

Girls' And Boys' Technological Toys: Music Composition In The Computerized Classroom

Victoria Armstrong

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Abstract: This article explores 15 to 18-year old boys' and girls' compositional processes as mediated by music technology. Adopting Sherry Turkle's theory of 'hard' and 'soft' styles of mastery, I assert that a compositional approach that emphasizes technological control and manipulation may be more conducive to the working styles of boys than girls. In drawing this conclusion, I focus on three female composers, examining to what extent they were able to transcend or reconfigure the hard mastery expectations that had been imposed upon them.

Introduction

In a technological environment, participants and 'experts' are determined by cultural assumptions about what technology "means" (Grant & Gill, 1995). The command and control of technology is one way in which men are defined both materially and symbolically. It has been argued that technology is the core domain of a socially constructed masculinity and acts as a "boundary marker", i.e., if it is technological it must be masculine (Murray, 1993). How meanings are constructed in relation to technology may reflect the values and expectations of particular social groups, particularly those in positions of power and influence. Men, moreover, customarily dominate the cultural settings and structural organizations in which technologies are used. The technology, as such, invariably takes on particular meanings that reflect their masculine associations, leaving women potentially alienated from or ambivalent towards technology.

In recent years, school classrooms in many countries have become increasingly technologies and students are expected to use Information and Communication Technology (IT) in all areas of the curriculum, including music. There appears to be an uncritical acceptance that technological innovation will have a positive impact on the educational environment into which it is introduced. It is presented as a 'neutral tool'; but, this metaphor is misleading because it ignores the material and symbolic associations that contribute towards the gendering of technology. Consequently, we are in danger of allowing gendered expectations and perceptions to go unchallenged in the classroom.

The cultural stereotype of the self-assured male computer user is echoed in the perceptions and expectations of teachers and pupils alike (Comber et al, 1993; Green, 1997). Comber et al (1993) found that there were three times as many boys as girls using a computer on a regular basis and a sizeable amount of that time was used playing games. Alternatively, girls were more likely to go for something 'interesting, like word processing or art' (p. 128), and viewed their use of the computer as more "grown up". This idea of the computer as a boy's technological toy is echoed in the title of this paper in which I have attempted to delineate the differences in boys' and girls' use of the computer in relation to music technology.

The Research Problem

The increasingly technologies music classroom is one site in which the so-called benefits of technology are rarely questioned. As Pitts (2000) has pointed out, the level of debate surrounding the use of music technology has been minimal in comparison to its level of use. However, recent research suggests that girls are less likely to opt for music when there is a greater technological focus (Comber et al, 1993), while teachers and pupils perceive boys to be most interested in electronic instruments and computer technology (Green, 1997). The development of a new National Curriculum for Music in England has led to a more standardized approach to lesson content in schools, and stipulates core elements: Performing-Composing-Appraising. It also states that "pupils should be given opportunities to make appropriate use of Information Technology to explore, create and record sounds" throughout Key Stages 1-3. In many schools, the composition component of the curriculum is increasingly focused on technology.

This, however, is potentially problematic, as both composition and technology have been historically and culturally constructed as masculine domains of knowledge and expertise. Women composers have long been denied access to the public professional world, receiving fewer public performances, publishing opportunities and/or a less comprehensive music education (Neuls-Bates, & Solie, 1993; Halstead, 1997). Their compositions have historically occupied a marginal position in relation to the Western music canon. The canon represents sets of values and ideologies that perpetuate the dominance of men's music and women, by their comparative invisibility, are therefore powerless to contribute to the construction of the canon (Citron, 1993). As Lamb (1993) points out "men, as a class, define the structures of power and maintain the relations of ruling within music and music education" (p.175). These "structures of power" also contribute to the gendering of technology through which men maintain material and symbolic associations. The computer itself has no inherent gender bias, but the computer culture is dominated by images of competition and violence, characteristics culturally attributed to males (see Figure 1). Therefore, women do not see themselves reflected or represented within this culture.



Figure 1: Male-oriented advertising images

Consequently, it is important to explore the ramifications of a musical environment in which composing is centred on computer technology. My research therefore aimed to explore the differences and similarities in boys' and girls' compositional styles and the role music technology played in constructing gender identity.

The analysis presented in this paper draws on the "hard" and "soft" mastery styles identified by Sherry Turkle (1984) in her analysis of computational style and computer programming. Although the outcome of the process is different, composing and programming both require skill, imagination and creative thinking, so it is perhaps not surprising that certain similarities gradually emerged. Although mindful that these "styles of mastery" may be overly dichotomous and may build in the very gender distinctions they seek to illuminate, her framework is useful because it attempts to synthesize these "ways of thinking" with an analysis of the culture in which programming takes place.

Conceptual Framework: Turkle's Styles of Mastery

Turkle carried out a large ethnographic study of four hundred children and adults using interviews and observations, whereby she examined the relationships that individuals forged with computers within a range of different computer cultures, such as 'hacker' communities and school computer learning

environments. From her work with young computer programmers, Turkle observed that both boys and girls expressed a similar degree of interest and aptitude for computer programming. But, she also identified a number of differences in the way they think about the task and their relationship to the computer. She labeled these styles of working "hard mastery" and "soft mastery", later re-defined as "the planner" and "the bricoleur" respectively (Turkle and Papert, 1990). She states that girls tend to be "softs" and boys overwhelmingly "hards". She attributes this to traditional models of male and female behaviour. She also suggests that girls are more likely to try to forge relationships with the computer, as something with which to communicate and negotiate, whereas traditional models of male behaviour stress decisiveness and imposition of will which are then transferred to boys' working strategies.

Hard Mastery

This style of working is tightly controlled, emphasizing imposition of will over the machine through implementation of a highly structured plan. Hard masters see the computer program as the instrument of premeditated control; getting the program to work is like getting to "say one's piece". Although, as Turkle (1984) states, there has to be some degree of flexibility in working out the details of the specific program in order to "get it right", ultimately the goal is always to get the program to realize the programmer's plan.

Turkle likens this style of working to that used by an engineer, one who controls the technology and sees the computational objects as an abstract entity. When "mistakes" occur they are eliminated. Those employing this style achieve their aim through the controlled use of the computer. The programme is meticulously worked out eliminating the possibility of chance happenings.

Soft Mastery

This mastery style sees the computational object in more physical terms, like a dab of paint or a building block that allows for negotiation and compromise. Problems are worked out by arranging and re-arranging elements. Often things happen unexpectedly, but these events are incorporated into the process and, as such, frequently lead to further

exploration and the development of new ideas. The computational objects are seen as tactile and are interpreted, not as a system of rules, but as a language for communicating and negotiating. It relies less on computational control than on the individual's ability to interact with the computer.

Methodological Issues

The Empirical Setting

The case study school was a large co-educational comprehensive located in West London with children from a range of economic and ethnic backgrounds typical of the area. I knew all the students taking part in this research project, although I had not taught them formal classroom music. Due to the ethnographic nature of the project, I adopted Cohen et al's (2000) criteria of typical case-sampling whereby respondents were selected based on the 'typical' attributes of pupils within this particular department. For example, they had attended the school from the age of 11, they played a musical instrument, they participated in curricular and extra-curricular musical activities, and they had equal access to the music technology lab.

I interviewed 2 boys and 2 girls from year groups 10, 11 and 12 (12 in total). Years 10 and 11 represent the 15-16 age group preparing for GCSE examinations (General Certificate of Secondary Education) and the year 12 students represent the 16-18 age groups in their first year of the two-year post compulsory Advanced Level examinations necessary for University entrance. As part of their GCSE and Advanced Level examinations, all students are required to submit a folio of compositions.

Total Number of Boys and Girls in Each Year

Year Group	% of Girls	% of Boys
10	60%	40%
11	56%	44%
12	50%	50%

Within my case study school, all composition activities were carried out using computer technology. The music room was well-equipped with ten computer terminals and keyboards running Cubase VST, an

integrated music software package that acts like a virtual recording studio. It can be used for the recording, editing and processing of MIDI (Musical Instrument Digital Interface) and audio material. The pupils had access to around one hundred and fifty musical sounds via the sound card installed on the computer. Once they had selected the appropriate sound or instrument, musical ideas were inputted via the electronic keyboard connected to the computer. In addition, there was an audio recording facility whereby 'live' sounds (either instrumental or vocal) could be inputted directly into the computer via a microphone.

Methodology

As Griffiths (1998) points out, methodology is the "rationale for the way in which a researcher goes about getting knowledge" (p. 135). It must suit both the *kinds* of knowledge that is being sought and the *purposes* for which this knowledge is obtained. This study is firmly located within a qualitative paradigm, by which I mean that the pupil's experiences and practices are central to the study. This type of research, therefore, stresses the socially constructed nature of reality and seeks to answer questions about how social experience is created and given meaning by the interpretation of phenomena (Denzin and Lincoln, 1998).

I decided to undertake interviews on a one-to-one basis, as this would afford the greatest possibility for in-depth discussion and reflection on the individual's compositional practices. As Alldred (1998) asserts, "the idea that any ethnographic subjects are free to present their own meanings in any radical sense neglects the ways in which the dominant culture provides hegemonic meanings" (p. 154). Consequently, it was important that I remain aware of the students' social and personal contexts of meaning throughout the interviews (Mishler, 1986), as these contexts were imperative to situating their words within the culture of the classroom as they understood it.

Over a period of two months, I interviewed the twelve participating students using a semi-structured format. First, they were asked to describe their general compositional process (how the technology was used, what they enjoyed or found difficult, where musical ideas originated from, etc.). Then, the students were asked to focus on one particular compositional project

in detail. This project could be one initiated from classroom stimuli or their own "extra curricular" activities. The part of the interview pertaining to the compositional project was structured in a way that roughly divided the compositional process into three stages: the initial stimulus, how the musical material was developed, and how the final product was stored/notated. This ordering of questions allowed me to focus in on specific aspects of the compositional process during the analysis of data. Each interview lasted between forty-five minutes to one hour and was transcribed in full.

When I began to analyze the data, I observed that a certain style of composing was being advocated within this particular environment. Composing acoustically using "live" instruments was not encouraged. The manipulation of musical ideas was carried out solely via the computer regardless of whether or not it was appropriate to the student's musical or personal needs. I noticed that the boys I interviewed never expressed any dissatisfaction with this way of composing, but that a large number of girls were very unhappy with this approach, as Jane's comments indicate:

VA: So how do you feel the computer helps you? Does it help you?

Jane: Not really. It's just there for you to put ideas into. It doesn't exactly help you. I mean if I could choose between somebody playing a live instrument and the computers, I'd go for the live instrument. It's very intimidating. You sit down and you just look at it [the computer] and think 'Oh my God, how am I gonna do this? There's just so many keys. Where do I start?' I suppose you could put it as not a big friendly giant but one of those under the bed monsters that kids are scared of.

This observation is mirrored in the findings of Comber et al (1997) in which they suggest that, when girls use technology, they may be compelled to make use of it in ways that are often considered "masculine". Caputo (1994) has suggested that this "male norm" may even set girls up for failure because they do not measure up to these masculine expectations.

Research Findings

I noted that there were many similarities between boys' and girls' compositional processes during the initial stages of composition. They both exhibited the qualities of "soft mastery", experimenting and 'playing around' with different musical fragments from which further ideas would emerge. However, I discerned a distinct difference in the medium they preferred to use at this stage. For the boys, it revolved almost entirely around the computer, whereas the girls preferred to work acoustically at this stage. However, the latter method of working was not widely encouraged and the girls were expected to input their ideas immediately, thereby compelling them to work digitally from the outset. When elements of 'engineering' and hard mastery came into play during the computer-focused developmental stages, the girls seemed less inclined to interact with it. The culture within this particular environment endorsed a style of composing that mirrored many of the characteristics of Turkle's "hard masters". Although this style was not necessarily appropriate for all students, it was privileged over other ways of working. In her work with female electroacoustic composers, McCartney (1995) found similar instances whereby a woman's preferred compositional processes were not valued. One of her respondents described how her intuitive and improvisational ways of working were discouraged within an environment that valued a highly structured approach. Others who expressed their preference for working "interactively" or "mucking around" with sound described similarly negative experiences.

Of the students I interviewed, the majority of boys displayed "hard" mastery characteristics and appeared comfortable with this style of working. They were also more likely to perceive themselves as technologically competent. This sense of belief in their technological prowess serves to affirm and reinforce their masculine identity as Tim's comment illustrates:

I had to learn everything about the computer on my first day...but now I go there and people are always coming up to me saying "how do you do this?"

However, this was generally not the case with the female students. Upon analyzing the data, I found the more a pupil exhibited the characteristics of the "hard" master, the more they perceived themselves as technologically competent. And, overwhelmingly, it

was the boys, not the girls, who expressed this high degree of confidence in their technological abilities:

Mark: Well, that's the main reason I'm doing the subject, the technology. I know all the kit, what the studio does...I mean, once you know it, it's all pretty easy stuff, like everything.

Martin: Oh yeah. I'm confident on Cubase. If someone asked me to produce a song I feel confident that I can come up with something good.

James: I'm used to using the computer anyway so if anything flashes up on the screen I know what to do.

While the boys were more likely to use the computer at every stage of composing, the majority of the girls stated they often played around with musical ideas using their voices or electronic keyboards. When compelled to interact with the computer for the whole of the compositional process, adopting a predominantly "hard mastery" approach, many of the girls expressed dissatisfaction with their compositions:

Jane: Nothing's perfect for me... it always come out rubbish. That's why working in a group betters you (sic). It helps you 'cause you get people playing instruments that you don't know about and you'd only need to be in a group with them for a little while and you'd think "Yeah, you can play this tune, and you can play that".

It appeared that the girls were often forced to deviate from their original modes of working to accommodate the computer. The girls became more like Turkle's "hard mastery" engineers, but having to grapple with the technology in order to find ways of controlling and manipulating it. For almost all of the boys, there was little or no sense of struggle or interruption – whether working with or away from the computers, their compositional style was consistent.

As the "hard mastery" style advocated within this particular learning environment appeared more conducive to the working styles of the majority of the boys, the remainder of this paper will focus on three students (all of whom were female) whose methods of composing were at odds with this technological culture. I will, therefore, discuss how and to what extent they were able to transcend or reconfigure the "hard mastery" expectations imposed upon them.

Ellen: 'Getting Stuck' - Subjugation to the dominance of hard mastery

Ellen, a fifteen-year old student, often felt unhappy with her music because she was unable to write in a way that she felt suited her compositional needs. One of her coursework assignments was to write a "pop" song. Although the structure of the song was within the standard verse/chorus format, Ellen was able to write her own lyrics if she wished and use any combination of voices and instruments. Ellen stated that she was having trouble obtaining a particular sound on the computer for the song accompaniment she was working on. She wanted to work with a live guitarist, experimenting with sounds and ideas and omitting the computer altogether:

The kind of music [that] would be easier without the computer because it's the kind of music that sounds good, just someone sitting there playing a guitar.

However, upon seeking advice, she was told that the guitarist must play the accompaniment directly into the computer:

As soon as I did that, it gets kind of stuck...it's being able to progress it, keeping it the way you want. And that's what's happened to most things I've done.

By being compelled to adopt the role of technological controller, the possibility of her retaining a more interactive, flexible style of working was denied. It is not that women are computer phobic, but rather that they may be computer 'reticent' because the computer becomes a "personal and cultural symbol of what a woman is not" (Turkle, 1984:41). The masculine cultures that prevail around sites of learning can prevent the computer from being a medium for individual expression; those who do not work within the dominant style are expected to adapt and conform. Structured, plan-orientated, abstract thinkers not only share a style but constitute "an epistemological elite" (Turkle and Papert, 1990).

Unfortunately, Ellen's preferred style of working became subjugated to the expectations of a learning environment that fostered an approach more apparent in the compositional styles of male composers. Rather than allowing more flexibility into the process via non-digital means, Ellen's negative, technologically circumscribed experiences compelled her to adopt a compositional style that was both alienating and

stultifying and, consequently, may not be conducive to encouraging Ellen's future compositional exploration.

In contrast to Ellen's experiences, the following seventeen-year old students were able to achieve a synthesis between their preferred "soft mastery" style and the dominant "hard mastery" style.

Carol: Integration Of Soft Mastery

In the first year of her course Carol produced a number of highly successful arrangements and compositions that had been awarded outstanding marks. However, these "successful" works were of no consequence to her. Her level coursework was all composed digitally, but the music that was meaningful to her were songs written acoustically using her guitar. By projecting her personal identity on to her acoustic compositions and remaining detached from her computer-generated music, she retained her strong sense of self with little interruption to her feminine identity. As Green (1997) observed, girl's pride in their compositions was often linked to their emotional existence and it is this link to their experiences and subjectivity that allows them to attach any real value to it. Consequently, Carol would only discuss her "free-style", song-based compositions. These songs were usually developed alone or with another guitarist.

Carol had become adept at compartmentalizing the different strands of her composition by retaining strong feelings of ownership:

The only thing that means a lot to me now that I'm writing music is my songs. It's the only stuff I'm prepared to talk about because it actually means something to me musically . . . if it has no expression, if it means absolutely nothing . . . then it's an abuse of music. That's how I see it.

She is extremely critical of the music she wrote for her coursework, the stimuli not always being her own and which was written using computer technology.

VA: How do you see the stuff you've been set in school? How do you feel about that?

Carol: Absolutely poor quality. I don't think I've ever written anything decent in school.

VA: Why is that?

Carol: I've never felt inspired. I've just done it because I've had to and so, as a result, the work has just been embarrassing. It's not what I would call a good standard even though I may have got an 'A' in the coursework...it didn't seem anything to me.

Her attempt to devise music that fulfilled her self-expressive aims appeared to be most successfully achieved when neither the process nor the product were mediated digitally. However, what is interesting about Carol is that, within this particular technological culture, she had proved herself adept at using the technology not by conforming to a "hard mastery" style but by incorporating 'soft' mastery elements into her computer-based composition. Her work relies on trying out and developing ideas in a very free and spontaneous way and she was one of the few girls able to successfully incorporate this "soft mastery" style into the computer stage of her work. She refused to eradicate "mistakes," making no attempt to use the technology to perfect her work – whatever she played in became the final piece:

I'll record it. I'll always mess it up. I'll always play the guitar a bit differently...then I listen to it and think "actually, that accident turned out better than the original" and that's happened so many times.

Hard masters would never allow this to happen. The musical components and the mechanical functions of the computer are manipulated to produce a successful overall musical design allowing little room for change or alteration. Carol's strong connection between her "soft mastery" style and the function she attributed to her composition enabled her to personalize the compositional process and accentuate her subjectivity. This allowed her to affirm her femininity as separate from the dominant hard mastery constraints of the technology while actually using it.

Kate: "The Sound Of The Body"

Kate, another seventeen-year old student, was also able to transcend the masculine associations of the "hard mastery" style by emphasizing her subjectivity within the compositional act with her singing voice. Kate chose to discuss a "free" compositional project that was part of her coursework assignments, but like Carol, it was a vocal piece in which she sang all the vocal lines. Singing has long been an "acceptable"

musical activity for women and Green (1997) suggests that one of the reasons for this is that the very absence of technological intervention affirms patriarchal definitions of femininity because the spheres of nature and the body, long associated with femininity, remain intact. She states that female performers can engage in a display that can both affirm and problematize the body, but "once women begin to compose, the body hardly features at all" (p. 88). The act of composing is now the metaphorical display of the masculine mind, and it is this, in part, that has denied women the freedom to compose. By insisting that children compose only with computers reinforces the notion of the masculine mind as the body is erased within the compositional act.

Some cyberfeminists argue that the importance of computer technology is its potential to escape from the problematic material body, thereby enabling us to resist and redefine the socially inscribed body: the absence of the body in cyberspace allows gender to be erased and reconfigured. Many have drawn on Haraway's (2000) cyborg image of the human-machine interface, which purports to offer a way out of the "maze of dualisms" (p. 316), the machine becoming part of us, "an aspect of our embodiment", an ungendered ideal that obliterates the material body. However, as Judith Squires (2000) argues, the image of the cyborg must be salvaged from what she calls "technophobic cyberdroll" in order that we may use it "as a metaphor for addressing the interrelation between technology and the body, not as a means of using the former to transcend the latter" (p. 360).

When we listen to the human voice we listen to a physical event, literally the sound of the body (Frith, 1998). Therefore any discussion of the human voice must acknowledge the presence of the material body, thus its presence within the compositional act prevents its subsumption by the technology. We cannot escape the inevitability of the body that exists behind the singing voice even when that voice is mediated digitally. Indeed, the composer Hildegard Westerkamp makes extensive use of human sound in her teaching methods in an attempt to redress the "body-denying" atmosphere of the electro-acoustic studio (McCartney, 1995). The female singing voice therefore, when mediated through the computer, can offer real potential as an aspect of our embodiment.

Kate chose to describe a "free" compositional project she had submitted for her coursework in which she used her own voice to generate the compositional material. She inputted eight vocal tracks, all sung by her, into the computer via Cubase Audio. Using these tracks she was able to explore different vocal textures and harmonies through use of multi-tracking, layering the sounds over each other. It was a rewarding experience for her:

It was the first time I'd ever used Cubase Audio... I just love it. It took me about five or six hours. I kept on, I was really working on it. So it did take a while but I was glad... because I was happy with the end result.

Like Ellen, Kate was in the position of technological controller, but unlike Ellen, it did not prevent her from achieving her musical goal because of what she was in control of: her own self. She devised a style that allowed her to redefine her own boundaries within this masculinist computer culture: exhibiting technological know-how and mastery in order to produce the required musical outcome but transcending these masculine associations because of the symbolic control of her own body as represented in sound.

This contrasts with Bradby's (1993) description of the technologization of women's bodies in the world of dance music, where their voices and bodies are often fragmented in a variety of audio and visual representations subsequently controlled and manipulated by mainly male producers and mixers. Unlike Haraway's cyborg, which appears to ignore the culturally inscribed body, Kate's voice inside the computer is not an attempt to replace the body. By manipulating her own voice/body, her subjectivity was placed in the forefront of the compositional process thus enabling her to devise a way of working that subverted and transcended the canonical "hard mastery" style of this particular musical environment.

Implications for Practice

The research examined the culture of the computerized classroom and its effect on adolescent's compositional processes. I have suggested that the culture within this particular school can be problematic for female composers because it advocates a style of working that compels them to place the computer at the centre of the compositional process, putting them

in the position of a "hard" master, controlling and manipulating technology. This is at odds with the style for which they expressed a preference and which allowed a more interactive and less plan-oriented approach. Girls were able to produce musical products but the means by which this was achieved appeared to induce feelings of ambivalence and dissatisfaction

Due to boy's apparent confidence and greater interest in technology, they appeared comfortable with a "hard mastery" style; whereas, the girls experienced a greater level of interruption and often appeared dissatisfied with the de-personalized, functional, manipulative aspects of working with technology. Of course, this will also disadvantage boys who have a "soft mastery" style. Given the scope of this article, I therefore decided to focus on these three female composers as they exemplify how the majority of the girls within this environment dealt with the constraints of a "hard mastery" style.

If we are prepared to acknowledge that there are different ways of working and if we are serious about providing an environment that allows all voices to be heard and valued, we must reassess how we teach composition in relation to ICT. The computer offers enormous possibilities for manipulating and storing sounds and, for those with little or no "formal" musical knowledge, can be enormously helpful. However, we must be mindful that a technological focus may encourage a particular style of working that does not always allow for diversity and may favour males because of their preference for a style of working that reinforces traditional notions of masculinity. As Kate and Carol illustrate, some girls do manage to successfully transcend these associations, but others, like Ellen, do not. The culture of the music classroom must encourage and allow for a pluralist approach. If we fail to acknowledge this we will perpetuate the myth that technology and composition remain the social property of men.



Fig 2. A positive image: two sisters learning to use the computer

What other skills and musical processes may be usefully examined through the lenses of "hard" and "soft" mastery? How may we explore the gender distinctions constructed through such lenses without sustaining the very gender distinctions we wish to examine?

References

- Allred, P. (1998). Ethnography and discourse analysis: Dilemmas in representing the voices of Children. In Ribbens, J. and Edwards, R. (eds.), *Feminist dilemmas in qualitative research*, 147-170. London: Sage Publications.
- Armstrong, V. (1999). *Gender, composition and music technology: Styles of mastery*. unpublished Masters dissertation, Institute of Education University of London
- Bradby, B. (1993). Sampling sexuality: Gender technology and the body in dance music. *Popular Music*, 12(2), 155-176.
- Cohen, L., Manion, L., & Morrison, K. (2000). *Research methods in education* (5th ed.). London: Routledge Farmer.
- Comber, C., Hargreaves, D. J., & Colley, A. (1993). Girls, boys and technology in music education. *British Journal of Music Education*, 10(2), 123-134.
- Caputo, V. (1994). Add technology and stir: Music, gender and technology in today's music classrooms. *Quarterly Journal of Music Technology and Learning*, 5(2).
- Citron, M. J. (1993). *Gender and the musical canon*. Cambridge: University Press.
- Denzin, N. K., & Lincoln, Y., (eds.). (1998). *Collecting and interpreting qualitative materials*. Sage Publications.

- Frith, S. (1998). *Performing rites: Evaluating popular music*. Oxford: Oxford University Press.
- Green, L. (1997). *Music, gender, education*. Cambridge: Cambridge University Press.
- Grint, K. & Gill, R., (eds.). (1995). *The Gender-Technology relation*. London: Taylor & Francis.
- Halstead, J. (1997). *The woman composer: Creativity and the gendered politics of musical composition*. Ashgate Publishing Ltd.
- Haraway, D. (2000). A cyborg manifesto: Science, technology and socialist-feminism in the late twentieth century. In Bell, D. and Kennedy, B., (eds.), *The cybercultures reader*, 190-226. London & New York: Routledge.
- Mishler, E. G. (1986). *Research interviewing: Context and narrative*. Cambridge, MA: Harvard University Press.
- Murray, F. (1993). A separate reality: Science, technology and masculinity. In Green, E., Owen, J., & Pain, D., (eds.), *Gendered by design: Information technology and office systems*, 64-80. London: Taylor & Francis Ltd.
- Neuls-Bates, C., (ed.). (1982). *Women in music: An anthology of source readings from the Middle Ages to the present*. New York: Harper & Row.
- Pitts, S. (2000). *A century of change in music education: Historical perspectives on contemporary practice in British secondary school music*. Ashgate Publishing Ltd.
- Squires, J. (2000). Fabulous feminist futures and the lure of cyberculture. In Bell, D. & Kennedy, B. M., (eds.). *The cybercultures reader*, 360-373. London & New York: Routledge.
- Turkle, S. (1984). *The second self: Computers and the human spirit*. New York: Simon & Schuster.
- Turkle, S., & Papert, S. (1990). Epistemological pluralism: Styles and voices within computer culture. *Signs: A Journal of Women in Culture and Society*, 16(1): 128-158.
- Wajcman, J. (1991). *Feminism confronts technology*. Cambridge: Polity Press.

