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Adapting the Emobook Life Story Book App for Reminiscence Focused Music Therapy in Dementia Care: An Interdisciplinary Participatory Design Approach

Abstract. Life Story books are frequently employed to facilitate reminiscence interventions, but their use in music therapy remains limited in the scientific literature. There is a paucity of research detailing the design processes involved in this context. In contemporary music therapy, the effective integration of technology is a significant concern. This paper aims to report on the Participatory Design process used to adapt the Emobook Life Story Book App for a Reminiscence Music Therapy Program for people living with dementia. An interdisciplinary team comprising an interaction designer, a software engineer, a music therapist, and a research assistant engaged in co-design sessions. The interdisciplinary and participatory process yielded four ideas and four lines of action, which evolved iteratively as the work sessions progressed. Points raised by the lines of action were addressed, leading to modifications in the Emobook application and adjustments in the intervention program for seamless integration. Collaborative, interdisciplinary efforts are essential in advancing the incorporation of technology into music therapy practice. This study demonstrates the value of a Participatory Design approach in adapting technology for use in Music Therapy.

Keywords: Music Therapy, Life Story Book, Participatory Design.

1 Introduction

In the field of contemporary music therapy, a notable concern refers to the effective incorporation of technological tools in professional work settings. The discipline has yet to reach a stage where it can be confidently stated that its practitioners have received comprehensive and adequate training for the competent use of technology within their practice [1]. In this context, music therapists are encouraged to network with experts from a wide range of disciplines, thus enhancing the development of their knowledge and skills. The synergies that emanate from such collaborative initiatives not only accelerate the assimilation of technological competencies but also generate knowledge that can be seamlessly integrated into music therapy practice. In other words, the path toward a professional practice that adequately integrates technologies is enhanced by collaborative and interdisciplinary work [1].

This paper aims to provide a comprehensive account of the Participatory Design (PD) process employed to adapt Emobook [2], a life storybook app designed for reminiscence therapy, for integration into a specialized Reminiscence Focused Music Therapy Program for people living with dementia [3]. To do this, an interdisciplinary team was formed, consisting of an interaction designer, a music therapist, a software engineer, and a research assistant. They conducted a series of co-design sessions that mixed meeting discussions, traditional material enactments, and mock-up screen design.

These sessions served to elicit and validate requirements and produce a post-prototype of the life storybook app adaptation to be used in a music therapy program.

2 Related work

2.1 Dementia Care

Dementia affects approximately 50 million individuals globally, with an annual increase of 10 million new cases. Projections suggest that by 2030, there will be 82 million people living with dementia, rising to 152 million by 2050 [4]. Given this growing prevalence, cost-effective and straightforward interventions are needed to enhance the quality of life for dementia patients and their caregivers.

Non-pharmacological approaches, such as reminiscence therapy, have demonstrated positive impacts on cognitive function, reduction of depressive symptoms, and promotion of positive self-esteem [5]. Particularly, music therapy has shown promise in improving mood, particularly depressive symptoms, in dementia patients in care settings [5, 6]. However, questions remain about the duration of these effects and the necessity for ongoing stimulation for lasting benefits [6].

2.2 Reminiscence and Music Therapy

Music therapy often triggers reminiscence naturally through familiar songs, facilitating conversations and the sharing of memories tied to personal and cultural identities. Research has demonstrated the positive effects of combining music and reminiscence therapy in reducing depressive symptoms among people living with dementia [7].

Music and reminiscence are often combined by a variety of practitioners in their work with people with dementia. Among these Music therapy techniques are:

- **Associative Mood and Memory Training (AMMT).** Cognitive rehabilitation technique that uses music to enhance memory processes in three ways - by producing a mood-congruent state to facilitate memory recall, by activating associative mood and memory networks to access long-term memories, and by instilling a positive mood at both encodings and recall enhancing learning and memory function [8]
- **Reminiscence Focused Music Therapy (RFMT).** Combined intervention with the use of associative items. The familiar music provided a supportive framework and acted as an anchor during periods of disorientation, directing the members of the group back to the present moment. The incorporation of associative items in the sessions encourages reality orientation, increased verbal interaction, and cognitive stimulation [7].

The two techniques offer a systematization of the reminiscence-focused process, including guidelines for the selection of music, session planning, and associated protocols [7, 8]. In particular, the AMMT involves a detailed clinical protocol and states that clinicians should discretely monitor patient behavior for affective response during music listening.

2.3 Reminiscence and Life Story Books

Life Story books are widely used to support reminiscence interventions [2]. These books typically contain photos or images of life memories. These help people living with dementia in constructing narrations about their life memories, which in turn has been shown to have positive effects on feelings of well-being and quality of life.

Emobook is a digital life story app designed to support reminiscence therapy. It aims to help therapists labor by giving them more control over multimedia stories and photos so that the reminiscing experience becomes stimulating and interactive (i.e., music, sounds, movie clips) and capturing activity records, which opens the opportunity for therapists to study the progress of the disease [2]. Its features include multilingual support, enable/disable settings for higher flexibility of the tool, full-screen support, and several mood meters to gather emotional responses from people living with dementia.

The utilization of such technologies in music therapy remains relatively underrepresented in the scientific literature. There is a notable scarcity of studies that specifically document the intricate design processes associated with these endeavors.

2.4 Participatory Design Methodology

Participatory design (PD) is a methodology that promotes the participation of users in the design process of health-related applications [3, 9]. It is an iterative process where each phase is planned by reflecting on the results from the previous phase concerning the participant's contribution.

Key activities of a PD process include fieldwork; literature reviewing; and development and testing. All activities must be applied with a participatory mindset that will ensure genuine participation throughout the project. For each of these activities, various methods are applied throughout the phases of a PD project to enhance user participation. These can be categorized under the headings of telling, making, and acting [3]:

- **Telling.** Practitioners are given a chance to share their knowledge.
- **Making.** Tools allow the ability to create, for example, through creative workshops conducted to generate ideas.
- **Acting.** Explore how new designs could affect practice, for example, by testing ideas in laboratories.

3 Interdisciplinary Participatory Design Process

The objective of this PD process was to merge different knowledge domains to co-design a post-first prototype of Emobook. It is worth highlighting that, given the application's purpose of aiding caregivers in the advancement of reminiscence therapy, the primary end users in this specific case were the music therapist and the research assistant. The process was developed in five working sessions. Each one was planned by reflecting on the results from the previous one. Key activities included fieldwork; literature reviewing; and development and testing. Below, we provide a detailed description

of its attributes, encompassing the setting, team composition, tools employed, procedural steps, materials, schedule, and evaluation methods:

3.1 Setting

The first meetings were held online through the Microsoft Teams platform, with access provided by the Starting with the second session, the meetings were held onsite at the ..., an institution belonging to the same University.

The meeting room was well-equipped to facilitate collaboration and productivity. It featured a spacious worktable, synchronized screens that mirrored the designer's tablet, and individual tablets for therapists' use. Additionally, traditional tools like paper and pens were readily available for sketching diagrams or notes. To ensure comprehensive documentation and continuity, we maintained diaries where we recorded key discussion points and identified areas for further exploration after each meeting. This blend of modern technology and traditional notetaking ensured a comprehensive and effective working environment.

3.2 Team

The team comprised four members: a music therapist responsible for designing and implementing the intervention program as part of her doctoral studies; a research assistant with institutional experience and participant familiarity; the software developer and creator of the Emobook application; and a computer engineer and project collaborator. Additionally, the process received oversight from an experienced music therapist and the director of the Doctoral Program.

3.3 Tools

The co-design tools were thoughtfully selected to effectively amalgamate knowledge from diverse fields and foster collaborative problem-solving:

- **Brainstorming:** Within this tool, the "technology domain" encompasses emerging technologies that may stimulate innovative design concepts. Simultaneously, the "social health domain" focuses on health aspects open to potential adaptations.
- **Timeline:** These minute-by-minute diagrams outline the actions to be executed during the intervention. They prove invaluable in aligning the application's adjustments with the specific phases of the therapeutic process.
- **Work Diaries:** These serve as comprehensive records, documenting the subjects discussed, ideas generated, and future action plans emerging from meetings.

3.4 Procedure

Five meetings were convened at biweekly intervals, lasting approximately one and a half hours each. These work sessions followed a structured format divided into three distinct phases:

1. **Introduction (Telling).** The session began with an introduction to the topic at hand. This phase often involved the presentation of findings from literature reviews or research results, and it also included updates to the project timeline.
2. **Brainstorming and Idea Generation (Making).** The second phase involved a brainstorming session aimed at finding solutions to any issues or challenges that surfaced during the presentation. This creative process generated a pool of ideas and potential solutions.
3. **Action Plan (Acting).** The final phase focused on defining concrete steps and action plans for upcoming sessions.

3.5 Evaluation

Each session was strategically designed to build upon the outcomes of the previous one. This deliberate sequencing aimed to facilitate the seamless integration of idea generation and the formulation of action plans, enabling well-informed decision-making for the successful Emobook integration within the music therapy program. To assess the effectiveness of our PD process, we considered several critical factors: the quantity and quality of ideas generated, their alignment with the defined lines of action, and their overall influence on shaping the new Emobook prototype.

4 RESULTS

4.1 Participatory Design Process

Session 1

Introduction. The initial session started with a comprehensive exposition of the music therapy pilot program incorporating the Emobook application. The music therapist delineated the program's specific objectives and the fundamental components. It should be noted that although the intervention program adopts the name “Reminiscence Focused Music Therapy” and follows its recommendations [7], the intervention was designed according to the clinical protocol of the AMMT technique [8]. Then, the research assistant provided pertinent details concerning the institutional context where the program would be executed, including essential attributes and the designated workspace.

Brainstorming. The technologists asked questions about the music therapist's presentation, the technique, and the processes involved. They also requested a copy of the protocol involved. They were interested in understanding the different stages of the session.

Action Plan. For the next working session, the music therapist should develop a minute-by-minute timeline of the intervention and state: what questions will be asked to the patients, when measures will be taken, and what instruments will be used (LA1).

Session 2

Introduction. The second meeting began with the presentation of the minute-by-minute timeline, following the line of action proposed in the previous session. Then, the technologists explained how to choose and preset the emotional assessment scales included in the app [2]. The architecture of the application at the data collection level was also explained.

Idea Generation. After listening to the clinical and technical explanations, the team came up with an idea to adapt Emobook, since the modality was in a group of three participants. The first idea generated was: to group individual profiles into groups of three (IG1).

Action Plan. Since the application allows selecting between different scales to assess emotions, it was considered necessary to carry out a literature review to find out which scales are most convenient for each moment and why. The line of action derived from this session was: to carry out a literature review of the emotional assessment scales included in the application to analyze which ones should be used and when (LA2).

Session 3

Introduction. The third meeting began with the presentation of the results of the literature review carried out between the music therapist and the research assistant on the use of scales for the emotional assessment of people living with dementia. They presented a synthesis of the results, highlighting Pick-A-Mood and the Dementia Mood Picture Test [10, 11, 12].

Idea Generation. Based on these, they proposed to use the Pick a Mood scale at the beginning of the session through the question "How are you feeling today?", to assess the mood before the intervention. Since mood does not change that often, it should be asked no more than twice around the event of interest [10]. The experience reported highlights that moods are best not reported immediately after an emotional event (e.g., social interaction) because people will tend to report their feelings about that (anticipated) event instead of their mood. Then, each time a multimedia file was used to recall a memory, the Ekman scale would be used to indicate the emotion associated with that memory. Therefore, the idea generated was to use two scales for emotional assessment during the proposed music therapy program (IG2).

Action Plan. Consequently, for the next session, the action line involved creating a new timeline incorporating the use of Emobook, taking into consideration each of the moments of the sessions and the use of the assessment scales included in the app (LA3).

Session 4

Introduction. The fourth meeting began with the presentation of the intervention timeline with Emobook integrated as a tool, following the proposed line of action. In the second part of this session, the technologists showed how a smartwatch with a built-in scale would work to assess the emotional responses of people with dementia. Such a smartwatch interface suffers from touch overshooting and divided attention as the user has to look down the wrist for longer and maintain the arm in an inconvenient position. Further, unlike the tablet, the smartwatch would not allow the multimedia material to be manipulated, it would only incorporate the emotional assessment scale.

Idea Generation. Following a constructive exchange of viewpoints and a thorough review of the intervention timeline, a consensus emerged. It was collectively decided that equipping both the music therapist and the assistant with tablets featuring the new Emobook prototype was the optimal choice. The primary rationale behind this decision was to ensure that the assistant also had access to the application and an updated data backup, enhancing the overall effectiveness of the intervention. Therefore, the idea generated was related to the device selection: to use two tablets featuring the Emobook post-prototype for the music therapy pilot program (IG3).

Action Plan. One of the technologists commented that it would be convenient to have at least one additional measurement instrument or tool for more objectivity regarding the data collected. The music therapist recalled that the data could also be correlated with a music therapy assessment tool that would be used. The line of action derived from this proposal was to determine how the validated music therapy assessment tools complement the records obtained through Emobook (LA4).

Session 5

Introduction. Concerning the line of action that emerged in the previous session, the music therapist presented MiDAS [13], a validated music therapy tool developed to measure the observable musical engagement of persons with moderate or advanced dementia who may have limited verbal skills to directly communicate their musical experiences. MiDAS focuses on capturing what people with dementia value in music (the “enjoyment”) using a Visual Analogue Scale (VAS). It also allows qualitative data to be recorded.

Idea Generation. After the music therapist's presentation, it was decided that it would be positive to correlate the data obtained through the Emobook application with those obtained from the MiDAS assessment toolkit (IG4). Especially, considering that it

allows qualitative data to be recorded, a relevant aspect facing the challenges and limitations of quantifying significant emotional experiences. In this sense, this assessment tool is adequately complemented by the scales incorporated in Emobook.

Action Plan. Finally, the technologists delivered the configured equipment with Emobook post-prototype. They explained that they configured the package to be updatable without deleting data, although previous tests must be carried out by creating three profiles. At the end of this session, the process was concluded with a post-prototype of Emobook ready to be tested by the music therapist before the start of the pilot program.

4.2 Evaluation

The results of the PD process include the generation of four ideas and four lines of action. The iterative condition of the process was reflected in the concatenation of LA and IG, as shown the Figure 1.

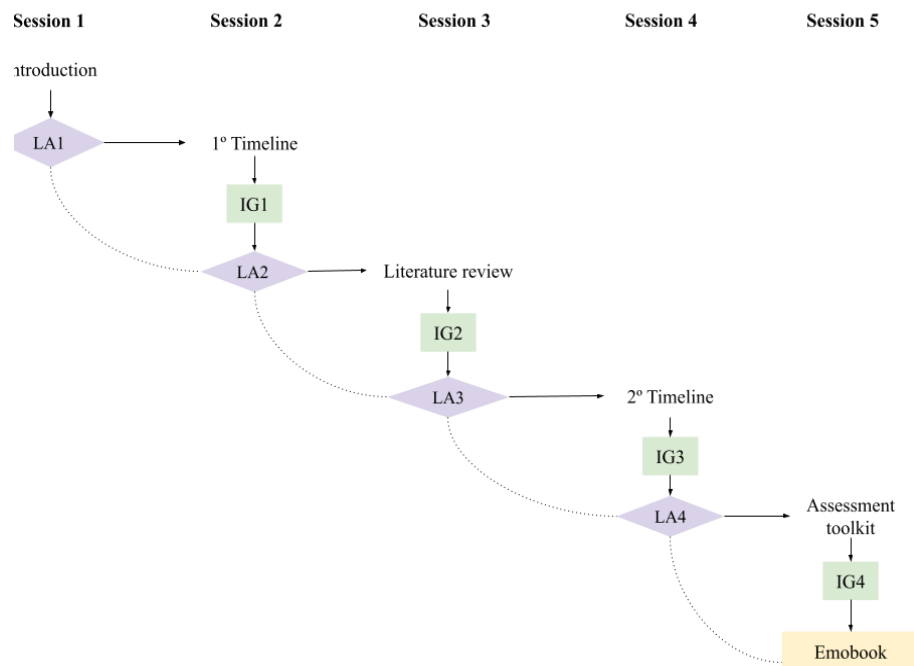


Figure 1. PD process flowchart: lines of action (LA) and ideas generated (IG) achieved.

As the work sessions continued to evolve, we implemented various modifications in Emobook and on the RFMT-associated timeline. Through this iterative process, we successfully achieved a refined version of Emobook.

5 Conclusions and Future Work

The interdisciplinary collaboration during the PD process was fruitful: technologists observed aspects that led to reflection on clinical practice, and practitioners posed challenges related to the implementation of technologies that could only be formulated based on experience in the professional field. As a result, Emobook post-prototype was adjusted to be able to incorporate it as a tool in a reminiscence-focused music therapy program. Likewise, it was possible to arrive at a joint timeline. The exercise of defining and detailing the tasks, writing the questions, and assigning time intervals for each action, was key in analyzing the best way to integrate Emobook with all the tools to be used in a justified manner, both at a technical and clinical level.

The results of this experience also represent progress towards the competent use of technology within music therapy practice. This collaborative process has accelerated the assimilation of technological competencies and, at the same time, generated knowledge that can be seamlessly integrated into music therapy practice.

In the future, we aim to assess the suitability of this new version of Emobook as a tool to monitor the effects on mood during and after the intervention period, evaluate the persistence of these effects, and determine the need to continue treatment to obtain sustained benefits. Likewise, it is of interest to assess the acceptance of this tool by therapists, and in particular the acceptance of this version of the application to be used by music therapists.

6. References

1. Magee, W.: Music technology in therapeutic and health settings. Jessica Kingsley Publishers, London (2013).
2. Catala, A., Nazareth, D.S., Félix, P., Truong, K.P., Westerhof, G.J.: Emobook: A Multimedia Life Story Book App for Reminiscence Intervention. In: 22nd International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI '20), Association for Computing Machinery, New York (2021). Doi: 10.1145/3406324.3410717
3. Clemensen, J., Rothmann, M. J., Smith, A. C., Caffery, L. J., Danbjorg, D. B.: Participatory design methods in telemedicine research. *Journal of telemedicine and telecare* 23(9), 780–785 (2017). Doi: 10.1177/1357633X16686747
4. World Health Organization Homepage. Dementia Site page, <https://www.who.int/news-room/fact-sheets/detail/dementia>, last accessed 2023/08/20.
5. Cammisuli, D.N., Danti, S., Bosinelli, F., Cipriani, G.: Non-pharmacological interventions for people with Alzheimer's Disease: A critical review of the scientific literature from the last ten years. *European Geriatric Medicine*, 7(1), 57-64, (2016). Doi: 10.1016/j.eurger.2016.01.002
6. van der Steen J.T., Smaling H.J.A., van der Wouden J.C., Bruinsma M.S., Scholten R.J.P.M., Vink A.C.: Music-based therapeutic interventions for people with dementia. *Cochrane Database of Systematic Reviews*, 7 (2018). Doi: 10.1002/14651858.CD003477.pub3
7. Kelly, L., Ahessy, B.: Reminiscence-Focused Music Therapy to Promote Positive Mood and Engagement and Shared Interaction for People Living with Dementia: An Exploratory

- Study. *Voices: A World Forum for Music Therapy* 21(2), (2021). Doi: 10.15845/voices.v21i2.3139
8. Thaut, M., Holmberg, V.: *Handbook of Neurologic Music Therapy*. Oxford University Press, Oxford (2014).
 9. Vandekerckhove, P., de Mul M, B. W., de Bont A.: *Generative Participatory Design Methodology to Develop Electronic Health Interventions: Systematic Literature Review*. *J Med Internet Res*, 22(4), (2020). Doi: 10.2196/13780
 10. Desmet, P. M. A., Vastenburg, M. H., Romero, N.: *Pick-A-Mood manual: Pictorial self-report scale for measuring mood states*. Delft, NL: Delft University of Technology (2016).
 11. Clarke, C., Woods, B., Moniz-Cook, E., Mountain, G., Øksnebjerg, L., Chattat, R., Diaz, A., Gove, D., Vernooij-Dassen, M., Wolverson, E.: *Measuring the well-being of people with dementia: a conceptual scoping review*. *Health Qual Life Outcomes*, 18(1), 249, (2020). Doi: 10.1186/s12955-020-01440-x
 12. Tappen R.M., Barry C.: *Assessment of affect in advanced Alzheimer's disease: the Dementia Mood Picture Test*. *J Gerontol Nurs*. 21(3):44-46, (1995). Doi: 10.3928/0098-9134-19950301-09
 13. McDermott, O., Orrell, M., Ridder, H.M. et al.: *The development of Music in Dementia Assessment Scales (MiDAS)*, *Nordic Journal of Music Therapy*, 24(3), 232-251, (2015). Doi: 10.1080/08098131.2014.907333