Supporting Non-Expert Users in Authoring Tasks for Learning Language and Culture: Evaluation Study

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ABSTRACT

This paper presents the evaluation of a web app (ENACT) developed to support users with no expertise in pedagogy, media, and/or technology in creating engaging pedagogy-informed open educational resources. The aim is to increase cultural awareness and linguistic skills development through the creation of, and engagement with, interactive cultural activities. The design, which is informed by both theory and user input, is implemented by building a user-facing layer on top of the existing H5P platform. Participants’ input from the evaluation workshop supported the design decisions around the provided task structure and the design choices around interactive media used. This work contributes a system as a web app to support non-experts in creating engaging online activities of a cultural and linguistic educational value and design recommendations generalizing the research based on literature, user insights, the developed system, and an evaluation study with migrants, refugees, and asylum seekers.

KEYWORDS
Augmentation, Creation, Cultural Activities, H5P, HCI, Human-Centered Design, Human-Computer Interaction, Pedagogy, Task-Based Language Learning, TBLL, UCD, User-Generated Content

INTRODUCTION

Migration poses linguistic and cultural challenges to migrants and host community members at three levels: Linguistic and cultural difficulties as migrants adapt to their new lives (Hashemi et al., 2017), host community members learning about migrant languages and cultures to achieve social harmony (Sancho-Pascual, 2020), and second and third generation migrants feeling detached from their heritage culture and language (Liaqat et al., 2021). In response to these challenges, this work presents our design of a web app that fosters two-way intercultural exchange through supporting both migrant and host community members to create a digital repository of cultural activities that preserves and shares their cultures and languages

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We aim to address these challenges through supporting the creation of activities that promote cultural awareness and language skills development by and for migrants and host communities for both intercultural and intergenerational exchange. We found only limited research examples in technology design focused venues of how to support non-expert users (i.e., those with no or limited educational, media creation, and/or technical expertise) to create their own content without expert support (e.g. in digital storytelling (Sawhney, 2009) or virtual reality (Vishwanath et al., 2019)). Most existing research in this context seems to target more specific issues. For example, teaching specific language skills using pre-prepared content (Kouri et al., 2020), understanding the experiences of immigrant youth through design thinking (Peterson Bishop & Fisher, 2015), supporting refugees in getting access to health care (Talhouk et al., 2016), or designing tools to support translation (Liebling et al., 2020). Moving beyond the context of migrants to focus on learning about culture and languages, recent literature shows an increased focus on Virtual Reality (VR) (Lawrence & Ahmed, 2018; Vishwanath et al., 2019), Augmented Reality (AR) (Fan & Antle, 2020), social robots (Kouri et al., 2020), or gaming (Culbertson et al., 2016) as mediums for learning, but again using pre-prepared content, thus limiting the scope and sustainability of such work. Hashemi et al (2017) analyzed mobile applications developed to support newly arrived Arabic Migrants focusing on language and cultural training. They found that the apps utilize traditional pedagogies, focusing on basic vocabulary training with fewer active learning activities and recommended more focus on active learning pedagogies and intercultural communication.

There is, therefore, a clear research gap in how to design technology to support non-expert users (migrant communities in our context) to create open educational resources (OERs) (Iannella & Marani, 2021) to teach others their cultures and languages. To address this gap, the provision of a sustainable and authentic repository of cultural activities, supporting the creation of educational content for cultures and languages by non-expert users, is the main design goal of this work. To ensure that the educational content is ‘open’, the cultural activities need to be accessible at no cost and used, adapted, and redistributed by others with no restrictions. To ensure engagement, the created activities need to be interactive and multimodal (Mestre, 2012; Oud, 2009; Schwan & Riempp, 2004), and to ensure educational value, they must align with current foreign language learning paradigms (Ellis, 2000; Hubbard, 2006; Nunan, 2004; Smith & González-Lloret, 2020) and trends in media use in language education (Nunan, 2004; Reyna et al., 2020). Upon designing a web app with representatives of the migrant and host communities and developing a proof-of-concept implementation, we wanted to answer the following design validation question: Is a user- and theory-informed web app able to guide non-experts in creating engaging and pedagogy-informed open educational resources to learn language and culture? In our research context, non-experts refer to users from migrant (including immigrants, refugees, and asylum seekers) and host communities who have limited or no expertise in pedagogy, media creation, and/or technology.

This work demonstrates how we combined input from users and theory to inform the design of a user-interaction layer on top of an existing platform to support content creation by non-experts. We then present an evaluation study of the developed tool (ENACT) focusing on our design decisions through a workshop with participants from migrant communities. To keep the paper design focused, and since the level of language and cultural learning is strongly dependent on the quality of the user-created content, we focus our evaluation in this paper on the participants’ views with respect to how the web app supported them in creating resources to learn about their language and culture.

We aim to make the following two contributions: 1) system contribution in the form of a web app (https://enacteuropa.com/) to support non-experts to create engaging online activities of a cultural and linguistic educational value. 2) design recommendations generalizing our work and findings that are informed by targeted users, literature, and our design and implementation experience and validated by data from the evaluation study with migrants. After reviewing related work, we present our web app design and implementation. We then explain our research methods and findings for a
user evaluation study to test the design of the developed app. We conclude with a set of generalized design recommendations in the discussion and conclusion sections.

LITERATURE REVIEW

Computer-Assisted Language Learning and Task-Based Language Learning

In Computer-Assisted Language Learning (CALL), basing design on well-established pedagogies is essential since technology aims to replace the tutors’ role, determines the quality of the teaching presence (Hubbard, 2006), and constrains what users can and cannot do (Smith & González-Lloret, 2020). It is thus essential to choose a pedagogical design that can support effective content creation and presentation by people without pedagogical knowledge or experience.

One such well-established pedagogy for language teaching and learning is Task-Based Language Learning (TBLL) (Ellis, 2000; Nunan, 2004; Smith & González-Lloret, 2020; Thomas & Reinders, 2010). It is ideal for combining language and culture learning because of its emphasis on structure and tasks—activities where the target language is used for a communicative goal to achieve an outcome (Willis, 1996). There is a clear relationship between tasks and real-world activities; learners work towards goals; and assessment is in terms of achieving task outcomes (Ellis, 2000; Nunan, 2004). TBLL typically involves three stages: 1) A pre-task stage comprises schema activation tasks which establish a context, or vocabulary exercises (Nunan, 2004). 2) A main task stage where learners carry out a task which resembles real-life activities (e.g., ordering food). 3) A post-task stage aims to consolidate learning through a focus on form (Willis, 1996), or a review of learning (Nunan, 2004). TBLL pedagogy is supported by both cognitive (Piaget) and social (Vygotsky) constructivist approaches. “From a cognitive constructivism perspective, learning is an active process which needs to be authentic, meaningful and real to the learners” (Li, 2017, p. 10). As such, TBLL is used as the pedagogical underpinning for the design of the web app.

On the one hand, popular tutorial CALL software (such as Rosetta Stone and Tell Me More) fails to offer culturally authentic tasks, but largely incorporates mechanical drills (Nielsen, 2011). On the other, and apart from scarce examples like the French Digital Kitchen (Seedhouse et al., 2013) which used digital sensors to turn a kitchen environment into a TBLL environment, most TBLL literature explores task design by teachers incorporating technology in their teaching as part of Computer-Mediated Communication, rather than as a guiding principle for software design (González-Lloret & Ortega, 2014; Thomas & Reinders, 2010). Linguacuisine (Seedhouse et al., 2020) is a good example of software designed for TBLL. It is an app which engages learners in cooking activities through a simple structure. First learners are presented with materials and ingredients required for cooking a meal (pre-task stage). They then follow instructions in the target language and cook through watching a passive video (main task stage). The app does not provide explicit post-task support. Our web-app extends the structure, level of interactivity, flexibility, and application scope, thus offering a richer experience of culturally authentic tasks beyond cooking.

Technology for Authoring Resources for Language and Cultural Learning

Research looking at the intersection of content creation by users and supporting informal learning about language and culture, especially from a technology design perspective, is limited. Searching and examining the abstracts of research articles in some of the main technology design focused conferences in ACM Digital Library (Conference on Human Factors in Computing Systems-CHI, Designing Interactive Systems-DIS, Interaction Design and Children-IDC) using the search term ‘(language OR cultura*) AND (creat* OR author*) AND (learn* OR teach* OR exchange)’ returned only three relevant articles (Piper et al., 2012; Sawhney, 2009; Vishwanath et al., 2019). Doing the same for IJCALLT return no articles that meet our content creation criteria. The focus of the
resulting papers is mainly on the use of existing technology for language learning by teachers and students. The closest to content creation by students was exploring the use of collaborative tools like Google Docs (Kukulska-Hulme et al., 2018), social media like Facebook (Vurdien & Puranen, 2016), or digital storytelling (Sevilla-Pavón & Nicolaou, 2017). Interestingly, searching using the term ‘(migrant? OR immigrant? OR refugee?) AND (language? OR cultur*)’ in IJCALLT returned no relevant results. Results for CHI, DIS and IDC showed some overlap with the first search with most of the new results looking into supporting programming and computer literacies. Note that research on supporting content creation facilitated by experts through participatory design or maker workshops (e.g. (Liaqat et al., 2021; Somanath et al., 2017) is outside our scope, due to our focus on non-human-facilitated content creation.

Unlike most research in VR in the context of learning about culture/language that uses pre-prepared content (Lawrence & Ahmed, 2018), Vishwanath et al (2019) explored co-creating VR content with teachers and students. Their work examines the integration of VR into informal learning environments (USA and India) to engage students with their economic, social and cultural realities. They highlight the potential for VR to support engagement with one’s surroundings through meaning making, as compared to simple content consumption alone. However, despite the studies lasting three weeks for training and content creation, teachers expressed their desire for a longer training and some students complained about the learning curve involved. These findings align with our assumption that VR, despite its immersive learning experiences, is not suited yet for casual content creation by non-experts due to the relative novelty of the technology, lack of simple tools for content creation, and the need for training.

Another popular approach to integrating language and culture is storytelling (Sevilla-Pavón & Nicolaou, 2017) which inherently involves content creation and is thus seen as a good medium to allow ordinary people and marginalized communities to tell their stories. Sawhney (2009) reports on a three-year program of workshops in refugee camps looking at the role of digital storytelling through videos as a creative medium to empower marginalized youth. Authoring of the stories provided a sense of shared satisfaction, identity and confidence in addition to recognition by others. Their findings, as with Vishwanath et al. (2019), include the need for effective training for content creation activities. The paper ends with several recommendations for supporting youth digital storytelling, including the need for designing intuitive digital media tools that seamlessly structure and support the creative lifecycle. Mencarini et al. (2014) focusing on the benefits and implications of using constraints as a composition approach for creating stories to support cross-cultural dialogue between teenagers speaking different languages, but in a non-digital pen and paper study. Piper et al (2012) looked at content creation using a hybrid paper-digital interface to support teachers and parents in creating language learning activities for children. Other examples of using video and digital storytelling within the context of language learning or cultural exchange include Clarke & Wright (2012) and Sarangapani et al. (2016). However, apart from a few examples (Jokela et al., 2008; Mencarini et al., 2014; Piper et al., 2012), the focus is normally on the process or the resulting media and evidencing impact, but not on the design of the tools needed. For our work, resulting video media, is one part of a multi-stage process to produce the learning resource. We are looking at how such language and culture-rich videos can be augmented with context, structure, and interactive activities to maximize the benefits from such contents.

Beyond these examples, the focus seems to be on the use of pre-created content by pedagogy and technology experts, with no discussion of the tools to empower casual users to create pedagogy informed material. This is despite examples that highlight the benefits and potential for supporting non-experts in creating learning material (Piper et al., 2012; Sawhney, 2009; Vishwanath et al., 2019). Some of the technologies used in these examples, however, may not be suitable for supporting non-expert casual users, as in our research, due to the technology involved or the training required. Our review shows that our work on designing for supporting non-expert users to create pedagogy-informed interactive online content addresses a clear research gap.
THE WEB APP: DESIGN AND IMPLEMENTATION

To answer our research question around supporting migrant and host communities to create their own language and cultural content, our first step was to work with representatives of the migrant and host communities to gain initial design insights through developing a general understanding of the level of support needed for such communities for task creation and identifying possible digital media types that potential users feel can best portray cultural activities online. The next step was to combine insights from users with theory to implement a proof-of-concept web app that will be evaluated with users.

Designing With Target Communities

We worked with a total of 41 immigrants, refugees, and asylum seekers; and host community members in the UK (11, 5 females), Finland (8, 7 females), Turkey (15 all females), and Spain (7, 5 females) recruited through convenience sampling (compensated with £10 vouchers or equivalent). Migrants included those from countries such as Russia, Syria, Kazakhstan, and Iran. All sessions with participants followed an identical structure: introductions, collecting consent, breaks and a non-technology based cultural activity. The focus in this paper is on the three activities that followed:

1. Engaging with interactive media through pre-created activities (30 minutes).
2. Card sorting activity (15 minutes).
3. Creating content (90 minutes).

To find a tool to support both the creation of, and engagement with, interactive digital media, we did an exploration into existing platforms. The most suitable was H5P.org, an open-source tool that supports the authoring and embedding of HTML5 interactive media content (H5P, n.d.). Over 40 content types are provided, and authored content can be easily reused. H5P has found favour with tertiary education institutions for its ability to support active learning (Singleton & Charlton, 2020; Wilkie et al., 2018), and among language teachers for the creation of teaching materials within the learning management system (Caballero & Alvarenga, n.d.) or as Open Educational Resources (OER) (Iannella & Marani, 2021; Ramírez-Sánchez et al., 2021).

The project team created several interactive media activities around cultural activities using H5P.org such as making shadow puppets (Turkish) and carving a Halloween pumpkin (English) based on their own cultural and linguistic background and knowledge. The interactive media used in these activities are:

1. Interactive images to introduce key vocabulary (Figure 1).
2. Interactive video with captions to demonstrate navigation buttons, use of branching options, and pop-ups for the keywords and instructions.
4. 360/VR video from YouTube and viewed with Google Cardboard.
5. 360-picture to demonstrate how 360-images provide an interactive experience of a place, support navigation between locations, and illustrate augmenting interactivities to display additional text, images, or videos.
6. Interactive slides to present background information using text only, or a combination of text, images, videos, hyperlinks to external resources, and interactive quizzes.
7. Drag and drop: An optional imaging sequencing activity as an assessment task.

After engaging with the pre-created activities that involved the different types of media above, participants carried out a card sorting activity to encourage discussions on the potential of different media types to support learning and engaging with cultural activities (Figure 2). Each media type was presented by a card and participants were asked to work in groups to place the cards on a 2D space representing how engaging the media type is and how helpful it is in learning about culture/language.
Research team members took notes and answered questions. Finally, during activity 3, participants followed a printed step-by-step guide (prepared by the research team) to create a simple interactive activity using H5P.org, took pictures and videos, edited pictures, and videos, and used 360-cameras.

Design insights from the workshops are based on researchers’ observation notes, photos of the ‘cards’ activity, and transcribed and translated recordings of the discussions during the activities. To understand the level of support needed when creating activities, we focused on understanding how participants engaged with pre-prepared H5P content and how they created their own content. The pictures and discussions from the card sorting activity were used to understand preferences in terms of media types and level of interactivity.

Activity 1: Engaging With Pre-Prepared H5P Content

- **Structure, guidance, and contextual information:** When discussing engagement with pre-prepared H5P content, participants expressed the need for further contextual information. For example, content was described as very unclear, lacking in meaning (why) and instruction (how). Participants highlighted the lack of introduction to an activity and the lack of connection between H5P content ‘It’s not about the introduction, but the whole structure. There is no story’ and ‘It would be good if they all [digital tools] would have the same template: for example, a short video...- the introduction, why do I need this, ... so there could be a text, some picture, and there come some questions, so you can test if you could learn it’. Others suggested we use H5P content to present the final output first to contextualize subsequent information, and that we create clear introductions.

- **Interactive elements to support learning:** Other feedback in relation to the interactive video included a suggestion for all text to be supported by audio/video demonstration of pronunciation, and a request for captions to accompany speech to help users who don’t understand the language.

Activity 2: Card Sorting Activity

When discussing card placements in the card-sorting activities, participants reported different levels of engagement between the H5P types, and no clear consensus emerged (Figure 2). For many, videos and particularly interactive videos were among the most engaging and most useful when demonstrating ‘how-to’ carry out a cultural activity. But again, there are always exceptions as can be seen from the left image in Figure 2 where interactive video was ranked the least engaging/useful. Interactive images were mentioned by some as more useful for vocabulary, while 360-images and videos were useful for showing things and demonstrating context.
Activity 3: Authoring H5P Content

- **H5P content creation interface:** When using H5P for creating content, participants needed some additional support from the research team to know how to navigate its busy interface (See Figure 4-left) even though they were provided with a detailed step by step guide with screen shots.
- **Use of different media types:** The Finnish research team stated that ‘participants came to a conclusion that the picture, video, sound, and text should be somehow present in teaching all the activities’. However, participants did not immediately see the relevance of all the available content options on the H5P platform.

Our work with the participants highlighted the challenges of using H5P.org as it is and the need for a tool that meets the following requirements:

**R1:** Provision of some structure and guidance with contextual information.
**R2:** Use of interactive elements (e.g. audio for text) to improve the learning and engagement experience.
**R3:** A simpler content creation interface as compared to H5P interface.
R4: Use of a variety of media types to improve engagement and to suit different purposes, with some preferences, but no consensus on what is best suited for what.

Implementation

In response to the insights gained and requirements identified from working with migrant and host community members, our high-level implementation decisions focused on two key elements: 1) media types and interactivity, and 2) structure. For the platform, using H5P proved to be challenging for learners and casual users (R3). Its user interface is not always intuitive and only supports creating isolated activities from a list of media types with no scaffolding, context provision, or a way to group activities together. Informed by the conceptual work of Lambton-Howard et al. (2020) that calls for using existing platforms as tools for design rather than developing new ones, and learning-focused research calling for a similar approach (Alhadlaq et al., 2019; Celina et al., 2016, 2020), we developed a user-friendly interactive layer on top of H5P. We created a new multimedia content type that wraps several existing H5P content types – such as the interactive video, image hotspots, quiz types, and text. This provides a structure with explanatory text to provide instructions and help contextualize the information contained within.

Media Types and Interactivity

Multimedia provides an excellent way to deliver verbal and visual (i.e., multimodal) information simultaneously, but due to its versatility, the use of multimedia alone will not guarantee good information presentation and retention (Mayer, 2002; Ruf et al., 2014). Mayer (2002) explored how instructors can foster active learning (selecting, organizing, integrating) through careful use of multimedia (graphics, audio, text), whilst minimizing the risk of overburdening working memory. 4 of Mayer’s 7 design principles have directly informed our design decisions as to how multimedia is used in our web app and as follows:

1. Using words and pictures rather than words alone. In response, our design decisions were to use image hotspots to link text to specific locations in normal images and 360 images in the vocabulary activity, and to require users to pair text to images in the vocabulary review phase (Figure 6).
2. Physically and temporarily integrating words and pictures. The physical integration is achieved as explained in the previous point with hotspots and pairing, and temporal integration is achieved with using interactive videos that allow adding annotations to specific moments in the video timeline.
3. Using graphics and narration (and captions for language learning) is more helpful than graphics and printed text. In response, our design decisions were to allow and encourage the use of audio along text for vocabulary introduction and review (e.g. Figure 3), and supporting and encouraging the use of videos with subtitles for both context introduction and the activity itself.
4. Pre-training people with important words and concepts. This recommendation is also in line with TBLL’s pre-task activity. In response, our design decision was to include context introduction as stage 1 using interactive videos plus an optional 360-video, and vocabulary training as stage 2 using image hotspots or course presentation.

Moreover, research suggests that the benefits of multimedia learning resources can be further enhanced by adding an interactive element, as this promotes active learning (Mestre, 2012; Oud, 2009). For example, experimental work has demonstrated that interactive video led to better learning gains than the non-interactive equivalent (Schwan & Riempp, 2004). These recommendations align with participants’ requirements of interactivity, adding audio to text (R2), and providing a variety of media types for different purposes (R4). In response to this, our design decision was to continue
with H5P as an underlying platform and built a user-friendly layer on top of it to provide a simpler interface (R3). This is because H5P supports the creation of interactive multimedia content, and has over 40 open-source content types available which could be modified to our specific requirements. For example, the original ‘Image Pairing’ type (Figure 3-top) involves users dragging items to pair up the images. To allow for such interactivity and to support Mayer’s recommendations 1-4 as above, our design decision was to allow users to pair words and sounds with images and achieved this by making modest modifications to the Image Pairing activities source code. An example of the resulting new ‘Matching’ multimedia type is shown in Figure 3-bottom.

The Matching multimedia type was one of seven interactive multimedia types (Table 1) integrated into our new task-specific type. Reflecting upon the chosen multimedia types and considering R3, we modified their authoring interfaces to give a simpler, more streamlined interface. See Figure 4 for an example of the modifications made to the interactive video multimedia type’s authoring interface.

Structure and Corresponding Media Types

A key design decision for the web-app was to create a very clear structure for the activity by dividing it into multiple stages with a set of suitable interactive media types associated with each stage. This design decision is informed by three main sources, educational technology literature (Heslop et al.,...
Figure 4. The original H5P video interactivity editing tool with many advanced options (top) and our simplified version (bottom)
Structuring content creation activities is recommended by Sawhney (2009) in the context of supporting digital storytelling. Previous research shows that applying existing pedagogies to structure interactions with digital educational tools and providing scaffolding for non-experts (i.e., students) helped in effective completion of tasks, in progression of thinking skills and in providing opportunities for reflection. In ‘Digital Mysteries’ a structure of reading (context), grouping then sequencing (main task) and reflecting, from the ‘Mysteries’ paper-based tool (Leat & Nichols, 2000), was applied to inform the design of a digital version used for collaborative problem solving (Kharrufa et al., 2010) and for supporting thinking skills for learners of English as a second language (Lin et al., 2016). Heslop et al. (2013b) applied the ‘Writing Frames’ structure (Lewis & Wray, 1996) to support children in collaborative writing by guiding them through paragraph creation, outline creation/planning, and connecting and typing stages. Reported benefits and recommendations from literature, and the findings from our exploratory workshops (R1), support our design decision to apply TBLL pedagogy with its well-defined stages to structure both activity creation, and engagement with activities.

H5P’s standard interface allows creating individual, unstructured activities but its underlying architecture makes it possible to create new media types that contain a sequence of existing types to enforce a multi-stage structure enriched with contextual information. Building on TBLL pedagogy (e.g. (Willis, 1996)), we wanted the resulting interactive cultural activities to be composed of four distinct stages:

- Stage 1 for contextual information.
- Stage 2 for vocabulary introduction map to schema activation tasks in the pre-task stage of TBLL, offering information on context and key vocabulary.
- Stage 3, the ‘how-to’ guide maps to the main task.
- Stage 4, a vocabulary review (Figure 6) which maps to the post-task activities to review vocabulary, culture, or procedure.

Appropriate existing multimedia types were considered for each stage and where multiple content types were deemed suitable for a stage; activity authors were given the choice (via a drop-down selection box - Figure 5) of which interactive content type they wanted to use (R4). To give additional flexibility for pre-task and post-task stages and to explore how participants respond to different media types, the web app allows for additional optional content for stages 1 and 4 as in Table 1 and Figure 5. Scaffolding, in terms of text instructions for each stage that projects the aims of TBLL, was added to the authoring interface (e.g. Figure 5) with reciprocal versions to the resulting engagement interface (Figure 6).

METHODS

This study employed a survey research design which was implemented following community workshops for the creation of user-generated open educational resources. In this section, we explain the participants and context, data collection procedures and analysis methods.

Participants

A total of 28 migrant and host community members participated in workshops organised by the researchers at a UK university in collaboration with two non-governmental organisations that support migrants, refugees, and asylum seekers in the region. In validating the app as regards its capacity to guide non-experts in content creation, we focus on feedback from the 17 migrant participants (11 worked with host community members and 6 in intergenerational pairs from the same family) as they
are members of the main target audience for this paper. The ages of the 17 selected participants (5 males, 12 females) included three 10-15 years old (P4, P9, P12), one 16-24 (P11), nine 25-40 (P2, P3, P6-P8, P10, P15-P17), and four 40-60 (P1, P5, P13, P16). The four younger participants were still at school, with all older participants having or studying for a college or university degree. Only P16 had pedagogical knowledge as a French teacher. Many participants were multi-lingual with first languages including English, Arabic, Zaghawa, Persian, Italian, German, Tigrigna, Mandarin,
and Greek. Participants were recruited through two local organizations that support the different migrant communities and through the UK university’s staff and student lists. We used a combination of convenience sampling and stratified sampling to ensure we ended up with intercultural and intergenerational pairs. These were run during Covid, which posed limitations on who could participate in person resulting in one pair working online to protect the senior participant.

When asked about their use of content creation and sharing technologies (such as Facebook and YouTube), two participants selected ‘browsing only’ (P12, P13); four selected ‘browse, share and engage’ (P6-P8, P17); and the remaining eleven indicated that they are comfortable with technology in terms of browsing, sharing, engaging, creating and uploading new content. Furthermore, our observations showed that none of the participants demonstrated technology skills beyond the level of everyday use (i.e., non-experts). Based on these responses and researchers’ observations during the sessions, all participants fall within our definition of non-expert users (limited or no expertise) in pedagogy, media creation, and/or technology.
Data Collection Procedures and Analysis Methods

Technology evaluation data were collected at the end of community workshop sessions which included pair-based activities over four sessions in three days. Sessions 1 and 2 were carried out in Day 1 and session 3 in Day 2 (with coffee and lunch breaks). Session 4 was completed online via video conferencing in day 3. The first session (~90 mins) involved providing project information, obtaining ethical consent based on the ethics approval from the hosting University, and collection of baseline data in relation to digital skills, language skills, and cultural understanding through questionnaires, discussion, and hands-on activities. Our focus in this paper is on the third session (~270 mins), whereby, working in pairs, participants co-created their own interactive cultural activity for others to learn from in their own languages using the authoring part of the web app. The creative nature of the activity kept participants motivated and engaged despite its duration. The final session (~60 mins) involved revisiting workshop activities and gains in digital, linguistic, and cultural knowledge and skills, as well as an evaluation of the creation and engagement parts of the web app through an online survey. Participants received £90 compensation Amazon vouchers for their time. Some activities and collected data relate to the wider scope project but our focus here is on the design evaluation data, which was collected through a survey for the technology evaluation.

The data for this study consists of 17 responses to the online survey which included quantitative and qualitative data. The survey questions that relate to answering our research question on content creation included rating the level of satisfaction about the suitability of the provided interactive media types for each stage of the activity using a 5-point Likert Scale with a comment field (Q1); open questions on what the participants liked and disliked about the structure of the activity (Q2); and general comments question (Q3).

Analysis of both types of data was based on identifying the participants’ views in response to specific design topics as listed above. Apart from the optional short comments left to clarify selected options, the main qualitative data involved comments left for the three open questions about what the participants liked and did not like about the structure, and general comments. In addition to the two top-level deductive categories of likes and not-likes about the structure, an inductive thematic analysis process (Braun & Clarke, 2006) was applied for the data from these three questions. Initially design aspect-related codes were created, then related codes were combined into concrete design-oriented themes. We present the identified themes later under the three top headings of positives of the structure, negatives of the structure and miscellaneous for everything else. The analysis was first carried out by one member of the research team, then data and analysis were examined and verified by a second member of the team to ensure that all relevant data had been identified and recorded correctly against the corresponding topics. Finally, an overall discussion of the results was carried out between three members of the research team.

FINDINGS

Suitability of the Interactive Media Chosen for Each Stage During Activity Creation

We asked participants to rate their level of satisfaction about our choices for the limited set of interactive options provided for each stage on a 5-point Likert scale as in Table 2. P4 selected ‘satisfied’ on the vocabulary part commenting ‘Even though it took a while to get used to the format of making the activity, it became more and more intuitive the more I used it’. P11 selected ‘very satisfied’ for the vocabulary review commenting that it was ‘simple and effective’ and selected ‘satisfied’ for instructions and commenting that they were ‘short and concise’. In our design, we provided a limited set of interactive types for each stage to simplify the interface (R3) and focus only on the types that are most suited to each stage yet still provided options and flexibility for users (R4). The results show that
most participants were satisfied or very satisfied with this constrained range of interactive options during activity creation, indicating that our design has struck a reasonable balance between flexibility (to meet R4) and constraints (to meet R3).

**Qualitative Data From Questions 2 (Likes and Not-Likes About the Structure in Activity Creation) and 3 (General Comments)**

*Positive of the structure:* All 17 participants left positive comments in response to the question ‘What did you like about the structure?’ and nine participants confirmed their positive view further in the ‘what did you not like about the structure’ question either by leaving comments (5) like ‘Everything was good’ (P3), ‘I can’t think one’ (P2), ‘nothing’ (P12), or leaving the field blank (4). The analysis of the data resulted in eight relevant themes: overall structure design, creation, language, culture, order, ease of use, videos, and interactivity.

There were 7 comments praising the overall structure design such as ‘I liked the structure and how it has a lot of different activities’ (P14), ‘it was step by step and that helped me a lot’ (P14), ‘The existing structure made sure that creators could come up with simple culture activities with an easy-to-dive into context’ (P15), ‘It is clear and informative’ (P17), and ‘Videos in the introduction, vocabularies, and tests’ (P10). Four of the comments specifically referred to the creation aspect such as ‘...it helped me get into a flow of making/doing the activities and it made making the activities quite enjoyable once I got into the flow of the creative process.’ (P4), and ‘I like all the tool provided to help me creating an educational activity...’ (P13). Four referred to aspects related to learning the language and three to learning about culture usually combined such as ‘Learning new words and using those words but learning their culture was very good Idea’ (P3), and ‘...It allows you to get accustomed with the vocab, then apply it to a cultural activity, and finally test your memory of said vocab’ (P11). Three participants commented on the order of the activities in the structure such as ‘The steps were in a good order and guided you through the process’ (P7), ‘...arranged perfectly’ (P8), and ‘It’s very logical and simple. It allows you to get accustomed with the vocab, then apply it to a cultural activity, and finally test your memory of said vocab.’ (P11). Five participants referred to ease of use ‘I appreciated how intuitive it was to make and participate in the activities...’ (P4), ‘I liked how it was very simple to learn other cultures and languages.’ (P9) and sometimes explicitly referring to how the structure helped in this respect ‘I like that it does give you a structure that is clear and easy to follow. It seems very logical to me’ (P16). Finally, P2 referred to how useful the videos were in providing context, and P6 referred to interactivity. The most detailed comment covering most of the above was left by P5:

<table>
<thead>
<tr>
<th>Table 2. Level of satisfaction about the suitability of provided interactive media options for each stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context (interactive video or Virtual 360)</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Vocabulary (Image hotspot or Course presentation)</td>
</tr>
<tr>
<td>‘how-to’ carry out the activity (interactive video or course presentation)</td>
</tr>
<tr>
<td>Review (image pairing + optional image sequencing or single choice set)</td>
</tr>
<tr>
<td>Clarity of instructions given to guide you through the activity creation process.</td>
</tr>
</tbody>
</table>

* P10 did not select any option for vocabulary and activity.
It is good to have a basic, fairly easy to use canvass to create a learning activity. This enables anyone to create a learning activity regardless of their experience. The association of vocabulary presentation and reinforcement through matching it is a good way to build confidence and curiosity in discovering more about the language. Some learners may be able to indirectly extract some basic pronunciation concepts.

Negatives of the structure: Only two themes were identified in relation to what the participants did not like about the structure: level of scaffolding and constraints. Two comments asked to allow the creator to provide more information to learners (e.g. ‘it restrict you to describe things as the way that can go with that structure’ (P8)), and one to help the activity creator (‘I would love more information’, P14). Three comments fall under the theme of constraints whether in terms of learning activities and exercises (‘The range of learning activities is a little limited….there should be a way to present a more advanced comprehension exercise’ (P5)), the level of scaffolding that can be provided (see P8’s comment), or in terms of the limitations to simplify the creation risking oversimplifying the targeted culture (P15).

Miscellaneous: The comments that were not structure-related fall into five themes. The first is the enjoyable experience with six comments, including one specifically referring to the making element (‘I enjoyed this experience of making a language learning resource…’ (P4)). The second is about learning with two comments (e.g. ‘I like this method of learning new words’ (P3)). The third is about usability and aesthetics with five comments such as requesting a more modern interface design (P4, P15), improving uploading of material (P5, P7), or some guidance being wordy and overwhelming (P7). The fourth theme was about asking for more tools and activities such as a video editing tool (P8) or drawing, coloring and games (P12, P13). The final one does not related to the tool itself but to content and community (P9, P10, P11, P14).

DISCUSSION

The data from the web app evaluation study provide good evidence that the web app with its structured user- and pedagogy-informed design was successful in supporting non-expert users to create open educational resources to learn language and culture. The limited negative comments in relation to the balance of level of scaffolding and constraints indicate that a reasonable compromise and balance has been achieved. Many of the overall design-related miscellaneous comments confirm that the design has generally been successful in providing an enjoyable content creation experience with the non-positive ones requesting improvements in usability, aesthetics, or more tools but not in relation to the core design principles.

As the activities the participants carried out and the questions asked were all about content creation, and not engaging with existing content, we can safely assume that the ratings and feedbacks are focused on the design of the web app itself and not influenced by any user created content. This has also been made clear in our introduction to the task and questions to the participant, and further confirmed by the qualitative feedback that was clearly design focused with no reference to content. The only limited references to content were in the comments on the miscellaneous section and these were suggestions for encouraging the creation of activities covering more languages and cultures.

The novelties of the work presented in this paper are in designing to empower non-expert users to create engaging, pedagogy-informed online resources of a cultural and linguistic educational value; and demonstrating how such tools can be developed with limited resources by augmenting existing platforms. It contributes a set of design recommendations and a system with user evaluation as a response to our design-focused research question. Each of our design recommendations below is informed by i) user-requirements, ii) literature, and iii) our experience designing and developing the tool. Each is also validated by findings from the evaluation study:
• **Choose a structured pedagogical approach to inform design:** The use of structured activities has been explicitly requested by participants in our design work (R1) and its benefits have been repeatedly stated in educational technology literature (e.g. (Heslop et al., 2013b; Kharrufa et al., 2010; Sawhney, 2009; Slof et al., 2010)). Moreover, using pedagogy to inform design is already a recommended practice in educational technology (Xie et al., 2019). The question is how to pick an approach that has clear practical implications on design. A starting point is deciding on a ‘pedagogical perspective’ (e.g. behaviorism, constructivism, or socio-constructivism) that aligns with the researchers’ epistemological belief. These perspectives are high level and do little to inform the design beyond deciding on whether to focus on stimulus/responses or constructing knowledge individually or collaboratively for example. Each perspective has several ‘pedagogical approaches’ (Bower, 2017) that align with it and that can be more informative to design. We emphasize choosing an approach that both aligns with the objectives behind the design (e.g. ours is language learning and thus TBLL is used as the pedagogy) and provides structure to the learning activity. Feedback from the evaluation study on the structure was unanimously positive with explicit reference to its logical order, ease of use, support for the creation process, and learning about language and culture. While cited literature focuses on structure in interacting with pre-prepared content, we used structure to guide the content creation process, which is then embedded into the resulting resources. We argue that when supporting non-expert content creation, ensuring that such structure and pedagogical scaffolding is embedded in the resulting resources is particularly important as it compensates for the lack of pedagogical knowledge by the content creators. Also based on R1 we recommend that such a structure ensures opportunities for the content creators to provide contextual information that not only provide background information, but also provide motivation for engaging with the material.

• **Support utilizing interactive multimodal content to increase engagement:** Our design sessions highlighted the importance of adding interactivity for learning and engagement (R2, R4). The use of multimodal content by itself is no guarantee of engagement, but using a variety of media and adding interactivity (e.g. interactive images, interactive videos, drag and drop elements, multichoice questions) increases the probability of engagement and promotes active learning (Mestre, 2012; Oud, 2009; Schwan & Riempp, 2004). In the evaluation study, and as in Table 2, participants reported a high level of satisfaction with the provided interactive media content. Moreover, positive feedback about content such as vocabulary and matching activities (see comments from P5, P10, and P11) further confirms the engagement and learning benefits of interactive content.

• **Provide scaffolding through constraints but with flexibility:** Flexibility in terms of supporting a variety of media types was identified as a requirement in our design work with participants (R3). This is not surprising as providing flexibility is a key HCI design principle to give users a sense of control. However, when designing for users who are not experts in pedagogy and/or media, too much flexibility (e.g. supporting the 40 content types provided by H5P) can be overwhelming and may not lead to the most engaging and useful content. In the context of storytelling to facilitate cross-cultural dialogue, Mencarini et al (2014) showed that a constrained text approach can still allow users to create meaningful and original stories and might be more helpful than a fully open approach. The design challenge then is in providing the right balance between providing constraints to support non-experts in creating content that is engaging and useful, and allowing for some flexibility of choice to give authors a sense of control. Table 1 demonstrates the flexibility and constraints provided in terms of structure (including optional sub-stages) and content (a limited set of the most appropriate content for each stage). Table 2 supports such design decisions and summarizes the participants’ mostly positive opinions about the limited media types chosen for each stage.
These design recommendations can lead to tools that can empower users with domain knowledge (in terms of language and culture in our case) but limited teaching and/or technical skills to create interactive, pedagogy-informed activities. This increases the probability of engagement with, and learning from, the user-generated resources regardless of the pedagogical and technical knowledge of the authors. This work demonstrates an implementation of these guidelines using TBLL pedagogy (Ellis, 2000; Nunan, 2004; Willis, 1996) and established knowledge about interactivity (Mestre, 2012; Oud, 2009; Schwan & Riempp, 2004) and multimedia learning (Baddeley & Hitch, 1974; Mayer, 2002; Sweller, 1994). But we view this as a general approach that can be applied to different pedagogies and knowledge domains that have concrete pedagogies with well-defined structures that benefit from interactivity and use of multimedia.

LIMITATIONS AND FUTURE WORK

In this paper, we looked at participants’ views in response to our design decisions. It will be useful to investigate the impact of the embedded pedagogy on learning outcomes in future studies. Difficulty in recruiting immigrants, refugees and asylum seekers especially during the pandemic meant that we relied on convenience sampling and could not achieve the desired balance in gender, age or technical backgrounds. Workshops had to be carried out at university premises to ensure a covid-safe environment. Being part of a larger project meant that the workshops aimed to achieve multiple objectives, limiting the time dedicated to this work’s objectives. Thus, only a survey was used for evaluation, with no time for focus groups/interviews for more qualitative data. However, the survey’s qualitative comments helped evidence a clear positive response to our design choices. Among the important learning practices that can be embedded into tool are qualitative feedback provision, remote collaboration, and community building. Participants made several verbal comments asking to support group work. Well-designed group support that goes beyond features of liking and sharing, can inherently lead to opportunities for reflection, feedback provision, and community building, so is a worthy direction for further research.

CONCLUSION

This paper describes the design and evaluation of a web-app designed to empower non-pedagogy and technology experts to create engaging online activities of a cultural and linguistic educational value. The main targeted audience of this work are migrants, immigrants, and refugees, but the findings and resulting recommendations are generalizable to support those who have valuable and shareable knowledge and experiences but without the pedagogical or technical expertise to communicate them effectively. This work contributes a theory- and user-informed system and design recommendations. The recommendations highlight the importance of choosing a structured pedagogical approach to inform design, utilizing interactive content to increase engagement, and enforcing constraints with some flexibility. Our evaluation study provided evidence in support of these design recommendations.

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CONFLICT OF INTEREST

The authors of this publication declare there is no conflict of interest.
REFERENCES


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ENDNOTE

1 In this paper, we will use the term migrants as a general term to also include immigrants, refugees, and asylum seekers.