CAN NEW TEACHERS BE ICT CHANGE-AGENTS?

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Abstract:

Information and communication technology (ICT) has changed society. Yet schools have been largely untouched. For a change like business process re-engineering to occur in schools, it has been proposed that pre-service teachers should bring new ideas into institutions. There are tensions associated with the engagement of pre-service teachers as ICT change-agents. They represent a new generation and schools can expect them to encapsulate new ways of learning, of teaching. However they are apprentices to a profession, without power in the school organisation. The aims of this research were to examine a cohort of pre-service teachers' beliefs about ICT to establish a baseline and gauge their preparedness for change-agency. Using a mixture of new and pre-calibrated items, we surveyed 53 initial pre-service teachers on their attitudes to computers, teaching philosophy, ICT beliefs and both experienced and expected classroom computer use. The findings showed that overwhelmingly, they want their future pupils to use computers more frequently than occurred in their own schooling. The ICT beliefs variable significantly correlated (p=.002) with expected future classroom computer use, but did not meet accepted standards of reliability (alpha = 0.31). This elicited discussion about the naivety of respondents or the ill-formed nature of a common view about ICT-led transformation in schooling. In their prospective training, the group favoured learning about using the computer as an educational tool in the classroom over enhancing their computer skills. This paper discusses how ICT beliefs shape teacher training to better prepare pre-service teachers to become change-agents. One important point is that a common view of ICT-based transformation in schooling has yet to emerge. We also suggest, in a time when curricula are increasingly devised within the local school, that pre-service teachers need to become engaged in this level of planning.

Key phrase: Teacher Education and professional development of teachers.

Introduction:

Two Australian government reports epitomise the stark tension between the rhetoric of ICT-led transformation of schooling and the reality of modest accomplishment (Downes, Fluck, Gibbons, Leonard, Matthews, Oliver, Vickers & Williams, 2001; Pegg, Reading & Williams, 2007). This is also a common problem in other countries (for instance Reynolds, Treharne & Tripp, 2003, p. 159). In their report to the Australian government entitled Making better connections, Downes, Fluck and others (2001) outlined four distinct ways or 'types' of incorporating ICT into school curricula. These types, which represent four nodes in a continuum of practice, were (1) ICT subjects focussing on discrete skill acquisition, (2) traditional curricula supported by ICT as a learning tool, (3) ICT-catalysed transformation of curricular content and pedagogy and (4) transformation of systemic structures. Although ICT has gained a good degree of political support, the rhetoric has far outweighed the impact of ICT in both the school classroom and in wider society (Kearns & Grant, 2001). Explanations for this state of affairs include lack of access to hardware, restricted professional training for teachers and cultural inertia (Cavanagh & Dellar, 1998). In Australia, government policies are making a computer available for every student in Year 9 and above with professional development funds being directed to ICT training. In their Partnerships in ICT Learning (PICTL) study, Pegg and others (2007) suggested that cultural inertia might be overcome by enlisting the help of pre-service teachers who are 'digital natives' to co-develop new ICT pedagogies with teachers in schools. However the success of this strategy has been problematic because pre-service teachers are apprentices in the teaching profession with little power or influence in schools. While the presence of several successful innovative approaches in the PICTL study indicated that some pre-service teachers are relatively confident in the use of technology, the likelihood of innovative approaches being sustained was low due to teachers' inexperience.

This research project therefore addressed the question of whether pre-service teachers are a suitable avenue for introducing ICT-based change into schools. We examined their capacity, predisposition and understanding of educational transformation using ICT. To do this, we began a longitudinal study of a pre-service teacher cohort to examine the background of their relevant beliefs and track subsequent

changes, especially those attributed to the training. This report is preliminary, concerning baseline measurements, and will be followed in due course by descriptions of training effects and in-service impact on schools.

Literature review:

One of the authors, as part of his normal teaching practice of ICT education, has habitually asked pre-service teachers about their family background in the field of education. Up to 85% of new students in a Bachelor of Education program have indicated a family background in the profession, and 50% of entrants into a post-graduate degree. This indicates a great deal of patterning, with a likely result of social replication. Given such proportions, it seems likely new teachers will reproduce the thinking patterns of their parents when they start work in school thus the literature of teacher beliefs about ICT is likely to be salient.

Hermans, Tondeur, van Braak and Valcke (2008) examined the relationship between teacher classroom use of computers and computer attitudes, demographics, teacher computer experience and teaching philosophies. They differentiated between constructivist, student-centred and traditional, subject-based philosophies of teaching. Data collected from 525 Flemish primary school teachers showed that 18% of variance in their classroom use of computers was ascribed to school differences and 82% to teacher differences. Teacher age had little effect on classroom computer use, but males were more disposed to use computers than females. Computer experience and computer attitudes also influenced decisions to use computers professionally. Constructivist student-centred beliefs were also found to be significant factors in determining classroom computer use. Hermans and others concluded that "teacher beliefs seem to be at least as important as technology-related teacher characteristics such as computer experience, general computer attitudes and gender" (p. 1506). This study confirmed teacher characteristics are important, and in particular, personal teaching philosophy contributes to the decision to utilise digital technology as a learning tool. However, there are other attitudinal aspects which may be significant, or more directly related to this particular technological debate. Some of these aspects were highlighted by Moursund (2007) who argued that measuring impact of technology with reference to traditional benchmarks (especially when these are rated using pen-on-paper tests) may not be a valid method of determining the true value of computers to learners. Moursund challenges us to envision areas in which computers and humans combined are more effective than either alone. Utilising historical analogies, one can imagine the discussion relating to the replacement of chalk by pencils, and later by ballpoint pens. Even today Tasmanian schools have protocols for pupils as they progress to using pens instead of pencils. Generally a degree of proficiency is demanded before the erasable nature of work written in pencil is discarded in favour of the permanent nature of work written in ink. It is interesting to consider the equivalent protocols for transition from using pencil or pen to word-processing. One developmental question that arises is whether the development of typing skills should precede the use of pencils due to the need for fine motor skill training for the latter. Apparently there are many challenges here for both experts and pre-service teachers alike. Of interest in this study were the relatively naïve attitudes of our pre-service cohort as they commenced their studies. Depending upon the results of this preliminary study, we could design the future course content to better prepare our cohort in their role of ICT change agents.

The change management literature indicates that organisations go through several discrete stages from 'innovators' through to 'laggards' (Rogers, 1995, p. 262). In addition a range of different people within an organisation may be the instigators of change. For instance in ICT education, change may spring from educational leaders, teachers or students alike (Elgort, 2005). The literature recognises the crucial nature of teacher beliefs in the adoption process. For example, Goodson (2001) argued that teachers' personal beliefs are a vital building block for change processes in schools. Indeed, Robertson concluded that, "teachers use ICT tools only if they are aligned with their beliefs about teaching and learning, and in the way that aligns with these beliefs" (2004, p. 184). In a small-scale project in New Zealand that investigated science teachers' beliefs about using computers, Dowden and McMillan (1996) described a range of pedagogical practice from integrating ICT into lessons through to reserving the use of computers for administration. They argued it was especially evident that previous experience with ICT shaped teachers' beliefs about the suitability of using computers in the classroom. Indeed Dowden and McMillan asserted that teachers' ICT beliefs were, "part of their whole philosophy about education" (p. 22).

Finally, the literature on naïve or early career change-agents is relatively scant. Fullan (1993a) suggested that pre-service teachers should aspire to a 'moral' purpose for making a difference in their communities. A Queensland study (Donnison, 2007) identified the conflicting values emerging from and imposed upon pre-service teachers, particularly in the area of digital impact. This study, comprised of 16 high school students aspiring to be teachers and 54 pre-service teachers, found that although the participants were

expected to become change-agents, they did not "expect digital technologies to significantly impact on the purposes of education, who is being educated, what is being taught in the classroom, or the organisation and management of the school or the school day" (p.9). This contrasts with the expectation that "professional partnerships between teachers and pre-service teachers would … improve the nature of schooling and learning in a modern technological age" (Pegg and others, 2007, p.22).

Method:

Teacher education has received much government attention, principally via several parliamentary inquiries. The comparatively recent Top of the Class report (The Parliament of the Commonwealth of Australia, 2007) received little on-going attention, but its general gist may be incorporated into the federal government's response to the Bradley review of higher education in Australia (Bradley, Noonan, Nugent & Scales, 2008). Top of the Class tracked many problems to inadequate funding for the sector, and subsequent "increased workloads of staff" (2007, p. 108). The University of Tasmania is responding to such pressures by re-organising its suite of pre-service training degrees with the intention of gaining efficiencies by combining units within degree courses and amalgamating classes. It is therefore timely to gather baseline data on our students' beliefs. Due to a recent policy of using an on-line learning content management system for all units, it was possible to insert an anonymous questionnaire into a foundation course of the Bachelor of Education. This was approved by the University of Tasmania's ethics committee. Since we sought valid data on the beliefs and ICT backgrounds of our students, we drew upon the most significant items from instruments of proven reliability (see Table 1). Our adaptation of the 'class use of computers' scale asked respondents to contrast their personal experience in schools when they were pupils with the likely regime they intended to implement in their future roles as teachers. In addition we wanted to collect baseline data on three other aspects: (1) pre-service teachers' specific beliefs about controversial areas of ICT use in schools, (2) their assessment of the particular ICT skills training they need, and (3) their ranking of stakeholders when curricula are designed. The latter variable was tied to our understanding that for ICT-led transformation to occur in schools, radical re-conceptualisation of schooling values, and hence curricula, needs to occur. Once armed with baseline data about pre-service teachers' conceptualisations of curriculum creation, we will be better placed to assist them to become ICT advocates (see Appendix for full survey). For each variable, item scores were summed and rescaled to 0-100 range to make comparisons easier.

Table 1: Survey variables and item sources

Variable	items	value	source
Demographics	2, 3, 4		
Computer attitude	13-15	higher score => likes computers more	van Braak & Goeman (2003, p. 657)
Traditional teaching philosophy	22-25	higher score => more traditional subject-centred teaching philosophy	Woolley, Benjamin & Woolley (2004, p. 329)
Constructivist teaching philosophy	17-21	higher score => more holistic student-centred teaching philosophy	Woolley, Benjamin & Woolley (2004, p. 329)
ICT beliefs	27-31	higher score => more inclined towards ICT-based transformation of schooling	Adapted from Moursund (2007)
Class Use of Computers – personal history	5-12	higher score => more frequent use of computer in classroom	Full scale applied from Hermans, Tondeur, van Braak & Valcke (2008, p. 1504)
Class Use of Computers – future class	36-43	higher score => more frequent use of computer in classroom	full scale from Hermans, Tondeur, van Braak & Valcke (2008) p. 1504
ICT skills training requirements	32-33		
Priority groups for curriculum design	34		

Results:

Our on-line survey received an initial 53 responses out of 138 enrolled students (a response rate of 38%) but four responses were blank, so were eliminated from the data leaving 49 valid responses from both the Launceston and Cradle Coast campuses. The results consider the effects of demographics, teaching philosophy and curriculum design, class use of computers, the measurement of ICT beliefs, and desired ICT skills.

Demographics
The oldest respondent was 48 years old and the youngest was 18, with a modal age of 20. 84% of the respondents were female which closely matched the profile for the whole cohort of 82% female. The youngest age at which they first used a computer at school was 5, the highest 30 (a female who was 43). The cohort was a distinct mixture from different generations thus it did not the descriptor of an homogenous 'Gen Y' group. Age was highly correlated with the age at which respondents first used a computer at school (Pearson's correlation = -.745, $p<0.01$) which was an expected result. However, neither age nor the age at which respondents first used a computer in the classroom significantly correlated with their expected future use of class computers. In this respect past personal history was not a good guide to future behaviour. In contrast, Dowden and McMillan (1996) found that prior personal experience of using computers strongly influenced teachers' willingness to integrate ICT into their pedagogy (1996, p.20). Additional demographic and descriptive data and their correlation with expected class use of computers are given in Table 2.

Table 2: Demographic and descriptive data

Variable	Reliability (Cronbach's alpha for constituent survey items)	Mean	SD	Pearson's correlation with expected class use of computers (r)	p	significance
Computer Attitude	0.86	81.1	24.6	0.017	.909	ns
Traditional Teaching	0.45	41.6	15.2	0.089	.544	ns
Constructivist philosophy	0.52	78.5	11.9	.083	.573	ns
ICT beliefs	0.31	52.0	12.5	.439	.002	vs
Age	n/a	24.6	7.4	-.037	.8	ns
Gender	n/a	1.9	0.4	-.265	.034	s
Personal use of class computers	0.94	38.6	28.3	.223	.123	ns
Expected future use of class computers	0.87	72.6	14.8	n/a	n/a	
Age at which first used a class computer	n/a	9.6	4.4	-.067	.646	ns

Reliability scores for most variables (except ICT beliefs) were satisfactory, representing the limited number of items selected from previously calibrated scales. Gender had a significant correlation with future use of class computers, confirming the findings of Hermans and others (2008, p.1504).

Teaching philosophy and curriculum design
The teaching philosophy of new entrants into pre-service training is expected to be shaped throughout their course, so the relatively low alphas for reliability are not a great worry. Their beliefs with respect to the importance of curriculum design listed in rank priority order these social groups as being most important:
1. Pupils
2. Teachers
3. Parents
4. Education system managers
5. Business and commerce

This pupil-centred approach could have been a result of the lecture sequence shortly before the survey, or their recent experience in the school system. There was a significant correlation between putting pupils first in the rank priority order for curriculum design and scores for constructivist teaching (r = -.258, p= 0.037, one-tailed).

Class Use of Computers
Responses were scored so a higher number indicates a greater frequency of computer use (0 = never, 4=Daily; see Table 3).

Table 3: Class use of computers – mean scores for lived experience and future expectation.

By Years 5-6 at school I used a computer..		*In my future class pupils will use a computer ..*	*Change*
0.59	.. to find out about the social implications of computers.	2.86	+ 2.27
0.86	.. as a tool for demonstrations.	2.82	+ 1.96
1.37	.. to undertake my assignments.	3.1	+ 1.73
1.8	.. to learn together in groups.	2.94	+ 1.14
2.08	.. to learn at my own pace.	3.2	+ 1.12
1.67	.. to find information on the internet.	2.61	+ 0.94
2.33	.. to learn how to operate a computer.	3.2	+ 0.87
1.65	.. to be taught things.	2.51	+ 0.86

The average difference between mean personal experience and mean proposed future use was +1.36. Thus the pre-service teachers expect to use computers in class much more frequently than was the case in their own schooling. The increase in projected use was greatest for learning about the social implications of computers, indicating an area of particular concern for the pre-service teachers. By contrast, they were not very interested in teaching pupils how to operate a computer, nor to use it as a teaching aid. This last result is highly important, because current policy is directed towards the integration of ICT across the existing curriculum as a way of enhancing learning.

Measurement of ICT beliefs
As part of the survey design we had included some questions which are a matter of debate amongst teachers. With one in five children have a special educational need at some time in their lives, how do we distinguish between computer aid to compensate for disability and unfair advantage in high-stakes testing? Other questions similarly probed pre-service teacher attitudes to the role of ICT in schooling, with several suggestive of transformative approaches. As can be seen in Table 2, there was a very significant correlation between the ICT beliefs variable comprising these items and future expected class computer use. However, the Cronbach alpha for reliability was very low, well under the usually acceptable value of 0.75. Therefore the ICT beliefs variable is not well constructed, and needs further development work. The correlations of the individual items with expected class use of computers are given in Table 4. Note the scoring is such that 5 indicates strong agreement, 3 neutrality and 1 strong disagreement. Thus respondents generally agreed students with special educational needs should be able to use an assistive computer, but there was neutrality about using a word processor before Year 3 (when most pupils are eight years old). Some items were significantly correlated with expected class use of computers.

Table 4: ICT beliefs items

ICT beliefs questions	*Mean*	*Correlation with expected class use of computers (r)*	*Significance (p)*
I believe.. pupils with special educational needs should be allowed to use an assistive computer whenever necessary.	4.08	.276	.027
I believe.. younger pupils should do by hand what older pupils use a computer for.*	3.04	.234	.052
I believe.. it's important pupils know their times tables before using a calculator regularly.*	3.84	.077	.299
I believe.. children should learn to use a word processor before they begin Year 3.	2.82	.343	.008
I believe.. Internet filters in education should adjust to the age of the pupil.	3.39	.155	.144

* Negatively scored item when included in ICT beliefs variable

Desired ICT skills

Respondents gave us advice about ICT skills to be included in their pre-service course. Table 5 shows how they rank ordered particular skills, with ICT integration into teaching practice the most important and personal operational skills the least important.

Table 5: Pre-service teachers ranked skills to be included in their training

Future skills	*Mean rank order*
Using the computer as an educational tool in the classroom	1.73
Techniques for helping students learn good habits when using computers	2.24
How to design an online course	3.57
New skills such as robotics, game-making, music composition, making videos, Google-Earth, GPS geo-caching etc.	3.57
How to use a computer myself	3.59

The pre-service teachers exhibited a range of eagerness to have ICT skills in their training. Some rejected such training because "I think it is much more important for children to be developing interactive and social skills" (19 years old, female). Another claimed to be fully prepared: "I feel relatively competent with computer usage in the classroom" (19 years old, female). Expressing a full spectrum of responses, another wrote "ICT literacy is an essential part of the learning experience" (48 year old, female). Other ICT skills specifically requested were broken into five thematic groups:

- Integrationist – using ICT to teach spelling, typing
- ICT subject – PowerPoint, Photoshop etc.
- Engagement - make lessons more interactive and interesting
- Planning/management – access information and to manage a mixed ability classroom
- Transformative – teaching methods beyond word processing - have online interaction with students from across the world

Discussion:

Donnison's (2007) study in Queensland investigated the beliefs of 70 aspiring teachers aged between 15 and 24. The intake to the Bachelor of Education at the University of Tasmania consists of 30% mature-age students, thus the demographics of our sample was different. This strengthened the validity of this study because it examined pre-service teachers as a type, rather than as a generation.

There were two significant demographic results. The first confirmed that female pre-service teachers did not expect to use classroom computers as much as males (corroborating Hermans and others, 2008, p. 1504). The other very significant result showed a strong link between ICT beliefs and an expectation of increased computer use in the future classroom; but the ICT beliefs variable was flawed with a very low alpha reliability. Despite this, pre-service teachers generally expected to use computers a great deal more in their future classrooms than experienced in their own schooling. There was an emphasis on social implications of ICT rather than using the computer as tutor in their preferences. As their training progresses they want instruction in using computers as an educational tool more than personal ICT skill development, but the themes encompassing this ranged between integrationist and transformative views.

The lack of coherence from the ICT beliefs items could be due to several reasons. Firstly, the pre-service students may have a clear idea about the transformative use of computers in schooling, but these items in the survey failed to elicit a reliable response. In which case, more work needs to be done to find better items which can reliably measure this variable. Alternatively, the respondents may not share a common understanding about the future impact of ICT in the classroom. In this case, future training may address this issue, by extinguishing naivety. We propose to use some interviews and focus groups in the future to determine which reason dominates, and thus employ qualitative methods to confidently triangulate (see Dowden, 1994).

From this report there appears to be glimmers of hope for pre-service teachers to become change agents for ICT-enabled transformation in schools. They are keen to use computers to a greater extent than experienced in their own schooling; they are confident about their own ICT skills; and some are open to transformational change. Over the next few years we will be looking at ways to enhance this capability and observe their effectiveness in emerging digital classrooms. Perhaps we need to co-develop a discourse of understanding ICT-based educational transformation by envisioning new learnings with pre-service teachers (Fluck, 2009)?

One area of interest will be methods for imbuing them with skills to manage the tensions inherent in 'making waves'. Will simply raising their awareness of the potential of ICT to change content and pedagogy be sufficient? What will assist in changing the minds of those who feel they already know enough about ICT, or who have a firm faith in the primacy of traditional learning? These are just the first few steps along the road.

Conclusion:

Schooling in Australia – especially ICT education – appears to be moving away from traditional emphases on the 'transmission' of knowledge and towards the 'generation' of new knowledge (Downes, Fluck & others, 2001, p.12). This observation seems surprising, as the wider literature indicates educational change is traditionally resisted. Fullan (1993b) explained that education systems are fundamentally conservative and that political interests generally work hard to maintain status quo. Tyack and Tobin coined the phrase 'the grammar of schooling' to describe a bundle of entrenched norms for schooling that are highly resistant to change (1994, p. 453). The single-subject curriculum is a key component of this 'grammar'. Thus an act such as introducing new subject matter like a component of ICT into a particular discipline is almost always opposed in the first instance because it threatens the existing hegemony associated with privileging discrete subject areas.

Nonetheless, all curriculum design is subject to change due to variables such as the wax and wane of political ideologies, the advancement of educational theory, technological improvements, societal change and global changes including the end of the industrial era and climate change. In addition, the ICT curriculum is subject to the peculiarly rapid pace of technological change and, as a result, pressing demands from stakeholders such as businesses and policymakers.

In all likelihood ICT curricula of the future will be designed and constructed at the school and community level. In the past curriculum delivery has been tightly controlled at the systemic level. However, curriculum frameworks in Australia are increasingly devolving to schools a degree of autonomy in curriculum design. Indeed, the current curriculum in neighbouring New Zealand explicitly specifies a bifurcated development of curriculum design at both the systemic and school levels (Ministry of Education, 2007). Educators and policy-makers now face a period of 'inevitable transition' (Tapscott, 2009) involving the significant challenge of integrating ICT education into a kind of schooling where both curricular design and learning with ICT needs to be genuinely meaningful and relevant to all young people (Beane, 1997).

We believe there is a need for stronger connections between teacher education and school-based curriculum development. Only thus can pre-service teachers become engaged in ICT-led transformation of schooling.

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Appendix - ICT beliefs Survey

1. Information Sheet	QUESTION	RESPONSE	
2. Year of birth	In what year were you born? (eg. 1990)		
3. Gender	What gender are you?	Male Female	
4. First computer use	At what age did you first use a computer?		
5. By Years 5-6 at school I used a computer..	.. to learn how to operate a computer.	1. Never 2. Daily 3. Weekly 4. Monthly 5. Once a term	Rescored to: 0. Never 1. Once a term 2. Monthly 3. Weekly 4. Daily
6.	.. to learn at my own pace.	- ditto -	
7.	.. to learn together in groups.	- ditto -	
8.	.. to undertake my assignments.	- ditto -	
9.	.. to find information on the internet.	- ditto -	
10.	.. as a tool for demonstrations.	- ditto -	
11.	.. to be taught things.	- ditto -	
12.	.. to find out about the social implications of computers.	- ditto -	
13. Computer attitudes -	Please tick the box which corresponds to your personal feelings. Computers make me feel nervous.*	1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree	
14.	I like working with computers.	- ditto -	
15.	Computers don't frighten me.	- ditto -	
16. Traditional and Constructivist beliefs	In questions 17-25, please imagine yourself in the future, working as a professional educator.		
17. As a teacher I will..	.. see an essential part of my teacher role as supporting a student's family when problems are interfering with a student's learning.	- ditto -	
18.	..invite parents to volunteer in or visit my classroom almost any time.	- ditto -	
19.	..involve students in evaluating their own work and setting their own goals.	- ditto -	
20.	..make it a priority in my classroom to give students time to work together when I am not directing them.	- ditto -	
21.	.. often create thematic units based on the students' interests and ideas.	- ditto -	
22.	.. ensure that I teach students all necessary content and skills, by following a textbook or workbook.	- ditto -	
23.	.. find that textbooks and other published materials are the best sources for creating my curriculum.	- ditto -	
24.	.. base student grades primarily on homework, quizzes and tests.	- ditto -	
25.	.. teach subjects separately, although I am aware of the overlap of content and skills.	- ditto -	
26. ICT beliefs	In questions 27-31, please tell us what you believe.		
27. I believe ..	.. pupils with special educational needs should be allowed to use an assistive computer whenever necessary.	- ditto -	
28.	.. younger pupils should do by hand what older pupils use a computer for.*	- ditto -	
29.	.. it's important pupils know their times tables before using a calculator regularly.*	- ditto -	
30.	.. children should learn to use a word processor before they begin Year 3.	- ditto -	
31.	.. Internet filters in education should adjust to the age of the pupil.	- ditto -	

	QUESTION	RESPONSE
32. The Future	What skills would you most like to learn about computers in this pre-service teacher education course? Rank the options by matching 1st against the most important skill through to 5th against the least important skill.	How to use a computer myself Using the computer as an educational tool in the classroom How to design an online course Techniques for helping students learn good habits when using computers New skills such as robotics, game-making, music composition, making videos, Google-Earth, GPS geo-caching etc.
33. The Future: other skills	I would like to learn how to use computers in class to.....	\<free text\>
34. Curriculum design	Which social groups are most important when designing a new curriculum? Rank them by matching 1st against the most important social group through to 5th against the least important social group.	Teachers Parents Pupils Education system managers and administrators Business & Commerce
35. My future class	The remaining questions ask about future class use of computers: what would you like to see happen in your classroom with computers when you enter the teaching profession?	
36. In my future class pupils will use a computer ..	.. to learn how to operate a computer.	1. Never Rescored to: 2. Daily 0. Never 3. Weekly 1. Once a term 4. Monthly 2. Monthly 5. Once a term 3. Weekly 4. Daily
37.	.. to learn at their own pace.	- ditto -
38.	.. to undertake their assignments.	- ditto -
39.	.. to find information on the internet.	- ditto -
40.	.. as a tool for demonstrations.	- ditto -
41.	.. to be taught things.	- ditto -
42.	.. to find out about the social implications of computers.	- ditto -
43.	.. to learn together in groups.	- ditto -

*represents a negatively worded item – score reversed when calculating scale value.