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Girls, Boys and ICT in the UK: An Empirical Review and Competing Policy Agendas

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ABSTRACT

This article examines the empirical research looking at girls' and boys' relationship to ICT in the UK secondary school context. The empirical evidence base is discussed in terms of differences in access, use and experience, attitudes, confidence and self-efficacy, motivation and attainment. This paper highlights the competing UK policy agendas operating in this sphere that attempt to address various 'problems', and which impact differentially on girls' and boys' relationship with ICT. The employment policy agenda responds to a context of a recognised skills shortage in ICT professions, where women are seen to be able to plug the 'skills gap'. This has lead to various initiatives to encourage school-aged girls to engage with ICT so that they do not automatically rule out ICT linked professions. This paper will discuss one such initiative, Computer Clubs for Girls - an out of school computer club for girls 10 - 14 which aimed to change the perception of an ICT career. Another competing policy agenda can be seen in ICT policy in secondary schools, which seems to be increasingly subsumed into the wider push to increase boys' attainment. ICT is seen as a way to motivate boys in school, thereby contributing to increased attainment. This paper argues that there is a clear need for more synergies to be created between the different policy agendas and that ICT and gender equality strategies need to be mainstreamed throughout the education and employment spheres.

KEYWORDS

Secondary Education; girls' and boys' relationship to ICT; boy's underachievement

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INTRODUCTION

Specialists in gender and technology studies are familiar with the statistical picture of the under-representation of girls and women in technology related education and employment. Despite female predominance in undergraduate enrolments in many parts of the 'developed' world (59% in Australia, 55% in North America, and greater than 50% in many European Union countries), girls are not pursuing ICT study in tertiary education in these parts of the world. They only account for 10-30% of students studying ICT courses and form under 20% of employees in ICT professions (Miliszewska and Moore, 2010). There have been various explanations developed to account for the under-representation of girls in ICT related studies at the secondary level. These often revolve around charting gender differences in interests, motivation, experience, personality characteristics, abilities, self-efficacy, stereotypes and socialization (ibid). These elements are subsequently seen to affect career choice resulting in the under-representation of girls and women in the ICT educational sphere and the labour market.

There has however, been a lack of empirical research looking at how wider contextual issues, and more specifically the policy context, can affect girls and boys relationship with ICT at the secondary level.[1] Castaño and Webster's (2011) paper in this issue highlights how women's under-representation in ICT cannot be conceived in a social, institutional and cultural vacuum. Whilst there has been a great deal of research conducted looking at why girls do not choose ICT studies - there has been an absence of research that has attempted to link the empirical evidence base of girls' and boys' relationship to ICT at the secondary level to the wider policy context (see Faulkner and Stewart, 2003 for a good example of this approach). There are various gendered policy agendas emanating from the employment, educational, and ICT policy spheres that attempt to achieve a wide range of objectives. This paper explores how two of these policy objectives a) increasing the numbers of women in ICT employment, and b) increasing boys' overall attainment in education (relative to girls) through ICT, differentially affect girls' and boys' relationship with ICT at the secondary level. Attempts have been made to address the first of these objectives through specific targeted initiatives (for example, Computer Clubs for Girls), whilst the second objective forms part of the wider ICT and education policy agenda that shapes how ICT is used in the classroom. This paper argues that specific targeted interventions, like computer clubs for girls, need to be embedded and mainstreamed into a broader gender equality strategy covering both the education and employment spheres.

In terms of the employment agenda policy-makers have responded to a recognised skills shortage. The report *Skills for Jobs: Today and Tomorrow: The National Skills Audit for England, 2010* (UK Commission for Employment and Skills [UKCES], 2010) highlights the computing industry as currently having the combination of the greatest economic significance and greatest skill deficiency. E-skills UK's (2010) *Technology Insights 2011* highlights how in the UK "gender remains a significant and worsening issue and in 2010 just 18% of IT and telecommunications professionals were female" (p.8). It is therefore unsurprising

that women have been identified as potentially providing an untapped pool of future ICT professionals (for the U.K., see Millar and Jaggar, 2001). The issue of girls' engagement with ICT is therefore usually conceived of in relation to their future participation in the labour market. This predominant approach is reflected in the majority of international literature on this subject matter. For example: Barker and Asprey's (2006) *The State of Research on Girls and IT* focuses on the US context; Gras-Valazquez et al.'s (2009) *Why are girls not attracted to ICT studies and careers?* is a comparative study looking at these issues in five European countries (Italy, Poland, UK, Netherlands and France); and, Miliszewska and Moore's (2009) *Encouraging Girls to Consider a Career in ICT: A Review of Strategies*, looks at these issues in the Australian context. This approach can be seen as embodied in specific targeted policy interventions that try to engage with girls in order to stimulate their interest in ICT and ensure that ICT is not ruled out as a viable occupational choice. This paper will briefly discuss one such intervention in the UK, Computer Clubs for Girls (CC4G).

There are however other competing policy agendas operating in the UK which shape and are shaped by girls' and boys' relationship to technology in the secondary school context. For example, ICT policy in secondary schools seems to be increasingly subsumed into the educational policy-makers' goal of increasing boys' attainment. Incorporating the use of ICT into lessons is currently seen as an innovative means to achieve this aim across all subject areas. The European Commission report *Gender Differences in Occupational Outcomes: Study on the Measures Taken and the Current Situation in Europe* highlights how "targeting gender-based attainment patterns has been found to be a specific policy priority. This is particularly connected to the under-achievement of boys in schools" (Eurydice, 2010, p.109). This approach of educational policy-makers has increasingly affected ICT policies in UK schools. For example, Bannister (2008) argues that the UK national strategy outlined in *Harnessing Technology: Transforming Learning and Children's Services* (Dept. for Education and Skills [DfES], 2005) explicitly includes attempting to close the attainment gap as one of its main objectives. Bannister also highlights that, in terms of specific ICT policy initiatives, the following have been identified as having an implicit gender dimension: interactive whiteboards, personalized learning, home access and computer based learning. One can see how the evidence base that charts boys' greater home use of ICT, greater computer game use, and how ICT motivates boys more than girls is being tapped into in ICT policy in order to raise boys' attainment in general. The effects of these developments however are yet to be studied in relation to girls' relationship to ICT at the secondary level.

The following section examines girls' and boys' representation in ICT GCSE and A-level, and Computing A-level in the UK in the years 2005 and 2010 in order to draw the statistical picture of representation in ICT and computing exams over a period of 5 years.[2]

UK GIRLS' REPRESENTATION IN ICT GCSE AND A-LEVEL AND COMPUTING A-LEVEL

Subject choice for GCSE exams (usually taken at age 16) is recognised to be linked to a gendered process. A DfES report *Gender and Education* (2007) noted the important gender differences in subject choices at GCSE level:

> Taking the 10 most popular GSCE choices, 9 out of 10 GCSE subjects are chosen by both boys and girls. Nonetheless many subjects show gender stereotypical biases with girls more likely to take arts, languages and humanities and boys more likely to take Geography, Physical Education and IT. (p.3).

In terms of girls' representation in GCSE and A-level ICT and computing in 2010 we can see how girls' are under-represented -as they formed under 50% at all exam levels. The number of girls taking GCSE ICT and A-level ICT examinations has actually risen very slightly in the years from 2005 to 2010, despite an overall decrease in the numbers of young people taking these examinations. In 2010, 44.4% of those taking GSCE ICT in the UK were girls. This was a very slight increase in comparison with 2005 when 43.22% of those sitting GCSE ICT were girls. The corresponding figure for girls taking A-level ICT was 38.1% in 2010, increasing from 35.46% in 2005. Girls who sat A-level computing formed 8.9 % of the total number of those sitting this examination in 2010 which actually dropped from 11.27% in 2005.

These figures must be considered in a context of overall dropping numbers. For example, 103, 400 people (boys and girls) completed GCSE ICT in 2005, by 2010 this figure had dropped to 61,022 - a staggering 40.98% drop in 5 years. This picture is mirrored in both A-level ICT and A-level computing where 14,883 people completed A-level ICT in 2005, which dropped by 18.12% to 12,186 in 2010. In 2005, 7242 people completed A-level computing, which dropped by 43.87% to 4065 in 2010.[3] There may be various explanations for these dropping numbers –and it must be recognised as a more general issue, rather than one simply related to gender. Hypotheses put forward for the decline and low numbers of those sitting these subjects in the UK include how ICT and computing are increasingly seen as 'Mickey Mouse' subjects, reinforced by the fact that they are not essential requirements for university admission in computer science.[4] Fuller et al. (2009, p.xii) note how the status of IT "is seen mainly as a supporting rather than a priority subject…It carries lower status than subjects such as Maths and Sciences and this has a negative effect on perceptions of IT in terms of university study". The drop in overall numbers of those sitting ICT exams is important to bear in mind when we examine how this landscape has subsequently shaped policy interventions in gender and ICT at the secondary level.

The picture of under-representation of girls sitting ICT exams contrasts with the overall picture of girl's greater overall attainment in GCSEs nationwide. Since 1998, on the threshold measure of gaining 5+ GCSEs A*- C, a significant gender gap in favour of girls has emerged. This gap quickly increased and subsequently became stable at around 10 percentage points difference, with little variation since 1995. In 2007 the gender gap was 9.6 percentage points with 63.4 per cent of girls and 53.8 per cent of boys achieving 5 A* - C GCSEs or equivalent in 2006. (DfES, 2007). This situation, which is mirrored in many of the OECD countries, has led to increasing policy attention being given to raising the attainment of boys (DfES, 2007).

AN EMPIRICAL EVIDENCE BASE OF GENDER AND ICT AT THE UK SECONDARY LEVEL

The lack of girls choosing ICT at the secondary level is often explained in relation to girls and boys differences in access to, use of and experience of computers. Gendered differences in terms of attitudes, confidence and self-efficacy are also used to explain why girls tend not to choose these subjects at GCSE level and beyond. In the UK context, gendered differences in terms of using ICT as a tool for motivation has also been explored, as has the gendered effects of increased use of ICT to raise attainment. All these elements are charted in the following section of this article.

Difference in Access, Computer Use and Experience

The results of the 2006 Programme of International Student Assessment (PISA) show a gender difference in the use of and time spent with computers, where boys tend to dominate (OECD, 2007). A report by the British Educational Communications and Technology Agency (BECTA) (2008) gives a comprehensive overview of the research literature relating to this issue in the UK context, and highlights how the school and home environments appear to be key factors in influencing gender differences in the use of ICT.[5] There seems to be few significant differences to girls' access and use of technology within schools (Haywood et al., 2003; Selwyn and Bullon 2000), but at home boys tend to have greater access to ICT and use it more (BECTA; 2008). Valentine et al. (2005), in their study *Children and Young People's Home Use of ICT for Educational Purposes: The impact on Attainment at Key Stages 1-4*, found that girls were more likely to have "no access to a computer, or to have access to only one computer/ laptop at home where as boys were more likely to have access to two or more computers/laptops" (BECTA; 2008, p.9).

In their study on age and gender differences in computer use and attitudes among secondary students in the UK, Colley and Comber (2003) found boys reported higher frequency of use. Their data collection procedure included recording the details of the type of computer used and the use of computers at friends' houses. As such, this study provides a more accurate picture of computer use outside the formal school environment. Colley and Comber found that boys were frequent users of games machines and were more likely to own these than PCs. This is contrasted to girls' lesser access to games machines, where ownership is more likely to be their brothers or the families. More boys than girls reported using a friends' computer (in particular a friends' games machine) and boys reported more frequent use than girls.

These findings back up other studies (Eurydice, 2005) which note the greater out of school use of computers both at home and with friends by boys and, thus, highlight the importance of computer games for boys. Levine (2008, p.14), however, notes how "girls are accessing facilities more often outside school than boys". She does not go into further detail about the source of these conclusions other than being "recent intelligence from the corporate world" (ibid) – and so we are left to wonder its significance and how this fits together with the other research evidence. One should recognise, however, that the gendered picture may indeed be changing given the considerable increase in home ownership of computers and the growth of social networking amongst young children and teenagers during the last five years.

In terms of specific applications, Colley and Coomber (2003) found gender differences in relation to the frequency of use of music technology software and computer games, however no gender differences were found in relation to the frequency of use word processing and graphics software; programming and mathematics; use of the Internet; and, the use of CD-ROM. In their 2008 report on children's media literacy in the UK, the Office for Communications (Ofcom) suggests that girls are more likely to have a social networking profile than boys and use technology for creative purposes, such as setting up their own website or creating an online photo album. Access is often studied in tandem with attitudes (Colley and Comber, 2003; Howe et al, 2007). However a direct relationship between access and attitudes must be questioned. As Stepulevage, (2001,p.327) notes, "there is not such a simple and direct relationship between access to computers and girls' being able to demonstrate confidence / expertise in the classroom".

Attitudes, confidence and self-efficacy

Most studies find that girls' confidence is lower than boys, although some studies highlight how this difference is narrowing (Faulkner, 2002). Colley and Comber (2003) found significant gender differences:

> Boys were more self-confident with computers, liked computers more and showed less sex bias concerning computing use than girls. They also rated themselves higher than girls on their computing ability in relation to both boys and girls of the same age (p.161).

This substantiates other international evidence that notes that boys consider themselves more capable of executing more advanced level activities such as downloading and programming (Eurydice, 2005). Of course lower self-efficacy does not mean that girls' actual skill levels are lower than boys (Sanders, 2005). Tømte (2008) cites Kennewell and Morgan's (2006) evidence that computer gaming can generate a self-efficacy with technology, thereby increasing attainment. Given boys' propensity towards computer games, this has significant gender implications.

Fuller et al. (2009) studied boys' and girls' attitudes to IT and ICT as a subject and found generally similar attitudes at KS3 [6]. However, what was markedly different was that a small number of boys held a more technically driven interest in computers, which manifested itself in terms of both hardware and software skills e.g. programming and an interest in the more technological aspects. This element was absent in the responses from girls. There is body of research however that challenges gender/ sex based difference in attitudes towards computers. North and Noyes (2002) assessed computer attitudes and cognition of 104 children aged 11 and 12, self-reported questionnaires in England and they found that the impact of psychological gender (sex and sex role) did not influence attitudes nor cognition towards computers. Gras-Velazquez et al. (2009, p.10) also found that "when surveyed about their ICT competences both genders reported similar skills and knowledge across a range of computing tasks".

ICT as a Tool for Motivation

The motivational effect of ICT in various subjects has been seen to both positively and negatively affect attitudes and motivation towards the subject. There is research on this topic that both confirms and rejects gender differences (Tømte, 2008). A study commissioned by the DfES reaffirmed the motivational effect of ICT and noted how boys seemed to be particularly motivated whilst girls were not seen to be disadvantaged (Passey, 2004 as cited in BECTA, 2008, p.5). Teachers who participated in the study noted how higher levels of access with short competitive ICT activities motivated boys. Other research in the UK also notes the beneficial effects that incorporating the use of ICT into the teaching of other subjects can have on the motivation of boys. Somekh (2006) investigated an ICT Test Bed project and, due to the exceptional gains in writing standards achieved by mainly boys in year 4/ 5, came to the conclusion that student motivation and learning were greatly increased by the use of ICT.[7] Haywood et al (2003, cited in BECTA, 2008) also found the use of ICT as more motivating than traditional methods of teaching, especially for boys. Girls did not say they found them less motivating, but identified that they made no difference.

Attainment

Given the recognized motivational effect of ICTs on boys and the current concern with boys' attainment – it is not surprising that ICTs are being studied as a means to raise boys' attainment (Younger et al., 2005). A DfES (2007) gender and education study highlighted how this technology enabled boys to improve the presentation of their work and their ability to rework numerous drafts enabled them to increase their attainment in literacy. In Kitchen et al.'s (2007) research secondary teachers identified how ICT impacted positively on girls' and boys' achievement, but they were slightly more likely to believe this was true for boys. Research has been conducted on the gendered implications of the introduction of whiteboards at the primary level on attainment (Somekh et al., 2007). This research found that the use of whiteboards increased attainment for both boys and girls, but which varied according to subject, key stages and prior attainment. An earlier study (Higgens et al., 2005) found that 56% of teachers denied gendered differences in terms of use of whiteboards, but that those who reported differences, most commented on the positive effect with regards to boys' motivation, focus and involvement. A possible explanation for the link between boys' increased motivation as a response to greater engagement with ICT and achievement may lie in the design of educational software and content, as there are a far greater number of male characters represented within this content (Aubrey and Dahl, 2008 as cited in BECTA, 2008, p.5). These authors researched the use of ICT in the Early Years Foundation education and observed how very young children (aged between 3 and 5) are subject to software with a far greater number of male characters. The negative effects on girls of gender bias in educational software is backed up by international evidence. In the U.S. Cooper (2006) remarks how the focus on boys' achievement in ICT policy has become embedded in the design of educational software. Point scoring and competition are seen to particularly encourage boys. Cooper (2006) cites research that shows how that using this software can lead girls to being demotivated, showing higher levels of anxiety and decreased performance. When girls are given gender neutral software, however, these negative associations disappear.

To summarise, there are reported gendered differences in computer access, use and experience, attitudes, confidence and self-efficacy, and ICT as a tool for increasing motivation and attainment have thus been well charted in the UK secondary school context, although some areas are better evidenced than others. This evidence base has subsequently been built upon in terms of influencing approaches to the development of educational and ICT policy. The following section attempts to highlight two elements of the policy landscape that affect the construction of gender and ICT at the secondary school level in the U.K, one targeting girls and the other aimed principally at boys.

POLICY CONTEXT: GIRLS INTO ICT, OR ICT AS A TOOL TO RAISE BOYS' ACHIEVEMENT?

The policy context shaping girls and boys relationship with ICT in the secondary school context is complex and contradictory. It emanates from various policy spheres i.e. employment policies, ICT policies and education policies, and these agendas shift in a dynamic and fast-changing environment. This section will explore one intervention targeting girls that has been developed specifically in response to the shortage of women working as ICT professionals (Computer Clubs for Girls). It will also explore the wider ICT policy environment shaping both girls and boys relationship with ICT at the secondary school level, which is implicitly linked to the policy agenda of raising boys' attainment.

Girls into ICT: Computer Clubs for Girls (CC4G)[8]

Computer Clubs for Girls was set up by SEEDA (South East England Development Agency) who financed and piloted CC4G from 2002-2004. The aim was to use a single sex learning environment to encourage 10-14 year old girls to become more interested in computers. In their evaluation of the CC4G project, Fuller et al. (2009) outlined the development of this initiative. CC4G was offered free to schools in the South East of England. e-skills UK, the Sector Skills Council for the IT and Telecoms industries, managed the development and implementation processes. CC4G therefore had crucial employer input, and companies like BA, IBM UK, Cisco Systems, and MTV became involved as part of their response to the gender imbalance in the ICT industry. In 2005-6 the (then) Department for Education and Skills (DfES) decided to fund the club, and the initiative was made available nationally. It consisted of out of school clubs, e-learning and offline learning projects. These ranged from designing and creating magazine covers, gardens, fashion shows to crime scene investigation and nature and the environment. Activities include programming, designing websites, creating databases and using Macromedia flash authoring tools. Fuller and her team describe the main objective of CC4G as:

- to change the perception, within the target group of IT as a career for women by offering inspiring and compelling activities which appeal to girls in a voluntary computer club environment and to counter the perception, within the target group that IT is a male profession.

Fuller and her team conducted an extensive evaluation of the club over four years, including: surveys (166 to current CC4G members, 89 past members); case studies (9 schools); focus groups (15 with past and present members); observation sessions (9); and, interviews (116, [95 girls] [21 boys]). They conclude the following:

Positive Impact

- Enjoyment and the social benefits of belonging to the club
- Showing that IT can be fun (often contrasted in this regard with ICT lessons)
- Increasing IT confidence particularly for those (mainly the older girls) whose confidence in IT was low at the start of their membership
- Raising awareness that IT has a wider range of uses than those encountered in mainstream ICT lessons.
  (Fuller et al., 2009, p.x)

Objectives met?

- Little evidence that the club has increased members' take up of, or propensity to take ICT courses pre- or post-16 or into higher education
- Little evidence that the club has increased members' propensity to consider IT careers and
- Little evidence that the club has changed members' perceptions of IT as a career for women.

The findings of this evaluation are consistent with other research looking at single sex (girls' only) educational settings in science and technology, which have tended to focus on impact at an individual level (see Castaño et al., 2010). This can be seen in the evaluation of Computer Clubs for Girls where the positive impact is evidenced by the 'fun' nature of ICT to individual beneficiaries or improving individual's levels of 'confidence'. In terms of fulfilling the specific objectives of the initiative, the evaluation notes how there is little evidence that the club has increased members' propensity towards further ICT study or developing a career in this field. They detail the following factors as possible explanations for this:

- GCSE ICT is seen as sufficient in itself and does not seem to foster further interest
- ICT curriculum and teaching- mainly related to office and administrative activities – seen as 'boring'
- the status of ICT studies is much lower than mathematics or sciences, for example
- lack of knowledge of IT careers
- student led approach to Information Advice and Guidance – does not challenge individuals' ideas about certain choices and careers

  (Fuller et al., 2009, p.78-9).

These findings are pertinent to explaining why ICT studies and careers are persistently unpopular, yet they do not explain why Computer Clubs for Girls have been unsuccessful in specifically changing girls' propensity to take up these studies or careers. Fuller at al. (2009, p.80) highlight how objectives of such interventions in terms of beneficiaries' experiences need to be constructed in light of "far more substantial and ongoing influences". This highlights how the institutional, curriculum or cultural change required to challenge the entrenched

nature of the problem is difficult to combat through an essentially out of school voluntary club.

Subsequently Computer Clubs for Girls has become Connect, Create and Go, in a push to include boys. e-skills cited three reasons for the change:

- they wanted the club to fit into National Curriculum (gender neutral)
- teachers asked them to let boys become involved
- recognition of overall drop in IT enrollments

It seems that the industry's need for more workers in a context of declining overall numbers of those entering into these professions has been put above the need to create a more diverse gender-balanced workforce. This is despite the lack of evidence to suggest that clubs of this nature make an impact on individuals' propensity to further their ICT education or occupational choices. This shift is also congruent with the current educational and ICT policy interest in raising boys' achievement. In the next section of this paper I will argue that the implicit gender dimension of ICT policy aimed at raising boys' attainment in secondary school must be taken into consideration in any gendered analysis of ICT in this context.

ICT as a Tool to Raise Boys' Achievement

In 1997 proposals to develop a National Grid for Learning (NGfL) were published by the U.K. government "which set out a vision for harnessing new technologies to enhance the educational experience of learners" (DfEE, 1997).

The NGfL provided the framework for policy intervention from 1998-2002. One of the main objectives of this policy in the context of schools was to improve learners and teachers ICT competences. Colley and Comber (2003: 156) list the measures, through which this was to be achieved:

- increase in the provision of hardware and infrastructure in schools (improving computer - pupils ratios; internet connectivity)
- national training programme for teachers
- development of a Virtual Teachers' Centre with online resources

Faulkner and Stewart (2003) evaluated the National Opportunities Fund for ICT training for Teachers and School Librarians, which was a public sector strategy to raise standards of pupils' achievements by increasing the effective integration of ICT in school education, linked to the NGfL and expanding hardware provision to schools. They note how "it is notable that nowhere in the formal documentation was there any analysis of the gender (or other) factors which might shape both teachers' and pupils' confidence and competence in using ICT" (p.4).

The NGfL was superseded by the ICT in Schools programme (2002-2006) which aimed to encourage and support the use of ICT for innovative teaching and learning whilst at the same time drive up educational standards (ibid). This would be achieved through the following measures:

- embedding ICT (pedagogy, ICT leadership/ whole school improvement)

- infrastructure investment (broadband connectivity, interactive whiteboards)
- digital resources – market model (e-learning credits)

In 2005 the Harnessing Technology strategy was launched, which encompasses all educational phases and children's services and set out a system wide strategy for technology in education and skills (BECTA, 2008). The latter phase of the strategy to be implemented 2008-12, is to bring about a step-change in the way technology is used across the breadth of the education and skills system, enabling learners to take greater control of their learning through access to learning resources at any time, and from anywhere (BECTA, 2008). This will be achieved through:

- use of technology that supports deeper learning and higher-order skills and competencies.
- leaders and institutions that are able to use technology to adapt their services and to support personalisation.
- better support for *all* learners – including the disadvantaged, the vulnerable and those with special needs.
  (BECTA, 2008, p.5)

In 2008, Phil Bannister (Strategy and Policy Directorate) of BECTA presented *Gender, ICT & Schools: A UK Policy Perspective* to the OECD expert meeting on Gender and ICT in Oslo. He highlighted the "relative absence of policy focused directly on ICT and gender in schools" (2008, p.8) although he identified that the implicit gender dimension of ICT policy is the potential of technology to improve boys' educational performance given the policy preoccupation with boys' attainment. The DfES report, *Gender and Education: the Evidence on Pupils in England* highlights a range of strategies for raising the attainment of boys. These strategies are predominantly based on the research of Younger et al., (2005) who conducted a four year study examining how to raise boys' achievement, working with over 50 primary, secondary and special schools. They identified four approaches to improve boys' attainment: pedagogic, individual, organisational, and socio-cultural (DfES, 2007,p.112). As part of an innovative pedagogic approach more interactive classroom activities and more integrated use of ICT were seen as part of a successful strategy for raising boys' achievement.

Bannister identifies four recent ICT policy initiatives that have an implicit gender dimension which he identifies as potentially favouring boys:

- Interactive whiteboards
- Personalising learning
- Home Access
- Computer games- based learning

There has been a large scale investment in interactive whiteboards to facilitate greater interactivity in the classroom, through multi-modal teaching (integrating text and audio-visuals etc.) thereby providing the potential to create more dynamic lessons with a faster pace of teaching (Bannister, 2008). This was seen as a tool to encourage boys in the classroom. A focus on personalised learning is

seen to place the learner at the center of the learning experience - technology is seen as enabling greater learner choice over subject, pace, place and mode of learning. It is thought that this strategy should "benefit boys without disadvantaging girls" (Bannister, 2008, p.11). Bannister also notes how emerging policy on technology is increasingly focused on the home environment and notes the synergy with research that highlights boys increased use of ICT out of the school environment . Government is also funding research and development projects looking at how computer games can be capitalised on in the educational setting. Bannister does however highlight how research evidence is limited regarding measuring the effects of increased use of ICT in the classroom on differences in boys' and girls' attainment. He cites two studies which question or at least underplay the difference in impact between the genders (ImpaCT, 2003 and BECTA schools survey, 2007). Evaluation of these policy initiatives will undoubtedly have to look at the gendered implications of implementation – and try to unpick the multi-level complex processes at work. However, it does not seem too presumptuous to draw attention to the dangers of policy reproducing associations of technology (specifically ICT) and masculinity (e.g. increasing use of computer games in the classroom), with the effect of precluding the use of ICT in a way that also engages girls.

CONCLUDING REMARKS

The policy context shaping girls' and boys' relationship with ICT in the secondary school context is complex and contradictory. It emanates from various policy spheres, i.e. employment policies, ICT policies and education policies. In 2003 Faulkner and Stewart highlighted how the gender blindness revealed in discourses surrounding the NOF ICT training for teachers is "severely at odds with the acute concern in other UK government departments to encourage more women into ICT based professions and industries" (p.5). This highlights how competing policy agendas in different spheres can contradict one another with subsequent practical implications in terms of how gender and ICT become mutually constituted on the ground. Since they conducted their research policies regarding ICTs in school has inevitably moved on as gender blindness in ICT policy seems to have been superseded by an implicit push to increasingly use ICT in the classroom to raise boys' attainment. This can be seen if one considers the evidence base regarding the differential gendered relationship to ICTs in the secondary school context and current policy push for increased home use of ICT, increased use of competitive games in the classroom, interactive whiteboards and personalised learning.

This policy agenda seems at odds with the policy agenda linked to the employment sphere which aims to foster girls' relationship with ICT as they are conceived of as potentially plugging the ICT skills shortage. In this article I have explored one intervention that aimed to foster girls' interests in becoming ICT professionals. Interventions such as Computer Clubs for Girls clearly need to be embedded into broader and wider processes, such as careers advice and changes in the curriculum – whilst it seems apparent that wider cultural change is needed if a more gender inclusive approach to ICT studies and employment is to be achieved. This paper concurs with the findings of Faulkner and Stewart (2003, p.21) that "active policy intervention is required in order to increase the likelihood of gender inclusive change around ICT". Interventions however need to be embedded within the wider policy context. There is a clear need for more

synergies to be created between different policy agendas and gender equality strategies need to be mainstreamed throughout the education and employment spheres in the field of gender and ICT.

ENDNOTES

[1] In the UK secondary school is for children from the ages of 11 to 16. After 16 compulsory education ends and young people can decide whether to continue their studies further at school or sixth form college, or leave the education system.

[2] The General Certificate of Secondary Education (GCSE) is an academic qualification awarded in a specified subject, generally taken in a number of subjects by students aged 14–16 in secondary education in England, Wales and Northern Ireland and is equivalent to a Level 2 (A*- C) and Level 1 (D- G) in Key Skills. (In Scotland, the equivalent is the Standard Grade.) (http://en.wikipedia.org/wiki/GCSEs). The Advanced Level General Certificate of Education, commonly referred to as an A-level, is a qualification offered by education institutions in England, Northern Ireland, Wales, Cameroon, and the Cayman Islands. It is also offered in Scotland by a small number of educational institutions, typically private fee-paying schools, where students would normally take the Scottish Qualifications Certificate Higher and Advanced Higher. A-levels are studied over a two year period and are widely recognised around the world, as well as being the standard entry qualification for assessing the suitability of applicants for academic courses in English, Welsh and Northern Irish universities.(http://en.wikipedia.org/wiki/Alevel).

[3] All data was taken from the Joint Council for Qualifications (JCQ) GCSEs and A-levels 2005, 2010.

[4] Hypotheses put forward by experts at the 'Women and ICTs through the Lifecycle Conference' held in Barcelona, 8-11th November, 2010.

[5] In 1997 BECTA (The British Educational Communications and Technology Agency) was established to lead the national drive to ensure the effective and innovative use of technology throughout learning. As a government agency it has acted as advisor to schools and local authorities, whilst also creating an impressive national body of research evaluating the impact of technology on the education and skills system (Colley and Comber, 2003). BECTA however was closed on the 31st March, 2011 as a result of the coalition's government's spending cuts of £6.2bn announced for the 2010-11 period (Arthur, 2010).

[6]Key Stage 3 (commonly abbreviated as KS3) is the legal term for the three years of schooling in maintained schools in England and Wales normally known as Year 7, Year 8 and Year 9, when pupils are aged between 11 and 14. In Northern Ireland the term also refers to the first three years of secondary education, although these are known as Year 8, Year 9 and Year 10.(http://en.wikipedia.org/wiki/Key_Stage_3).

[7] The ICT Test Bed project (2002-06) was initiated by the Department for Education and Skills (DfES) to explore how ICT can be used to support the Government's wider agenda for education reform.

[8] This section is predominantly taken from Fuller, A., Connor, H., Johnston, B. and Turbin, J. (2009) *The Evaluation of Computer Clubs for Girls: Final Report to SEEDA*, Southampton Education School: University of Southampton.

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