

The LoCALL App: A Mobile Tool to Promote Learning from and About Linguistic Landscapes



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Abstract Educational research has been showing a growing interest in the field of Linguistic Landscapes (LL) with numerous studies highlighting the pedagogical potential of LL in developing pupils' and teachers' competences at different levels. Yet, despite the pervasive role new technologies are taking in Education, research bridging LL and digital tools is slim and mostly focused on the use of mobile devices for methodological purposes. Considering this background, this chapter reports on the results of a basic qualitative study conducted with a group of seven teachers from a school in Ílhavo, Portugal, who developed an interdisciplinary project around the LoCALL App. The App is an educational resource that invites pupils, teachers and the community to document and critically reflect upon LL through a multiple-choice question game to be played outdoors. In particular, the study explores teachers' perceptions regarding the competences developed by a class of 20 pupils, aged 11–13, while participating in the project. Data was collected through a group interview conducted with the teachers after the conclusion of the project, which was transcribed and treated using inductive content analysis. Results show that, according to the teachers, the project was successful in developing pupils' awareness to language and linguistic diversity, in promoting critical thinking, autonomy and

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engagement, as well as in activating and developing (prior) knowledge in different curricular and non-curricular subjects. Surprisingly, digital skills were not mentioned by the teachers, a result that needs careful interpretation. These findings are relevant for the international audience of teachers, who may explore LL with this mobile tool in their teaching practice and in their own language, and for researchers, as more studies on this innovative approach to LL in education are required.

Keywords Linguistic landscapes · Interdisciplinary learning · Mobile learning · Game-based learning · Lower secondary education · Basic qualitative research

1 Introduction

Linguistic Landscapes (LL) have been emerging as a significant research field in Education, given their potential to value linguistic and cultural diversity inside and outside the classroom and their unique contribution in fostering pupils' competences at different levels. Indeed, research in language didactics has highlighted the effective role of LL in developing critical language awareness and multilingual and plurisemiotic literacies, which are fundamental in language learning and teaching processes (Dagenais et al., 2009; Gorter, 2013; Rowland, 2013). Studies have also identified significant effects of the use of LL in promoting multimodal/sensory learning experiences and text-to-world connections (Li & Marshall, 2018), and in developing pupils' soft skills, such as critical thinking or intercultural awareness (Clemente et al., 2012). More recent research has also shown that LL-related tasks can be a powerful starting point to reflect upon issues of linguistic inequality, inclusion and social justice in school and in the community, as LL allow teachers and pupils to rethink multilingualism as an even more inclusive concept and to think of languages attached to issues of power, equity and sustainable human development (Lourenço & Melo-Pfeifer, 2021).

Since the first attempts to define the concept from an educational perspective (Landry & Bourhis, 1997), there has been a considerable amount of research focusing on the didactic potential and on the possibilities of working with LL with pupils and teachers. Traditional ways of exploring LL in Education include, for instance, taking photographs of the LL in the city or in the home, completing observation grids (identifying, counting and comparing languages), reading maps and interpreting geographic coordinates to reach points of interest, interviewing people (shop owners, tourists, members of the city council or other members of the community), writing reports or personal opinion essays, drawing or crafting an imagined of real LL (Clemente, 2017; Dagenais et al., 2009; Santos & Pinto, 2019). However, the emergence of new technologies and their increasing pervasiveness makes the integration of such technologies into teaching and learning processes, in general, and into teaching and learning about and from LL, in particular, the next logical step to take.

Mobile devices, particularly smartphones, are an example of such technologies. It is estimated that, in 2020, there were 105 mobile-cellular subscriptions per 100

inhabitants worldwide (ITU, 2020). Still, not many studies have analysed the role of these devices in developing pupils' knowledge, attitudes and skills through LL. Research bridging LL and digital tools is slim and most studies focus on the methodological side of using mobile devices to document (i.e., collect and analyse) LL, rather than on the pedagogical benefits of using these tools. Such is the case of studies that describe specifically designed software that allow users explore the distribution of languages in the LL by linking images to their geographical location and adding analytical descriptors according to a predefined framework (Barni & Bagna, 2009; Gaiser & Matras, 2021; Ziegler, 2013).

The literature has been demonstrating that mobile devices are familiar to students (Mascheroni & Ólafsson, 2016) and that they have positive perceptions regarding the use of mobile devices to learn (Pollara & Broussard, 2011). Considering these findings, if these technologies are properly used, they intrinsically motivate students and promote positive learning outcomes (Chee et al., 2017; Crompton et al., 2017; Pombo et al., 2019). Additionally, a mobile device is portable, readily available and relatively cheap; hence, learning through mobile applications provides easy access to learning materials, individual place and time of study, immediate feedback, and self-testing. It is an attractive and dynamic process, which increases students' motivation and encourages them to study (Gafni et al., 2017).

Given those results, teachers are seeking to use the present technology (with its capabilities and limitations) in the most effective ways, while computer science specialists are trying to advance the technologies, providing more options for their practical use (Purgina et al., 2020). For example, through 4G Internet access, which has 84.7% of the world's population coverage in 2020 (ITU, 2020), and Wi-Fi, modern mobile devices provide learners with opportunities to be involved in meaningful real-context interactions, which are often lacking in traditional learning environments. Moreover, the use of mobile devices can lead to high cognitive and affective outcomes in educational contexts, whilst leveraging learning relevant to a wide range of subject areas, thus supporting interdisciplinary teaching approaches (Pombo & Marques, 2019). The literature has already revealed that interdisciplinary mobile apps may have high educational value, particularly for 10–15-year-old pupils, who reported feeling more motivated to learn with this approach (Pombo & Marques, 2020). In what concerns language learning, empirical studies have found that the use of mobile devices and applications as tools for learning foreign languages is efficient, contributing, for instance, to the improvement of students' listening comprehension skills (Azar & Nasiri, 2014).

In addition to these new trends of teaching languages and other subjects through mobile devices is the rising interest in the gamification of learning. Gamification does not imply mobile learning, as it integrates a set of technical concepts (such as points, badges, and leaderboards) in the learning process, which can take place outside or inside the classroom. However, mobile digital games integrated in an app combine those two features that enable users to engage in a game-playing behaviour and in a real outdoor environment supported by simple observation and benefiting from game elements to motivate learners and from immediate feedback for learning purposes.

In line with this background, this chapter presents the LoCALL App, an educational resource that was conceived in the scope of a European Erasmus + project named “LoCALL: Local Linguistic Landscapes for global language education in the school context”, which aims to develop multilingual pedagogies for the school context based on pupils’ and teachers’ lived experiences with multilingualism outside school. The LoCALL App invites pupils, teachers and the community to ‘read’ and explore LL, while playing a multiple-choice question game. The App is available in English and in the languages of all LoCALL project partners, and all games can be freely accessed by everyone. In contrast to other digital tools developed within LL-research, the LoCALL App is not mainly targeted for researchers or university students, but for primary and secondary school pupils and teachers who co-create games in an online platform according to a project-based didactical approach. The App allows pupils not only to document and discover LL, but to critically reflect upon their findings, linking curriculum content to the ‘real’ world.

The aim of this chapter is thus to present the results of a basic qualitative study that was carried out with a group of seven teachers and an 8th grade class of 20 pupils, aged 11–13, from Ílhavo (Portugal), who used the LoCALL App in an LL interdisciplinary project during academic year 2020–2021. In particular, the study aims to identify teachers’ perceptions regarding the contribution of the project in developing pupils’ competences in different domains, such as language awareness, curricular content knowledge, soft skills or digital competences.

The next section of this chapter outlines the genesis and features of the LoCALL App and the associated web-platform. This is followed by the presentation of the empirical study, namely the methodological design, the educational context and participants, and the methods for data collection and analysis. Finally, the results are presented and discussed followed by a conclusion highlighting the main findings, presenting study limitations and suggesting avenues for future research.

2 The LoCALL App and the Web-Platform: Development and Features

The LoCALL App and associated web-platform were conceived with the aim of supporting learning from and about LL. For the characterisation and development of the App and platform, principles of pedagogical usability were taken into account. Pedagogical usability refers to the way learning content is made available by the software and to its usefulness for teachers and students in achieving learning goals.

Some principles that served as the basis for the App and platform design are briefly summarised:

- Teachers can use the created software to encourage active learning, following a project-based approach to build new knowledge from and about LL;
- The work to be developed can be individual or in groups, encouraging collaborative learning;

- Learning objectives must be clear and the activity should be results-oriented;
- The acquired skills must be transferable to other contexts, to have practical application;
- By introducing a technological tool into the pedagogical activity, it must add value to learning, due to its creative potential, its flexibility and adaptation to learners (Nokelainen, 2006).

2.1 The LoCALL App

The LoCALL App provides games to explore the LL of multiple cities in multiple languages (currently, in Dutch, English, French, German, Portuguese and Spanish). It is available on App Store and Google Play for installation on iOS and Android devices. Its use is free and it does not require user registration.

Upon entering the App, the user selects a language and a city. Then, a list of all the games available in the selected location and language is displayed. Figure 1 shows some screenshots of the App from the starting screen until game selection.

The games are made up of city paths, which are marked on a Google map. Each path consists of a set of points of interest that depict the LL of a city. Each point of interest is associated with multiple choice questions, which may include text and multimedia elements, such as images, audios and videos of the LL.

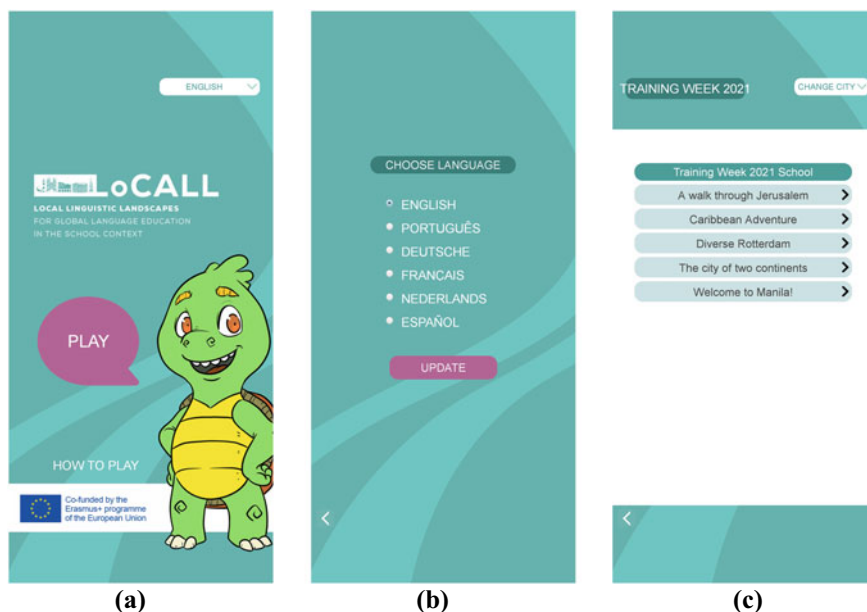


Fig. 1 Initial screens of the LoCALL App: **a** starting screen; **b** language selection; and **c** game selection

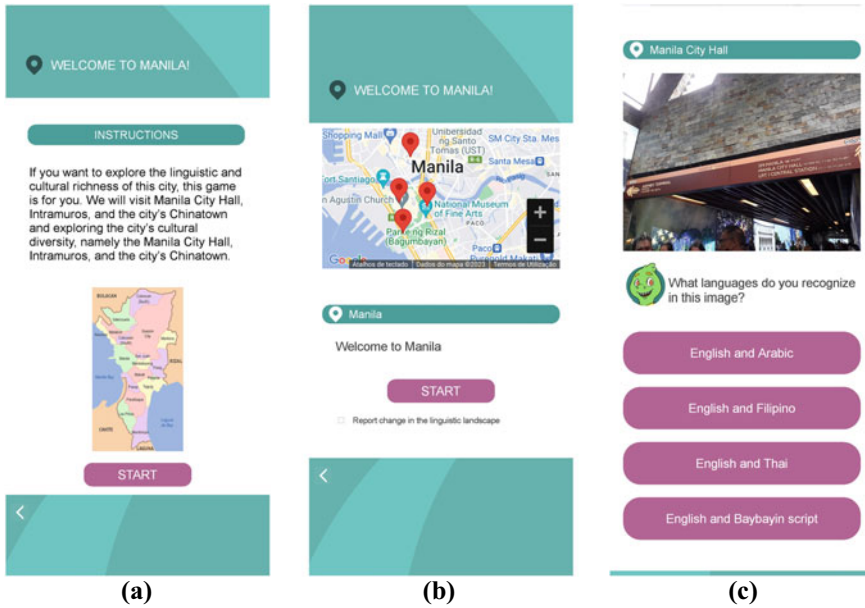


Fig. 2 Screenshots of the game “Welcome to Manila”: **a** Introduction; **b** Map with points of interest; **c** Example question at a point of interest

Upon entering the game, the user accesses the map which marks the points of interest and is prompted to follow the instructions to reach the first point. Then, (s)he will have to answer questions about the LL in that location (Fig. 2).

Every time a user answers a question, a feedback message is displayed, indicating that the user selected a correct or incorrect answer. When the user finishes answering the questions related to that point of interest, it is possible to move on to the next question, until the end of the path. At the end of the game, the user can see the score and can choose to play again to improve the results, therefore learning more about the LL explored. Figure 3 shows the feedback and scoring mechanisms of a game.

In short, App users enjoy activities which are simultaneously digital and analogic, hence promoting engagement and motivation to achieve learning goals and encouraging healthy behaviors (Chassiakos et al., 2016). The mobile game provides guidance and information that is combined with the exploration of the outdoor environment, which is necessary to complement knowledge and successfully play the game (Kim, 2015).

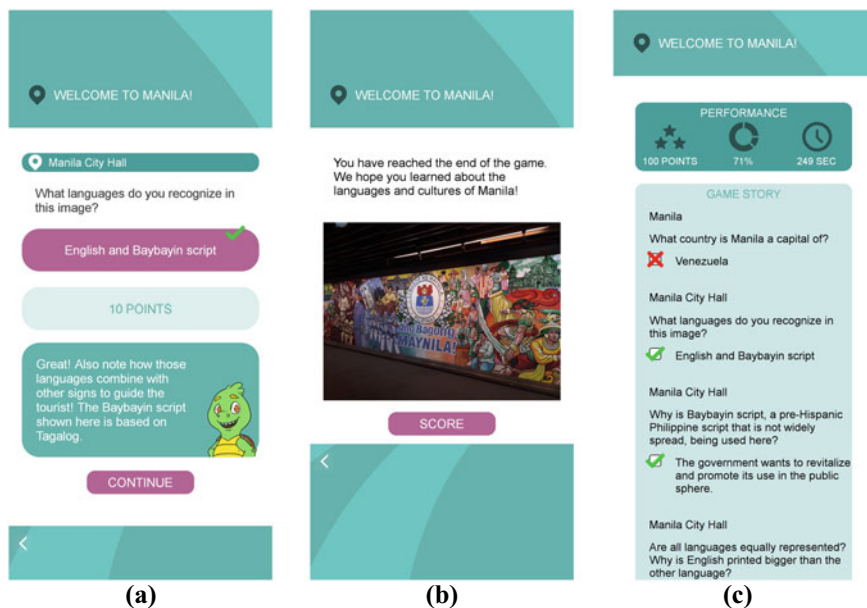


Fig. 3 Screenshots of the game “Welcome to Manila”: **a** Example feedback message; **b** End of game screen; **c** Score screen

2.2 Web-Platform

The platform brings together features that allow the management of the content of the LoCALL App, the management of user accounts, access to App usage statistics and also the possibility of adding new languages, countries, cities and schools, as a way of expansion and future sustainability of the project.

Regarding content management, the platform allows students and teachers to create games exploring the LL of their city, which are to be available on the LoCALL App. As a preliminary task, it is necessary to find and select points of interest displaying the LL in the city, and to produce multimedia content, in order to build a game path.

To create a point of interest in the platform, the user chooses a name and a location, associating it with a geographical coordinate by writing the latitude and longitude or by clicking on a map point. The next step is to create questions about the LL related to that point of interest. In this feature, the user fills in several fields: (a) Writes an (optional) introduction to which media elements can be added; (b) Writes the question and up to four answer options, indicating which one(s) is/are correct; (c) Writes two feedback messages, one associated to the correct answer(s) and another to the incorrect one(s), and adds media elements (optional); (d) Links the question to a point of interest. Questions can be edited and translated into other languages.

The game is built following four steps: (1) Initial settings, such as the language, the name of the game and a game introduction with text and media elements; (2) Selection and ordering of points of interest composing the game path, and writing instructions to reach each point; (3) Selection and ordering questions for each point of interest; and (4) Final game message, composed by text and media elements. Figure 4 illustrates Step 1—Initial settings with a specific game.

Regarding user management, the platform integrates four access profiles with different permissions in the creation of games and management of the App content:

- Student Profile—the student registers a new account, associates it with a school and a teacher, which validates his/her access. Once validated, (s)he can create points of interest, questions, and upload media elements to the platform.
- Teacher Profile—the teacher registers a new account, associates it with a school and the account is validated by the national LoCALL coordinator of his/her country. The teacher is responsible for a group of students, being able to view and edit their content. The teacher creates the games by joining points of interest and questions. The teacher has access to anonymous statistics about the usage of games created in his/her account.

The screenshot displays the 'Edit game path' interface for a game titled 'Welcome to Manila'. At the top, there are four circular progress indicators numbered 1 through 4, with indicator 1 highlighted. Below the indicators, there is a section for 'Active' with radio buttons for 'On' (selected) and 'Off'. The 'Language' is set to 'English'. The 'Game id code' and 'Game name' fields both contain the text 'Welcome to Manila'. A 'Message at the beginning' field contains a paragraph: 'If you want to explore the linguistic and cultural richness of this city, this game is for you. We will visit Manila City Hall, Intramuros, and the city's Chinatown and exploring the city's cultural diversity, namely the Manila City Hall, Intramuros, and the city's Chinatown.' Below this message is a 'Media' section with a 'choose' button and a small map image labeled 'Manila map.png'. At the bottom right, there are 'Back' and 'Next' buttons.

Fig. 4 “Welcome to Manila” game on the platform, Step 1—Initial settings

- **National Coordinator**—is responsible for the LoCALL project in a partner country. (S)he manages the teacher accounts in one country and may validate, view, edit and delete teacher profiles. (S)he can view, edit and delete all games created by users associated with schools in his/her country and access the anonymous usage statistics of those games in the App.
- **Administrator**—Accesses all games, points of interest, questions, anonymous statistics and media elements created by users from all countries. (S)he can add new languages, countries, schools and users to the platform. (S)he has the maximum platform access permissions, not only for managing and maintaining the App, but also for accessing anonymous data.

Summing up, the features available for content creation and student access management on the platform allow teachers to develop pedagogical activities related to LL. This way they can actively involve their students in the construction of knowledge around LL to create digital games for the LoCALL App, using a technological tool that does not require coding skills.

3 The Empirical Study

This chapter reports on the results of a basic qualitative study (Merriam & Tisdell, 2015) that aimed to identify teachers' perceptions regarding the competences their pupils developed while participating in an interdisciplinary project on LL that used the LoCALL App and platform. Basic qualitative studies are usually interpretative and data is collected through interviews, observations, or document analysis, and analysed to identify recurring patterns. This form of research is one of the most common qualitative research designs in the field of Education, and it is considered to be suitable to uncover the meaning of a phenomenon for those involved in it (*idem*).

The study was developed in an urban school in Central Portugal, and the participants were seven teachers who lectured a class of 20 8th grade pupils. The sample of this study is small, non-random, and purposeful, which is frequent in qualitative research (*idem*). Section 3.1 provides a detailed description of the context and the participants, while Sect. 3.2 presents the project developed by the teachers and the pupils.

In order to access teachers' perceptions regarding the effects of the project in the development of pupils' competences, a group interview (GI) was conducted with the teachers at the end of the project. The instrument and procedures for data collection and analysis are detailed in Sect. 3.3.

3.1 Context and Participants

The Erasmus + LoCALL Project launched a challenge to schools in the Aveiro region (Portugal) to develop an interdisciplinary project to ‘read’ and explore LL, including the creation of an interactive game for the LoCALL App. One school in Ílhavo, in the vicinity of Aveiro, embraced the challenge and became this study’s educational context.

The school is located in an urban setting and offers education and training to pupils from 3 years old (preschool education, not compulsory) up to 18 years old (secondary teaching, compulsory), and also to adults. In the school year 2020–2021, the student population was around 1628. From these, 73 were foreign students (about 4.5%).

As previously mentioned, seven teachers participated in the project:

1. “Charlotte”,¹ 49 years, Portuguese and French teacher, with 26 years of teaching experience. Has a Masters in Supervision;
2. “Finn”, 47 years, Moral Education and Catholic Religion teacher, responsible for the Citizenship and Development component, with 22 years of teaching experience;
3. “Amelia”, 55 years, English teacher, with 32 years of teaching experience;
4. “Mia”, 59 years, Portuguese and French teacher, with 34 years of teaching experience.
5. “Violet”, 58 years, Geography teacher, with 34 years of teaching experience;
6. “Ivy”, 50 years, Physics and Chemistry teacher, with 23 years of teaching experience;
7. “Abigail”, 54 years, teacher of History and of Citizenship and Development, with 20 years of teaching experience.

This was a set of very experienced teachers, all having in common the teaching of the same group of pupils with whom the interdisciplinary project was developed. These consisted of an 8th grade class of 20 pupils, aged between 11 and 13 years-old (mean age = 13). Thirteen pupils were girls and 8 were boys. This class was studying both English and French as foreign languages. Regarding nationalities, the class included one Brazilian female pupil, one pupil with Tunisian origins, and another with Venezuelan origins. Two pupils had special education needs and six came from disadvantaged socioeconomic backgrounds. Most pupils’ parents had an academic qualification of Secondary Education or higher, and most of them had an employment contract. Neither teachers nor pupils had any coding skills.

To support teachers in the development of the project, two 3 h-workshops were conducted online by the five researchers in April 2021. The first workshop presented teachers with a theoretical background on LL and its educational potential, a first contact with the App and platform, and the negotiation of the project’s challenge. The second workshop provided an opportunity for teachers to explore the technology by themselves, with the support of the researchers. Additional support was offered

¹ All participant teachers were given fictitious names, to keep anonymity.

by email, namely by providing a planification template and giving feedback on the initial version of the lesson plans collaboratively produced by the teachers. Teachers kept their curricular autonomy, by selecting and adapting educational aims, activities or resources. Due to the COVID-19 pandemic, no classroom observations were made by the research team.

3.2 *Interdisciplinary Project*

The teachers defined the following main objectives for the interdisciplinary project on LL: (a) to raise awareness to linguistic and cultural diversity; (b) to develop critical thinking and autonomy; and (c) to promote reflection upon the local surroundings, building links with curricular content. According to the teachers, the main idea was to provide learning experiences that promote the school's openness to its local surroundings. These objectives are aligned with Portuguese education policy documents, namely with the *Students' Profile by the End of Compulsory Schooling* (Ministry of Education Portugal, 2017a), which defines as competences to be developed by the students at the end of grade 12 (18 years old) an acknowledgement of the local linguistic and cultural diversity, critical and creative thinking, communication and information processing skills, interpersonal relationship skills, and aesthetic and artistic sensitivity. These objectives also meet the three axes of the *National Strategy for Citizenship Education* (Ministry of Education Portugal, 2017b), namely individual civic attitude; interpersonal relationship, and social and intercultural relationship. Finally, it is worth mentioning that the project was integrated within the school's educational project, which aims to promote inclusion through the recognition and valorisation of people from other countries and cultures.

The project was organised around five sessions, which can be grouped in three categories: analysing the LL at home, analysing the LL in the school, and analysing the LL in the local community. The following school subjects were involved in the project: Portuguese, English, French, Citizenship and Development, Information and Communication Technologies (ICT), History, Geography, and Physics and Chemistry. Each of the sessions had previously defined aims, a topic and specific activities, as can be seen in Table 1.

The work with the App and its platform resulted in the creation of a game, titled "The sea starts here". The game starts with a brief text and video introduction that presents the points of interest, providing some context to the user. The game consists of ten points of interest and 60 questions: Ílhavo Museum (11 questions), Municipal Library (6 questions), Ílhavo Scientific Station Shipyard (3 questions), Ílhavo Culture House (1 question), Vista Alegre² (12 questions), Oudinot Garden (6 questions), Santo André Ship-Museum (6 questions), Aveiro's Port (6 questions), Costa Nova³ (5 questions), Barra Lighthouse (4 questions). Points of interest include questions

² Famous porcelain clay factory.

³ Famous tourist area.

Table 1 Overview of the interdisciplinary project (sessions, aims, main activities and subjects involved)

Title	Sessions	Main aims	Main activities	Subjects involved
The linguistic portrait of our school community	1–3	Raise pupils' awareness of the project's topic	Dialoguing with pupils; writing emails to the whole school community	Portuguese
		Identify pupils' and their parents' mother tongues	Processing gathered information; identifying the pupils' mother tongues; elaborating and carrying out a questionnaire	Citizenship & Development History Geography
		Promote critical thinking; raise pupils' awareness of linguistic and cultural diversity	Collecting photos taken in pupils' homes, in the school and in the streets, which illustrate the LL of these places	Portuguese English French
Linguistic portrait: at home	4	Develop knowledge about other social, cultural and political realities	Organising the gathered information for dissemination; creating an interactive world map with the pupils' countries of origin	Portuguese Citizenship & Development ICT
"Hands on" work with the App	5	Organise information; define questions for the App; develop attitudes of openness towards others and their culture(s); Develop and use knowledge about the local surroundings	Selecting points of interests; producing questions; defining the itinerary; testing the game	All

related to LL (e.g., "In how many languages is the word cod written in?"), but also questions from other disciplinary areas such as Biology (e.g., "What is the purpose of the cod sensory line?"), Physics (e.g., "What construction material is used in the market of Costa Nova to increase sound reverberation?"), Chemistry (e.g., "What kind of transformation occurs when ships acquire a reddish color?"), History/Arts (e.g., "Who was the sculptor who authored the tomb of the bishop who ordered the construction of the chapel of Nossa Senhora da Penha de França inside the church?"), Geography (e.g., "In which ocean is *Gadus morhua* found, the species of cod consumed in Portugal?"), local culture (e.g., "There is a typical Ílhavo figure

represented in the tomb. Which one?”), Tourism (e.g., “Which tourist activity takes place annually in August in the garden?”). The class chose to create questions with three response options and text feedback messages, without resorting to photographs, videos or audio.

3.3 *Data Collection and Analysis*

As semi-structured interviews are suitable for studying people’s perceptions and the ways they make meaning of their experiences (Kallio et al., 2016; Merriam & Tisdell, 2015; Rabionet, 2011), data collection in this study relied on a semi-structured group interview (GI) that was conducted with the teachers at the end of the school year. The overall aims of the interview were the following:

1. To characterise teachers from a professional point of view and to understand their motivations and prior knowledge on LL
2. To become more familiar with the project and context in which it was developed
3. To identify the reactions of the pupils to the project and the competences they developed
4. To identify the main difficulties experienced by the teachers in the development of the project
5. To understand the effects of the project on teachers’ professional development and their future intentions

This study focused specifically on aim 3, as it sought to understand teachers’ perceptions regarding the competences the pupils developed during the project. Yet, it is worth highlighting that aims 1 and 2 were also relevant, as they allowed the researchers to describe the educational context of the study.

In line with these aims, a preliminary semi-structured interview guide was developed by one of the authors of this study. There was a concern to formulate clearly worded open-ended questions that were single-faceted, participant-oriented and also not leading (Kallio et al., 2016). Ethical issues related to interviewing were taken into consideration, such as asking for informed consent, informing the use and scope of the results, ensuring confidentiality, and providing options to withdraw (Rabionet, 2011). Pilot testing comprised internal testing (Kallio et al., 2016), as the preliminary guide was critically analysed by the remaining authors of this study. The document was discussed and changes for improvement were negotiated. Changes included reformulating some items for greater clarity and adding more questions. Appendix 1 presents the resulting interview guide, concerning aims 1–3.

The GI was conducted through a video communications service. Consent was also asked for video and audio recording of the interview. Five researchers and five teachers participated in the GI, which lasted about 1 h and 15 min. The interview was transcribed and anonymised. Interviewed teachers were offered the opportunity to review the transcripts. The two participant teachers who could not participate in the GI were given the opportunity to read the transcripts and add their thoughts on

the topics discussed: one mentioned she had nothing to add and the other reinforced what her colleagues said. The anonymized transcripts are provided on request.

Inductive coding was used to categorise the data (Bardin, 2016). This meant that the interview transcripts were read and tentative codes were created, drawing on the data and bearing in mind the aims of the study. These codes were later refined to create categories and subcategories for more efficient analysis. The coding process for each category was manually conducted by one researcher and then checked for validity by the other researchers through a peer debriefing process.

4 Results and Discussion

Inductive content analysis of the GI resulted in the identification of four main categories related to the effects of the project on pupils' learning, as perceived by the teachers. These pertain to the development of pupils' knowledge, attitudes and skills, namely in what concerns: (1) language-related knowledge and skills; (2) soft skills; (3) attitudes and dispositions and (4) content/world knowledge. Table 2 provides an overview and a description of each category that emerged from the data.

As expected, and in line with prior research on LL (Cenoz & Gorter, 2008; Li & Marshall, 2018; Rowland, 2013; Tjandra, 2021), teachers made extensive references to the effects of the project in developing pupils' awareness of language and linguistic

Table 2 Categories of analysis that emerged from the data

Categories	Description
(1) Language-related knowledge and skills	References to incidental language learning instances, as well as to a heightened awareness to language(s), including, for instance, the development of decoding, transfer, analytical and (multi)literacy skills by the pupils
(2) Soft skills	References to the development of cross-curricular skills required for learners' holistic development and adaptation to change, such as critical thinking, autonomy, collaboration, organisational skills, digital skills, or social responsibility
(3) Attitudes and dispositions	References to the socio-affective dimension of learning, including pupils' interest, engagement and participation in the activities
(4) Content/world knowledge	References to the development or activation of (prior) knowledge by the pupils related to (curricular) subjects, disciplines or knowledge areas not necessarily linked to languages, such as history or geography

diversity, as well as in fostering incidental language learning. Recalling an event that took place in an end-of-the-year party, the French teacher mentions:

At the end of the year, in the last lesson, we had a small snack and each student brought a food or drink to share with others. (...) Then, one of the pupils said: “Do you know how to say *sumo de pêssego* (peach juice) in French? Look at the bottle here. There it is, in French it is *jus de pêche* and in English *peach juice*”. That was really funny!⁴ (Mia, GI, p. 7)

Mia explains that, as a result of the project, pupils became more attentive to the languages that surround them in their immediate environment and realised that landscapes are not only physical but also linguistic. This was also promoted by one of the activities conducted during the project—The linguistic portrait of our school community. This consisted in a survey to all the students attending the school in order to unveil their mother tongues. According to Charlotte, pupils were suddenly amazed when an infographic with all their nationalities and home languages was shared, revealing that the school was a more diverse place than they had initially anticipated.

Apart from promoting pupils’ awareness of linguistic diversity, the project also developed pupils’ awareness of language itself in what concerns word formation processes and word loans. As true language detectives, pupils explored shop signs to discover patterns and trends in word formation and also the reasons for selecting a specific name or designation for a store. They also realised that language boundaries are very slim and that languages are permeable to others. Mia stressed that the pupils found out and that some words they thought were Portuguese, are actually loans from other languages (such as *pizzaria* from the Italian word *pizzeria*, or *sandúiche* from the English word *sandwich*). This is corroborated by research conducted by Gorter and Cenoz (2008), who postulate that LL can provide important insights and a different perspective on our knowledge about language(s).

Research has also put forward the relevance of LL-related activities in developing sensitivity to connotational aspects of language and semiotic knowledge (Rowland, 2013). This was evident in an episode narrated by Finn, the Citizenship and Development teacher:

In the first session of the project, I noticed that all pupils were wearing a T-shirt with something written on it, mostly in English. So, we decided to take pictures of each individual T-shirt and then a group photo, and it was very nice. They realised that we also speak, we also affirm ourselves through what we wear. This was perhaps one of the situations I found most curious, because I realised that they were able to really pay attention to what they see and not just simply seeing without realizing what is going on. After all, we are what we wear (Finn, GI, p. 17).

Therefore, it is not surprising that teachers highlighted critical thinking as one of the main outputs of the pupils’ participation in the project, in what soft skills is concerned. While analysing the photographs they took of the LL of Ílhavo, pupils were compelled to move beyond mere language identification and counting to reflect critically about the presence and absence of some languages. As summarised by

⁴ Statements were translated from Portuguese into English for purposes of clarity.

Charlotte: “They developed an ability to look at reality and discover the meaning beyond what they see, ‘Why are things like this?’, ‘Why these languages?’, ‘What are they doing there?’, and, above all, a critical positioning towards things” (Charlotte, GI, p. 17).

In particular, pupils reflected about the predominant role of the English language in this touristic region. As Mia recalls: “Along the most emblematic places of Ílhavo, they noticed that, next to Portuguese, English is the second most prevalent language and that some things are written almost exclusively in English” (Mia, GI, p. 17). As a result of this discovery, pupils were adamant in questioning the (omni)presence of English, as they realised that the main migratory groups in Ílhavo and the tourists that normally visit Ílhavo are not English-speaking, but rather French or Spanish-speaking. Indeed, following the political and economic crisis in Venezuela in 2010, many Venezuelans came (or returned) to Ílhavo, most of them due to family ties, as their ancestors had moved from the Ílhavo and Aveiro regions to Venezuela in the 1950 and 1960s. Concerning the visitors of the region, these come mostly from Spain or France due to geographical proximity. So, the inclusion of English in the LL of Ílhavo was met with some surprise by the pupils.

According to the teachers, this led them to develop a more engaged and committed attitude towards their community, sustained by the need to promote and value linguistic diversity. Violet notices that pupils “suggested that the information boards appeared in other languages”, mentioning that they could “take this idea to the City Council” (Violet, GI, p. 18). This is in line with prior studies that suggest that LL may function as a “pedagogy of engagement” (Pennycook, 1999) and activism, making pupils more aware about their role and responsibilities in building (or writing) cities that are more inclusive and socially just (Clemente, 2017; Lourenço & Melo-Pfeifer, 2021; Lourenço et al., 2023).

Apart from critical thinking and engagement, the teachers also emphasized that the project, particularly the creation of a game for the LoCALL App, played a very important role in developing pupils’ autonomy and organisational skills. The teachers were eager to present anecdotal evidence, reporting specific episodes that support their claims. Violet, for instance, described the time when the pupils were elaborating the questions for the game, and she had to momentarily leave the classroom. When she returned, the pupils had prepared an additional set of questions, ranging from three to four. Mia, on her part, recalled a moment when the pupils decided to write a script in both French and English with questions they would like to pose to the fish sellers in Costa Nova to record their reaction to linguistic diversity, when the initial task was to write a script in French only. Charlotte also added that she had her email being constantly flooded with pictures the pupils had taken of the city’s LL, and that they were very independent in arranging transportation to visit the different points of interest selected for the game. These results are somehow novel in comparison to prior LL research. Indeed, to our knowledge, there are no studies reporting the development of pupils’ autonomy and organisational skills as a result of engaging with publicly displayed texts. Therefore, we assume that these findings are an outcome of the use of mobile devices in education. In fact, mobile learning literature (Alzieni, 2020; Alzubi, 2021) has shown that mobile devices may play a

vital role in impacting learner autonomy in foreign/second language contexts in a positive sense.

This might also be one of the reasons behind pupils' enthusiasm and active participation in the project. As reported by the teachers, once they discovered they were going to create a game that would be available in the LoCALL App for other people to explore, they became very excited. According to Amelia, "all pupils were very much interested and engaged in the project. Even pupils who are often shy, and do not get involved as much, ended up being influenced by the enthusiasm of others" (Amelia, GI, p. 16). Hence, teachers considered that the project was also important in developing positive attitudes and dispositions towards learning itself. This is in line with existing literature which shows that mobile learning affects self-motivation, networking and socialization, and encourages pupils to learn (Chee et al., 2017; Crompton et al., 2017; Gafni et al., 2017).

Finally, the interdisciplinary nature of the project and the fact that the activities the pupils undertook were rooted in the school curriculum also led them to develop knowledge of other content areas that are not within the (foreign) languages realm, such as physics' principles and concepts related to the use of light, sound and colour, or the types of economic activities that are included in the Geography 8th grade Portuguese curriculum. As Violet explains:

In the case of Geography, a specific topic in the curriculum is economic activities. And at that time, we were talking about the primary sector, so fishing has everything to do with this region and it was easy [to link the project with the curriculum]. Pupils, therefore, acquired theoretical knowledge and later, when they presented the pictures they took related to economic activities, they were able to fully integrate the prior knowledge they had. So, I used much of what they took to the classroom and moved forward to introduce other economic activities as well (Violet, GI, p. 13).

The activities they undertook also helped pupils to get to know (and appreciate) their community a little bit better, discovering famous (and less visible) people, historical sites, customs and traditions, and unknown locations. Charlotte recalls that when pupils visited the kaolin deposits that were at the origin of the porcelain clay factory of Vista Alegre "they were very astonished, they were born here and didn't know about it". (Charlotte, GI, p. 14). So, in short, the project developed by the teachers around LL and the LoCALL App played a crucial role in helping pupils to successfully create links between the school and the "real" world, which is one of the aims of the LoCALL project as a whole. As summarised by Mia,

I think these projects are an asset for pupils as they allow them to leave the classroom and bring other realities into the classroom. They also take what they learn in the classroom and apply it to real practice later on. They get really involved in the activities, they enjoy learning more, and learn much more easily (Mia, GI, p. 6).

5 Conclusion

The study reported in this chapter aimed to identify teachers' perceptions regarding the contribution of an interdisciplinary project on LL, which involved the exploration

of the LoCALL App and its associated web-platform, in the development of competences by a group of pupils aged 11–13. For that purpose, a semi-structured group interview was conducted with seven teachers from Ílhavo (Portugal), who developed a project with their 8th grade class around the LoCALL App. The interview was transcribed and treated using inductive content analysis.

The results indicate that, from the teachers' point of view, the project was successful in developing pupils' language-related knowledge and skills, namely in what concerns (incidental) language learning, language awareness (related, for instance, with the discovery of loan words and word formation processes), semiotic knowledge, and awareness of linguistic (and cultural) diversity. For the teachers, the project was also important in promoting pupils' soft skills, in particular, their critical thinking. Indeed, the opportunity to explore LL through the lenses (i.e., screen) of the LoCALL App helped pupils look beyond what they see to question the reasons behind the presence/absence of certain languages in the LL.

Apart from critical thinking, working with mobile devices was fundamental in creating a sense of novelty and excitement among the pupils, which triggered positive attitudes towards learning, more participation and autonomy. Teachers also mentioned that their pupils appeared to have become more engaged and committed citizens. For example, pupils considered the need to value linguistic and cultural diversity more, both inside and outside the school walls, in order to build more inclusive communities.

Finally, in line with the teachers' goals when developing this project, pupils also benefited from the opportunities provided by the LoCALL App to explore (and appreciate) their local surroundings, and to develop (curricular content) knowledge in "real life" contexts, thus successfully bridging indoor and outdoor learning.

Concerning expected results that were not confirmed, especially if we consider that this was a project involving the use of digital tools (the App and web-platform), it would be anticipated that teachers made references to the development of pupils' digital competences. Still, there was a lack of explicit references to this type of competences, which may be interpreted in two different ways. For instance, it is possible that digital competences were so obvious that they were not considered to be worth mentioning by the teachers. In alternative, the pupils may have developed these skills previously, as a result of participating in other online activities in two school years marked by remote learning due to the COVID-19 pandemic, which made digital competences a necessity. Hence, teachers might have chosen to give more room in the interview to express more surprising findings, particularly those related to pupils' autonomy and participation.

These findings seem to be relevant for teachers and researchers alike. Firstly, for teachers, this study reveals empirically based claims regarding the interdisciplinary competences, specific knowledge and social and soft skills pupils may develop when participating in an innovative project-based didactic approach to LL exploration, one that involves the use of an app and associated web-platform to co-create games. Secondly, it points at the work with and about the local LL as a means to link pupils' lifeworld outside school with the learning that is promoted in school. Thirdly, the

work with a mobile tool seems to foster engagement of non-participating pupils. Finally, the creation of a game seemed to be perceived by pupils and teachers as something fun, making collaborative learning processes more appealing and developing positive attitudes towards it. These may be only a few arguments for the adoption of this type of approach in educational settings, which, according to teachers, promotes a set of curricular and LL-related competences and skills. On another level, researchers have access to a study of pertinence for an international audience due to the novelty of studying the relationship between LL, mobile learning and game-based approaches, especially from an educational point of view. Nevertheless, there are some study limitations and future perspectives of work to consider, as the following paragraphs highlight.

The study's limitations can be found at different levels. One aspect to consider pertains to the aims of qualitative research in providing a deeper understanding of phenomena. In a study focusing on the identification of the competences developed by pupils while taking part in innovative learning experiences, such as the one reported in this chapter, the observation of the learning activities in the field would have been a valuable data source. This would have allowed data triangulation and would potentially provide stronger empirical evidence. However, limitations related to the pandemic made this data collection technique impracticable. Another study limitation is the lack of data regarding pupils' perceptions about the interdisciplinary project, once again as a result of the pandemic. As main actors and relevant stakeholders in the educational innovation that took place in their school, pupils could reveal new insights on the development of their competences.

Considering the above, further research is needed to more clearly elucidate the pedagogical benefits and constraints of learning from and about LL with mobile learning tools, such as the LoCALL App. This could focus on observations in situ (in the classroom and outdoors), while pupils create games and explore them, to investigate the effects of this teaching approach in their learning skills. Additionally, studies could be conducted addressing the challenges teachers' find when implementing mobile learning and games in the classroom, or investigating the effects of these types of interdisciplinary projects around LL and mobile devices in their professional development.

Appendix 1 Semi-structured Group Interview Guide

Purpose: To understand teachers' perceptions on the competences their pupils developed while participating in an interdisciplinary project on LL that included creating content for the LoCALL App.

Aims (analysed for this study):

1. To characterise teachers from a professional point of view and to understand their motivations and prior knowledge on LL

2. To become more familiar with the project and context in which it was developed
3. To identify the reactions of the pupils to the project and the competences they developed.

Interviewees: *[teachers names were removed for anonymity]*

Interviewers: Mónica Lourenço, Filomena Martins, Alexandra das Neves, Lúcia Pombo, Margarida M. Marques

Date: 21st July 2021.

Guide

Interview stages	Aims	Information/Questions
Introduction	To explain the aims and the conditions in which the group interview takes place	<ul style="list-style-type: none"> • Thanking teachers for their availability to participate in the interview and in the study, and reminding participants of the possibility to withdraw at any time • Explaining the interview’s purpose and aims, as well as how the results will be used • Explaining this is a group interview, where all participants can present their views or complete their colleagues’ intervention, if they feel it is needed • Asking for informed consent and permission to audio and video record the interview • Allowing teachers to ask any questions or express any concerns regarding the interview and the study
Development	1. To characterise teachers from a professional point of view and to understand their motivations and prior knowledge on LL	<ol style="list-style-type: none"> 1. Firstly, we would like each one of you to introduce himself or herself briefly, indicating name, age, working years, academic background and subject(s) you teach 2. Why did you decide to get involved in the LoCALL project? What led you to participate in the project? 3. Before this project, were you aware of the concept of Linguistic Landscapes? In which context(s) did this occur?

(continued)

(continued)

Interview stages	Aims	Information/Questions
	2. To become more familiar with the project and context in which it was developed	4. In which context(s) was the project developed? Could you characterise the school and the class or classes involved? 5. Why did you select this group of pupils? 6. Besides the classroom/class, was the project developed in other curricular spaces? 7. Which subjects were involved? How was this selection made? 8. How were they articulated from a disciplinary point of view? 9. What were the main aims you defined for your project? 10. What activities did you develop? Can you give us some examples?
	3. To identify the reactions of the pupils to the project and the competences they developed	11. How did the pupils react to project activities? Which activity(ies) did they like the most/least? Why? 12. What did the pupils gain from participating in the project? Which competences (knowledge, skills, attitudes) did they develop?
	(...)	(...)
Conclusion	To let teachers add information they deem pertinent	19. Would you like to add something else or make any comments or suggestions?
	To thank teachers for their collaboration and to finish the interview	<ul style="list-style-type: none"> • Thank you very much for your cooperation! • We will send you the interview transcripts for you to validate and add any information or comments that you consider relevant

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