


# Music Technology for Health and Well-Being: The Bridge Between the Arts and Science

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Improvements in medical technologies in recent decades are reflected not only in improved survival rates following severe illness and trauma but also in the degree of severity of disability experienced by the survivors. Thus, health and educational professionals from both the arts and sciences meet increasing challenges in assisting people with highly complex needs to achieve some level of independence, an important factor contributing to quality of life. How do we facilitate clients/patients/service users to lead genuinely fulfilling lives, with opportunities for pleasure, social experiences, and personal expression? Across all disciplines, “technology” presents a solution to such challenges. Within this special issue, musicians, scientists, therapists, patients, educators, and designers collaborate using technology as a vehicle to achieve these goals.

Although computers and assistive technologies are common tools in work with people with special needs, the music therapy profession has sometimes seemed slow to engage with these tools. An initial study of music technology in therapy in the United Kingdom identified the uptake of technology would be greater with more information about which tools to use, how to use them, and when, why, and with whom these tools should be used.<sup>1</sup> Developing this work, an exploratory study based in the United Kingdom identified that electronic music technologies primarily enable access for client and therapist.<sup>2</sup> Using assistive devices, such as “switches,” can help patients to access active music making when they cannot access acoustic instruments due to physical disabilities. Music technology can help therapists access clients when acoustic tools fail. Also, music technology can help meet a client’s personal expression of cultural identity, for example by producing particular instrumental sounds related to ethnicity (eg, the Bodhrán for an Irish client), or create music in a genre not readily created using acoustic instruments (eg, hip-hop or dance genres). Tentative indicators and contraindicators for using music technologies in clinical settings were proposed.<sup>2</sup> To gain an international perspective and to test the findings with a larger sample, a further study broadened its sights to the United States.<sup>3</sup> This US-based study, entitled *Music Technology in Therapeutic and Health Settings*, gained multiple perspectives from a range of professionals and people who had used music technology in their own journey to improve health and well-being as patients

in therapeutic and health settings.<sup>3</sup> In particular, this most recent study sought insights into using and developing music technology with a variety of populations, from differing perspectives, with people of differing generations. One of the emergent factors was the importance of bringing divergent skills and knowledge together from the arts and sciences. It has long been acknowledged that science and music may not be the most comfortable of bedfellows.<sup>4</sup> Technology, however, may provide a natural meeting point for the two.

This special issue is the culmination of a project including presentations from 2 interdisciplinary events in 2010 which brought together science and the therapeutic applications of music. *Music Technology in Therapeutic and Health Settings* was a national symposium held at Berklee College of Music, Boston, Massachusetts, in April 2010. The event could not have been more timely. Held just 2 days after the launch of the first I-pad and within a stone’s throw of the Apple Store in Boston, it attracted clinicians, students, trainers, engineers, designers, and people who had used music technology in their own music therapy as “patients.” Presentations from experienced clinicians revealed the challenges with which we are presented in clinical scenarios. Workshops, demonstrations, and experiential improvisations led by the School of Electronic Production and Design proposed answers to these challenges, including an adaptation of the newly launched I-pad as a musical instrument. A second international event, *Music Technology: Solutions to Challenges*, was held at the Royal Hospital for Neuro-disability in London, in June 2010. Two days of events, workshops, and presentations provided a forum for interdisciplinary exploration in which delegates from 13 countries charted philosophical, practical, and theoretical territories representing music, science, education, therapy, health, research, and design.

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Incorporating music technologies into therapeutic settings, whether these be in health, education, or the community, demands interdisciplinary collaboration with multiple perspectives. In this special issue, we see many examples of the innovative collaborations taking place in clinical settings. Although switch interfaces were described some decades ago in music therapy practice,<sup>5</sup> the first article in this issue reflects the progression of interface technology by describing the development of a brain-computer music interface. Eduardo Miranda, Wendy Magee, John Wilson, Joel Eaton, and Ramaswamy Palaniappan from England describe the use of “eye gaze technology” in a person with locked-in syndrome to generate a melody, varying in both melodic and dynamic components. Although eye gaze technology is gaining widespread use in clinical settings, its ability to generate music is highly inventive reflected in the resulting collaboration between computer scientists, a composer, a music therapist, and a patient. David Ramsey, a pioneer in using music technology in music therapy based in the United States, describes his collaboration with a music technologist/therapist to design new musical instrument digital interfaces (MIDI) specifically for physical rehabilitation, which can capture quantitative data to reveal the patient’s gains. Ramsey highlights the need for “form to follow function,” both in terms of an instrument’s design to meet the patient’s specific clinical goals but also to enable ways to measure patient gains. Liz Norman and Eddie Norman from the United Kingdom provide insights into the collaborative process between a music therapist and designers. The practical issues that face therapists in finding appropriate musical tools were used as factors for design consideration. This collaboration resulted in multiple novel designs of digital and acoustic instruments for use in therapy and educational settings for people with special needs.

Two of the articles in this special issue deal directly with the clinical information needed by music therapists wishing to use technology but unsure of which technologies are most appropriate with particular populations. The article by Wendy Magee, Michael Bertolami, Lorrie Kubicek, Marcia LaJoie, Lisa Martino, Adam Sandowski, Jennifer Townsend, Annette Whitehead-Pleaux, and Julie Buras Zigo is a summary of the presentations given at the symposium *Music Technology in Therapeutic and Health Settings* held in Boston, in April 2010, reflecting practice in the United States. Although there have been a handful of published accounts of the use of music technology in music therapy over the past two decades, this article addresses several omissions from the literature. Existing publications have focused on a narrow age range of predominantly adolescent or adult age groups. This has prompted questions about whether there is a place for music technology with people at either end of the life span, particularly with elderly individuals, given the generational issues of technology. Divided into sections focusing on assistive devices and software platforms, the clinical cases offered demonstrate that technology has a role with young children and the elderly as well, particularly in work with families. Guidance is provided for those wishing to develop a technology service and not knowing where to start. Annette Whitehead-Pleaux, Stephanie

Clark, and Lisa Spall from Boston, Massachusetts, offer more detailed direction on using music technologies with children in medical settings. Of particular importance for clinicians are the recommendations for when technology might be unhelpful in pediatric medical settings and the notes of caution offered. Both of these articles update the knowledge base for clinicians by referencing the most recent technologies commonly used, such as handheld devices using “apps” and music software frequently available on laptops.

In any context, improvisation is an important part of music making and 2 articles focus on the use of technology within improvisational practice. There could be no one better to lead a piece on improvisation using technology than Pauline Oliveros, an American accordionist and composer, who is a central figure in the development of post-war electronic art music. Her collaboration with Leaf Miller and Jaclyn Heyen from the United States, Sergio Hazard from Chile, and Gillian Siddall from Canada describes the development of video tracking software for use in improvisation and its use in educational and rehabilitation settings. Sensitive enough to pick up even eyebrow movements, the interface has enabled the inclusion of students and patients that are often excluded from weekly music-making sessions. Alan Lem and Garth Paine from Australia report on a preliminary evaluation of a video-based musical instrument specifically geared to free improvisation. Of importance is the technology’s capacity for dynamic responsiveness to changes in velocity, acceleration, or direction of the client’s movements. Using video tracking technology, the findings from this trial study offer thought-provoking insights into matching technology to clients’ needs. Although music technology tools are often most suitable for people with severely restricted movement, the device reported here suggests it is more effective for people with milder physical disabilities.

Angela Vogiatzoglou, Adam Ockelford, Graham Welch, and Evangelos Himonides from the United Kingdom present research in its final phase of a Web-based tool for practitioners in educational settings to assess, record, and evaluate musical development in children and young people with complex needs. The project has aimed to improve the understanding of musical abilities and needs of pupils with severe learning difficulties, working toward a music curriculum for students with learning difficulties based on empirical evidence. The Web-based technology will provide a musical development framework package that can draw on video, photographs, and written descriptions of children’s musical engagement, enabling practitioners to record incremental change in pupils’ developments. This evaluation tool will be available to practitioners internationally, and promises to be an invaluable resource for educational practitioners and therapists, improving our understanding of young people’s music and psychoeducational development.

In the final article, Joseph Nagler from the United States challenges the reader in commentary with the dilemma faced by professionals wishing to use technology in therapeutic contexts. A therapist wishes to enable a patient to express himself or herself musically, and through choosing the optimal tool of

technology to meet this task, the therapist distances herself or himself from the process. Herein lies the dilemma for many therapists and it is this issue that lies at the root of the reticence in incorporating music technology into therapeutic and educational work. Technology in its essence requires a “small input for big output” (see note 1). That is, it facilitates the tiniest gesture to trigger a sound many times its magnitude. The consequence may be perceived as bizarre, unnatural, and incentive-based which seems a contradiction of the frailty in the clients with whom we work. Paradoxically, this can also be the power and appeal of using technology.

The selection of articles included herein represents some of the most prescient practice in health and therapeutic contexts, providing a snapshot of developed and emerging music technologies and their applications in clinical settings. I hope that this issue inspires and challenges readers to consider the ways that incorporating music technology in interventions may enhance both the lives of others and the care which we can offer as professionals.

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#### Bio

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