Emobook: A Multimedia Life Story Book App for Reminiscence Intervention

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ABSTRACT

Physical Life Story Books are widely used as part of reminiscence interventions, where people with dementia (PWD) recount their life experiences and memories to family and caregivers supported by pictures. This paper reports the design of a tablet app, Emobook, to facilitate the implementation of Digital Life Story Book workshops in the context of therapeutic day care centres specialized in PWD. Our digital app facilitates not only preparing life stories flexibly based on multimedia but also captures emotional responses associated to each memory. This can bring an opportunity to assess how the disease progresses and rely on mood trackers to provide personalized and more positive future interventions, which remain still unexplored.

CCS CONCEPTS

• **Human-centered computing** → **User centered design**; **Participatory design**; • **Social and professional topics** → **Sociotechnical systems**; **Seniors**.

KEYWORDS

life story book; people with dementia; digital technology; app interaction design; emotion

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1 INTRODUCTION

Reminiscing helps people with dementia (PWD) to recount their life experiences in chronological order[13]. To support this, Life Story Books are widely used as part of reminiscence interventions[8]. These books typically contain photos (with captions) of life memories that are collected by the PWD and their family. Research shows that the autobiographical memory of PWD stays relatively intact for a long time [2],[5],[3].

It helps PWD in constructing narrations about their life memories, which in turn has shown to have positive effects on PWD's feelings of well-being and quality of life (QoL) [12]. While some apps already exist (e.g., [1], [6]), we aim to better support caregivers labour by giving them more control on 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 up the opportunity for therapists to study the progress of the disease. This paper presents the design process and implementation of the app Emobook supporting such features, which have emerged through co-design with professional caregivers.

2 RELATED WORK

Reminiscence interventions based on life story books have been used and reported in the literature extensively [8]. However, Elfrink et al. [5] pointed out that the use of digital approaches to life stories and reminiscence interventions are uncommon and rare to find besides *Powerpoint* slideshows.

Hashim et al. [1] presents an app for Alzheimer patients that includes a daily reminiscence routine based on photos and games to practice cognitive functions. It however does not support the creation of any life story chapters or personalization. Huber et al. [7] argues that evaluation of interactive systems for reminiscence in PWD should focus on emotional responses rather than effectiveness and efficiency. Hence they propose *Proxemo* as a smartwatch interface to integrate in User Experience and QoL evaluation that could be used in different reminiscence settings. Gibson et al. [6] presents *InspireD*, a mobile app where PWD along with caregivers

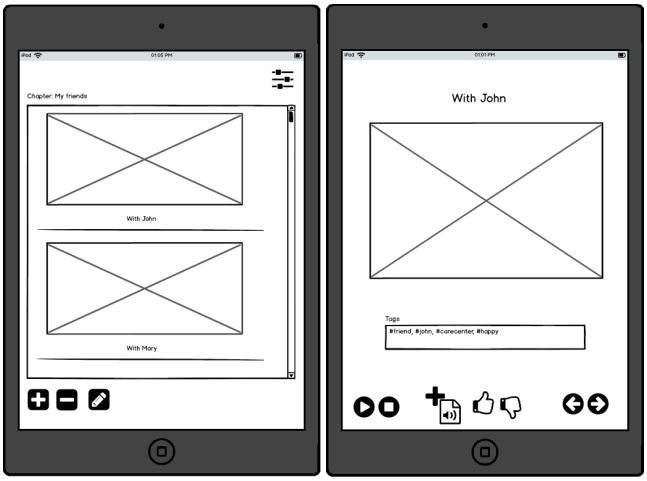

Figure 1: Sample mock-up sheets: Left) A chapter of multimedia memories. Right) Reading a memory.

can play media from a gallery. A usage tracking study over a 12-week trial period [10] reports a significant correlation between the usage by the dyad caregiver and the patient, indicating that the role and commitment of caregiver is key. The study also suggests that media related to personal memories is preferred as it shows a higher engagement than general material.

A systematic review by Lazar et al. [9] on technologies used for reminiscence therapy reports some benefits such as the access to engaging multimedia materials and opportunities to socially engage in conversations. We expect that digital life story books can be a way to offer richer multi-sensory stimuli than physical books, which are mostly bound to still pictures, and facilitate more engaging narrations and lively conversations among caregivers and PWD during reminiscence interventions.

3 CO-DESIGN PROCESS AND DESIGN RATIONALE

3.1 Eliciting Requirements and Playing with Mock-up

To acquire the requirements for the design and development of the life story book app, we collaborated with an association[1] that runs several therapeutic day care centres for PWD and their families. An interdisciplinary team was formed, consisting of an interaction designer, a speech therapist, occupational therapists and a software engineer, to conduct a series of co-design sessions that mixed meeting discussions, traditional material enactments, and mock-up screen design and interactions. These sessions served to elicit and validate requirements and produce prototypes of the life story book app following an agile software development methodology.

The therapists carry out life stories workshops as part of their practice in the centres. The workshops are used to favour PWD's well-being and provide orientation on caring needs, preferences and personalized interventions. They also seek to work the most affective side and build positive relationships among workers and users, getting feedback via the life story narration. To make all this possible, family members facilitate a collection of memories in the form of pictures and textual information. Although the workflow can largely differ from one patient to other due to differences in preserved skills, the typical life stories workshop is outlined as follows: 1). the therapist first works individually with the PWD, getting in a dialogue in which they try to compose a spoken narration supported by the pictures provided by the family, 2). they then work in a group session with multiple PWD, using a digital wall to project pictures or a *Powerpoint* presentation prepared by the therapists, which are used to trigger memories and facilitate narration. The digital wall is often used in other group activities, allowing PWD to stand up, touch and write on the screen. Some groups still preserve writing and reading skills relatively well; thus, the speech therapist is very interested in keeping them writing and reading as much as possible. Based on their experience with technology in the centres, therapists consider tablets as a good technical resource as the digital component in activities serves to bring novel and richer stimuli (e.g., videos, audios, touchable) to catch PWD's attention, while it raises their integration in society as PWD can see themselves using technology that their (grand)children handle daily.

With the elicited information and the review of existing literature reporting digital approaches to life stories, we elaborated a 12 mock-up screens implemented in *BalsamiQ*[2] to better communicate and discuss the design space with the therapists and how they would like to integrate technology. The mock-up covered both preparation/creation and reading/reminiscence processes separately. Memories would always revolve around a media piece (e.g., picture or video). Figure 1 depicts some sample screens. The feedback and observations of the mock-up are summarized below.

According to the therapists, any tool should be flexible and support enough complexity to work with PWD who still preserve writing capacity rather than constraining the design very much. Lastly, short texts and bigger font sizes were advised by the therapists, which is in line with [11].

Therapists remarked that providing a structure of empty chapters would be useful in a life story book app as a hint for topics. Based on the life stories workshop given in the local association, we adopted their taxonomy for the chapter-topics in life stories to structure the life story book. In addition, creating a dynamic chapter via keyword filtering is also possible. This would allow therapists the flexibility to implement interventions dynamically, e.g., by querying only happy memories or specific type of events. Therapists also offered improvements in editing the memories, mentioning that auto-completion would assist them while typing keywords.

Therapists insisted again that digital tools are more beneficial to PWD in early stages of the disease, from very mild to moderate, as they remain more functional. When discussing about the writing and typing of PWD, therapists remarked that a physical keyboard should be supported as many were used to type. This can be easily achieved via a Bluetooth keyboard. Finally, a desirable feature for this group mentioned by the therapists would be to create a book

[1] *La Asociación de Familiares de enfermos de Alzheimer y otras demencias afines de A Coruña* (AFACO) https://afaco.es/

[2] https://balsamiq.com/

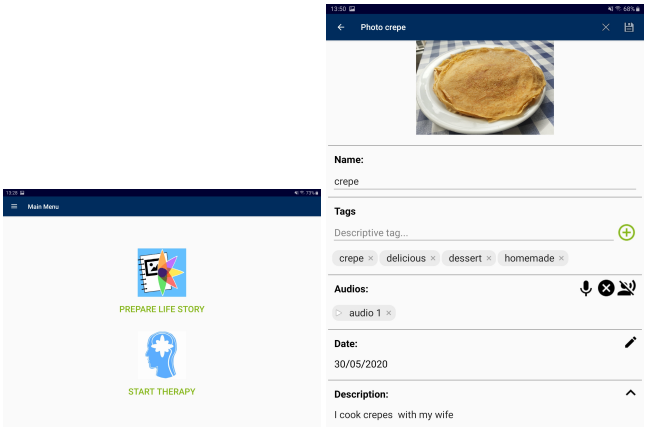

Figure 2: Emobook app screenshots (I). Left) Separated preparation and reminiscence pathways. Right) Editing a memory.

which is printable in paper by generating a PDF or a webpage, not just displayed on screen as the design is currently considering.

3.2 Feedback and New Features on the App Prototypes

Based on the design rationale and previous inputs, a first prototype was implemented in Android. Two therapists who participated in the design sessions fully tested the app. In response to their comments, multiple adjustments were made regarding visual and UI layout issues. Other remarks that were raised at this stage were about privacy, as the tablet is treated as a shared resource in the centre and hence can be used by multiple users. Thus, a user login screen was added to provide protection at user-group level. Furthermore, a master/root password login has been added to allow administrative therapists to get access to sensitive features (e.g., back-up/restore, password settings). Current version works with all data stored locally in the device owned by the centre.

In a follow-up stage, a new version of the prototype was tested. As a result navigation pathways were simplified, UI glitches were fixed and new features were added in terms of multilingual support, enable/disable settings for higher flexibility of the tool, full screen support, and several mood meters to gather emotional responses from the PWD. The mood meters range from like/dislike models to more elaborated instruments such as Plutchik's 8 basic emotions, Ekman's model or Desmet's Pick-a-Mood[4]. Figure 2 and 3 depict some sample screens of the resulting app.

4 TOWARDS EMBEDDING THE APP IN PRACTICE

To gain more information on how the developed app can be embedded in the life story book workshops run by therapists, a focus group was conducted with an occupational therapist, a social educator, a speech therapist who also participated in the design process, and a student researching personal therapies. The therapists are currently responsible for running the life stories workshops in the day care centres of the association. After presenting the app to them,

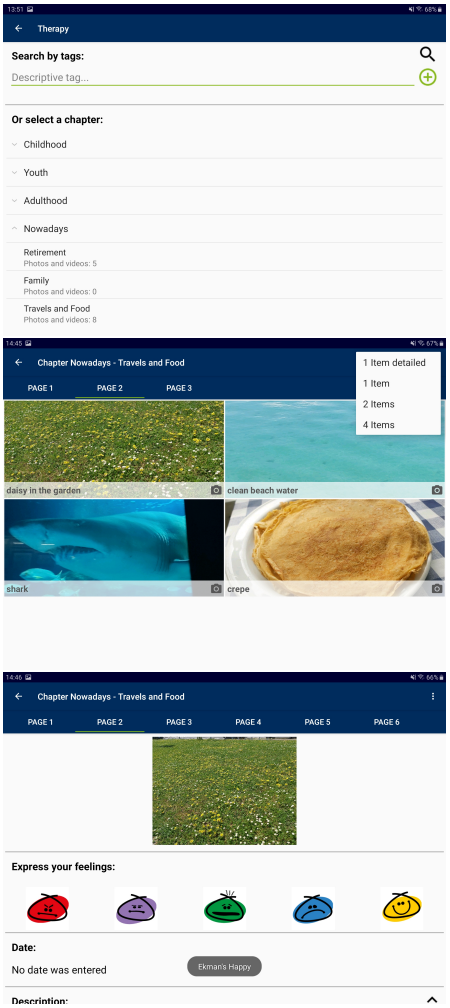

Figure 3: Emobook app screenshots (II). Above) Dynamic filtering to make up a life story intervention. Middle) Flexible chapter view in reminiscence view. Below) Embedded Ekman's mood meter. Settings enable caregivers to flexibly configure the reminiscence detailed view and the interaction with the mood meter.

they reviewed the app and discussed how it would be integrated in their methodologies. Several printed pictures were brought in as samples to introduce interactive situations and facilitate discussion.

4.1 Feedback from the Focus Group

The therapists confirmed that the app fully supports individual reminiscence interventions. As for group interventions they typically gather several PWD and whenever possible use the digital wall. Projecting to the wall screen would simply be supported by mirroring the tablet screen. When explaining their strategies to intertwine life stories of PWD, one therapist specially emphasized her focus to stimulate all senses. For example, she said PWD have to find out what today's session is about by using music or sounds, then using a picture that evokes smell or taste. Such multi-sensory approach

is supported by the current app implementation. The therapists explained that they sometimes do live web searches to show what one person is talking about during the life story workshop. The opportunity brought by keyword searches in the app was agreed to be the feature with most potential and value added as it provides flexibility to interactively focus on specific topics that can be interesting for the group members at a time despite the extra effort to tag media. Another important feature in therapists' view relates to support affective response gathering. The most experienced therapist raised the concern about the mood meter complexity as she explained that simpler instruments would be desirable for PWD, for example with three levels to measure mood (good/happy, neutral, bad/unhappy). This way, PWD can be asked whether they are happy/neutral/sad with a memory, getting more accurate answers. Therapists then remarked that having a secondary mood meter for therapists to register a more complex or complete range of emotions would be an interesting option. This clarification aligns with some ideas reported in the design of *Proxemo* [7].

The social educator said that the app was not only suitable for her workshop but also for personal use at home. She explained that it can serve to quickly deploy and administer interventions at home for families with PWD just by sitting on the couch together. PWD at home are somehow isolated as family members are sometimes not sure how to approach, interact and engage with them in a positive conversation. The app can thus help to define topics in a similar rationale like therapists do, and eventually be a tool to initiate the story and stimulate conversations.

At the moment, the therapists have a review with each PWD every 6 months to assess whether the dementia is stable or progressing. They think that having a record of life story activities and their responses would allow them to keep track of decline between periods. Nevertheless, checking whether it can help as an early assessment tool is something to be further investigated. Finally, they were all enthusiastic about testing in their future workshops involving their patient groups with the aim of finding the optimal use of the app based on the group characteristics.

5 CONCLUSION AND FUTURE WORK

We have designed an app intended as a digital tool to support the implementation of life story book workshops in a network of therapeutic day care centres. In the co-design, we have formed an interdisciplinary team, involving several experienced professional therapists. Flexibility has been a key requirement demanded by therapists to cope with differences in their practice. Therapists acknowledged the value of Emobook to bring multi-sensory richer stimuli that catch PWD's attention and stimulate engagement in conversations as well as the potential of life stories to gather personal and emotional information that must serve to create more personalized and effective future interventions.

For future work, we plan to investigate the readiness of patients/family to work with the application (e.g., technical skills barriers, intention to use technical devices that store their private information) and carry out an empirical study with caregivers and PWD to establish guidelines for best practices when using the digital life story app in the context of both workshop and at-home interventions, tailored to PWD preserved skills for optimal stimulation. Then conduct a longitudinal study to get insights into the extent that logging usage and emotional responses can help tracking the disease. To this end, we will investigate the combination of mood meters with information from wearable sensors to provide a method to better track mood and activity over time.

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