

Virtual Study Visits: a valuable tool for the educational process

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Abstract — Education is the key to achieving a more sustainable society. In Portugal, the educational systems determine some rules to promote an educational process that leads students to attain specific skills, abilities, and attitudes according to the student profile at the end of compulsory education. Study or training visits are didactic tools that contribute to the link between theoretical content and practice, adding value to the teaching and learning process. In this sense, virtual study visits (VSVs) using digital technologies are a way to promote connections between knowledge and know-how since they have a low cost, require less bureaucratic processes, and allow teachers to make use of this resource within the timetable of the curricular units. VSVs can be used in all curricular units, adding value to the contents covered. This study rooted in the Design Science Research methodology, proposes the construction of an artefact that can contribute to the training processes within teaching. It is based on an innovation idea awarded in 2021 and consists of creating a web portal to promote virtual visits, which may be used as an environment for the promotion of virtual field trips customised according to the curricular units and the level of the classes. It is expected that the web portal can contribute to the sustainable development of the regions, as it will use local tour guides who will receive all the training to prepare multimedia material and deal with each level of education.

Keywords - digital technologies; virtual study visits; design science research; education; innovation.

I. INTRODUCTION

Education opens doors to change attitudes in society and is also essential in the sustainability-seeking process. The concern with the promotion of a more egalitarian society passes mainly through the 2030 Agenda, through the 17 Sustainable Development Goals (SDGs), with Education being addressed in SDG 4, which prioritises measures that contribute to more inclusive education and integrated with the environment, to promote active citizenship that leads to sustainable development [1].

The initial formation of citizenship principles in society occurs mainly during primary and secondary education through the curricular units that make up the basis of the national curriculum established by the Directorate General for Education (DGE) in Portugal [2]. According to the *Perfil dos Alunos à Saída da Escolaridade Obrigatória* (PASEO) (Profile of Students Leaving Compulsory Education), the student should work to acquire knowledge, skills and attitudes that contribute to personal growth and the development of society [2]. Thus, it

should integrate theoretical and educational practices that lead students to develop transversal skills in various areas of knowledge [1].

In this context, the teaching methodologies used in the curricular contexts should cover a panoply of instruments capable of promoting the student's critical sense about the theoretical contents addressed throughout the school career [3],[4], deepening the curricular contents as recommended in the DGE's guiding document *Curriculo do ensino básico e do ensino secundário - para a construção de aprendizagens essenciais baseadas no Perfil dos Alunos* (Primary and secondary school curricula - towards constructing key learning outcomes based on the Students' Profile) [2].

Among the teaching-learning possibilities, the study visits (SVs) are a notable pedagogical resource that assists in understanding the theoretical components and the interrelationships between the environment, contributing to the connection of knowledge and know-how.

Some research works define SVs as educational projects that require careful planning at the bureaucratic, logistical and economic levels since they involve leaving the school environment [3],[4]. In this sense, the study visits *in situ*, traditional or conventional study visits (CSVs) require a substantial amount of time for their preparation and realisation. Indeed, authorisations and dispensation from classes, transportation and a ratio of professionals determined according to the number of students often make the outings unfeasible [4],[5]. In this context, the teacher can use digital technologies, providing students with contact with the environment through virtual environments, a facilitated and low-cost process with a high added value for the teaching-learning processes.

Virtual study visits (VSVs) are a pedagogical resource to complement the programmatic contents of the national curriculum acquired by students. It can be used unlimitedly in the different lesson planning phases, like in the introduction of content (i.e., the specificity of a lesson topic) or the conclusion of a curricular component or topic [3],[4],[6]. VSVs supported by digital technologies involve various multimedia contents such as photographs, videos, audio, videoconferences, virtual reality, and augmented reality applications. It should be noted that the proposal to use VSVs is not intended to abolish the CSVs, but to allow teachers to use this activity more within their class timetable in the curricular units taught.

The objective of this study is to present a proposal for the creation of an educational artefact for the realisation of VSVs, within the concept of an innovation idea awarded in the year 2021, within the scope of the contest "Promote the Future of the Interior", promoted by La Caixa Foundation, BPI Bank and Foundation for Science and Technology (FCT).

The study's methodology consisted of the use of Design Science Research (DSR), preceded by a narrative bibliographic review as it is necessary to carry out more extensive research within the scope of DSR.

The structure of this study includes a brief introduction and characterisation of VSVs, the methodology based on DSR, the presentation of an innovative project and the final considerations.

1.1 Virtual Study Visits

As previously addressed, SVs are part of the learning strategies that can be explored within the context of the curricular units in all areas of knowledge, contributing value in consolidating the theoretical knowledge and working on the student's behavioural and social issues throughout the class activities, allowing them to contact with reality between theory and practice [3],[4],[6].

According to paragraph "a" of article 4, of Order no. 6147/2019, of July 4, SVs can be defined as:

"Curricular activity intentionally and pedagogically planned by teachers aimed at the acquisition, development or consolidation of learning, carried out outside the school space, with a view of achieving the areas of skills, attitudes and values set out in the Profile of Students Leaving Compulsory Education and, where applicable, in the professional profile associated with the respective qualification of the National Qualifications Catalogue" [5, p. 18990].

Since the introduction of information and communication technologies in education, their use for SVs has become an added value for teaching, allowing students to have contact with museum collections, natural parks, and science centres, among others, which would sometimes be unfeasible through CSVs, contributing to an education-action model, where students become active agents in the construction of knowledge [3],[6].

Many VSVs models can be explored through digital technologies such as: common to find digital resources in the form of QTVR (Quick Time Virtual Reality), virtual visits or similar promoted by knowledge institutions [or non-formal education entities (e.g., museums and natural parks)], using Google Earth to facilitate immersion in space almost in real-time (allowing to see details of a location), websites that provide videos and other content about specific places, among other media formats [3],[6]. This approach has become a democratic model for spreading culture and natural and architectural heritage at all levels.

More recently, with the advent of the SARS-CoV-2 pandemic, VSVs gained expression with the vulgarisation of the use of resources via videoconferences, for example, the service offered by NewsMuseum, namely

NewsMuseum@Zoom, "an e-learning programme that allows guided and interactive visits for schools through videoconferencing" [7]. In the same segment, since 2021, the Pavilion of Knowledge of the Ciência Viva Centre has provided virtual guided tours with pre-defined themes where the teacher mainly explores natural sciences content.

Gonçalves mentioned that VSVs allow students to go outside in [4]. In other words, from inside a classroom, you can visit places anywhere around the world, contributing to more updated training with the new demands imposed by the labour market. Also, according to Eira and Costa [3], the SVs are part of the formal teaching environment, being planned by the teachers to provide the student with a multidisciplinary curriculum.

It seems undeniable to us the added value of using VSVs within education, contributing to the training of students who are more motivated, participatory and able to better deal with theoretical knowledge to transform it into inspiration for research processes within the curricular units [6].

II. METHODOLOGY

The work methodology utilised DSR to propose the construction of an innovation idea developed in 2020, which aimed at offering a solution to the constraints caused by the SARS-CoV-2 pandemic. Using the DSR methodology allowed the authors to understand a problem of social nature and thus propose a technological solution for problem-solving using ICTs.

The DSR falls within the scope of Information Science and is a work methodology aimed at creating artefacts that lead to the development of technological solutions to real problems from the perspective of the problem and the end user [8]. According to Barbosa and Bax [9], DSR provides a practical solution to a real problem but with the rigour of scientific research that considers several parameters when developing a solution. Also, for Padua [8], the DSR leads to innovation and co-creation processes, contributing to the construction of more innovative solutions.

A narrative search was conducted in the bibliometric databases SCOPUS and Web of Science (WOS), in the Open Access Scientific Repositories of Portugal (RCAAP), in Google Scholar, and the World Wide Web, namely in governmental portals and websites related to the topic. The narrative bibliographical research, by not following specific and systematic criteria, presents a more open view process for collecting information, being important within the DSR for stimulate creativity and critical thinking within the generation ideas process for the development of a technological artefact.

III. DESIGN OF INNOVATIVE IDEA

Innovation-oriented contests are a strategy to capture ideas that can be transformed into business models (start-ups) or R&D projects, giving rise to products and services that contribute to the use of current digital technologies and lead to social equity.

Since 2018, La Caixa Foundation, along with BPI Bank and the Foundation for Science and Technology (FCT), has been

opening calls for the contest "Promote the Future of the Interior" to promote the development of innovative ideas for the interior regions of Portugal.

The idea awarded in 2021, *Trás-os-Montes Interativo: Percursos Virtuais*, focused on the general presentation of an idea: the development of a web portal for the realisation of virtual visit experiences, as a way to publicise the most attractive places of the Trás-os-Montes region (Figure 1). Besides ensuring the main rules of usability and accessibility, in a first phase of the project, it was intended to stimulate the offer of virtual guided tours in Portuguese sign language, thus contemplating the deaf public, given the principles of social inclusion. After the consolidation of the portal in the market, it will be also intended to provide new inclusion services for other types of special needs. To guarantee the service for inclusion of the deaf, will be necessary to use specific professionals that can translate the content for this public.

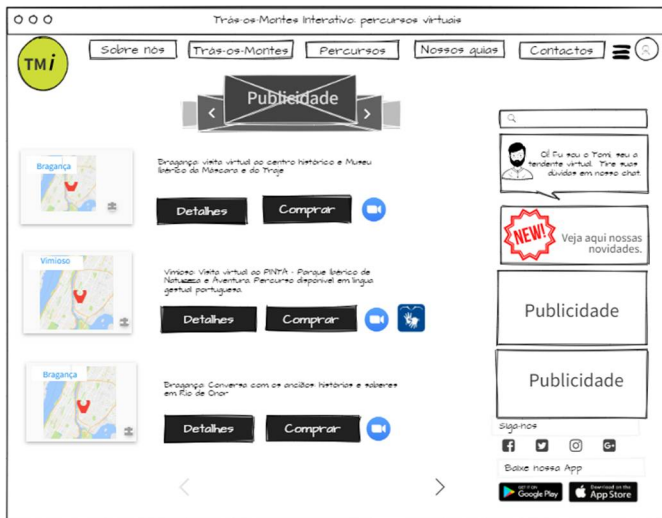


Figure 1. Illustrative mock-up of the platform to offer virtual routes. Source: Authors, 2022.

Considering the context of education, the portal proposed here allows that, in addition to the provision of virtual tourist routes, customised VSVs are also offered according to the needs of the lesson plan proposed by the teacher. The VSVs would be carried out through the online videoconferencing platform, where a local guide would present the features defined in the lesson plan (Figure 2). We also cannot underestimate the growth of artificial intelligence services such as GPT Chat. The use of a chat bot will be another facility that will be supported by the web portal, as a way to improve the communication between teachers with the guides, to allow a better experience.

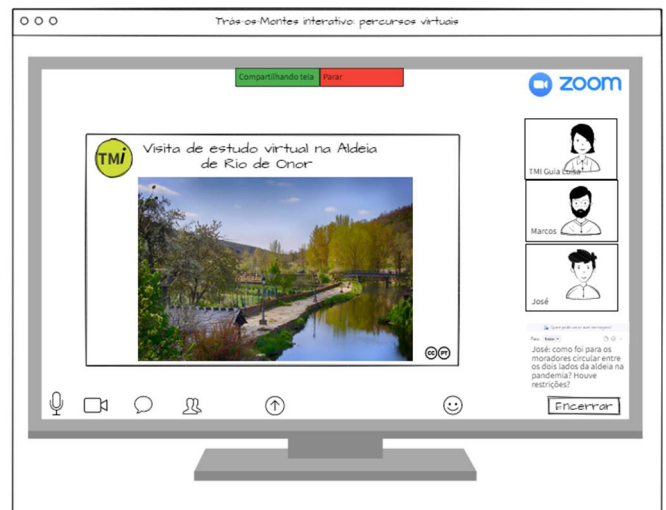


Figure 2. Illustrative mock-up of VSVs via videoconference. Source: Authors, 2022.

In this way, the platform could initially, within the local territory, promote VSV focused on the territory's assets, creating job opportunities for local guides and later include other partnerships for VSVs at national and international levels. For the platform's operation, the guides would receive training not only in multimedia to produce customised content, but also in pedagogical content according to the curricular units and year of schooling of the classes to be served. For the development of customized content according to the study theme, the teacher or an instructional professional should be involved, mainly in the planning and test or evaluation phases, to help the conception and creation of the pedagogical content to be covered in VSVs, in order to allow the guides to prepare the appropriate multimedia content for the class themes.

III. FINAL CONSIDERATIONS

The National Curriculum governs the Portuguese education system for primary and secondary education, which recommends essential learning for students to acquire knowledge, skills and attitudes that can create values that contribute to the sustainable development of society. The Student Profile foresees that the student can understand the interrelations between curricular contents and practical applications in a transversal way, leading them to obtain active citizenship and construct more equalitarian environments.

Digital literacy is also part of the basic education guidelines, and digital technologies should be part of the curricula since the world is increasingly moving in this direction. The use of online digital resources that help the student in the acquisition of skills should be encouraged and, in this sense, VSVs are an added value in meeting this goal, besides being aligned with the purposes of SDG 4 - an education able to generate new formats of business models that contribute to a better quality of life of society.

VSVs can awaken students' curiosity to explore new virtual environments, through video content, virtual reality, augmented reality, among others, in order to contribute to student creativity and critical thinking.

The study's DSR methodology corroborates those mentioned above and creates educational artefacts that lead to problem-solving through scientific studies, especially within social science areas.

The proposal of a portal for the provision of services of tourist routes and VSVs, significantly contributes to the sustainable development of the interior region of Trás-os-Montes, since it creates new part-time job opportunities for local guides in digital areas, in addition to contributing to the valuation of knowledge kept by inhabitants of these regions.

In this sense, the proposal of a portal to promote the territory gains even more relevance when it contributes to the teaching and learning processes, providing a stimulating experience for constructing knowledge and its fixation. Future work will include the completion of the development of the proposed portal and its validation as a valuable tool for the educational process.

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