Reading Rooms: A Chatbot Guided Bibliotherapy Service

Patrick McAllister[1,2], James Kerr[2], Michael McTear[1], Maurice Mulvenna[1], Raymond Bond[1], Aoife Lyons[2], Blaithin O'Grady[2], Tara Harkin[2], Karen Kirby[3]

[1] Ulster University, School of Computing, Jordanstown Campus, Newtownabbey, Co. Antrim, UK,
{`mcallister-p2, mf.mctear, md.mulvenna, rb.bond`}@ulster.ac.uk
[2] Verbal, Derry-Londonderry, Co. Derry, UK
{`ktp, James.Kerr, psychology.manager, thirdspacestorymapper, thirdspacestory`}@theverbal.co
[3] Ulster University, School of Psychology, Magee Campus, Derry-Londonderry, Co. Derry, UK,
{`k.kirby`}@ulster.ac.uk

Abstract. Chatbots have become a popular choice for organisations in delivering services and e-commerce to users through using natural language processing (NLP). The popularity of chatbots in mental health is increasing and is seen as an accessible approach to receiving mental health support along with clinical/therapy treatment. The aim of this paper is to investigate a digital solution to the Reading Rooms affective bibliotherapy model, using state-of-the-art chatbot technology. This paper discusses the motivation for this work, and how state-of-the-art technologies could benefit how Reading Rooms is currently delivered. Paper also discusses current state of the art chatbot applications that are used to support mental health as well as applications that use bibliotherapy based programmes to support users with emotional and mental health issues.

Keywords: chatbots · bibliotherapy · mental health.

1 Introduction

Chatbots have become a popular choice for organisations in delivering services and e-commerce to users. Chatbots provide a conversational user interface that enables users to interact with services and brands using their favourite messaging apps such as Facebook and Twitter to automate laborious or repetitive processes e.g. inputting structural data such as forms. In recent years, research suggests that chatbots have begun to replace mobile applications (apps) as a more intuitive and convenient way for users to interact with online services [1]. In this way, the user does not have to learn a completely new style of interaction when moving across different applications.

One of the advantages of the chatbot interface is that it runs on messaging applications such as Facebook Messenger, Telegram, Slack, Skype, and WhatsApp, among many others, that are widely used by millions of people to interact with friends, colleagues, and the services of companies. This means that it is not necessary to download

and install a different app for each different service. Furthermore, since chatbots live within messaging applications, there is no need to worry about platform issues as each chatbot can be available on all operating systems that are supported by the messaging app. In contrast, native mobile apps have to be adapted or rewritten for each mobile operating system and they need to be frequently updated to keep up with upgrades to the host system and its features. Since chatbots are implemented server-side, any updates can be propagated almost immediately to all users [2].

The aim of this paper is to investigate a digital solution to the Reading Rooms affective bibliotherapy model developed by Verbal [3], using state-of-the-art chatbot technology. The Reading Rooms affective bibliotherapy model involves small groups of people (2-12) meeting weekly in a community/youth/commercial/criminal justice/social care location for a facilitated, inclusive session where short stories and poetry are read by a trained Reading Room facilitator. At various points during the story, regular discussion breaks occur whereby the facilitator uses a "mapped" set of prompts/questions/cues with the group to elicit discussion and to encourage them to reflect on what is being read and how it might relate to their own lives. This aim of digitising Reading Rooms will enable the programme to be scaled to multiple locations across Northern Ireland and further afield and to automate key processes to augment Reading Rooms delivery and to improve Reading Room group discussion through providing automated prompts to facilitators to elicit further discussion from participants.

2   Motivation

Mental health is a growing problem in the UK and the latest research demonstrates that one in six (17%) of people over the age of 16 had a common mental health problem in the week prior to being interviewed [4]. This is an increase from a 2007 survey, which found that 16.2% had a common mental health problem in the past week. Since 2000, there has been a slight steady increase in the proportion of women with symptoms of common mental health problems with this increase in prevalence mostly evident at the severe end of the scale. Men overall have remained relatively stable. Nearly half (43.4%) of adults think that they have had a diagnosable mental health condition at some point in their life (35.2% of men and 51.2% of women) [4]. A fifth of men (19.5%) and a third of women (33.7%) have had diagnoses confirmed by professionals. A third of people (36.2%) who self-identified as having a mental health problem in the 2014 Adult Psychiatric Morbidity Survey (APMS) have never been diagnosed by a professional [4].

The Mental Health Foundation estimates that by 2030 there will be approximately 2 million more adults in the UK with mental health problems [5,6]. Investment in mental health services is falling, and there is also significant unmet need. The London School of Economics and Political Science estimates that 75 per cent of people experiencing depression and anxiety-related problems access no treatment [6]. It is also thought that 75 per cent of children and young people experiencing a mental health problem do not access any treatment either. Digital technology presents healthcare providers with new ways of delivering services more efficiently and effectively. Service users and their families have very different expectations today of both services and professionals. Verbal's main programme of activity is in the trading area of literacy/reading development in the

proprietorial service - Reading Rooms Affective Bibliotherapy Model - an accredited, curated, shared reading experience delivered across Northern Ireland, the border counties and the North of England to 25,000 people per annum. The programme is delivered in the areas of social care, mental health & well-being and criminal justice from early years to older adults in care homes. Since 2015, Verbal has received multiple requests to widen the delivery of the programme to Great Britain and the U.S.A. specifically in the programme's application to mental health & well-being. This is an opportunity for Reading Rooms increase accessibility to its platform using state-of-the-art chatbot and web technologies.

2.1   Related Work - AI Mental Health Applications

Studies and recent application developments have demonstrated the feasibility of utilising chatbots to deliver mental health support to individuals. These chatbots have been proposed as an initial intervention point for individuals to complement traditional therapy sessions, the increase in smartphone usage and technology in general has enabled the increase of mental health web services to allow for greater access to resources and support. The use of chatbots in the field of mental health enables psychologists and mental health professionals to program a cognitive behaviour strategies to support individuals suffering from depression and anxiety. Chatbots enables users to take advantage of accessing immediate support services to inform themselves of symptoms and techniques to manage their mental health, and to educate the user to seek treatment sooner. Woebot is widely known example of using chatbot technologies to deliver mental health services [7].

Woebot[1] is a conversational agent that is monitors user's moods and allows users to converse with an AI built around theraputic responses. Woebot is underpinned by CB and applies state-of-the-art technologies such as natural language processing (NLP) to infer meaning from text. Woebot was conceived on the basis of DIY CBT through providing a coaching element to direct users to relevant material for the user to interact with. A study was completed that assessed the effectiveness of Woebot in reducing depression symptoms and results show a randomised controlled trial (RCT) group that used Woebot daily experienced a reduction in depression symptoms when compared to an information-only group.

Other chatbot applications such as Pacifica also use CBT techniques as well as using bibliotherapy approaches to provide the user with information to challenge their thinking patterns and to inform them of CBT techniques. Pacifca also has the ability track their habits through a chatbot interface. Other artificial intelligence (AI) based applications such as Wysa[2], Moodnotes[3], and Tess[4] also use chatbot based text interfaces to provide mental health services and much of these applications are cross-platform that allow users to access the app through Facebook messenger, or Android, iOS based devices for greater accessibility.

---

[1] https://woebot.io/

[2] https://www.wysa.io/

[3] https://itunes.apple.com/us/app/moodnotes-thought-journal/id1019230398?ls=1&mt=8

[4] https://www.x2ai.com/

As well as chatbot based technologies being used in providing mental health services, much research has been completed in combining state-of-the-art visual for emotion detection to enhance mental health support. Work completed in [8] proposed the use of a chatbot counselling service to provide mental health support to individuals. The aim of the work described in [8] was to develop a chatbot based psychiatric counselling service that was able to monitor human emotion through natural language through combining a number of state-of-the-art technologies for natural language processing (LNP) e.g. Long Short-Term Memory network (LSTM) and recurrent neural networks (RNN) [8]. Other works explore the use of computer vision and signal processing technologies to infer the emotional well being of an individual in relation to depression. Results from [9] indicate that affective behaviour can be automatically captured and assessed to support individuals with depression. Furthermore, in [10] deep learning architectures were used to determine emotional state of individuals in images using depression prediction scale 'Unimodal Visual Prediction', and also using short segment audio snippets to also determine emotional status using the same scale. Results from the platform proposed in [10] are promising when tested against a public dataset. The potential of combining these technologies (facial and voice emotional detection) within a chatbot interface would have the ability to derive more information from the individual to ultimately provide more accurate support. The incorporation of these technologies further personalises the UX experience to promote user retention.

2.2 Related Work - Bibliotherapy & Technology

Bibliotherapy can be described as type of therapy that utilises books, short stories or poems to support individuals dealing with mental health or emotional issues. During a bibliotherapy session participants may be asked questions related to their emotions or events that may have happened to them and certain stories are selected as a catalyst for discussion to help explore their emotional challenges. Stories, books, and poems may be selected that contain a range of themes that may relate to the participant. The selected literature can then be interpreted and discussed with the participant's current circumstances considered and through this the participant is able identify or resonate with characters in the story to help them understand their own issues to achieve behaviour change. Research has documented the positive clinical effects of using bibliotherapy as a method to treat obsessive compulsive disorder (OCD), depression, and emotional disorders.

Little has been published in regards to combining state-of-the-art AI chatbot technologies with bibliotherapy to support individuals. However 'bibliotherapy-type' education websites and tools have been developed to support users by providing information for self-help purposes, nevertheless in regards to story-led bibliotherapy (offered by Verbal in the form of Reading Rooms), little has been researched nor implemented. In regards to the effectiveness of bibliotherapy as a therapeutic tool to support emotional challenges, research published in [11] highlighted the effectiveness of using poetry or fiction stories in a group context and how such approaches can complement other treatments. Furthermore, a project described in [12] discusses the development of a website to provide bibliotherapy to children and young people. This website acts as a facilitator and the participant is able to use the website to read literature and write reflections as

well as connect with other participants for peer support [12]. The website presented in [12] does not include AI to automate processes to provide support but merely as a medium between the facilitator and participant to increase access to a bibliotherapy programme. The system described in [12] is similar to the work in this paper, however the aim of this paper is to incorporate the use of NLP technologies to infer meaning from user responses to provide further questions to instil greater dialogue and reflection. Other websites also use bibliotherapy concept as method to provide literature based on emotional and mental health issues such as Littherapy[5], which is a website that allows users to search for literature based on ailments and issues to provide the user with a range of stories. NHS Direct Wales[6] also provide a bibliotherapy programme that provides individuals with literature to help overcome a wide range of emotional and mental health issues and books are recommended to the individual/family group by a health professional. This type of bibliotherapy in relation to offering 'self-help' guidance has also been incorporated with technology, e.g. research presented in [13] presents the design of an offline application called mHEal to deliver mental health literacy for users to increase self-efficacy. Authors highlight the advantage of applying bibliotherapy based interventions to inform users who may be unable to attain mental health support. Other works have focused on complementing smartphone app usage for mental health disorders with bibliotherapy sessions and results are promising [14].

From the literature, it is clear that there is little automation in regards to determining literature for a bibliotherapy programme. Healthcare professionals select literature and align it to the related condition for the user to read. This paper presents a Bibliotherapy platform that seeks to personalise literature to a group/individual based on their preferences and also provides a conversational flow providing annotated questions to instil conversation and reflection.

2.3 Current Reading Rooms Delivery

In its present form the Reading Rooms affective bibliotherapy model involves groups of people (2-12) meeting weekly in social care location for a facilitated, inclusive session where short stories and poetry are read aloud by a trained facilitator. Regular discussion breaks are used to pose questions to participants to elicit discussion. The facilitator uses a "mapped" set of prompts/questions/cues with the group, encouraging them to reflect on what is being read and to explore how it might relate to their own lives.

These "story-maps" are grounded in a framework of CBT concepts, and with the use of 'socratic' type dialogue and questioning, these 'story maps' are used to help increase insight, awareness, personal understanding of their own psychological formulation, as well as inadvertently working out and learning about problem solving strategies. All of which can support the development of positive mental health and coping strategies going forward. Exemplars of the type and range of questions/ techniques that can be used are, for example; Guided self-discovery, selection based information questions related to the narrative, attention focused/issue based selections, systematic observation of character statements, monitoring of character maladaptive behaviours, problem solving

---

[5] https://www.littherapy.com

[6] http://www.nhsdirect.wales.nhs.uk/lifestylewellbeing/bibliotherapy

within the context of the story (e.g. problem defining, anticipation of consequences, options selection/selecting solutions, evaluation of outcomes in the story), and modelling of self-statements and image association – using reader's own cognitive skills.

This model currently provides a targeted and supportive creative intervention to those most in need or most vulnerable i.e. people suffering from mental health difficulties and disabilities, ex-offenders, older people, looked after children and young people. The aim of the group conversation model developed by Reading Rooms seeks to enable participants to develop the cognitive and emotional understanding and facilities to reduce or overcome some of the effects of anxiety disorders including: Generalized Anxiety Disorder (GAD), social phobia, panic disorder, phobias, and Obsessive-Compulsive Disorder (OCD). At present, the Reading Room delivery relies on physical copies of stories, which are manually annotated by literary and psychology staff at Verbal. High costs are incurred in regards to programme preparation, therefore an automated framework that utilises digital technologies is needed to reduce costs and improve user engagement.

3   Research Aim

The aim of this work is to incorporate a chatbot to automate the current group Reading Room delivery that will allow the group facilitator to deliver group Reading Rooms sessions through his/her device (tablet device or smartphone). It is anticipated that the facilitator will follow a structured series of prompts to initialise a Reading Rooms session. The following section provides an overview of how chatbots can be used to automate and support Reading Room group sessions. It is further envisaged that data collection during group sessions can be used to refine and improve the conversational flow to maximise impact and delivery.

4   Proposed Platform

It is essential that a scalable digital solution is developed that facilitates the distribution of Reading Room programme and maintains the integrity of the present delivery model. In digitising the current Reading Room delivery, a number of benefits can be achieved such as saving time through automatically generating stories based on group preferences and using tablet devices to facilitate the Reading Rooms session. Labour costs can be greatly reduced as staff would not have to make physical copies of the stories/poems and distribute them to Reading Rooms facilitators/readers. Facilitators would use a tablet or smartphone device connected to a database and stories would be automatically allocated for each group. Data collection and analysis can also be improved and Verbal will have the ability to collect data on a wide variety of processes related to Reading Rooms sessions i.e. engagement and story recommendation scores.

4.1   Proposed Digital Reading Rooms

Figure 1 depicts how Reading Room literary and psychology guides at Verbal will use Reading Rooms digital platform to initialise a Reading Room session with participants. Literary and psychology staff at Verbal Arts will be able to store stories and

story questions into a database, as well as group and session information. Facilitators will be initialise group Reading Rooms by supplying group information to personalise sessions.
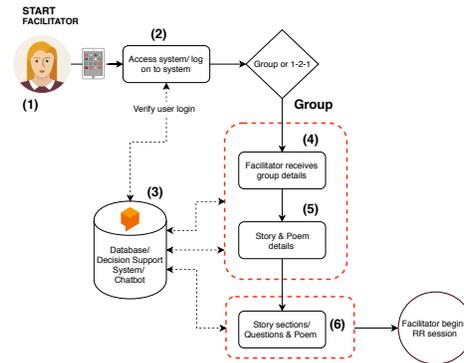

Fig. 1. Flow diagram depicting Digital Reading Room group session platform.

4.2 Conversational Interface

It is envisaged that Reading Rooms digital platform will be scaled to accommodate 1-2-1 sessions (participant and facilitator), however initial Reading Rooms digital platform will focus on digitising current group sessions. To use the Reading Room digital system; (1) the facilitator would first log into the Reading Room digital platform using a web app messaging group workspace using their account or using a social media platform (e.g. Facebook, Twitter's direct messaging service). The facilitator is able to begin a Reading Room session through registering a group or continue a session with an existing group. Natural language processing technologies provided by Dialogflow is used to derive meaning from facilitator text input. New group information would be stated in a text response e.g. "*Register new group. Group name is Derry-1, 5 females, 5 males, group age range 10-13, based in Derry, sessions are every Tuesday at 2 o'clock, group theme is resilience, sub-theme is anxiety*" and relevant information is parsed and saved in a database. The group information is then used to personalise a 12-week bibliotherapy programme and select stories based on the themes saved.

Future bibliotherapy sessions with the same group can be initiated by stating the group name with a statement;"*When is the next Reading Room session for Derry-1 ?*" or "*What story is used in the next Reading Room session for Derry-1?*". Facilitator is also able to configure reminders to alert upcoming Reading Room sessions. Facilitator would be able to input "*Create alert for group Derry-1, send email 15 minutes before session*" or update group details e.g. "*Change age range for group Derry-1 to 13-15*". The use of NLP technologies is integral to be able to match key phrases to trigger intents and functions to interact with back-end database/APIs. Figure 2 is a example of how sessions are initiated. Information related to the group will then be outputted to

the facilitator stating what week the group are currently on as well as the selected story. Facilitators are then able to view the allocated story which is divided into sections and a series of questions/prompts are allocated to each section to stimulate discussion (6). Facilitator can immediately begin their next scheduled Reading Room session by typing "*Begin session*" or "*Start session*", group information and the first story section is then sent to the user along with annotated questions.
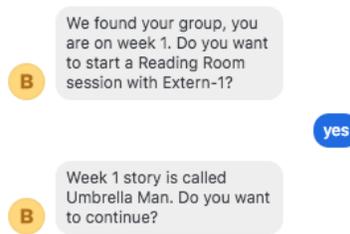
Fig. 2. Initialising story with BiblioBot using Facebook Messenger

Each annotated question will have a follow-up question to instil further conversation. If a particular question is resonating with a group then the facilitator can input "*Follow up question*", "*Follow*" or tap the annotated question in the chatbot interface for the follow up question. Once the discussion for a section is completed, the facilitator states "*next section*" to output the next story section. The chatbot will also act as a data capture interface to record what annotated questions were useful in creating a catalyst for discussion through recording what questions the facilitator interacted with to determine follow-up questions. The data collected from these questions would be used to annotate other similar stories to automate annotations procedure. For further data collection regarding story selection, the chatbot will be able to capture participant engagement and opinons at the end of each session. The participant will be able to complete a narrative engagement survey to determine engagement and enjoyment levels (Figure 3). The facilitator will be able to pass around Reading Room tablet device to allow participant to each state their ratings for the session. This data can then be collated and analysed to further refine and ultimately automate story selection based on group preferences and age.
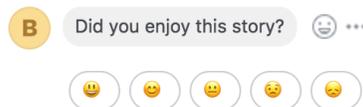
Fig. 3. Collecting participant engagement ratings using Facebook Messenger.

4.3   Summary & Conclusion

In this position paper, a chatbot led bibliotherapy platform was proposed based on Verbal's Reading Rooms. The benefits of such a chatbot is two-fold; (1) The current group Reading Room delivery isn't automated and there is a heavy reliance on paper-based material, merely digitising how stories are presented would be beneficial to facilitators as this would reduce the cost of producing material (photocopying, scanning materials) and also promote scalability to other locations. (2) The chatbot could also collect user group information and engagement levels to refine and personalise story selections. At the end of each session participants would be asked to rate the story and engagement, these ratings would be used to gain a 'snapshot' insight into the group's thoughts with a particular story and this data would be used to recommend stories to similar Reading Room groups. The automatic story decisions based on the data collected would then be verified by staff at Verbal to ensure suitability for groups. This position paper highlights technologies that are available to automate the group session processes using a chatbot underpinned by NLU/NLP, where the functionality that a facilitator needs to manage a Reading Room group would be accessible through the chatbot using natural language input. Further research will be completed in conducting interviews with Reading Room facilitators and participants to gauge the usability of such methods proposed in this paper.

5   Acknowledgements

6   References

1. M. Nguyen, "Customer service and virtual assistant bots will be prevalent for online businesses in many markets", Business Insider, 2018. [Online]. Available: http://uk.businessinsider.com/customer-service-chatbots-websites-2017-10?r=US&IR=T. [Accessed: 15- Sep- 2018].
2. Shevat, A.: Designing bots: Creating conversational experiences. O'Reilly Media, Inc., (2017).
3. "Verbal Arts Centre — Home", Verbal Arts Centre, 2018. [Online]. Available: https://www.theverbal.co/. [Accessed: 15- Sep- 2018].
4. Mentalhealth.org.uk, 2018. [Online]. Available: https://www.mentalhealth.org.uk/sites/default/files/fundamental-facts-about-mental-health-2016.pdf. [Accessed: 15- Sep- 2018].
5. Mentalhealth.org.uk, 2018. [Online]. Available: https://www.mentalhealth.org.uk/sites/default/files/starting-today.pdf. [Accessed: 15- Sep- 2018].
6. Nhsconfed.org, 2018. [Online]. Available: http://www.nhsconfed.org/ /media/Confederation/Files/Publications/Documents /The_future_of_mental_health.pdf. [Accessed: 15- Sep- 2018].

7. Chatbots Life. (2018). Therapy Chatbots are Transforming Psychology – Chatbots Life. [online] Available at: https://chatbotslife.com/therapy-chatbots-are-transforming-psychology-de67570236bc [Accessed 15 Oct. 2018].
8. Dongkeon Lee, Kyo-Joong Oh, & Ho-Jin Choi. (2017). The chatbot feels you - a counseling service using emotional response generation. 2017 IEEE International Conference on Big Data and Smart Computing (BigComp). doi:10.1109/bigcomp.2017.7881752
9. Divya, S., Indumathi, V., Ishwarya, S., Priyasankari, M., & Kalpana Devi, S. (2018). A Self-Diagnosis Medical Chatbot Using Artificial Intelligence. Journal of Web Development and Web Designing.
10. Chao, L., Tao, J., Yang, M., & Li, Y. (2015). Multi task sequence learning for depression scale prediction from video. 2015 International Conference on Affective Computing and Intelligent Interaction (ACII). doi:10.1109/acii.2015.7344620
11. Mohammadian, Y., Shahidi, S., Mahaki, B., Mohammadi, A. Z., Baghban, A. A., & Zayeri, F. (2011). Evaluating the use of poetry to reduce signs of depression, anxiety and stress in Iranian female students. The Arts in Psychotherapy, 38(1), 59–63. doi:10.1016/j.aip.2010.12.002
12. Lanasa, P., Criscoe, B. & Lovelace, T. (2001). Website 101: Creating Annotated Special Education Bibliotherapy with Children's and Young Adults Books. In J. Price, D. Willis, N. Davis & J. Willis (Eds.), Proceedings of SITE 2001–Society for Information Technology & Teacher Education International Conference (pp. 2624-2625). Norfolk, VA: Association for the Advancement of Computing in Education (AACE). Retrieved October 15, 2018 from https://www.learntechlib.org/primary/p/17239/.
13. Cannon, P., Walkup, K., & Rea, J. M. (2016). mHEaL and mHealth in a Restricted Environment. Proceedings of the 34th ACM International Conference on the Design of Communication - SIGDOC '16. doi:10.1145/2987592.2987613
14. Gonzalez, V. M., & Dulin, P. L. (2015). Comparison of a smartphone app for alcohol use disorders with an Internet-based intervention plus bibliotherapy: A pilot study. Journal of Consulting and Clinical Psychology, 83(2), 335–345. doi:10.1037/a0038620