Development of a Bespoke Chatbot Design Tool to Facilitate a Crowd-based Co-creation Process

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***Abstract*—Developing an effective educational chatbot is a challenging and time-consuming process. One of the main challenges in a co-creation process, is ensuring multiple stakeholders, as professionals in a variety of roles such as academics, learners, researchers, and subject experts, are all able to contribute successfully. More common online learning resources are designed using traditional methods such as group storyboarding workshops. With chatbot design, it is especially difficult to maintain a group focus on pedagogical requirements while minimizing technological interaction. Furthermore, more time is required to gather sufficient and accurate data used to train a chatbot to the point where it can be deployed for education. This paper describes the development of a web-based chatbot design tool formed to break down these barriers and support the overall design process.**

Keywords—chatbot, design, co-creation, application, tool, platform, innovation, learning, technology

I. Introduction

Chatbots can be an effective learning resource for teaching in sectors such as medicine and healthcare [1]. However, to develop chatbots to be effective can be a costly process [2]. The "Chatbot Enhanced Personalise European Healthcare Curricula (CEPEH)" ERASMUS+ project will deliver and deploy several chatbots for use in healthcare education [3]. These aim to cover a range of topics such as cybersecurity, critical appraisal, and virtual patient. They have been designed using the ASPIRE framework ("Aims, Storyboarding, Population, Implementation, Release and Evaluation"), which supports the development of bespoke online learning resources with all stakeholders central to its co-creation approach [4]. One of the issues identified during the application of ASPIRE in the development of chatbots is the challenges stakeholders faced during the Storyboarding and Population phases. Compared to designing more traditional, linear-based online learning, an adapted ASPIRE process was required [5] in which a form, as a template, was provided to help crowd-source the data required for the chatbot implementations. Based on this intervention, it was apparent there was a need to create a structured bespoke tool, as a web-based application, to support all stakeholders involved in chatbot design. Importantly, the tool needed to be simple and user-friendly so that stakeholders of various roles could interact with it but in a way which shielded them from the typically technical nature of the process. Similarly, another objective of the creation of the tool would be to produce a data set formatted into an automatically generated output file recognisable by chatbot software.

II. Description

A. Defining the architecture

The main technologies chosen to build this tool include PHP, a MySQL database, HTML, CSS, and JavaScript. Data output would be in a YAML or JSON file format. These technologies are current and highly reputable across the software industry.

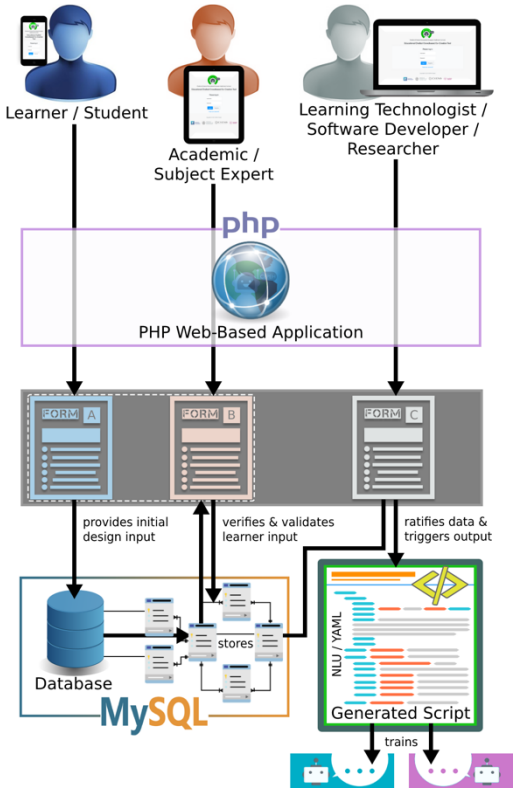

Fig. 1. A schematic representation of the application architecture

B. Defining roles and responsibilities

The range of stakeholder roles were identified as those shown in Fig. 1. In addition, there needed to be an Administrator role for overall functionality and responsibility of the application. The initial registration form for the tool presents stakeholders with the ability to specify their role.

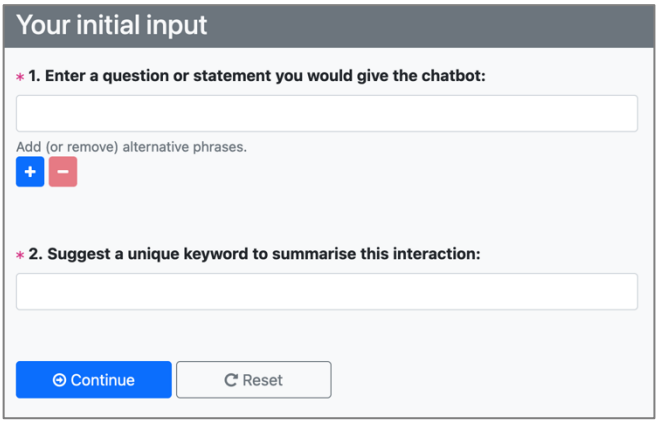

Fig. 2. A form for learners to provide initial input

For learners or students, their responsibility is in supplying the initial data, shown in Fig. 2, for a chatbot based on their knowledge and experiences. After finding for a chatbot to add detail for, they can input questions or statements they would supply it, for a given topic, whilst also providing the type of response they would expect in return. As Fig. 3 shows, examples of input are provided in each step, so it is clear what is being asked for [1].

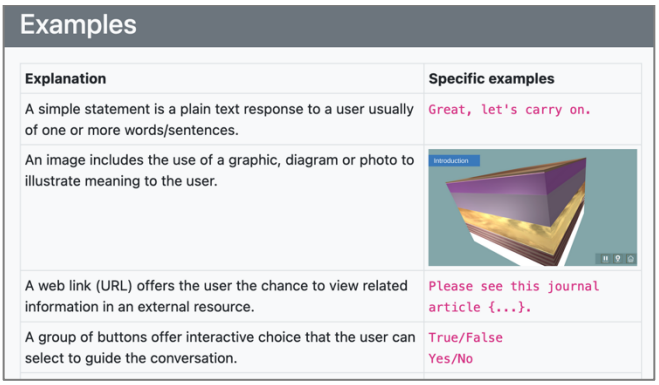

Fig. 3. Help examples showing the types of responses to consider

For academics or subject experts, their responsibility is to validate and verify a selection of this data entered by learners. Once a chatbot is chosen, all data as statements and matching responses will be shown and can be instantly edited and/or marked verified as being accurate.

Responsibilities for those such as learning technologists, researchers, and software developers include being able to ratify and prepare the verified data ready for export. This will utilise the script used to generate the output files into a particular format such as YAML, illustrated in Fig. 4, for upload to chatbot software such as Rasa Open Source.

III. Highlights

The following list of features can demonstrate the extent of the tool as a usable, accessible, and scalable platform:

- A registration form to allow users to define their credentials and specify a role for access
- A search function which can be used to display chatbots as tagged by keywords
- The ability for chatbot instances to be created, edited, and removed on-demand
- Multiple reports available to provide an ability to check against application users, chatbots and data
- Automatic recognition of similar data already provided in which users are offered the chance to append or merge to avoid duplicating effort
- A simple rewards scheme in which users can be provided with a certificate for several contributions
- Separate views for different roles and access to keep the interface simple and user-friendly

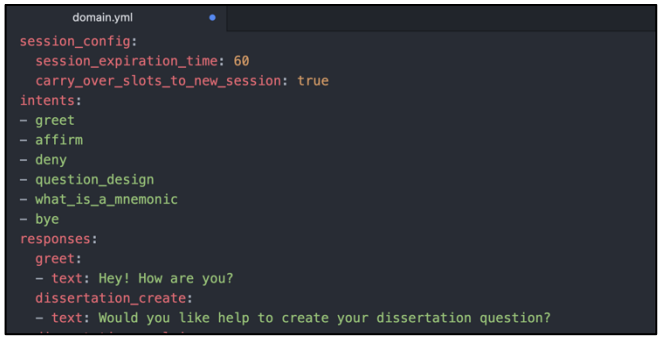

Fig. 4. An example YAML file output using data from the tool

IV. Potential Impact

The tool will continue to be put forward for use throughout the remainder of the CEPEH project. This initial use will present an opportunity for any amendments from early feedback to help make the tool more accessible and scalable. The script used to generate the final data output files for uploading directly within external chatbot software will be adjusted to offer more flexibility and variety of formats.

On completion of the project, the application will be made publicly available through a Creative Commons license for anyone to freely use and adapt accordingly. It is anticipated that this will see an increase in users and chatbot data from more contributions in true crowd-based fashion. The impact of such significant uptake of this tool can potentially deliver many collaborative designs and actively deployed chatbots beyond education in a variety of sectors across the globe.

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