



Literature review

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Thirty years into the discussion of gender in music technology and audio, a large amount of research has been published on inclusion and particularly on the gender imbalance in music technology. There has been a growth in publications documenting the challenges women face as a minority in audio, electronic music, and related audio industries (Hill, 2018; Parsley, 2022; Partti & Devaney, 2023; Strong & Gadir, 2023; Werner et al., 2020), and greater interest in the social context as an influential factor. This literature review summarises what the existing published high-level research shows us, on the realities facing women, girls, and minority gender learners in music technology. It highlights the main points that have been described and discussed by the experts and academics in this area. The cited texts are listed at the end of the review.

1. Existing research shows us clearly that the whole 'audio' field is still heavily male dominated, which in itself creates issues for the heavily outnumbered non-male individuals (see point 2 below), and such imbalances then often lead to further-dwindling gender diversity. These examples are reporting statistics that describe just how widespread this stark gender imbalance across the audio industries really is:
 - **Across 20 Audio Engineering Society conferences:** (with 702 presentations) overall 89.04% of presentations were by men (reported by K. Young and co-authors, 2018). At the time of publication, the membership of AES was more than 93% male.
 - **In television:** Emma Butt's report *Diversity in post-production sound roles in UK television production* (in 2023), of a sample of 55 responses to the research noted only six identified as women; and she reports that the "highest rated shows produced for BBC1 and BBC2 included only three (white) women" in the audio team. This is a very specific area of the industry, but similar statistics are reported in other audio areas.
 - **In music production / studio settings:** Yorkshire Sound Women Network's own *Volume Up* report from 2018 highlighted that seven in 10 of the Yorkshire recording studios and live music venues surveyed were all-male environments (*Volume Up*, 2018).
 - **In audio engineering generally:** in December 2023 the job website Zippa presents US-based statistics from almost 10,000 audio engineering profiles, showing that 92.3% of audio engineers are men, and 62.2% are white men.
 - **In popular music production:** California journalism college USC Annenberg regularly publishes on this topic. E.g. *Inclusion in the Recording Studio? Gender & Race/Ethnicity of Artists, Songwriters & Producers* (by Smith, Pieper, Hernandez & Wheeler, 2024) is based on 1,100 popular songs from 2012 to 2022, and reveals that only 2.8% of producers have been women over this timeframe, 3.4% in 2022 specifically, which is a drop since reaching a 'high' of 5% in 2015.



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2. Existing research then shows us that the situation whereby men hugely outnumber all others in audio, a reality still enduring after so long, has also perpetuated a remarkably outdated culture of misogyny.

An enormous and growing amount of published research has documented evidence of extensive and debilitating sexism, and attitudes and behaviours that advantage males, throughout our audio industries in the UK, and North and Western world music scenes. Examples include the following:

- **Sexual harassment and gender discrimination in the workplace:** Statistical analyses by Grace Brooks, Amandine Pras and co-authors in their article 'Do We Really Want to Keep the Gate Threshold That High?' (2021) reveal highly significant and systemic gender inequalities within the field, e.g., cisgender women experience many more sexually inappropriate comments, and unwanted comments about their physical appearance than cisgender men, and they are much more likely to face challenges to their authority and expertise.
- **The cynical financial interest the industry takes in sexualising women in the industry:** In 'Gendering Music in Popular Culture', in *The International Encyclopedia of Gender, Media, and Communication*, SK Bridge outlines this capitalisation (i.e. calculated to create financial gains) of sexism and misogyny in popular music, with "sexism permeating its whole structure" (Bridge, 2019, p.1).
- **Rape and sexual objectification:** Gray, in 'Evidence of Rape Culture in Modern Music' (2019), specifically highlights how prominent rape culture and misogyny are in particular music cultures such as rap, where women are the "targets of sexual slurs, objectification, explicit content, and manipulation" (Gray, 2019, p.46).
- **An embedded toxic culture of violence:** According to Bridge, this toxic culture operates with the support of cultural trends that link ideas of masculinity with violence and musical virtuosity, especially in rock music. These trends simultaneously promote a "racialised hypermasculinity" (Bridge, 2019).
- **How misogyny becomes a part of the culture, and manipulation and control of women's commercial image is the norm:** Bridge also shows evidence that these attitudes contribute to a more general desensitisation towards the issues of sexism and misogyny, and that it's helpful to remember that until very recently women have "had little control of their music, images, and performances" (Bridge, 2019, p.2). We note that the rise of unregulated social media means this situation is almost certainly deteriorating again, with very recent cases demonstrating that even the most successfully autonomous women in popular music – e.g. Taylor Swift in 2023 – have had their public image stolen and 'deep fake' manipulated. In her *Guardian* interview (with Emine Saner, 31/1/2024) author Laura Bates comments that this is "just the new way of controlling women. You take somebody like Swift, who is extraordinarily successful and powerful, and it's a way of putting her back in her box."

- **Power is still in men's hands, and the industry is designed to advantage men and disadvantage others.** In 'Off the Record: How Studios Subliminally Silence Women' (2017), G. Banks emphasises that men hold the majority of social and economic capital* in the audio industries (*the money, and influence over how things are done, as well as the contacts, networks and pathways to rise to success). Banks shows that spaces are designed to be comfortable and accessible for white, able-bodied, cisgender men, and that complex power dynamics pose very significant risks for women and gender minority artists and audio engineers, leading to debilitating experiences, especially at the early career stage.
- **The root of how the music industry tolerates such sexism may lie in how much we already expect it to be a male domain.** After attending 56 events and conferences over 12 years from 2006–2018, and collecting contributions from 93 individuals, as well as drawing on other researchers' interviews of female producers and artists, Paula Wolfe's research ('A Studio of One's Own'. In *Women in the Studio: Creativity, Control and Gender in Popular Music Production*, 2020) has a lot to tell us. It looks at how our (everybody's) ideas and understandings of music production as a practice at all, including audio as a creative and technical expertise, are heavily influenced by how 'gendered' (unbalanced and predominantly male-orientated) the sector is. She demonstrates how this skews not only what we expect to see and hear, but also who can and should be enabled to build successful career pathways as professionals across different aspects of the industry (Wolf, 2020, p.2). For example, girls must face the persistent marketing of women in the industry as objects of sexual interest¹, who are largely associated with voice and performance, but not with technology or control over their art. In this way, career pathway expectations become narrowed, or even polluted, from an early stage of girls' future ambitions for their careers.

Overall, as Björk and co-authors have written, “Despite 50 years of gender equality efforts in music, women are still underrepresented and underprivileged in many parts of the field, and many gender-stereotyped roles and hierarchies still prevail” (Björk et al., 2021, p.45).

¹ This is the issue of how women are represented influencing younger women, and this being also problematic, as women are portrayed as objects.

3. Against this background, existing research shows us that more is now understood about the social factors that may be contributing to a drop in engagement amongst girls and gender minority young people in music technology.

The role of those involved in teaching – in education settings or through industry apprenticeships, placements and mentoring – in sustaining and supporting this engagement is explained in the literature as pivotal, and researchers highlight the detailed ways in which these settings are often not culturally positive or socially inclusive places for girls and minority gender learners.

- **Most famous musical figures and role models have been male.** Formal western music education has a long history of celebrating and championing white male composers, performers, producers and audio engineers. Only as late as 2015 in the UK, following sixth form student Jessy McCabe's [historic petition](#), the Edexcel A-level music syllabus was changed to include any works by women composers. This is one positive change, and more are needed.
- **Music technology is still framed and understood as a male domain.** The cultural norms affecting music and music technology so that it is seen and experienced through a gender-biased lens are evident across all parts of the music curricula. While according to Comber, Hargreaves & Colley (1993) music as an artform discipline "is traditionally regarded as a feminine rather than as a masculine domain", further gendering within music from a very early age comes through particularly clearly in research discussing the social and cultural factors that influence children's music instrument choice (see works by Abeles & Porter, 1987; Conway & Arbor, 2000; Mateos-Moreno & Hoglert, 2023 and others).
- **Music technology was introduced explicitly as a strategy to involve boys.** V. Armstrong (2016), and Comber, Hargreaves & Colley (1993 & 1997) all point out that technology was introduced to the music classroom specifically to encourage boys to engage with music education – in effect to rebalance the 'feminine' connotations of the subject, which seemed to be alienating boys. So in this sense music education both drew directly on, and also helped to reinforce, social and cultural norms that firmly associate technology and music production with maleness and masculinity. So the very origins of music technology as a subject had these gendered associations baked into the foundations for the curriculum.
- **The unspoken culture and expectations about gendered roles in music tech continue to be communicated in the classroom.** According to Jackson's *Life in Classrooms* (2009, 1st edition, 1968) education includes a formal curriculum, and an informal 'hidden curriculum': a learning experience which contains a "myriad of beliefs and values transmitted tacitly through the social relations and routines that characterized day-to-day school experience" (cited in Giroux, 1981, p. 284). In music technology this can be seen in the common assumptions about roles different people may have in studio spaces, and who is likely to have some control. This suggests that the culture of a music department is just as likely to be infused with biased assumptions, attitudes and behaviours that undermine women, girls and gender minorities just as we see happening in broader music industries, broadcast and also social media.

- **Music students can be vulnerable to manipulation or abuse in various settings within their music department generally.** There is a scope for particular power relationships to operate in studio-based environments, including in music teaching studio settings, where members of these communities have different levels of knowledge, experience and control over facilities. We perhaps assume that students are perfectly safe. However, referencing the classical music world, where one-to-one and intensive teaching is the norm, Giroux (as above, pp.351–2) shows that students can be vulnerable in these environments, and that tertiary level music education has a documented history of “domineering and abusive teachers” and a profusion of Svengali². So in various ways a tutor can consciously or unconsciously abuse their position, and “exceed their domain of authority” (Giroux p.352).
- **Learning through apprenticeships can also be an unhealthy pathway that perpetuates old stereotypes for those starting out within the industry.** In their AES conference paper ‘Audio+: A Research Forum to Transform our Traditions’ (2021), K. McNally and A. Pras point to the problem of the traditional ‘apprenticeship’ model in music production, whereby skills are often acquired through tacit knowledge learnt on the job from ‘master practitioners’. This leads in their view to problems for apprentices – male and non-male – since their lead practitioners (masters) have built their own success in hierarchical, male-dominated recording studio settings and are themselves mostly male. The valuable ‘real world’ experiences these opportunities present are often infused with unhelpful gender biases and assumptions, transmitted on down the line by successful giants in the music industry, who are reluctant to change their framings: “the recordists who are referred to as *masters* of the tradition may not be the best ambassadors to inspire experimentation and cultural changes.” And in this way the damaging culture is stuck, and is perpetuated. (McNally & Pras, 2021, p.1). In ‘Studying Recording Techniques’, in *The Bloomsbury Handbook of Music Production* (2020), McNally and Toby Seay draw upon this theory to discuss how training approaches in the field are largely represented using these real-world examples, and therefore the same issues are perpetuated also by textbooks that are used in our music tech classrooms.
- **Safe boundaries can too easily become blurred or difficult for apprentices, students or less powerful team members to hold to, where high pressure performance and public recognition are the prize.** As K. Burwell’s work on music education ‘Power Relations in the Music Teaching Studio’ (2023, p.350) observes, in music technology there may also be “particular vulnerabilities in a tradition premised on high levels of commitment, and conducted in relative isolation.” Burwell is pointing here to common characteristics of music technology learning patterns, whereby students may be more at risk of feeling under pressure to push their own boundaries unsafely in pursuit of recognition, and where isolated creative spaces may leave them without the protection or solidarity of classmates and their wider community (similar conditions to those described in the film industry as part of #metoo disclosures).

² Those who exert excessive control and manipulation over another derived from a fictional villain featured in the 1894 novel *Trilby* by George du Maurier.

- **Teachers and educators have a key role in changing the culture and opening up the field more equally.** Culp and Robinson ask that “teachers consider their practices to help learners of all genders be empowered and supported to use music technology” (in ‘Promoting Gender Inclusivity in General Music (Part 2): Considerations for Using Technology’, 2022, p.19); and in this toolkit we are concerned with how that is, or might be, accomplished. Should we accept that girls lack the same confidence as boys with music technology (as suggested by Armstrong, 2016; and Comber, Hargreaves & Colley, 1993 & 1997) and develop interventions to address that, or is it the learning environment that is inherently (formally and informally) disadvantaging girls and minority gender learners? The literature seems to suggest both.
- 4. So how does the research show women in the music tech industries are responding to these realities?**
- **Ploughing their own furrow outside the industry mainstream:** Paula Wolfe’s work finds that many women in the industry prefer solitary practice, and independent studios and artistic practices: working independently means bypassing gatekeepers, not engaging with external commercial agendas, and having agency over personal artistic integrity, and identity, as well as fuelling a personal sense of confidence and authority with the overall production and sound. Wolfe acknowledges that of course men also desire this kind of control. But she talks about the ways in which women specifically are finding their way in a “gendered culture framing music production” (Wolfe, 2020, p.103).
 - **Speaking up and resisting – even where change needs to be systemic:** Bridge’s work in *The International Encyclopedia of Gender, Media, and Communication* acknowledges prominent movements of resistance emerging over five decades to tackle sexism, racism and ableism in the industry, including feminist collectives and businesses that have been challenging inequalities since the 1970s. More recently there has been #metoo, and of course Riot Grrrls – although their slogans were absorbed by the capitalist music industry, and their effectiveness largely lost (Bridge, as above). So the issues and the struggle are not new. But nor (as Björk and co-authors said above) has positive change become rooted over that time, and this highlights the imperviousness of the negative culture at the heart of the audio industries.
 - **Stepping up as role models:** In recent years researchers and commentators have pointed to a greater visibility of female sound engineers (such as Sylvia Massy), producers, (e.g. Sylvia Robinson) and electronic music pioneers (including Suzanne Ciani). For a while attention has been focused on these kinds of prominent figures, though the fact that these can be individually named shows their scarcity across the field. Helen Reddington has published interviews in *She’s at the Controls: Sound Engineering, Production and Gender Ventriloquism in the 21st Century* (Reddington, 2021) that give some women in the industry a voice. All these pioneers in this male dominated scene are a lifeline for aspiring sound engineers, especially since the landscape still requires careful navigation.

5. Finally, very little work has explored the perspectives of men on gender in music technology.

- **What male-led research there is seems to report non-male perspectives.** The academic research field of gender and music production is almost exclusively female, as seen in this review. There are a few notable male contributors (Werner et al., 2020; de Boise, 2020) though much of this literature presents second-hand accounts, indirectly reporting the female and gender diverse experience. So there is a conspicuous absence of male perspectives in the literature.
- **More exploration of male perspectives could both offer insight into persisting issues, and help unlock change.** The music tech sector needs significant actions and interventions to change the culture, and change is most likely to be led through policy, and systemic review. As one action-focused web-based panel discussion 'Unlocking The Control Room: Equity Achievements in Audio Engineering' (Brooks & Pras, AES convention of Autumn 2020) asserted, these need to be initiated and implemented by people in positions of influence (still most often men). So the sector needs to pay close attention to how men are perceiving and responding to the disengagement of girls and gender diverse youth in music technology. We need to understand the range of male values, positions, and understandings, to see how these (since men are in the majority by far) will impact on any proactive interventions, particularly in education contexts, if we are to achieve real change.

6. Conclusion

We have shown that the sector already has more than enough research to justify recommending proactive and conscious action to change how things are currently, for women, girls and minority gender people involved in music technology. However, there remain two gaps in what is published to date: knowledge and research on the topic of girls and gender minorities specifically in music technology education (11–16), and male perspectives on the topic generally.

The new WIRED study which has informed this toolkit documents the scale of the gender issues in music tech and audio not only through statistics. It goes on to explore the implications of this gender imbalance, looking into deeper sociological issues that contribute to women, girls and minority gender groups, who study or work in the fields of music technology and audio, being disadvantaged on a systemic level and scale. It also includes the perspectives volunteered by male research participants who are currently music educators, to open up the field a little more.

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¹ Information retrieved from <https://www.zippia.com/audio-engineer-jobs/demographics/> on 21/12/23.



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