

Student teacher attitudes and beliefs towards using ICT as part of inclusive practice: A 2008-2009 pilot survey

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Abstract

In recent years there have been concerns in initial teacher education regarding the lack of attention given to developing students' attitudes and beliefs to prepare them for inclusive education. New Scottish initiatives, such as the Inclusive Practice Project (University of Aberdeen, 2011) have recently been carried out to address such issues and reform teacher education.

Although, it is too soon to determine the extent to which these initiatives have been successful, observational evidence suggests that Newly Qualified Teachers' (NQTs) effective use of Information and Communication Technologies (ICTs) within their inclusive practices is mixed. Since both physical and virtual environments can convey affordances of educational exclusion, it is important that student teachers are prepared for inclusion using ICT.

This paper describes a pilot survey which was conducted to develop a clear picture of student teachers' beliefs and attitudes towards inclusive education when using ICT. The findings from the survey suggest that student teachers' perceive their inclusive practices as not affected by the use of ICT. However, the findings also show that they are unsure about the extent to which ICT can affect inclusive pedagogies.

Keywords: Student teachers; Attitudes and beliefs; Inclusive education and practice; E-learning; Digital divide.

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Introduction

Research into student teachers' attitudes and beliefs towards inclusive education and practice has recently received growing attention in the light of concerns about the adequate preparedness of student teachers to handle particular groups of learners who experience learning difficulties (Donaldson, 2011; Sharma et al, 2008; Lambe and Bone, 2008; 2006; Kershner, 2007; Wilkins and Nietfeld, 2004; Forlin et al, 2004; 2001; 1996).

Today inclusion relates to the placing and retaining of learners who experience difficulties in mainstream classrooms and for them to be taught the same curriculum as all pupils in the school. The research presented in this paper is underpinned by the definition of inclusive education as: 'a process of increasing participation and decreasing exclusion from the culture, community and curricula of mainstream schools' (Booth & Ainscow, 2002). In terms of inclusive practices they represent: 'what people do which give meaning to the concept of inclusion' (Florian, 2008, p. 205). These definitions not only relate to all learners but they also entail inclusive practices carried out by teachers with and through others both inside and outside school.

Florian and Black-Hawkins (2010, p.14) state that 'Our conceptualisation of inclusive pedagogy focuses on how to extend what is ordinarily available in the community of the classroom as a way of reducing the need to mark some learners as different. This is underpinned by a shift in pedagogical thinking from an approach that works for **most** learners existing alongside something 'additional' or 'different' for those (**some**) who experience difficulties, towards one that involves providing rich learning opportunities that are sufficiently made available for **everyone**, so that all learners are able to participate in classroom life'.

In the light of the above definition, pedagogies for inclusion focus on how to extend which ICTs are ordinarily available in the community of the classroom as

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a way of reducing the need to mark some learners as different. It is not about the type of ICT used and its effectiveness to improve pupils' learning but instead about the beliefs and attitudes of teachers towards education inclusion and ICT and the decisions they make when considering how to use ICT in the classroom. For example, since most classrooms in primary schools in Scotland contain computers which have access to the internet, some student teachers believe that pupils with additional support needs should be given preferential access to such computers as a way of allowing these pupils to stay in the classroom with their peers and improving inclusion. They fail to recognise that placing some pupils on a computer in the corner of a classroom on their own to work on materials different to the rest of the class can be considered exclusion, not inclusion.

Recent studies have reported that student teachers' attitudes and beliefs towards inclusive practice are key factors in preparing them to teach children who are excluded from mainstream education (Beacham and Rouse, (in press); Norwich and Nash, 2011; De Boer, Pijl and Minnaert, 2011; Florian, Young and Rouse, 2010 ; Forlin, 2010; Florian and Rouse, 2009; Sharma et al, 2008; Pearson, 2007). However, a concern has been the growing evidence that shows student teachers' beliefs and attitudes tend not to be sustained by the end of Initial Teacher Education courses (Beacham and Rouse, (in press); Vermeulen *et al.*, 2012; de Boer *et al.*, 2011; Lambe, 2011; Savolainen et al, 2011; Forlin, 2010; Florian and Rouse, 2009; Hodgkinson, 2005). Their attitudes and beliefs tend to be positive toward inclusive education and practice at the beginning of their course but their attitudes and beliefs towards inclusive practice become less positive (or more negative) after spending time on school placements. In a recent study, conducted by the Inclusive Practice Project at the University of Aberdeen, investigating new ways to better prepare student teachers for inclusion, reported that student teachers' views whilst sustained showed a realisation that some children are difficult to include in some schools (Beacham and Rouse, (in press); Beacham, 2009; Rouse, 2008).

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There are many reasons for student teachers' views not being sustained. Such reasons can be attributed to factors such as a school's ethos, structure, culture, resources and infrastructure. It is therefore important to study schools' ecologies and children's learning environments inside and outside school to gain a better understanding of why student teachers' views are not sustained during school placements (Hart *et al.*, 2004). Given that ICT plays an increasingly complex and central role in education, this paper focuses on the extent to which student teachers' views towards using ICT in their inclusive practice could be a factor; this in the light of recent findings that show in some sectors of education there has been a decrease in the learners' experience using ICT (Livingstone, 2011; Roberts, 2011; Becta, 2008) in spite of the considerably increased presence of digital technology in education over recent years (Livingstone, 2011; Abbott, 2007).

ICTs can impact on a schools' ethos, structure, culture, resources and infrastructure (Bingimlas, 2009). Whilst there have been many reports of successes, the impact of using ICT in education is mixed (Andrews, 2004, Becta, 2008). Findings from a recent study by Hammond *et al.* (2009) indicated that access, support for, and modelling of ICT use in the classroom were key issues in developing teachers' and learners' effective use of ICT. It has also been suggested such issues relate to some teachers' reluctance to accept technology due to lack of ICT knowledge and skills, negative attitudes towards ICT and lack of understanding of e-pedagogies and resources (Becta, 2008; Toe, 2009). Possessing and developing positive attitudes towards using ICT is important in terms of inclusive practice because a teacher's decisions about deploying digital tools to facilitate the inclusion of all children within the classroom, for example, whether or not or how to use assistive technologies (ATs) such as an Alphasmart, will inevitably be made on the basis of such attitudes (Cook and Hussey, 2002; Khek *et al.*, 2006). It is therefore important that student teachers possess positive attitudes towards both ICT and inclusive education if they are to effectively adopt inclusive teaching practices which incorporate ICT successfully

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(Beauchamp, 2011). To date the development of such multifaceted attitudes tend not to feature centrally in initial teacher education (ITE) programmes and standards (GTCS, 2006; TDA, 2011a). Since many standards seem to focus on basic skills in ICT, a consequence has been that some agencies are considering less not more emphasis on such aspects; for example, the removal of the ICT test as part of the TDA's QTS standards (TDA, 2011b).

Student teachers' rationale for using ICT as part of their inclusive practice and the extent to which their decisions are influenced by their attitudes and beliefs towards ICT, are two aspects that have received little if no attention (Hague and Williamson, 2009). For student teachers to use ICT effectively within inclusive classrooms and to develop effective e-pedagogies for inclusion, it is important that they are aware of how their beliefs and attitudes towards digital technologies reflect and impact on their inclusive practices in the classroom, and how their attitudes and beliefs towards inclusive practice reflect and impact on their use of digital technologies. Studies that exist tend to focus on access to ICT, on digital contents and on support networks available via ICT (Keating *et al.*, 2009). They fail to address the broader aspects based on well founded theories and principles of inclusive education, such as those covered by Hart's (2004) theory of transformability.

In order to develop a clearer understanding of student teachers' views towards inclusive practice and digital technology a pilot study was carried out. The main purpose of the study was to investigate student teachers' views towards using ICT within their inclusive practices. It explored the views of student teachers tasked with accommodating individual differences using ICT while avoiding or minimising actions that would stigmatise or mark some pupils as different. The study aimed to determine:

- To what extent do student teachers report positive beliefs and attitudes towards using ICT within inclusive practices; and

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- To what extent do student teachers who studied inclusive education in greater depth report positive beliefs and attitudes towards using ICT within inclusive practices.

Findings from the study are important in informing future research and policies on equality and e-safety in education, such as the future reform of teacher education and the use of digital technologies such as mobile phones, assistive technologies and virtual learning environments in schools.

Methodology

The pilot study involved distributing a survey to 354 primary and secondary student teachers who had recently completed a Postgraduate Degree in Education (PGDE) course within one Scottish university during 2008-2009. In each primary and secondary student cohort there were student teachers of varying age, gender and teaching experience.

Data from the survey allowed demographic comparisons to be made of the student teachers' attitudes towards and beliefs about using ICT as part of inclusive education and practice in terms of students' gender, programme, age and ICT confidence. Comparisons were also made between the views of students who had studied an optional further professional studies module 'Learning without Limits' (LWL) and those that had not.

Although the PGDE had inclusive education as a central theme running through the entire course, a small number of students (limited to twenty five) elected to study the theory and principles of inclusive education in greater depth as part of the optional module 'Learning without Limits'. The module is grounded in the concept of 'Transformability' as outlined by Hart *et al.*, (2004) and is underpinned by research carried out by Black-Hawkins, *et al.*, (2007). This theoretical framework is founded on three key principles, summarised as co-agency, everybody and trust, which are themselves premised on affective, social and intellectual purposes of learning. These principles play an instrumental role in the

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choices made by pre-service teachers. The study of this particular group of pre-service teachers was important because it was hypothesised that these individuals would not only retain their positive attitudes and beliefs relating to inclusive education and practice, but that these positive views would be reflected in their beliefs about and attitudes towards using digital technology within their practice.

The key section of the survey, containing 18 items, focuses on student teachers' views of using ICT within inclusive practice (see Appendix A). The first 16 items obtain student teachers' attitudes and beliefs towards using ICT in their inclusive practice, in the form of a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. These items have been derived from the theoretical framework 'Transformability', and digital exclusion 5Cs framework (Beacham & Rouse, in press; Bradbrook & Fisher, 2004) and are discussed further by Beacham (2011). Appendix A. lists the items used. The items are based on the fact that the student teachers in the targeted sample had studied inclusive education as part of their PGDE course and had adopted inclusive practices in their school placements. Each ICT item relates to aspects of inclusive education which involve accommodating individual differences using ICT while avoiding or minimising actions that would stigmatise or mark some pupils as different. For example, the item '*Teaching is more difficult using ICT*' sought to ascertain if they viewed using ICT as being more difficult when using ICT within consciously selected inclusive practices.

In the form of open-ended questions, the remaining two items ask students to describe the main difficulties and experiences using ICT in their inclusive practice. The final part of the section asks students to disclose whether they had their own computer, had access to the internet at home, and had used different types of ICT in their teaching practice.

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A small panel of leading international experts in the field of education inclusion and e-learning was formed to help support the development of the questionnaire. The panel helped select and clarify those items derived from the theoretical framework 'Transformability', and digital exclusion 5Cs framework (Beacham & Rouse, in press; Bradbrook & Fisher, 2004). Before the questionnaire was finalised, it was also reviewed and trialled by the panel.

Whilst questionnaires have their limitations, the methodology adopted a questionnaire approach in an attempt to acquire a broad perspective of student teacher's views in a standardised or more objective way which focus groups and interviews could not deliver (Cohen *et al.*, 2007). It was also evident from past studies on inclusion (Beacham, 2009) that enthusiastic and willing student teachers with positive attitudes towards inclusion were often more prepared to volunteer to attend focus groups and interviews. By distributing questionnaires, the study aimed to obtain views from all the targeted student teachers regardless of their attitudes towards inclusion.

Results

Demographic Results

The table below provides a summary of the demographics of student teachers who had taken part in the survey. Table 1. provides an account of the number of student teachers who completed the pilot survey, the percentage of respondents in terms of gender, age group, age at which they decided to become a teacher, programme studied (primary or secondary), and whether they had experience in working in schools, in disability and in diversity.

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Table 1: Demographics

Respondents =241 of 354 (68% response rate)						
Gender	Male	Female				
	25.7% (62)	74.3% (179)				
Age	Under 25	25-29	30-34	35-39	40-45	46+
	46.1%	22.0%	11.6%	5.8%	8.7%	5.8%
Age decided to be a teacher	Under 15	16-20	21-25	26-35	36-45	46+
	14.1%	22.0%	32.8%	19.1%	9.1%	1.7%
Programme	Primary	Secondary				
	56.4%	43.6%				
Working in a school	Experience	No experience				
	83.4%	16.6%				
Disability	Experience	No experience				
	58.5%	41.5%				
Diversity	Experience	No experience				
	58.1%	41.9%				

The data from this sample showed that the majority of student teachers were female, aged 25 or under, and had experience working in a school. There were similar numbers of student teachers in each cohort taking primary and secondary programmes respectively. There were also similar numbers of student teachers in the group that had and had not had experience of disability and diversity prior to joining the PGDE programme.

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ICT Access

As represented in Figure 1., data from the survey showed that the overwhelming majority of student teachers had access to their own computer and the internet at home (99.2% and 96.7% respectively). There was only one student teacher, a female individual, under 25 years old, studying to be a primary teacher, who did not have access to a computer at home. In terms of those who did not have access to the internet from home (3.3% of the sample), this comprised 6.5% of males and 1.7% of females.

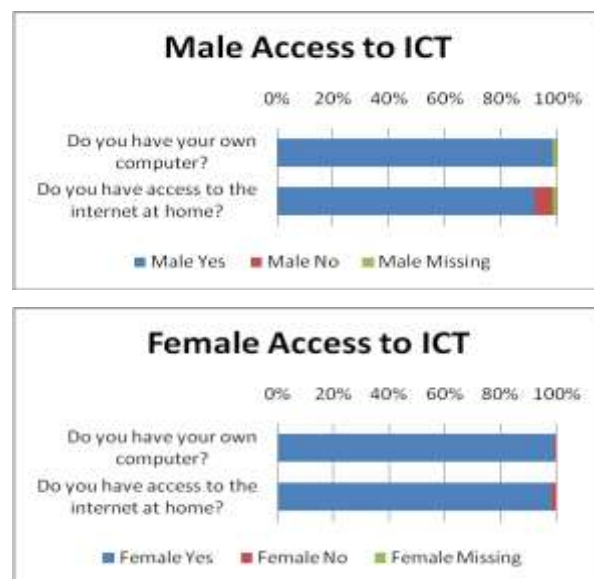


Figure 1. Access to computer between genders

From a programme perspective, 2.9% of primary student teachers and 2.9% of secondary student teachers had no access to the internet at home. Of these students without internet access from home, 4.5% were under 25 years old and 1.9% of them were between 25-29 years old. All student teachers over the age of 34 had internet access at home.

Using ICT in Placement

The overwhelming majority of the student teachers used some form of ICT in their school placements (figure 2). The most used form of ICT was a desktop

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(92.1%) followed by interactive whiteboard, digital camera, laptop and email. The forms of ICT used least in placement were personal digital assistants, video conferencing, calculators, wikis, electronic discussion boards, voice readers, assistive technology, and blogs. Of those who did use ICT in their placement, 10-20% used camcorders, mobiles, and iPods or MP3 players.

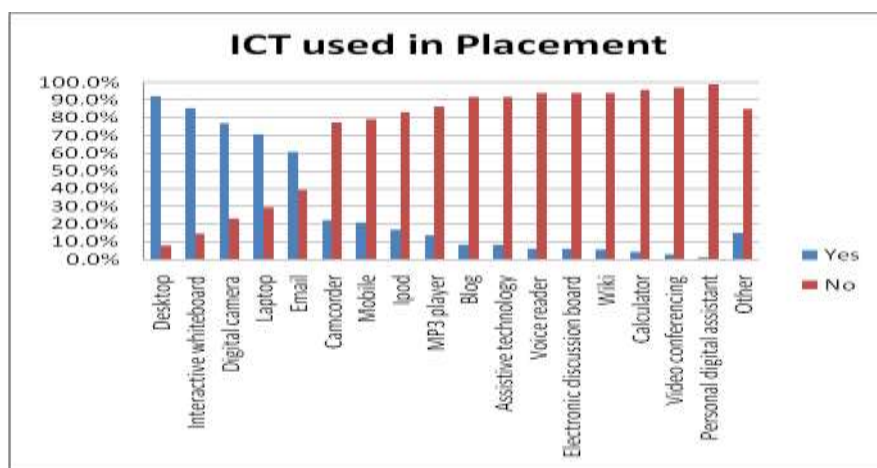


Figure 2. Types of ICT used by student teachers in school placements.

There was no difference between genders in their use of ICT in their placements, except for those student teachers who used wikis. Of those student teachers who used wikis, MP3 players and iPods, the majority tended to be by male than female students. More females than males used digital cameras. A Mann-Whitney U test indicated that there were some significant differences in the use of ICT in placements across programmes. Of those who used laptops ($U=5806.5$, $p=0.002$), interactive whiteboards ($U=6206.0$, $p=0.004$) and digital cameras ($U=4537.0$, $p=0.000$) the majority tended to be primary. Although, statistically too small a result to report, of those who used video conferencing the majority of student teachers tended to be secondary.

Overall Results of Student Teachers Attitudes towards ICT for Inclusion

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As shown in Figure 3., in terms of student teachers' views towards ICT for inclusion, the majority of student teachers (85.0%) disagreed that '*Teaching is more difficult when using ICT*' with their inclusive practices.

The majority of student teachers also disagreed with the following statements: '*ICT should only be used to reward children*' (93.7%); '*Using ICT in the classroom makes collaborative group work more difficult*' (83.8%); '*Only one child at a time can learn when using ICT*' (95.5%); and '*Allowing ICT to be used by some children in the classroom is detrimental to the learning of others*' (65.5%).

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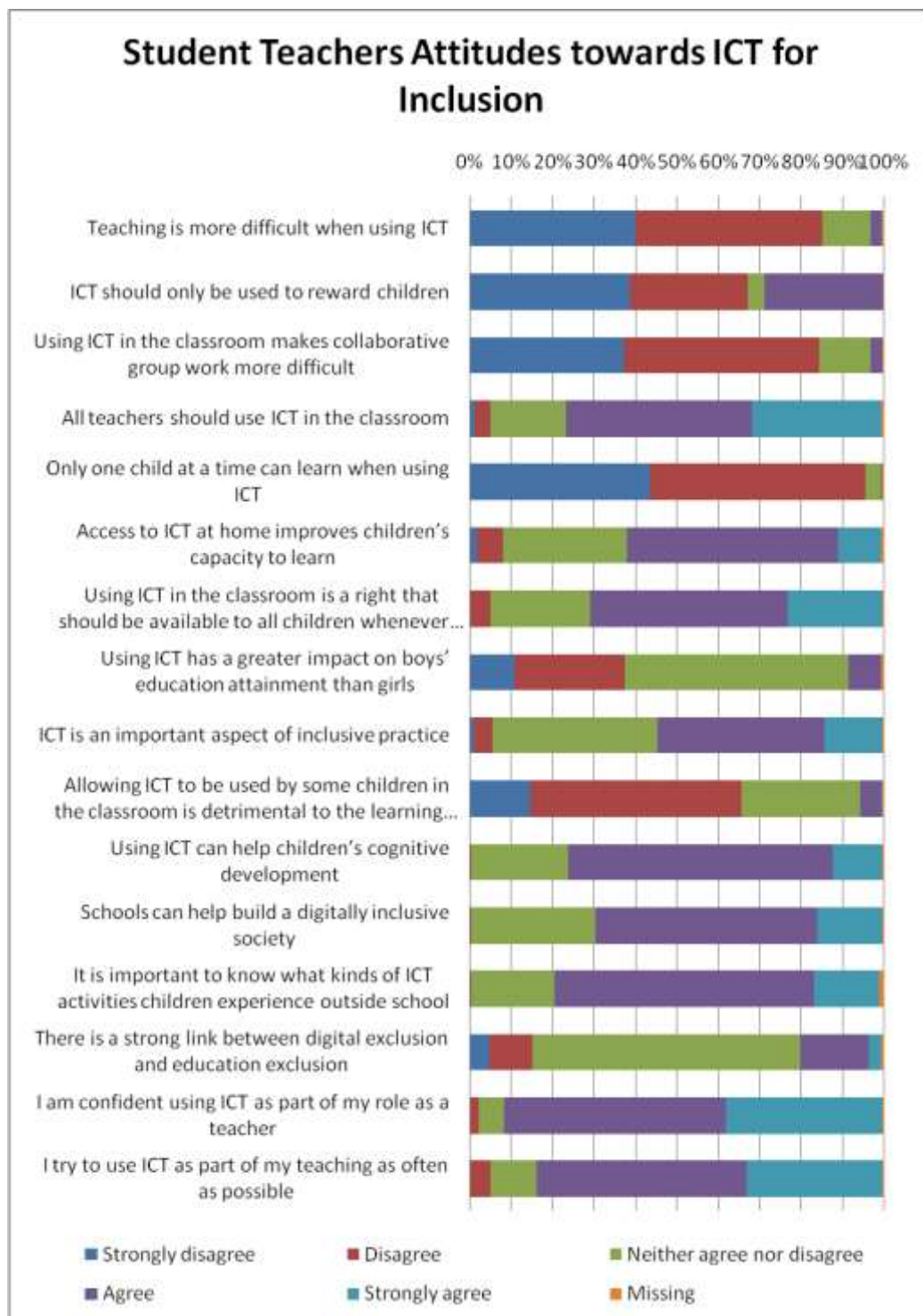


Figure 3. Student teachers views' towards using ICT for inclusion

Alternatively, the majority of student teachers agreed that '*All teachers should use ICT in the classroom*' (75.9%); '*Access to ICT at home improves children's*

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capacity to learn' (61.4%); *'Using ICT in the classroom is a right that should be available to all children whenever possible'* (70.5%); *'ICT is an important aspect of inclusive practice'* (54.3%); *'Using ICT can help children's cognitive development'* (75.9%); *'Schools can help build a digitally inclusive society'* (70.0%); *'It is important to know what kinds of ICT activities children experience outside school'* (69.3%); *'I am [they are] confident using ICT ... as a teacher'* (91.3%); and that *'I [they] try to use ICT as part of ... teaching as often as possible'* (83.4%).

The majority of student teachers who neither agreed nor disagreed did so with the items *'Using ICT has a greater impact on boys' education attainment than girls'* (53.9%), and *'There is a strong link between digital exclusion and education exclusion'* (64.7%).

Inferential Results

Gender

As shown in Figure 4., when comparing student teachers' views between genders, there were no significant differences between male and female student teachers' perceptions towards their confidence, motivation to use ICT and access to ICT and the internet from home.

When comparing the student teachers' views towards ICT for inclusion between genders, a Mann-Whitney U test showed that there were significant differences in views between male and female student teachers for the following items:

'Teaching is more difficult when using ICT' (U=4297.0, p=0.004) and *'Access to ICT at home improves children's capacity to learn'* (U=4404.0, p=0.008). AND?

A cross-tabulation showed that whilst very few student teachers agreed that *'Teaching is more difficult when using ICT'*, male students had significantly greater negative attitudes towards the item than female student teachers. There were also a sizeable percentage of female student teachers (13.4%) which neither agreed nor disagreed. The findings seem to suggest that the male

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student teachers in the study perceive using ICT less difficult than female student teachers.

A cross-tabulation also showed that whilst very few student teachers disagreed that '*Access to ICT at home improves children's capacity to learn*', male students had significantly greater positive attitudes towards the item than female student teachers. There were also a sizeable percentage of female student teachers (33.0%) which neither agreed nor disagreed. The findings seem to suggest that male student teachers in this study have more positive attitudes towards improving children's capacity to learn using ICT at home.

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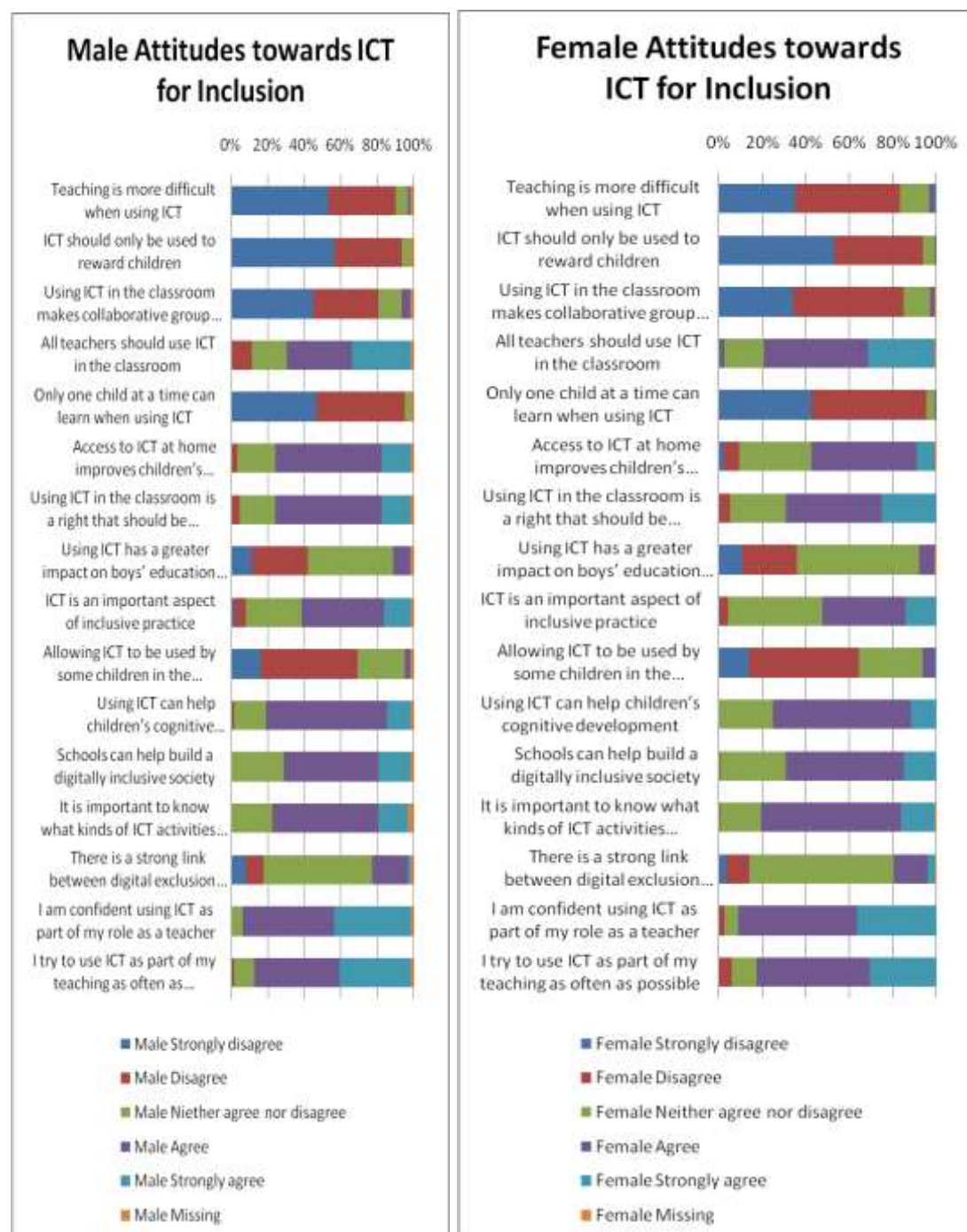


Figure 4. Student teachers' views towards using ICT for inclusion between genders

Primary and Secondary Programmes

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As shown in Figure 5, comparing student teachers' views between programmes showed that there were no significant differences between primary and secondary student teachers' perceptions of their confidence towards ICT and access to ICT and the internet from home.

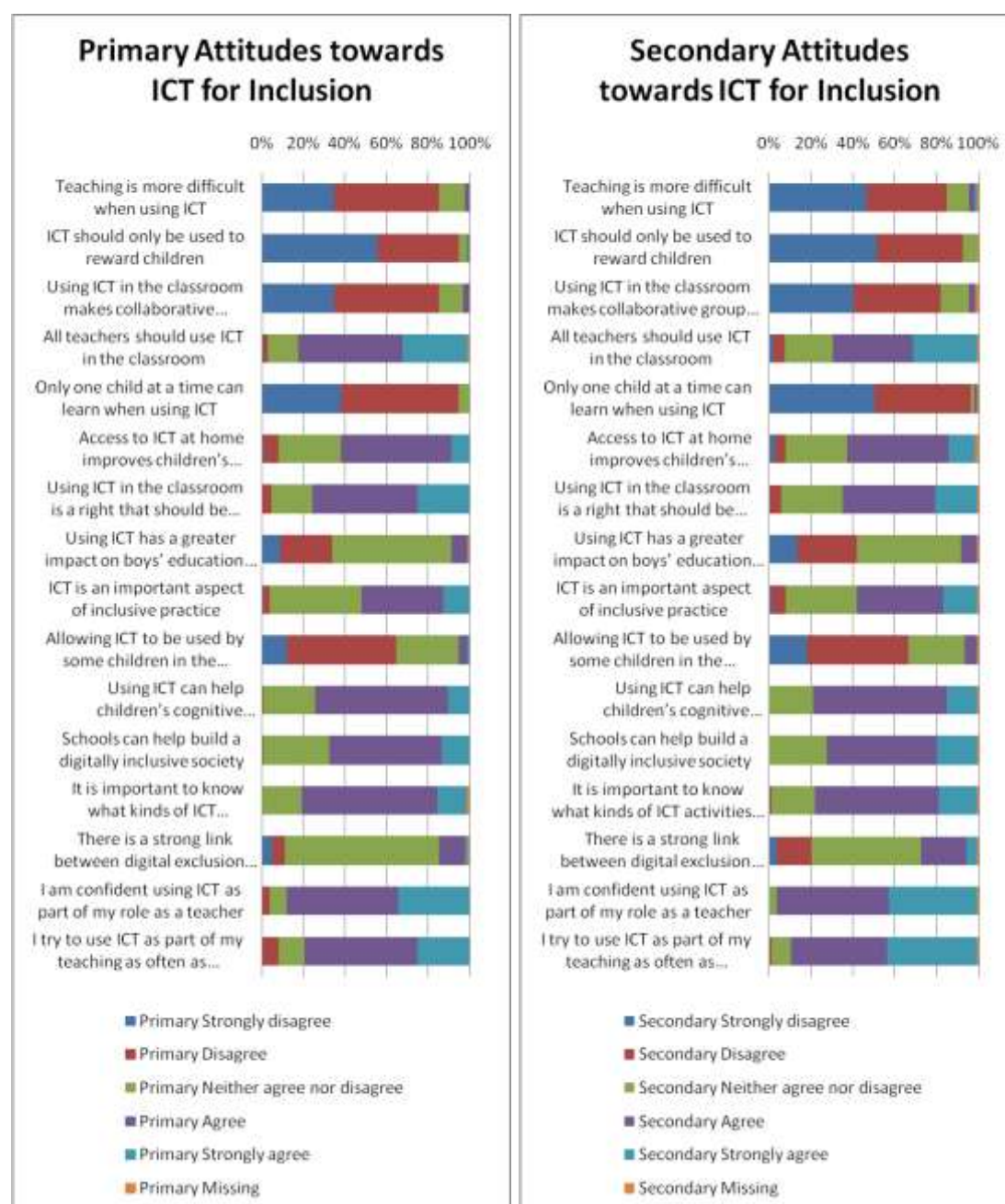


Figure 5. Students' views towards using ICT for inclusion between programmes.

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A Mann-Whitney U test showed that there were significant differences in views between primary and secondary student teachers for the following items: '*Only one child at a time learn when using ICT*' (U=6123.0, p=0.032); and '*I try to use ICT as part of my teaching as often as possible*' (U=5604.0, p=0.002). The item '*Using ICT in the classroom is a right that should be available to all children wherever possible*' (U=6226.5, p=0.067) was also close to significant. A cross-tabulation showed that whilst the majority of student teachers agreed that '*I [They] try to use ICT ... as often as possible*', primary student teachers seemed to have less positive attitudes than secondary student teachers. There was a sizeable percentage of primary student teachers that either disagreed or neither agreed nor disagreed (20.6%).

A cross-tabulation showed that whilst few student teachers disagreed that '*Using ICT in the classroom is a right that should be available to all children wherever possible*', there were significantly more primary student teachers with more positive attitudes towards the item. A sizeable number of secondary student teachers (29.5%) neither agreed nor disagreed. The findings seem to suggest that fewer secondary student teachers perceive the use of ICT as a right by all children in the classroom.

There was also a significant difference (Chi-Squared=15.990, p=0.003) between student teachers' attitudes towards the item '*There is a strong link between digital exclusion and educational exclusion*' across programmes. There were a greater percentage of secondary student teachers with either positive or negative views than primary views.

There was a significant difference between student teachers' attitudes towards the item '*Schools can help build a digitally inclusive society*' when comparing students using desktops in placement (Chi-Squared =8.047, p=0.045), using AT in placement (Chi-Squared =14.601, p=0.002) and experience working in schools

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(Chi-Squared =7.963, $p=0.047$). More of those who worked in schools agreed with these statements.

Age Groups

Comparing student teachers' views between age groups showed that there were no significant differences between the age groups of student teachers' perceptions of their confidence and motivation towards using ICT and access to ICT and the internet from home.

A Kruskal Wallis test showed that there were significant differences in views between the age groups of student teachers for the following items: '*Allowing ICT to be used by some children in the classroom is detrimental to the learning of others*' (Chi-Squared=14.272, $p=0.014$), and '*There is a strong link between digital exclusion and education exclusion*' (Chi-Squared=11.558, $p=0.041$).

As shown in figure 6, a cross-tabulation showed that of those who were 46+, the majority (92.8%) either disagreed or strongly disagreed. Of those that disagreed, the majority were in the age range 30-34 and 35-39. Of those who were aged 40-45 38.1% neither agreed nor disagreed, and of those who agreed the majority (8.1%) were in the age range under 25.

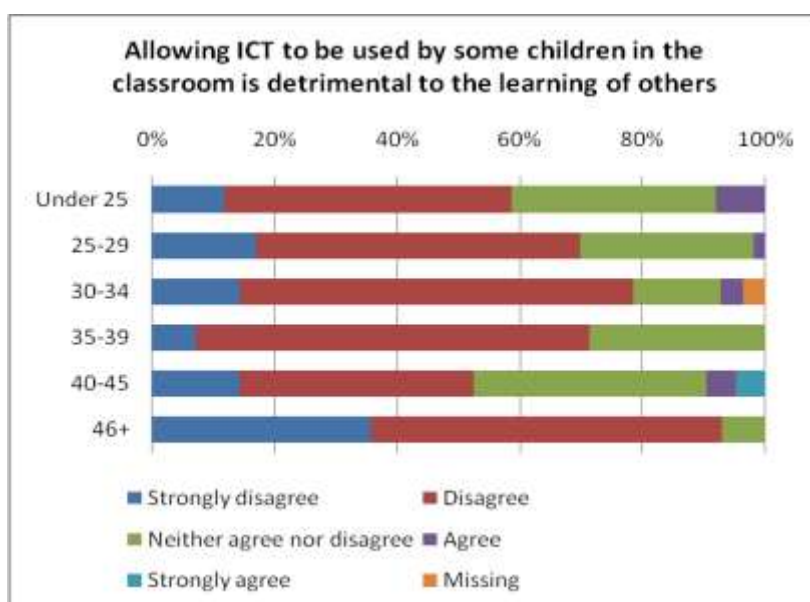


Figure 6: Students' views towards using ICT for inclusion between age ranges

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As shown in figure 7:, a cross-tabulation showed that whilst the majority of age ranges neither agreed nor disagreed, there was a greater percentage of those in the 35-39 age ranges (50.0%) who agreed that '*There is a strong link between digital exclusion and education exclusion*'. Furthermore, there was a sizable percentage of those aged 46+ who strongly disagreed (21.4%). The findings also seem to show that, except for those aged 35-45, there is an increasingly small percentage of student teachers who either disagree or strongly disagree as age increases; with 12.6% aged under 25 leading to 28.5% aged 46+.

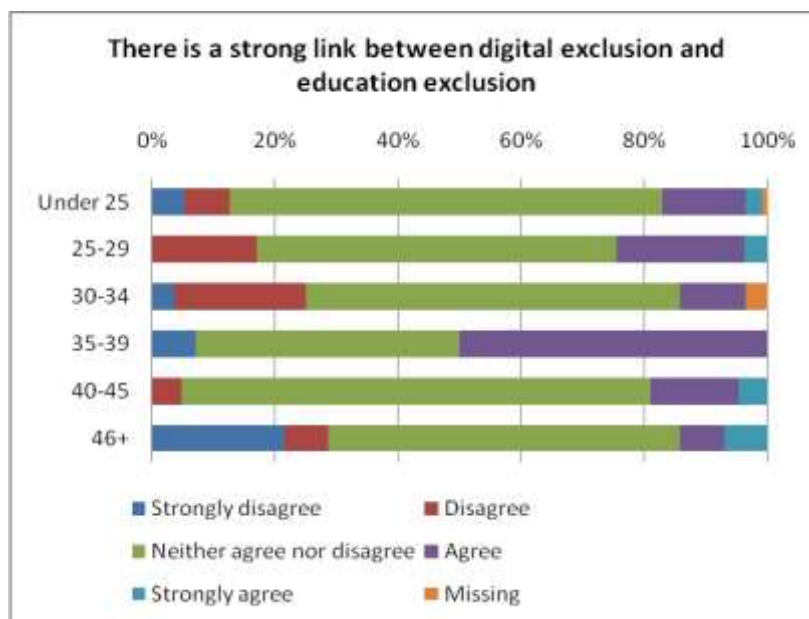


Figure 7. Student teachers' views towards using ICT for inclusion between age ranges.

LWL and Non-LWL

Comparing student teachers' views between those who studied and did not study the optional module Learning without Limits (LWL) showed that there were no significant differences between the LWL and Non-LWL student teachers' perceptions of their confidence and motivation towards using ICT and access to ICT and the internet from home. There were also no significant differences in use of ICT in placements across the LWL and non-LWL groups.

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A Mann-Whitney U test showed that there were significant differences in views between LWL and Non-LWL student teachers for the following items: '*Schools can help build a digitally inclusive society*' (U=1012.5, p=0.034). The item '*Only one child at a time can learn when using ICT*' (U=1069.0, p=0.055) was also close to significant.

As shown in Figure 8., a cross-tabulation showed that the majority (53.8%) of the LWL group neither agreed nor disagreed that '*Schools can help build a digitally inclusive society*' whilst the majority (53.9%) of the Non-LWL agreed. There was also a sizeable percentage of the Non-LWL group (16.7%) that strongly agreed.

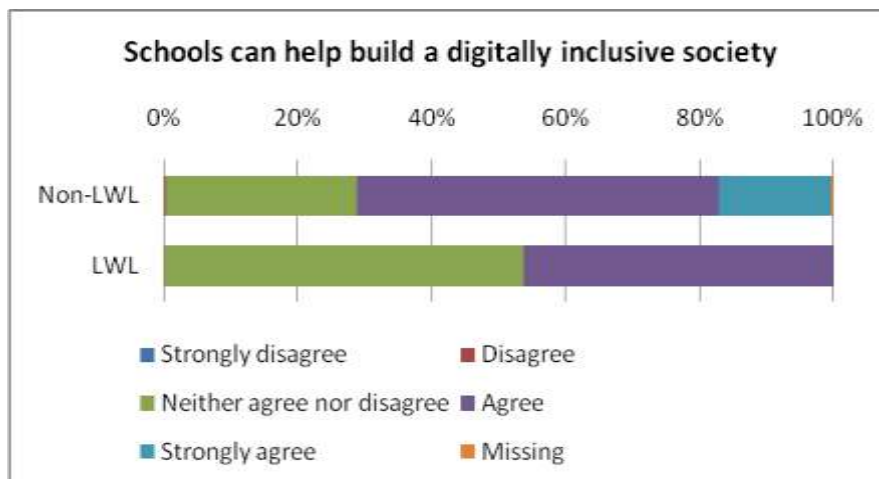


Figure 8. Student teachers' views towards using ICT between LWL and non-LWL groups.

As shown in Figure 9., a cross-tabulation showed that whilst the majority disagreed that '*Only one child at a time can learn when using ICT*' there was also a sizeable percentage (15.4%) of student teachers in the LWL group that neither agreed nor disagreed.

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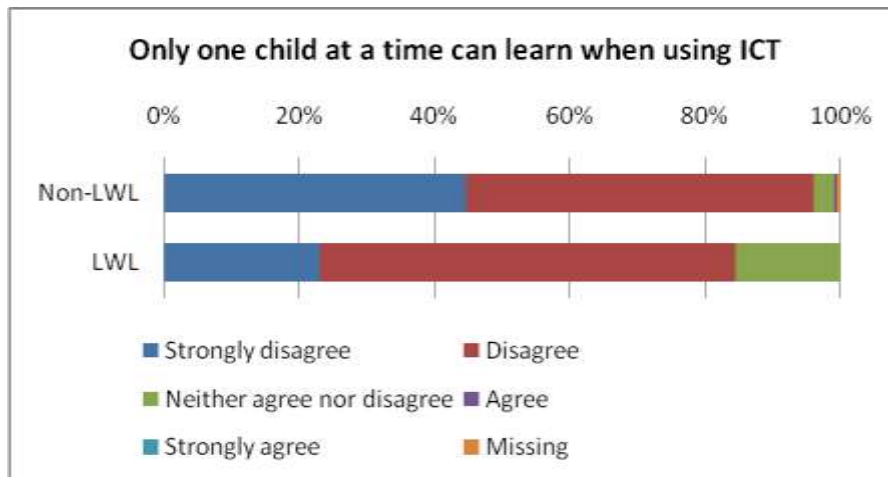


Figure 9. Student teachers' views towards using ICT for inclusion between LWL and non-LWL groups.

Discussion

The findings seem to suggest that the majority of student teachers who took part in the survey:

- do not view inclusive practices (particularly collaborative activities) more difficult using ICT;
- do not feel they use ICT to discriminate between good and bad behaviour;
- do not feel that using ICT impacts on the education attainment of boys more than girls; and
- do not feel allowing ICT to be used by some pupils is detrimental to the learning of others.
- Similarly, the majority of the student teachers:
- do feel confidence using ICT and use it as often as possible as part of their inclusive practices;
- do feel all children can learn using ICT even when passively watching others;
- do feel children's capacity to learn is improved if having access to ICT at home;
- do feel all children have a right to use ICT whenever they wish; and

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- do feel that ICT is an important aspect of inclusive practice; and that schools can help to build a digitally inclusive society.
- From these findings it is suggested that the student teachers did not feel inclusive practices were inhibited by the use of ICT. They also suggest that because the use of ICT did not directly prevent pupils from taking part in lessons, that inclusion and their inclusive strategies were not impeded.

Given that there is growing evidence linking digital exclusion and educational exclusion (Benson *et al.*, 2002; Bozionelos, 2004; Warschauer *et al.*, 2004; Casacuberta, 2007; DfCLG, 2008; Bingimlas, 2009; Keating *et al.*, 2009, Selwyn and Facer, 2007), and since in this study the data indicate students' uncertainty of a link between digital exclusion and education exclusion, it seems likely that many student teachers may not be fully aware of the impact that ICT can have on their inclusive practice. One possible explanation is that student teachers often plan inclusive practices incorporating ICT without a full appreciation that ICT changes the impact of pedagogies. In the case of adopting inclusive pedagogies, ICT can actually exclude, not include, learners at the point of use (Warschauer *et al.*, 2004). An obvious case is when ICT fails to work and the teacher is left to resolve the problem. Along with their peers, children with additional support needs can be left to cope for themselves while the issue with the ICT is resolved. It is therefore important that student teachers are given time and space to reflect on such situations from both a technological and an inclusive pedagogical perspective, and to develop e-pedagogies for inclusion that enable them to cope with such situations (Waycott *et al.*, 2010).

It is also interesting to note that in the data:

- There seemed to be a difference between male and female views in terms of the difficulties of using ICT in teaching and whether access to ICT at home improves children's capacity to learn.
- There seemed to be a difference between primary and secondary teachers' views in terms of using ICT as often as possible, the rights of pupils to use

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ICT whenever possible, and the extent to which there is a link between digital exclusion and education exclusion.

- There seemed to be a difference between the views of younger and older age groups of student teachers' in terms of whether allowing some pupils to use ICT is detrimental to the learning of others.

Such findings might be explained by the relative large number of male students in the age range 35-45 training to be secondary school teachers, and the cultural and structural differences between primary and secondary sectors.

The findings comparing the LWL and the non-LWL groups seem to suggest that either more students within the LWL group were unsure about how schools help build digitally inclusive society, or that they were more aware of the barriers that digital technology cause during inclusive practices.

This pilot study raises a number of areas for further enquiry. First, the link between student teachers' views towards ICT and inclusive practices and, second in terms of social inclusion, the link between digital inclusion and education inclusion (DfCLG, 2008).

From the literature there is evidence to suggest that decisions about ICT use can affect pedagogical practice (Booth, 2009; Loveless *et al.*, 2001). This prompts the questions: to what extent do decisions made about ICT use affect inclusive pedagogical practices and in what ways? Interestingly in this study, all students did not seem aware of any influences afforded by ICT taking place; reporting that ICT did not impact on their inclusive practices. More research is therefore needed to determine the extent to which student teachers' knowledge and understanding of educational exclusion relates to accessibility (such as access to the curriculum using specific ICT) or reflects a broader view of ICT for inclusion. It is evident from past studies that student teachers' views of ICT is based on their experience gained during their course as well as their lack of experience using ICT in their inclusive practices during school placements (Hammond *et al.*,

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2009). Such evidence is supported by this study. In this study the student teachers tended to view using ICT for inclusion in the classroom to help improve access to the curriculum. Very few if any viewed using ICT for inclusion in a broader sense of education, such as using ICT to increase learners' sense of empowerment, trust, participation, collaboration, achievement or belonging both inside and outside school (Hughes *et al.*, 2002).

Implications for Policy and Practice

Whilst this study highlights that some student teachers are unaware of the broader influences ICT can have on inclusive pedagogy, it also raises implications for policy and teacher education.

In Scotland, the findings in this paper have implications for initiatives such as 'Curriculum for Excellence' (Scottish Executive, 2004), 'Assessment is for Learning' (Learning and Teaching Scotland, 2005), the 'Additional Support for Learning (Scotland) Act 2004' (Scottish Executive, 2005) and 'Getting it Right for Every Child' (Scottish Executive, 2005). In terms of 'Curriculum for Excellence' where there is an emphasis on 'knowing what' and 'knowing how', in future it is important to develop student teachers' positive attitudes towards and beliefs about both inclusive practice and ICT so all pupils experience full participation learning together, not only in traditional learning environments but also in both virtual and augmented reality learning environments. In terms of the initiative 'Assessment is for Learning' where there is a greater emphasis on formative assessment within the curriculum, in future it is important to develop student teachers' positive attitudes towards and beliefs about both inclusive practice and ICT so that all pupils experience using digital technologies as a way of receiving feedback from teachers, parents and other pupils. In terms of The Education (Additional Support for Learning) (Scotland) Act 2004 which introduces a new system for identifying and addressing the additional support needs of children and young people who face a barrier to learning, it is important to continue to develop student teachers' attitudes towards and beliefs about both inclusive

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practice and ICT so that all pupils can use ICT to support each other when faced with such barriers to learning. In terms of the policy 'Getting it Right for Every Child' which attempts to bring together education, health and social services to ensure that children will get help when and where they need it and that everyone who works with children uses fair and consistent approaches, it is equally important to continue to develop student teachers' attitudes towards and beliefs about both inclusive practice and ICT so that the technological and pedagogical factors associated with exclusive education are able to be addressed.

In teacher education, ICT tends to be taught as a separate subject. It is either taught as a separate module in undergraduate and postgraduate courses, or as a separate course through continuing professional development. Many focus on the digital tools available for learning, ICT skills for use in the workplace and how ICT can be used to improve access to information and the curriculum, particularly for learners with learning difficulties. It has been observed during this study that whilst such courses have focused on pedagogical aspects of ICT, they do not tend to address the broader aspects of inclusive pedagogies in so far as considering for example how children could better participate in mainstream education by addressing aspects of digital exclusion inside and outside school. Similarly, educational inclusion in teacher education tends to be taught as a separate subject. It too, whilst focused on pedagogical aspects of inclusion, tends not to address ICT affordances in relation to inclusion. Such affordances are important in inclusion, as reiterated by the students in this study. Such courses need to broaden their focus not just in terms of considering the positive impact ICT can have on learners' ability to participate inside and outside schools, but also in terms of considering virtual and remote aspects of participation, identity, empowerment and trust (Hart *et al.*, 2004).

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Appendix A

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Teaching is more difficult when using ICT

ICT should only be used to reward children

Using ICT in the classroom makes collaborative group work more difficult

All teachers should use ICT in the classroom

Only one child at a time can learn when using ICT

Access to ICT at home improves children's capacity to learn

Using ICT in the classroom is a right that should be available to all children whenever.

Using ICT has a greater impact on boys' education attainment than girls

ICT is an important aspect of inclusive practice

Allowing ICT to be used by some children in the classroom is detrimental to the learning...

Using ICT can help children's cognitive development

Schools can help build a digitally inclusive society

It is important to know what kinds of ICT activities children experience outside school

There is a strong link between digital exclusion and education exclusion

I am confident using ICT as part of my role as a teacher

I try to use ICT as part of my teaching as often as possible

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