An Embodied Perspective of Open Educational Resources (OERs) Collaborative Design supporting Self-determined and Autonomous Learning

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Abstract

In the framework of the EULALIA project (Enhancing University Language courses with an App powered by game-based Learning and tangible user Inter-faces Digital Creativity Enhanced in Teacher education) the authors develop a blended embodied approach to cultural competence education by using scenario based and multisensorial methodologies applying Tangible User Interfaces (TUIs) and Mobile Learning. Combining virtual and multisensorial physical dimensions thanks to the application TUIs and VR elements, situational affordances are distributed across a network of Learning Objects (Smart) storing a variety of digital contents. Exploring a physical map the user experiment learning scenarios constructing personal meanings, self-directing and serf regulating their learning path. In this view, the students and teachers are able to creatively, and collaboratively design Open Educational Resource (OER), co-creating their Language Learning Strategy (LLS), in the form of a game scenario. The paper explores the potential of OERs co-design approach in the in the educational context presenting the EULALIA workshops experience.

Keywords 1

Tangible User Interfaces; Scenario Based Learning, Digital Game Based Learning, OERs, Collaborative learning

1. Introduction

1.1. An embodied approach to cultural and language learning

Successful learning is a constructive process that involves seeking solutions to problems and relating new experiences to existing knowledge [1]. The internalization of the learning experience, fundamental in the learning process, is successful when concepts and knowledge are anchored to real-life problems and scenarios, as "knowledge is a storehouse of representations, which can be called upon for use in reasoning and which can be translated into language" [2]. Learning is a process of personal construction of meaning by the learner through experience, and that meaning is influenced by the scaffolding of prior knowledge with the reflections, activated during a new current experience, drawing forth cognitive and emotional information from several sources: visual, auditory, kinesthetic, and tactile [3]. Central to learning is conversation with the world as we carry out experiments and explorations, and interpret the results [4]. Learning is most successful when in control, carrying out an active and continuing cycle of experimentation and reflection [5].

EULALIA (Enhancing University Language courses with an App powered by game-based Learning and tangible user Interfaces Digital Creativity Enhanced in Teacher education), proposes a multimodal storytelling system in which the learner is guided through the exploration of a map. The EULALIA App

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has the structure of a serious game in which the player deals with multidimensional data through a gamified learning experience in which visual and spatial, auditive and tactile aspects interact using TUI applications [6]. EULALIA is a technology enhanced learning tool providing multimodal communication and multisensory applications that transform the approach to language learning, immersing the player/learner in a simulated scenario that situate the knowledge in a context with an interactive storytelling approach [7]. Scenario-based learning (SBL) provides meaningful learning experiences by engaging students in authentic environments to support reflective practices and active learning in a real-world problem and in a subsequent solution finding process [8]. Within EULALIA the narrative of scenarios is hinged on tangible and intangible cultural elements and interactions built as problem-oriented tasks. In language learning, scenarios facilitate language learners to practice in real life simulated situations. TUIs paradigm allows a continuous interaction between user and digital interface, e.g. a software installed on PC or smartphone. This interaction is granted through tangible objects that can stimulate different senses, including touch, smell and taste. The users interact with the digital interfaces and is guided to perform actions within scenarios whose elements are anchored to physical and real objects, characterizing elements of the tangible and intangible cultural heritage.

2. Development of multimodal-multisensory learning scenarios

The software allowing the scenarios development and logic is STELT (Smart Technologies to Enhance Learning and Teaching) [9], which also encompasses the communication protocols of the hardware (RFID/NFC readers) that support the use of tangible interfaces application [10]. These materials permit to link together smart technologies and physical materials, uniting the manipulative approach and digitalized technologies [11]. STELT can be a very flexible and useful tool to develop inter-active and engaging learning environment. Each object, namely smart object [12], is equipped with a RFID/NFC supporting the connection object-meaning, making possible its association to a multisensory learning scenario [13]. The App[2] was created as a first prototype of the EULALIA project[3] funded by European Commission developed for Android devices. In this context, a learning activity is deployed through a quest on a physical map by browsing with the phone equipped with NFC sensor, which represents the sensitive STELT point. Each interaction on the map by browsing and searching the next answer is part of the learning experience exploring the mart objects that store cultural contents and language meanings. As scenarios are sequences of communicative situations, they offer a means of incorporating Common European Framework of Reference for Languages (CEFR) descriptors into language learning path. In language learning, scenarios facilitate language learners to practice in real life simulated situations. A CEFR-based scenario provides a set of real-world variables, including a domain, context, tasks, language activities and, in which “Can-Do” descriptors can be integrated as learning objectives, together with aspects of strategic, pragmatic and linguistic competence as enabling objectives, and quality criteria for evaluation purposes [14].

Figure 1: Develop a tangible map using NFC

[2] https://play.google.com/store/apps/details?id=it.smarted.eulalia&hl=en
[3] eulaliaproject.eu/

3. Using Open Educational Resource (OER) design as a framework supporting self-determined, autonomous learning and collaborative leaning

Conceived as a tool supporting cultural and language education, EULALIA scenarios focus on three main fields, namely: 1) cultural heritage and traditions, 2) daily life situations, 3) second language acquisition. Such scenarios are delivered through language domain activities (i.e. Scratch) [15, 16]; and tangible user interfaces applications [17, 18, 19, 20]; supporting technology enhanced language learning strategies [21, 22, 23, 24]. By using the STELT system, the prototype provides an easy to use mechanism to design and develop new learning scenarios that allow students to explore, trough tasks, an interactive map embedding cultural and language domain contents within tangible objects. In this view, the students and teachers are able to creatively design an Open Educational Resource (OER) [25], co-creating their Language Learning Strategy (LLS), in the form of a game based scenario. In this process, students become responsible to construct their learning experience, moving from consumers to co-producers [26]. The pedagogical approach underpinning the development of OERs is based on the concept that situational affordances are distributed across a network of learning objects (smart) storing a variety of digital contents and take place when learners collaboratively and creatively generate new contents connections developing new knowledge artefacts [27], self-directing and serf regulating their learning path. Furthermore, in the context of EULALIA OERs development reflects a collaborative and peer-to-peer approach, where teachers guide the tasks and learners acted as sense makers [28]. Learning occurs as learners are able to probe their own construction of meaning against others' understandings; essentially negotiating meaning and knowledge [29].

A participatory approach was adopted in the phase of EORs development, in form of focus group workshops, stimulating dynamic discussion among students participants guided by a moderator, a schoolteacher of a HEIs lecturer, in such a way that all group members are engaged and active creating the scenarios. OER Authoring tool [30], in form of a scheme supporting the advancement of the scenario storytelling process, was provided, in line with digital game-design tasks logic [31]. The tool supports the collection of information related to each interaction/task the user will play while exploring the map.

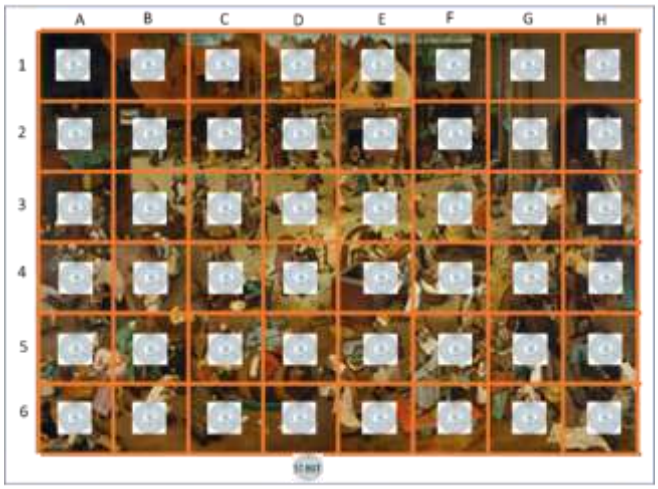

Figure 2: A painting of Bruegel enriched with NFC/RFID sensors

3.1. EULALIA Workshops

An integral part of the IO3 lifespan (OERs development) task of the EULALIA project and a unique opportunity to dissimilate the first project developments were workshops organised by project participants (University of Naples Federico II (UNINA), Universitat d'Alacant/Universidad de Alicante (UA), Uniwersytet im Adama Mickiewicza w Poznaniu (AMU) and Università ta' Malta (UM). During the workshops organised between November 2020 and March 2021 lecturers and professors from EULALIA partner universities taught how to use of OER Authoring tool and the App. The first workshops targeted at researchers, lecturers, professors, etc. involved in teaching Erasmus students.

The idea of the project-leading organisation was to share the development of the project with teachers from institutions not involved in the project directly so that they also can benefit from the project findings. During the first day of the workshop, the methodological aspects were presented whereas during the second day practical activities were organized to involve the participants also into initial OER development. The workshop was divided into the following steps:

- EULALIA project presentation;
- EULALIA model (IO1) and integration in language course routine;
- Introduction to the Tangible User Interfaces paradigm;
- Introduction and description of the EULALIA APP and their OER Authoring Tools;
- Design of the project OER in the form of game/exercise for language learning/teaching;
- Demonstration of a typical game developed with EULALIA APP, with the digital interface and with the tangible interface (one example for each template of OER);
- Implementation of the OERs, also with tangible material.

Approximately 100 among teachers and researchers participated in the workshop. A second workshop was organized following a similar path but involving approximately 2002 Erasmus students participating in the courses offered by EULALIA partner universities.

3.2. Examples of OERs created during workshops

Both for teachers and students taking part in EULALIA workshops it was the first opportunity to work with EULALIA App, nevertheless the results of the cooperative teamwork were approximately 50 scenarios developed during the workshops with teachers and students. Topics of the OERs developed by teachers and students referred to cultural issues (well-known places, eminent people, sightseeing), potential issues that Erasmus students have to deal with in a foreign country (administration, using means of transport, accommodation, shopping), or related to university functioning (library, Deans office, official documents etc.), in line with the findings of the needs analysis conducted at the beginning of the project. The most common situations were related to Erasmus students needs to use the local language for shopping (71.9 %), transports (64.9 %), university facilities (61.6 %) and accommodation (56.2 %). The OERs have different levels of language advancement from A1-B2 (CEFR).

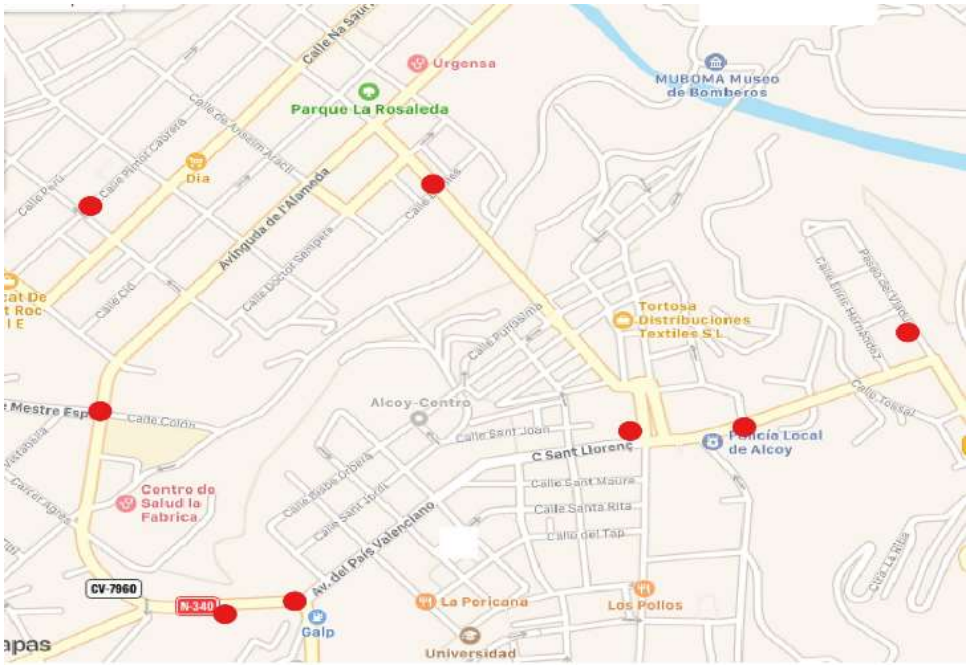

Figure 3: Example of interactive map "Conoce Valencia" developed during Eulalia workshop for teachers in Alicante, Spain.

Figure 4: Example of interactive map "Famous Polish Nobel Prize winners" developed during Eulalia workshop for teachers in Poznań, Poland.

The user, can either interact through a virtual or physical map, the different symbols (smart objects) store different digital contents of the situational affordances network. Each interactive object on the map constitutes an interoperable Learning Object [32, 33, 34] that can be reused to combine a different instructional learning path. For example, the outline of the eagle in Figure 4, which is the symbol of Poland, could be a virtual or physical shape, where virtual or physical symbols related to Polish Nobel Prize winners have been placed. During the workshop, students were asked to match the objects on the map with specific Nobel Prize winners including details that could provide additional cultural information about the Nobel winners. For example, the name of the radioactive element is connected with the person of Marie Skłodowska-Curie, who was awarded the Nobel Prize for the invention and description of this element, which she named polonium in honor of Poland. When using the interactive map as a tool to support mainstream curriculum, the student is called to interact placing the physical symbol on Polish Nobel Prize winner. If correctly placed, the system provides a confirmation statement (Great, bravo, Great job!). At the same time, the application allows the student to read or hear the information provided about the person in two language versions (in this case Polish and English). If the student does not complete the task correctly, he/she is encouraged to try again.

3.3. Evaluation of EULALIA Workshops

At the end of the workshops both students and teachers participants evaluated the event through an online anonym survey and invited to share their suggestions regarding the application in an open discussion. The results gathered clearly showed the great potential of the project and the interest not only of the teachers but also of the students themselves. At the same time, it is worth emphasising that among the advantages mentioned by the participants, it was highlighted that the App is an unconventional, engaging, usable and effective tool supporting learning, particularly in relation to the multimodal interaction it allows. Furthermore, it was mentioned that the opportunity to physically interact, activates a sense of personal control over a cooperative challenge, adaptable to meet learners' abilities, that enhace motivation, concentrations, engagement, and confidence that introduce a flow

state, which in turn predicts increased performance [35, 36, 37]. Flow is in fact supported when an activity challenge meets the learner's abilities and creates an ideal level of arousal, meaning it creates neither anxiety nor boredom [38]. Positively related to achievement, engagement does increase when activities are tailored to the personal needs and emotional state of the learner [39].

4. Conclusion and future directions

This paper presents the structure of a game application embodying multisensorial learning experiences via TUI application and presents the theoretical framework underpinning its deployment. The game application can support the implementation of blended cultural competence education paths, including scenarios in three main fields, namely: 1) cultural heritage, 2) daily life situations, 3) langue, incorporating Common European Framework of Reference for Languages (CEFR). The OERs co-design phase involving students as well as schoolteachers and HEIs lecturers resulted in the implementation of reusable OERs.

The next step brings to the piloting of EULALIA methodology in the formal teaching and learning context, following teachers and lecturers training on how to use and embed the tool within the activities part of the curriculum. During the piloting phase, data will be collected, both qualitatively and quantitatively, to assess the following dimensions: development of language competencies, learning of cultural aspects of a city/country different from that of origin, personal development, and impact on the teaching and learning practice.

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