is clear and innovative vision, from which a shared policy and action plan have been developed. Focus on the potential of ICT to have an impact on teaching and learning, and on effective support mechanisms to maximise attainment.
Model 3: Leadership/management maturity				
1. Planning				
There is no detailed ICT development plan or ICT element within the institution. If a plan exists, it has not been updated in the medium term.	There is an up-to-date detailed ICT development plan embedded within the SIP. It has clear targets for ICT. Funding is allocated on an ad hoc basis.	There is an up-to-date detailed ICT development plan embedded within the SIP. It has clear targets for ICT. Funding is allocated on a formula basis similar to other subjects.	There is a long-term strategic plan for future developments within the SIP. This is supported by an up-to-date ICT development plan embedded within the SIP. It has clear targets for ICT. Funding is allocated on this basis.	The SIP includes a detailed ICT development plan with short and long-term targets, costings and a commitment to developing ICT across the whole-institution curriculum, in line with new innovations for teaching and learning.

Model 4: Workforce maturity				
1. Planned staff development in ICT				
Little CPD is encouraged or takes place.	Individuals have to identify their own needs and training.	Needs are identified through performance management reviews but targets may not be set.	There is regular identification of IT and other development needs. Annual targets included within the SIP are set for staff. There may be some evaluation of impact. Staff are encouraged and supported in meeting targets.	All staff have institutional supported CPD. There is a process for the induction of new staff. Impact of development is evaluated in relation to classroom performance or, in the case of support staff, effective administration.
Model 5: Linkage maturity				
1. Communications throughout the institution				
Curriculum, learner and management information is held by individuals and in a range of formats.	Curriculum, learner and management information is held in electronic formats and shared within the institution.	Curriculum, learner and management information is documented, centralised and easily accessible; is up-to-date and accurate; has an appropriate interface with human systems and practice.	Curriculum, learner and management information is integrated; is informing the evolution and development of systems and practice; is enabling and influencing decision-making; is accessible from all sites; is accessed and contributed to by staff, with confidence.	Curriculum, learner and management information is embedded within institutional practices; is used to support learning and teaching, decision-making and quality assurance; feeds into external communication channels; influences institutional development.

Appendix D: Headteacher/senior member of staff interview

Sample questions and areas of interest

What are you proud of within the school?

What would you show to people?

What are the barriers to achieving your ideal?

What is frustrating you?

Personalisation

Can you find some words which describe the term ‘personalised learning’ as you understand it?

Can you give any examples of personalised learning within your school?

VLEs

Have you got a virtual learning environment (VLE)?

If so, what is the purpose of it?

E-portfolio

Do you use an e-portfolio? Generate key descriptors as for personalisation and record on checklist.

Can you tell us how you use it?

Tool evaluation

Check the usability of the maturity model framework.

Appendix E: Interview schedule for ICT co-ordinators

Sample questions and areas of interest

Equipment

How many whiteboards are there in the school?

Intranet traffic

What data is available about how much the school intranet is used?

Structure

Over the last two years what have been the major developments in ICT in the school?

Curriculum and ICT

How does ICT affect teaching pupils of varying abilities?

Intranet

Is the school's network accessible outside school?

Extra-curricular activities

Are there clubs using the facilities?

Can you give some examples?

Appendix F: Questionnaire for staff

Sample questions and areas of interest

School intranet (the school's internal network) (5 items)

I use the intranet extensively.

Teachers and teaching (6 items)

ICT has changed the way people teach.

Impact on learners (4 items)

In this school ICT has a positive effect on student motivation.

Personalisation in school (14 items)

In my school I am encouraged to… (for example, agree targets with pupils)

Personalisation and ICT (5 items)

In this school ICT supports a wider range of learning tasks.

Potentialities (3 items)

ICT is a major driver of quality in the school.

Outreach (4 items)

ICT has been used to develop closer links with parents and the community.

Teachers were also asked to respond to the following two requests:

- Identify your three most valued online resources.
- The piece of technology I couldn't do without is…

Additional subscales:

Personalisation (full) (19 items) [personalisation in school + personalisation and ICT]

Resource provision (full) (8 items) [network resources + potentialities]

Reliability values for the teacher subscales were generally strong. Of particular interest was that both the brief and full version of the personalisation scale showed high values for coefficient alpha (brief version, alpha = 0.90; full version, alpha = 0.91). The reliability of the full resources scale was also acceptable (alpha = 0.73).

Appendix G: Questionnaire for pupils

Sample questions and areas of interest

Two versions of the questionnaire were created, one for primary learners and one for secondary learners. The main difference between the two was that a restricted response scale was used on the primary learner scale (4 options) and a broader one was used on the secondary scale (5 options). There were also some minor differences in language but overall the two scales were comparable.

Support and assistance at school (3 items)

The teachers in this school understand me and support me.

Attitudes towards computers (4 items)

I enjoy doing school work on the computer.

Computer use (4 items)

How often do you use the school computers at lunchtime or after school?

Modes of working (4 items)

In lessons I can choose whether I work by myself or in a group.

Personalisation (4 items primary, 5 items secondary)

My teacher tells me how well I am doing in my work.

Self-efficacy (4 items)

I expect to do well in school this year.

Personalised challenge (4 items)

Once I have solved a problem my teacher gives me a harder task.

Value (4 items)

It is important to me that I do well in school.

Persistence (3 items)

I always try to understand what the teacher is saying.

Disengagement (4 items)

I do not think what I learn at school will help me with my future dreams.

Learning goals (4 items)

I prefer to do work that is familiar to me rather than new work that I have to learn how to do.

Additional subscale:

Personalisation (full) (14 items primary, 15 items secondary) [personalisation + modes of working + personalised challenge + two questions from support]

Reliability values for the primary subscales were not as strong as for the secondary subscales, which is to be expected given the restricted response options as well as the age of the children. Reliability for the full personalisation scale (S12) was strong for both primary (alpha = 0.77) and secondary (alpha = 0.88).

Appendix H: Observation schedule

Sample questions and areas of interest

The learners

Which year group

Number of pupils participating in this session, age of the pupils and ability

Location

Location of the observed lesson (for example, in the classroom)

Classroom organisation

Layout of the classroom

Pupil/computer ratio

Mode of working (groups, pairs, individual)

The activity

Give a description of the assignment the children have been given.

What are the intended goals from the lesson? How are task instructions delivered?

How does the communication in the classroom occur?

Evidence of personalisation

Does the teacher negotiate targets?

Is the work related to out-of-school experiences?

Give examples of personalisation in the classroom.

Learner attitudes

How engaged are the learners by the activity?

What happens at the end of the lesson?

Efficiency and help

Were there any technological problems during the lesson?

Who do the learners look to for support?

Appendix I: List of school-level measures

School size

Rurality

Overall maturity model mean

Mean Model 1 on maturity model

Mean Model 2 on maturity model

Mean Model 3 on maturity model

Mean Model 4 on maturity model

Mean Model 5 on maturity model

E-maturity

P-maturity

DfES maturity

Key Stage 3 English level 5 or above

Key Stage 3 mathematics level 5 or above

Key Stage 3 science level 5 or above

Key Stage 3 average point score

SEN statement

SEN supported

Achieving level 2 threshold (the equivalent of five A to C GCSEs including English and mathematics)

Achieving level 2 threshold (the equivalent of five A to C GCSEs)

Achieving level 1 threshold (the equivalent of five A to G GCSEs)

Average total point score per pupil

Percentage of half-days missed due to authorised absence

Percentage of half-days missed due to unauthorised absence

Mean attitudes

Mean use

Mean support

Mean modes

Data was gathered from teachers and learners using online questionnaires. The learner questionnaires were modified versions of the pilot version but the teacher questionnaire was unchanged from the pilot instrument.

Appendix J: The multilevel modelling process – A technical summary

Background

Many common statistical techniques assume that data is from independent samples, in other words, the observations are not systematically related to each other and similarities between them can be seen as random. In many real-world situations, this assumption is implausible: data sampled from members of the same family, school or workplace is probably related in interesting and important ways. For this reason, it is often useful to adopt statistical methods that recognise that observations are 'clustered' in this way rather than independent.

A multilevel model is one very flexible and powerful way to incorporate this kind of clustering into statistical analyses of real-world data. Multilevel models were developed in educational research (for example, Goldstein 1987). They are ideally suited to modelling data sampled from learners within year groups or schools. Statistical methods that incorrectly assume observations are independent will be biased and are more likely to produce incorrect or misleading results.

In addition to producing a more appropriate model than traditional methods, multilevel models also have the attractive feature that they allow researchers to test hypotheses that simpler approaches cannot (for example, see Snijder and Boskers 1999). In a multilevel model, for instance, it is not only possible to look at the average effect of a variable on some outcome measure, but also consider whether that effect varies between units at different levels of the model (for example, whether it varies between learners or between schools).

The Impact 2007 models

The results of the multilevel modelling presented here are taken from three-level models that look at learners (level 1) in year groups (level 2) within schools (level 3). In these models, either personalisation (the full scale) or disengagement were used as outcome measures (see Appendix K for further details on these measures). Each model incorporated potential predictors at the learner level, for example, demographic information such as gender, scale scores (from Appendix I), year level (for example, derived from teacher scales) or school level (for example, DfES data or maturity model data).

There were 53 units at the school level (25 primary and 28 secondary). Separate models were constructed for primary and secondary because they differed in important structural characteristics, and because primary school data used a simplified and brief form of many of the questions used to derive some of the scales. For the primary schools, Years 3, 4, 5 and 6 were sampled, with several hundred learners in each year. For the secondary schools, Years 7 through to 13 were sampled, with several hundred in each year from 7 through to 10 (with peaks in the

targeted Years 8 and 10) and only a handful of learners in Years 11 through to 13. Teacher perceptions of personalisation were modelled with teachers (level 1) clustered within schools (level 2), incorporating data from the staff questionnaire and school-level predictors (see Appendices F and I for further details).

Scoring of data

For the multilevel modelling, all predictors on arbitrary scales (for example, maturity model predictors, subscales from pupil and staff questionnaires) and all outcome measures (DVs) were scored as a percentage of maximum possible performance (0 to 100) to facilitate comparability of effects. Dichotomous predictors (for example, gender) were scored 0 or 1. Ratio predictors, including school-level predictors already expressed as percentages, retained the original units of analysis (with the exception of average performance in the teacher model where school Key Stage 2 and GCSE averages were standardised using z scores).

For the learner models, some highly correlated subscales were combined based on the findings of the factor analyses reported in Section 4.2. These were work ethos (self-efficacy, persistence and value) and investment in learning (disengagement and goals – with disengagement reversed). Preliminary analysis of the teacher measures showed that several of the subscales were highly correlated and could be described by a single factor reflecting the perceived effectiveness of ICT resources available to learners. This was included in the teacher model as ICT effectiveness (combining net resources, ICT and teaching, learner impact, potentialities and outreach).

Details of model selection

Model selection was hypothesis-driven where possible, using hypotheses derived from the research proposal in conjunction with project stakeholders and emerging findings from the case studies. The final models were selected using criteria that included robustness, parsimony and theoretical coherence. Model selection was guided using chi-squared goodness-of-fit tests and information criteria (for example, AIC). All modelling took place using MLwiN 2.02 (Multilevel Models Project 2005) using IGLS estimation for initial exploration and RIGLS and MCMC for model checking.

Appendix K: Outcomes of the multilevel modelling

Primary

Personalisation (full form) as DV

General comments: Most of the random variation appears to be at the learner level (105.82) with some at year level (7.50) and negligible variation at the school level. All predictors decrease goodness-of-fit ($p < .05$) and increase AIC if excluded from the models.

Predictor	Parameter	Type	Description
Work ethos	+0.436	Fixed	Higher levels of work ethos are associated with greater personalisation.
Use of ICT (brief)	+0.165		More opportunity to use ICT is associated with greater personalisation.
Attitudes	+0.049		More positive attitudes towards computers are associated with greater personalisation.
Town	-4.107		Schools in towns (not urban, village or hamlet) are associated with lower personalisation.
MM mean	-0.118		Greater average school maturity is associated with lower personalisation.

Investment in learning as DV

General comments: All of the random variation appears to be at the learner level with negligible variation at year and school level. All predictors increase AIC if excluded from the models. All predictors also decrease goodness-of-fit ($p < .05$), except 'Male' ($p < .10$).

Predictor	Parameter	Type	Description
Male	-1.953	Fixed	Male learners (on average) have lower investment in learning than female learners.
E-maturity	+0.132		Greater school level e-maturity is associated with increased investment in learning.
Work ethos	+0.312		Higher work ethos is associated with increased investment in learning.

Support	+0.173		Feeling supported by teachers and peers is associated with increased investment in learning.
Modes	-0.078		Greater choice in mode of learning is associated with decreased investment in learning.
SEN statement %	-0.328		A higher percentage of statemented children in schools is associated with lower investment in learning.
Year (linear contrast)	-0.925		Investment in learning decreases (on average) from Years 3 to 6.
Work ethos	0.067	Random (level 1 variation)	There are systematic individual differences between learners in the effects of work ethos on investment in learning (as the fixed effect is relatively large and positive, this suggests that it is even larger for some learners and smaller for others – with a negligible or negative effect for very few).
Work ethos	-4.002	Random (level 1 covariation with constant)	The effect of work ethos on investment in learning is negatively correlated with the level of investment in learning. The effects of work ethos are higher for learners with low investment in learning.

Secondary

Personalisation (full form) as DV

General comments: Most of the random variation appears to be at the learner level (319.84) with some at year level (8.38) and negligible variation at the school level. All predictors decrease goodness-of-fit ($p < .05$) and increase AIC if excluded from the models.

Predictor	Parameter	Type	Description
Work ethos	+0.445	Fixed	Higher work ethos is associated with greater personalisation.
Use of ICT (brief)	+0.228		More opportunity to use ICT is associated with greater personalisation.
P-maturity	+0.100		Higher school p-maturity is associated with greater learner personalisation.
Average point score	-1.080		Higher average academic performance at school level is associated with lower learner personalisation.
Year (linear contrast on Years 7 to 10)	-1.541		Personalisation decreases (on average) from Years 7 to 10 (this contrasts with zero-weighted Years 11 to 13 where data is sparse).
Use of ICT (brief)		Random (level 1 variance)	There are systematic individual differences between learners in the effects of opportunity to use ICT on personalisation (as the fixed effect is positive, this suggests that it is even larger for some learners and smaller for others – with relatively few with negligible or negative effects).
Use of ICT (brief)		Random (level 1 covariance with constant)	The effect of opportunity to use ICT on personalisation is negatively correlated with the level of personalisation of the learner. The effects of use are higher for learners with low personalisation.

Investment in learning as DV

General comments: Most of the random variation appears to be at the learner level (223.0) with little variation at school level (1.011) and negligible year level variation. All predictors (except the fixed effect of 'E-maturity') increase AIC if excluded from the models. All predictors also decrease goodness-of-fit ($p < .05$) except the fixed effects of 'E-maturity' ($p = .25$) and 'Modes' ($p = .11$) estimated alongside their random effects at level 1.

Predictor	Parameter	Type	Description
Work ethos	+0.570	Fixed	Higher work ethos is associated with increased investment in learning.
E-maturity	+0.051		E-maturity is associated with higher investment in learning. NB: Fixed effect – not statistically significant.
Modes	-0.034		Greater choice in mode of learning is marginally associated with decreased investment in learning. NB: Fixed effect – not statistically significant.
% achieving level 2 GCSEs (including mathematics and English)	+0.089		Higher than average school-level exam scores (percentage achieving level 2 GCSEs including mathematics and English) are associated with increased investment in learning by learners.
Work ethos		Random (level 1 variance)	There are systematic individual differences between learners in the effects of work ethos on investment in learning (as the fixed effect is large and positive, this suggests that it is even larger for some learners and smaller for others – with a negligible or negative effect for very few).
E-maturity		Random (level 1 variance)	There are systematic individual differences between learners in the effects of work ethos on investment in learning (as the fixed effect is relatively small but positive, this suggests that for most learners it is a negligible or small positive effect and negative only for relatively few).

Modes		Random (level 1 variance)	There are systematic individual differences between learners in the effects of choice in mode of working on investment in learning (as the fixed effect is relatively small but negative, this suggests that for most learners it is negative and small or negligible and likely to be positive for relatively few).
Modes		Random (level 1 covariance with constant)	The effect of choice in mode of learning is negatively correlated with the learner's level of investment in learning. It is generally negative but more likely to be negative for learners with low investment in learning (and most likely to be positive for learners with high investment in learning).
Work ethos with e-maturity		Random (level 1 covariance)	School-level e-maturity is negatively correlated with learner-level work ethos. E-maturity has a more positive impact for learners with low work ethos than high work ethos.

Teacher

Personalisation (full form) as DV

General comments: Most of the random variation appears to be at the teacher level (57.45) with around 10 per cent at school level (7.64) and negligible variation at the school level. All predictors increase AIC if excluded from the models except the fixed effect of 'P-maturity' estimated in the model alongside interaction with 'ICT effectiveness'. Most predictors also decrease goodness-of-fit ($p < .05$) except 'P-maturity' ($p = .40$) and the 'P-maturity x ICT effectiveness' interaction ($p = .067$).

Predictor	Parameter	Type	Description
Primary	+3.429	Fixed	Primary school staff have higher perceived personalisation scores than secondary staff.
Mathematics	-3.682		Mathematics teachers have lower perceived personalisation scores than staff with other roles.
Assessment or management	+8.924		Staff with assessment or management roles have higher perceived personalisation scores than staff with other roles.
P-maturity	+0.034		School e-maturity is associated with higher perceived personalisation. NB: Fixed effect – not statistically significant.
ICT effectiveness	+0.562		Greater perceived ICT effectiveness is strongly associated with higher perceived personalisation.
P-maturity x ICT effectiveness	+0.005		School p-maturity appears to moderate the effect of ICT effectiveness. Perceived personalisation is enhanced when both p-maturity and ICT effectiveness are high. NB: The effect of +0.005 appears small but is multiplicative and will be substantial if both p-maturity and ICT effectiveness are high. (See also the general comments on model fit above.)

Standardised average points score (primary)	+2.843		Better than average school performance (average Key Stage 2 points) is associated with increased perceived personalisation. NB: To facilitate comparison between primary and secondary schools, the performance scores were standardised.
Standardised average points score (secondary)	-3.196		Better than average school performance (average GCSE points) is associated with decreased perceived personalisation. NB: To facilitate comparison between primary and secondary schools, the performance scores were standardised.
ICT effectiveness		Random (level 1 covariance with constant)	The influence between ICT effectiveness on personalisation is negatively correlated with the level of personalisation of the learner. They are more pronounced for teachers with low perceived personalisation scores.