

Live Audience Accessibility & Augmentation Project – A Case Study into Inclusive Haptic Futures for Music Festivals.

Keywords

Knowledge Transfer, Liveness, Accessibility, Disability, Haptics, Music Festivals.

Abstract

Purpose

This case study describes the Live Audience Accessibility & Augmentation ('LAAA') project, which installed a haptic dance floor at Falmouth University.

Design/methodology/approach

LAAA was designed to deliver knowledge exchange, community engagement and research outputs pertaining to liveness and inclusivity at music festivals. A knowledge exchange through practice methodology was adopted to programme six LAAA events including live performances, in-conversation events, DJ Workshops, a sound installation and an access workshop.

Findings

LAAA evidenced the potential for delivering knowledge, community and research outputs through the practice of creative programming, by producing live music performances and associated events. Findings evidenced 80% agreement that haptics provide authentic live experiences, inferring that using the BEAT BLOCKS floor and/or Woojer haptic vests may help mitigate exclusion at music festivals.

Originality

LAAA represented an original intervention, to explore perceptions of liveness and potential for novel haptic ICT to improve accessibility for people who are d/Deaf, disabled or neurodiverse.

Research limitations/Implications

Research limitations included a relatively small sample size, impacted by an unforeseen royal visit. Results were amalgamated with follow-on research to develop a liveness scale relating to ICT augmented performances (Bossey 2025).

Practical implications

LAAA enabled early-stage development of an evidence base that haptic ICT improves accessibility and positively influences audience intentions to attend music festivals. LAAA inspired follow-on field research projects and delivered practical knowledge exchange outcomes.

Social implications

LAAA delivered community engagement to two school groups, to address societal need pertaining to accessibility at music festivals for people who are d/Deaf, disabled or neurodiverse.

Context

This case study of an actual intervention, the Live Audience Accessibility & Augmentation ('LAAA') project, explores the potential to deliver research,

knowledge exchange and community engagement outputs by programming live performances, talks and workshops. Building on previous research addressing inclusivity at music festivals (Bossey 2020, 2023, 2023) LAAA installed an innovative haptic dance floor at Falmouth University over a period of 4 days in May 2023. The research, knowledge exchange and community engagement project was led and delivered by Cornwall Business School ('CBS') in association with the Academy of Music and Performing Arts ('AMATA'). LAAA aimed to evaluate audience experiences of engaging with authentic 'live' music performances, including those augmented with haptic ICT which stimulates the sense of touch. Attendees at LAAA events were invited to experience Beat Blocks a new Bass flooring system which transforms sound into felt vibration.

Six LAAA events were devised to deliver knowledge exchange and community engagement while gathering research data pertaining to perceptions of 'liveness', via on-line questionnaires. LAAA activities included: Live public performances, public in-conversation events, DJ Workshops, a haptic sound installation and an accessing Culture & Tourism workshop. LAAA also provided subsidised places on an on-line CPD course and created student research assistant opportunities. LAAA delivered a range of knowledge exchange outputs including 255 attendees, 17 businesses supported, 2 schools supported, 5 performers showcased and 124 students engaged. The success of the project inspired two follow-on projects in 2023/2024. The first measured audience perceptions of disrupting gaming technologies by wearing Woojer haptic vests on-site at Boomtown Fair in August 2023 and the Deaf Rave Festival in October 2023. The second explored experiences of the BEAT BLOCKS multi-sensory interactive flooring system at Cheltenham Jazz Festival in May 2024, Meltdown at the South Bank in June 2024 and Tropical Pressure Festival in July 2024.

Literature Review

Music festivals need to increase accessibility for people who are Deaf, disabled or neurodivergent (Bossey 2020). In the future, the use of ICT augmentation at music festivals which is designed to enhance accessibility for people who are Deaf, disabled or neurodivergent is likely to grow. This may incorporate haptic technologies, pertaining to the sense of touch, which are either innovative new developments or disruptions of existing ICT for new uses around leisure or tourism. However, the use of haptic ICT to increase inclusion at music festivals is currently under researched and the uptake of ICT enhancements in this regard may be influenced by audience perceptions of 'liveness'.

People who are disabled have "a physical or mental impairment that has a 'substantial' and 'long-term' negative effect on (their) ability to do normal daily activities" (The Equality Act, 2010). Within the UK population in 2020/21, 16 million people had an impairment or illness "that has lasted or is expected to last 12 months or more" (House of Commons Library 2023:1). Because impairments are more likely to be acquired by older people, demographic changes meaning over 25% of UK residents will be at least 65 years old within the next 44 years (Office for National Statistics, 2018) are likely to lead to increases in the disabled population of the UK. This is likely to lead to an increase in audience members who are disabled at music festivals, where audience demographics are already ageing

Live music events deliver "profound and diverse" contributions to social well-being (Rickard et al 2025:610). In England, 39% of all adults over 16 attended a live music event during the year prior to Q4 2023 (Ashton et al 2024), this was higher than Scotland (32%), Wales (32%) and Northern Ireland (34%). Music festivals

represent a significant element of the UK live music sector, attracting over six million attendees in 2022 (McLennan 2023:8). They are generally held outdoors and comprise concerts featuring numerous performers, which regularly last several days (Shuker 2012:130). Music festivals are exclusive (Calver et al 2023:2) and can discriminate against both the protected characteristics of the Equality Act 2010 and the poor. This creates a need to improve access for people who are d/Deaf, disabled or neurodivergent, which extends beyond audience members to include people working within the music industry. Accessibility refers to “measures put in place to address participation by those with impairments” Finkel, Sharp & Sweeney (2019. 2) and is supported by organisations including Attitude is Everything who “connect disabled people with music and live event industries to improve access together”. Increasing accessibility for all to music festivals could have positive implications for the 73% of disabled respondents to the UK Music Diversity Report (2024) who stated that they “compromise their health or wellbeing to do their job”, as compared to 52% of all respondents.

Accessible Information Communication Technologies (‘AICT’) can increase accessibility for people who are d/Deaf, disabled or neurodivergent at music festivals (Lazar, Goldstein and Taylor 2015:71) and hybrid events containing in-person and virtual elements are growing in popularity (Linthicum 2021:2). Existing ICT augmentations include hearing loops which deliver a wireless signal for hearing aids (Hearing Link Services, 2023), time synchronised text in the form of closed captioning (Mahoney 2023) and sign language interpretation displayed on a big video screen. Additionally, tactile sensations can be created by haptic ICT to “stimulate the sense of touch in a user experience” (Mass Challenge 2021). Emergent haptic ICT for potential use at music festivals appears in a range of products including vests, dance floors, benches and gloves. Touch is one of the “big five” senses (Sensory Trust 2020:3) and could be relevant to future audience experiences at music festivals (Robertson et al 2015:580). Engrained connections have been identified between the senses of touch and hearing (Jack et al 2015) so haptic ICT may have particular relevance to audience members who are d/Deaf.

An authentic performance is “one that isn’t deceptive or false” (Maxwell Keller 2023:6) so uptake of haptic ICT at music festivals may be partially influenced by perceptions of the live experience they engender. The concept of ‘liveness’ relates to “a performance, heard or watched at the time of its occurrence, as distinguished from one recorded on film, tape, etc.” (Oxford English Dictionary in Auslander 2008, 2012, Kim 2017 and Bossey 2023). Whilst disputed, some conceptualisations of liveness have evolved to incorporate audio and visual ICT (Sanden 2013:11) or ICT augmentation regarding additional senses including smell, taste and touch, described as ‘liveness 4:0’ (Bossey 2023). Therefore, understanding attendee perceptions of the liveness of haptic ICT may help inform their provision and uptake.

The LAA project was designed to derive knowledge exchange, community engagement and research outputs from haptic ICT installations in industry-standard live music facilities based within a university. Research has been defined as “a process of investigation, leading to new insights, effectively shared” (Research Excellence Framework 2024). This approach can facilitate a range of outputs from research and stimulate knowledge exchange, a process whereby academic staff, users of research and wider groups and communities “exchange ideas, evidence and expertise” (Office for Students 2023). Community engagement involves the participation in joint activity by members of the public (Harney and Morrison 2022) to address societal needs (The European Platform for Community Engagement in Higher Education 2024). Community engagement can enhance knowledge exchange, improve learning experiences and increase

research outcomes (Trappett 2023) so is becoming more prevalent amongst universities globally (Koekkoek et al 2021).

Methodology

A qualitative case study methodology, was selected to enable in-depth exploration of social phenomena as they occur (Annamalah, 2024:486). Case studies can produce accounts which stimulate change or spread innovation amongst practitioners, policymakers, and educators (Savin-Baden & Major, 2023) so were judged to be potentially powerful in the context of haptics intended to drive inclusion. The boundaries of this descriptive case study were established to explore one setting where the phenomenon of creative programming to deliver research, knowledge exchange and community engagement could be examined.

Knowledge cannot be passed on in an 'inert' form (Fazey et al 2012:32) and so a technique of knowledge exchange through practice was adopted during LAAA. This entailed programming live performances to facilitate exploration of haptic ICT through community engagement. Other examples of programming live performances to deliver knowledge exchange and/or community engagement include Creative Partnerships at Guildhall School of Music & Drama, RCM Sparks at the Royal College of Music and the public programme at the Royal Conservatoire of Scotland. An internal bid for LAAA was submitted for Higher Education Innovation Fund (HEIF) monies to deliver knowledge exchange and community engagement outputs over a period of 4 days in May 2023. Targets included supporting 21 businesses, 5 community groups/schools and 430 attendees (including 300 Falmouth University students). LAAA was also designed to showcase 5 performers to the live music industry.

LAAA drew upon previous research considering 'liveness', haptic ICT and potential digital futures for accessible live performances for people who are d/Deaf, disabled or neurodivergent at music festivals. Additional analysis of literature and a preparatory field trip to see the technology in use at the London Roundhouse, were then undertaken. This informed the programming varied performances, workshops and presentations and utilised innovative haptic ICT to simultaneously advance and exchange knowledge. LAAA comprised of 6 separate events, which were publicly advertised through the use of posters and social media:

- 'Around the World in 80 Raves'; presented by In Place of War featured the BEAT BLOCKS floor and programmed live performances from Deaf Rave and showcased student performers Ghetto Orange + Lobisen
- An in-conversation event with Suzanne Bull, founder of Attitude is Everything and Honorary Fellow of Falmouth University, explored increasing access to live music for performers and audiences who are d/Deaf or disabled
- Deaf Rave DJ Workshops for school groups offered attendees the opportunity to experience Woojer Haptic Vests whilst developing DJ-ing skills and provided access to AMATA Music student ensemble performances experienced using the BEAT BLOCKS haptic flooring.
- An in-conversation event with Lucy Evans, Producer and Events Manager for In Place of War explored the Around the World in 80 Raves project.
- 'Haptic Thresholds: Feeling the World Through Sound' a haptic sound installation through BEAT BLOCKS was devised by researchers working at the intersection of soundscape ecology, aural diversity, voice studies, and sound-based composition.
- Accessing Culture & Tourism Workshops with Access Cornwall and Rowan James, founder of BEAT BLOCKS supported local businesses considering

enhancing their provision to people who are Deaf or disabled. It also featured a haptic flooring demonstration with student performers Achilles Heal + The Beau Bennett Collective.

The modular BEAT BLOCKS haptic dance floor was set-up in studio K, a 200-capacity specialist music studio designed for amplified performances and equipped with professional sound and lighting equipment. DJ workshops featuring Woojer haptic vests took place in Studio E, a 60-capacity specialist 'black box' studio space. LAAA also provided subsidised places on the Attitude is Everything Disability Equality Training for Live Events course, to visitor attractions and/or music venues, to improve industry practices around accessibility for people who are Deaf or disabled.

Building upon previous research (Bossey 2020, 2023, 2023) and additional expert feedback, a five-point Likert scale was created to gather responses regarding perceptions of liveness via on-line questionnaires. The scale considered varied perspectives of a performance at a music festival and represents the first of a series of iterations of the scale being developed. A second Likert scale explored whether the haptic ICT improved access, sense of inclusion, sense of belonging/community and appreciation of the musical performance. Additionally, respondents were asked whether knowing that a forthcoming live music performance would be augmented with haptic ICT would positively influence their decision to attend in the future. All research activities were approved through the Falmouth University institutional ethics processes. To facilitate research-based learning (Griffith 2004) student research assistant roles were devised and promoted to students across CBS and AMATA. Tasks included elements of event management, visitor support, artiste liaison, collection of survey responses and event stewarding. Under a competitive process, 6 successful applicants were selected on the basis of a brief expression of interest and re-numerated as 'student workers'.

Findings

LAAA successfully attracted 255 attendees to live performances, talks and workshops linked to haptic technologies. Whilst these results were significantly below the original project targets, they remained sufficient to contribute towards detailed exploration of the social phenomena under consideration (Annamalah, 2024:486). Audience numbers were impacted by tight security accompanying an originally unforeseen royal visit (please see Figure 1). This occurred on the first day of the project when Sophie, Duchess of Edinburgh, who is Patron of several disability and neurodivergence charities, experienced the BEAT BLOCKS floor and chatted to students and members of Deaf Rave. The Duchess was very positive about LAAA, and her visit undoubtedly helped raise the profile of the haptic ICT in relation to people who are d/Deaf, disabled or neurodivergent. Never-the-less research limitations for LAAA do include a relatively small sample size.

Installing the BEAT BLOCKS floor facilitated knowledge exchange via the exchange of ideas and experiences (Office for Students 2023) regarding haptic ICT. It enhanced public facing accessed music student performances and has subsequently informed dialogue with and teaching for Falmouth University students. Additionally the floor facilitated the 'Haptic Thresholds: Feeling the World Through Sound' a haptic sound installation, which incorporated sounds from nature drawn from the Bernie Krause Natural Sound Archive, which for example included using the floor the experience the vibrations created by the sounds of two species of South Atlantic seals interacting together underwater. Rowan James (Beat Blocks) said: "The week's events at Falmouth were ambitious, supportive

and curious. A particular highlight for me was seeing our hopes for the floors use beginning to be realised”.

In total LAAA supported 17 business organisations. These can be subdivided into organisations supported through participation (BEAT BLOCKS and Deaf Rave) organisations supported through attendance (Tate St Ives, Lapa Valley, Minack Theatre, Access Cornwall, Services for Tourism, Cornwall Association of Tourist Attractions, Visit Cornwall, Quick Panda Productions, In Place of War & Attitude is Everything) organisations supported through separate visits/discussion/introductions (Newquay Zoo, The Lost Gardens of Heligan, Seahaven Pride Festival & Searlelaw) and organisations supported through CPD courses (Bristol City Council, Access Cornwall & Attitude is Everything). Troi Lee (Deaf Rave) said: “It was such an honour to be involved in this unique project ... Who says Deaf people can’t enjoy music? We feel music!! Those smiles as soon as the vibration hit, says it all!”. Suzanne Bull (Attitude is Everything) said: “LAAA was a fascinating project ... the best part was seeing students from the Deaf Academy who had never experienced a live music performance before, use the BEAT BLOCKS dance floor and learn how to DJ with Deaf Rave.” Additionally, a total of 5 performers were showcased during LAAA to a mixture of industry/media professional and potential audience members. This raised their profile, with the hope that they may receive additional bookings to perform elsewhere in the future.

LAAA community engagement centred on year eleven students from Mounts Bay Secondary School, facilitated by the ASONE music hub, and sixth formers from The Deaf Academy. In total 36 students and teachers/teaching assistants were supported to participate in joint activities (Harney and Morrison 2022) around haptic ICT which aim to address societal needs (The European Platform for Community Engagement in Higher Education 2024). Each group of students benefited from a DJ workshop (please see Figure 2) and experienced a live music performance augmented with the BEAT BLOCKS floor (please see Figure 3). Students were engaged with and positive about both haptic ICT formats (please see Figure 4) and their responses captured in images of the event have inspired the research team to explore photo elicitation techniques in on-going research. Ben Iremonger (The Deaf Academy) said: “All the students had an amazing experience using the BEAT BLOCKS floor watching Falmouth University students doing a live performance. They loved being able to feel a melody, rhythm and bass at the same time. One student said, ‘this technology is amazing I’ve never experienced anything like it before its fantastic’ and other students said events having a BEAT BLOCKS floor would encourage them to attend music events. The students also had the opportunity to wear a Woojer vibrating vest to help enhance the music (and) really enjoyed the DJ workshop.” This positive feedback infers that using the BEAT BLOCKS floor and/or Woojer haptic vests at music festivals may help “address participation by those with impairments” (Finkel, Sharp & Sweeney 2019. 2). Furthermore, it suggests that knowledge exchange through the practice of creative programming can produce case studies which help spread innovation (Savin-Baden & Major, 2023) in relation to accessibility and the unifying potential of live music events (Rickard et al 2025:610).

Contributing to research as a process of investigation, leading to new insights, effectively shared (Research Excellence Framework 2024) a sample of 76 completed questionnaires were collected during LAAA, with 68 respondents agreeing to the use of their data. From this sample, 22% of respondents considered themselves to be d/Deaf or hearing impaired. Regarding gender, 51% identified as being male, 47% as female and 1% as gender fluid. While 51% stated that they predominantly attend live music performances as an audience member,

33% stated they predominantly attend for work and 16% said they do not attend live music performances.

When asked whether the haptic technology provided an authentic live experience 80% of respondents agreed. This may support the proposed paradigm of 'liveness 4:0' (Bossey 2023) which incorporates ICT augmentation regarding additional senses including smell, taste and touch. Strong levels of agreement were also attained regarding the haptic technology improving access (77.4%), sense of inclusion (70.9%) and sense of belonging/community (71.5%). Furthermore, 75% agreed it improved their appreciation of the musical performance and 80% of respondents agreed or strongly agreed that knowing a forthcoming live music performance would be augmented with haptic technology would positively influence their decision to attend in the future.

These initial results have been subject to detailed analysis which suggest that the BEAT BLOCKS floor and Woojer vests are AICT's, capable of increasing accessibility for people who are d/Deaf, disabled or neurodivergent at music festivals in line with Lazar, Goldstein and Taylor (2015:71). The results amalgamated with findings from the two follow-on Live Audience Accessibility & Augmentation 2 ('LAAA2') projects, which measured audience perceptions of experiencing the BEAT BLOCKS multi-sensory interactive flooring system or wearing Woojer haptic vests on-site at Music Festivals. This led directly to the development of a liveness scale relating to ICT augmented performances at music festivals which are intended to increase accessibility (Bossey 2025).

LAAA engaged a total of 124 students, predominantly as audience members at performances and talks. This figure was lower than the original target of 300, in part reflecting the impact of the closure of the AMATA building during the royal visit. All six student research assistants worked at LAAA events and most met the Duchess of Edinburgh, including one CBS student whose ambition is to work on royal events! From verbal feedback, it appears that most of the student research assistants did benefit from research-based learning (Griffith 2004). A third year BA(Hons) Creative Events Management student said: "Working on the LAAA project was such an incredible experience. Accessibility for the d/Deaf is very close to my heart, and learning about this inclusive technology, seeing it being used by members of the deaf community, and knowing what kind of difference it can make, really made me look forward to the future of inclusive events." The success of the student research assistant roles in LAAA has led to similar roles being used at follow-on LAAA2 research projects and may support research-based learning (Griffith 2004). A second year BA(Hons) Creative Events Management student said: "I am so excited by the experience I gain from this project and never expected university to give me opportunities that help me develop so deeply - thank you". A more detailed piece of research into student's experiences in these roles is currently being undertaken.

Media outputs from LAAA occurred at the time through local BBC outlets Radio Cornwall (please see Figure 5) and Spotlight (TV). Additional outputs have continued over time as the profile of the project has grown and these include articles in Standout Magazine, the Mail on Sunday/maonline and Digital Frontier Magazine. This coverage has helped promote BEAT BLOCKS, DEAF RAVE, Woojer vests and LAAA more widely.

LAAA has informed further research activities measuring audience perceptions of wearing Woojer Haptic Vests on-site at two music festivals during 2023 and experiencing the BEAT BLOCKS floor at three music festivals in 2024. Furthermore, additional installations of the BEAT BLOCKS floor were carried out

at AMATA in September 2024 to deliver Knowledge Exchange to businesses. An additional schools engagement event was produced in May 2025 featuring the floor. On-going explorations of photo elicitation techniques and policy-based research are taking place, with the intent to publish joint authored papers. Further research could consider audience perceptions of using alternative haptic AICT products and/or performer's experiences of working with haptic technologies.

These findings indicate that programming live performances, talks and workshops can deliver research, knowledge exchange and community engagement outputs.

Conclusion

In order to consider a social phenomena 'in the field' (Annamalah, 2024:486), this case study explored one iteration of knowledge exchange through the practice of creative programming, which facilitated haptic augmentation for people who are d/Deaf, disabled or neurodiverse at music festivals. It evidenced that the LAAA project produced knowledge exchange, community engagement, research, and student experience/employability outputs and pump-primed follow-up projects. LAAA delivered HEIF outputs, attracting 255 attendees to live performances, talks or workshops and received 1 royal visit. Six student research assistant roles were embedded in LAAA to support research-based learning (Griffith 2004).

LAAA enabled knowledge exchange through practice by programming six live performances, talks and workshops to stimulate the sharing of "ideas, evidence and expertise" (Office for Students 2023) between academics, businesses and community in relation to the BEAT BLOCKS haptic floor and Woojer haptic vests. The project was very positively received by both BEAT BLOCKS and Deaf Rave as organisations supported through participation, while interest for other potential usages of the haptic ICT was stimulated from a range of other organisations supported through attendance, particularly music promoters and venues/attractions. These attendees contributed responses to the initial research findings and in some instances have continued to engage with the potential of the haptic ICT post LAAA. Media coverage emanating from LAAA has also helped promote the technologies more widely, including on the BBC and in the Mail on Sunday.

LAAA addressed societal need around accessibility for people who are d/Deaf, disabled or neurodiverse to deliver community engagement (The European Platform for Community Engagement in Higher Education 2024) to two school groups, alongside other attendees. In total 36 secondary school students and teachers/teaching assistants experienced a DJ workshop featuring Woojer vests and a live music performance augmented with the BEAT BLOCKS floor. Students and staff from The Deaf Academy were especially positive about both experiences, suggesting that haptic ICT has potential to help "address participation by those with impairments" (Finkel, Sharp & Sweeney 2019. 2).

LAAA successfully facilitated research activities into the provision of BEAT BLOCKS haptic flooring and Woojer haptic vests, as part of a process of investigation, leading to new insights, effectively shared (Research Excellence Framework 2024). Initial findings evidenced 80% of respondents agreed the haptic ICT provided an authentic live experience. This finding may support the proposed paradigm of 'liveness 4:0' (Bossey 2023). Furthermore, 77.4% agreed that haptic ICT improved their access and 80% agreed that provision of haptic augmentation would positively influence their decision to attend a music festival. Detailed findings were analysed and contributed to the publication of a liveness scale for ICT augmented performances at music festivals (Bossey 2025).

Initial results from LAAA related research suggest that haptic AICT is capable of increasing accessibility (Lazar, Goldstein and Taylor 2015:71) at music festivals for people who are d/Deaf, disabled or neurodivergent. However, further research is required consider audience and/or performer perceptions of using haptic technologies. With this in mind, LAAA also prompted additional research activities on-site at music festivals during 2023/2024 deploying photo elicitation techniques and policy-based research. Furthermore, Falmouth University successfully programmed the BEAT BLOCKS floor for a Knowledge Exchange event in September 2024 and a schools engagement event in May 2025. Other potential projects are currently under investigation.

It is hoped that evidencing the potential for delivering knowledge, community and research outputs by producing live music performances, will encourage more academics to engage with knowledge exchange through practice. Working in partnership with haptic innovators DEAF RAVE and BEAT BLOCKS was a successful approach which could be replicated. Adopting a case study approach felt effective to help publicise innovation in relation to accessibility at music festivals. The provision of haptic augmentation to increase access to music performances is itself under-researched and represents fertile ground for further investigation.

Figures

FIGURE 1 Sophie Duchess of Edinburgh experiences BEAT BLOCKS floor while visiting Falmouth University CREDIT Falmouth University

FIGURE 2 Attendees wearing Woojer vests at LAAA Project DEAF RAVE DJ Workshops CREDIT Matt Jessop

FIGURE 3 Attendees at LAAA Project using BEAT BLOCKS haptic floor CREDIT Matt Jessop

FIGURE 4 Deaf Academy Attendees and LAAA team at LAAA Project CREDIT Matt Jessop

FIGURE 5 BBC Radio Cornwall interview at LAAA Project CREDIT Matt Jessop

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