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COLLABORATIVE FLIPPED-CLASSROOM APPROACH TO EFFECTIVE LIFELONG LEARNING OF CULTURAL HERITAGE

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Abstract

Lifelong learning has recently emerged as an innovative learning strategy that aims to satisfy the individuals' desire for continuous and unrestricted learning. However, technological progress, especially mobile networks and their applications, has enhanced schooling conditions and made them more accessible. In that respect, this paper aspires to increase the participation level of learners by involving them in the production process of teaching content. In this context, a novel educational system called XPShar has been proposed as a client-server application enabling users to share content of cultural heritage. The system is based on integrating the principle of openness with the flipped classroom approach. Finally, the study focused on the benefits of embracing ICT for an effective learning process via openness and the right to access information.

Keywords

Participatory Work, Flipped-Classroom, Openness, Cultural Heritage, Lifelong Learning

1. *Introduction*

Cultural heritage plays an indisputable role in human life. For this, every state has developed its schooling curriculums that tell the story of ancestors' civilization to develop the rising generation's patriotic spirit, and strengthen their loyalty to their homeland. Indeed, there is a growing worldwide interest in the tourism industry, particularly archaeological ones, to promote economic activity and diversify revenue streams on the one hand, and to draw awareness of the cultural assets on the other.

Nowadays, many studies have extensively focused on the tourism industry, and several approaches and methods have been developed to improve its efficiency. Agosti, Orio, and Ponchia (2018) proposed a novel access and interaction approach based on the adaptation of the search interface and the user's expertise to enhance its involvement with the digital cultural heritage. Other studies dissected the phenomenon of tourist involvement in the promotion process of archaeological sites by producing and disseminating multimedia content while visiting these places to attract potential future tourists (Corpas & Castillo, 2019; Melvin, Winklhofer, & McCabe, 2020). In the same context, a recent study by the President of the International Council of Museums (ICOM) on the impact of the global health crisis on museums concluded that the current pandemic is a catalyst for museums to accelerate their digitalization and adopt interactive techniques in their cultural heritage management (Garlandini, 2021). While we find that the following works (Telli et al., 2018; Bourahla, Telli, & Benferhat, 2019) proposed an ontology to define the traditional Vietnamese dances taking into account the semantics of its art and its cultural anthropologists. this ontology helps to transmit a part of the folk cultural heritage between generations.

Despite the great interest of researchers in modernizing tourism services by developing new approaches and models to meet the challenges of the digital age, most works conducted in this context have focused on promoting the quality of service within for-profit, institutional tourism. However, this situation limits people's ability to explore their surroundings and learn about their historical context. Therefore, we must seek a new tool that allows people to openly share their own experiences and knowledge on tourist attractions and heritage sites to encourage open tourism for

individuals and communities.

This paper aims to provide an ICT-based solution to overcome the difficulties faced by people engaged in an open tourism process outside their traditional institutional contexts. This solution must meet the users' needs wherever and whenever they want to conduct an open tourism experience and lifelong learning of cultural heritage in the best conditions. The following characteristics have therefore been established for the solution to be developed:

- Being able to raise the engagement level of learners while adopting the openness principle in teaching and diversifying the sources of information.
- Avoid the boredom that can affect the learner during the consultation of certain contents, especially archaeological, by adopting an innovative method that allows a real-time recording of the contents related to a given tourist site.
- Eliminating the exploitation cost of educational content and avoiding violation of intellectual property protection law by considering content voluntarily shared by learners as open educational resources (OER).

In the following, the approaches and technical solutions proposed in the literature of tourism information dissemination and cultural heritage, in particular, will be discussed. Then, the modus operandi of the proposed Collaborative Flipped Classroom (CFC) approach and its non-collaborative precursor will be explained, as well as the essential differences between them. Thereafter, a detailed conception of the proposed educational system will be presented, defining its components and the way they interact with each other, in addition to explaining its operation and the functionalities it can provide to its users. Section 6 shows how to implement a prototype of the proposed educational system as a client-server application called XPShar (Experiences Sharing App), together with the software architecture adopted in this context. Finally, the last section concludes this paper and discusses the possibilities of development for the proposed approach.

2. Literature review

Nowadays, ICT has facilitated human life in several aspects, thanks to innovative solutions to improve work efficiency and reduce efforts. Tourism and travel have taken their share of change and made way for a new context where they are more effective in achieving the goals expected of them. The concept of smart tourism was emerged amid these advances, which was defined by Gretzel et al. (2015) as describing the increasing reliance of the tourism sector on nascent ICT shapes that convert large datasets into useful offerings.

As storytelling about heritage sites is one of the most effective mechanisms to attract tourists, several studies have been conducted in this context and a range of approaches and methods have been developed. We think that the most mature model developed in this regard is based on the involvement of the audience in a collaborative process to improve the tourism branding system (Bassano et al., 2019). Almost the same storytelling approach has been applied to the city of Thessaloniki, where it has given very satisfactory results in the management of its cultural heritage (Psomadaki et al., 2019). Further, another research wanted to improve storytelling by combining interaction and personalization techniques to entice travelers to discover local products while waiting on the airports (Burova et al., 2019).

It is indisputable that the mobile internet has currently contributed to the development of the tourism industry worldwide. In this regard, researchers have embraced the concepts of collaboration and real-time communication to promote tourism, resulting in the development of a new approach based on the use of mobile devices and modern web applications (Y.-J. Chang et al., 2019), others have also developed an innovative platform for strengthening relations between tourists and indigenous (Nisi et al., 2019). Further, the emergence of the Internet 5G has allowed the adoption of geo-localization techniques for smart tourism (Bujari et al., 2020) as well as virtual reality-based digitization (Hajirasouli et al., 2021). In addition, other researchers conducted a field study on the effect of location-based applications of digital cultural heritage on the tourist attraction, where encouraging results were obtained to involve this technology in the tourism process (McGookin et al., 2019). In contrast, another study highlighted the important role that different social media networks play in the exchange of personal experiences and the promotion of tourism

services (Yu et al., 2021).

Information Retrieval Systems (IRS) are among the first investments of ICT in tourism, intending to facilitate access to relevant information for the various actors interested in tourism and travel. In this regard, researchers have incorporated the collaboration feature to tourism IRS by developing a theoretical model that brings together tourist collaboration and information retrieval (Arif, Du, & Lee, 2012). Besides, others went further when they sought to develop a robust and efficient ontology-based IRS to manage a massive quantity of data on Indian tourism (Laddha, Koli, &Jawandhiya, 2018).

The development of Artificial Intelligence (AI) applications, big data, especially, has led to the emergence of intelligent systems that help in decision-making, known as recommendation systems. The advantages of this type of system have been exploited in various sectors, including tourism, where many solutions have been proposed in this context, for example, those based on: check-in data (Kesorn, Juraphanthong, & Salaiwarakul, 2017), a social network and GPS data (Logesh, Subramaniyaswamy, & Vijayakumar, 2018), location-based cellular clustering and collaborative filtering (Zhou et al., 2021).

Although researchers have recently focused on tourism by developing a multitude of ICT-based solutions, they have not sufficiently served the individual's right to freely share tourism information anywhere and anytime, especially historical ones. This situation has had a significant impact on the individuals' initiative spirit to engage in a personal touristic experience outside its institutional contexts.

To remedy this shortcoming, this article proposes a new solution for the collaborative sharing of cultural heritage information between the different actors interested in the tourism process.

The proposed solution is the result of the hybridization of Geographic Information Retrieval (GIR) systems with the technique of the Flipped-Classroom (FC) to ensure smoother dissemination of tourist information.

The next section will highlight the FC technique and identify the main reasons why the authors were motivated to adopt it in their proposed approach.

3. *Collaborative flipped-classroom to effective tourism education*

The FC approach is one of the blended learning strategies that aim to raise the level of student engagement and learning by involving them in the implementation of all the requirements of the educational process. This learning method differs from the previous one, which is traditional in the way educational content is transmitted to students, as well as in the nature of required in-class and out-of-class instructional activities.

It should be noted here that the traditional classroom relies primarily on a human teacher to communicate course content to students, while the FC relies on the use of computer-based solutions known as Learning Management Systems (LMS). In the FC, the teacher has only an advisory role in guiding the student-centered instruction in the classroom. The following table summarizes the key differences between traditional and FCs.

Tab. 1: Traditional vs. flipped classroom

	Traditional	Flipped
In-class activities	The teacher primarily presents the lesson to the students.	Active completion of all student-centered instructional practices.
	Listening and note taking by students	Students work with partners or in small groups
Out-of-class activities	Most students instructional practice occurs individually	The teacher records the lesson, often in video form.
	Most teamwork, if any, takes place without teacher guidance	Students receive the provided lesson individually

In recent years, this innovative strategy of blended learning has aroused the interest of researchers, as they have tried to introduce it in various fields, including tourism education. Davis (2016) dissected an FC by describing how a tourism instructor flipped an advanced marketing course, finding that an FC increases the teacher's ability to interact with students. Another researcher went further when he applied the FC approach to English language learners in the tourism field. He found that it had a positive effect

on the building of problem-solving skills and group effectiveness (Chang, 2020). These good results have significantly motivated us to adopt the FC technique in the proposed approach to lifelong learning in tourism.

But the usual form of FCs does not serve us in the process of lifelong tourism learning. We have therefore hybridized this pedagogical approach by introducing the principle of openness that allows for the free exchange of information and the democracy of access. This gave birth to a new approach that we called Collaborative Flipped-Classrooms (CFC). Figure 1 illustrates how two forms of FC approach work: normal and collaborative.

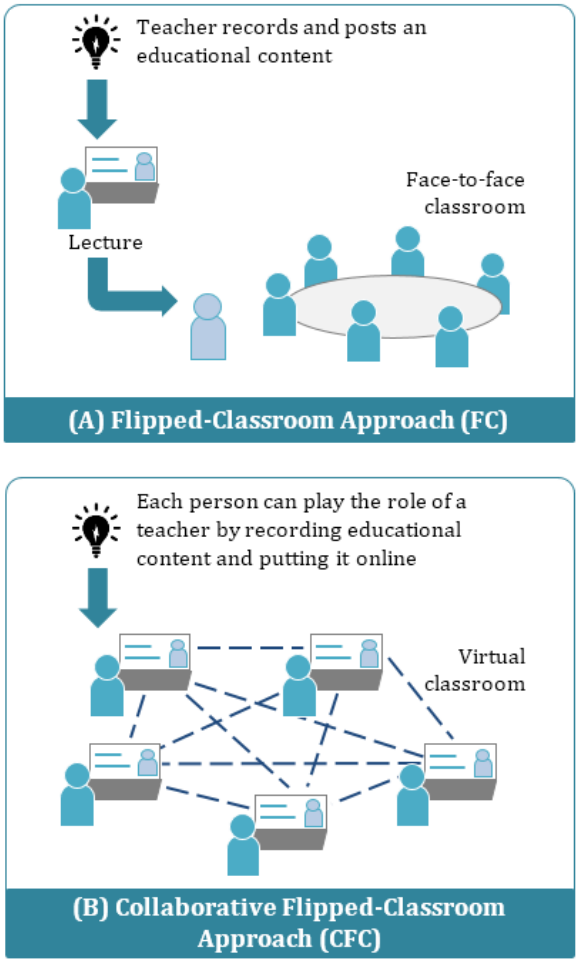

Fig. 1: Operating principles

In the FC approach, students must be present face-to-face at a given time and place, under the supervision of their teacher, to discuss the lesson content they have previously received individually. Conversely, students constitute an open virtual classroom in the collaborative approach to pursue their learning activities.

Effectively, the ability to increase the engagement level of students in the distance learning practices of CFC encouraged us to adopt it in the proposed approach for lifelong learning of cultural heritage. Moreover, the CFC approach can provide agreeable schooling conditions in several respects, including the following:

- In psychological respects, CFC activates the student's spirit of voluntarism by allowing them to record and share their educational content.
- In terms of student interest in courses, CFC breaks the impasse that some courses, especially historical ones, can find themselves in by diversifying sources of information and encouraging open participation by students.
- In terms of lifelong learning opportunities, CFC allows students to access available courses wherever and whenever they want.
- In terms of learning costs, CFC eliminates all charges related to the educational process, as its philosophy is based on the principle of openness and the right of individuals to have free access to learning materials.

The following section exhibits the architecture of the proposed solution for lifelong learning of cultural heritage and identifies the functions of its main components.

4. Modeling of the proposed approach

In the oldest civilizations, humans have employed modeling in many walks of life, where it helped them to accomplish their various artistic and urban activities by drawing thumbnail plans. Antiquarians agree that modeling emerged within the ancient Egyptians, Romanians, and Greeks (Gomaa, 2011). In software engineering, the modeling process aims at obtaining an acceptable solution when the best solution cannot be determined in a single iteration. It is necessary to carry out several consecutive steps to refine the level of detail of the system to be produced. Thus, the first steps give a very rough vision and allow us to advance in the understanding of the problem.

For supporting the lifelong learning process of cultural heritage, the present research has tried to assist learners in their knowledge acquisition task by proposing a new IT solution. In fact, we

are talking about a hybrid solution that is based on the principles of openness, sharing, and free access to information without restrictions or conditions. Figure 2 illustrates the proposed architecture in detail.

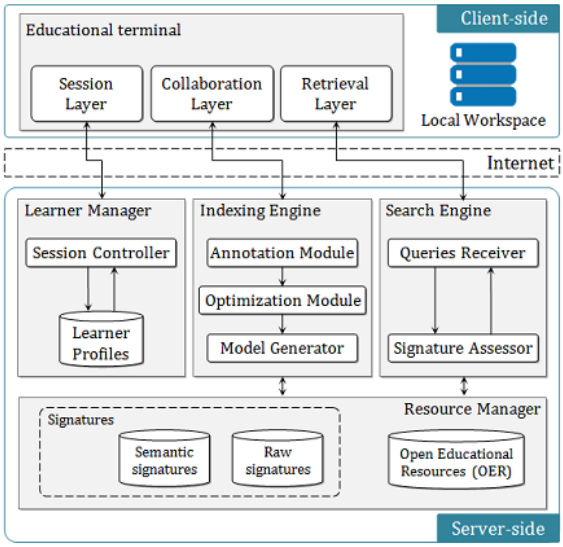

Fig. 2:A client/server architecture of the proposed approach

In the proposed architecture, the client part has been provided with a local workspace allowing users to manage their own shareable contents, as well as an educational terminal allowing to interact with the server part to better exploit the offered functionalities, this terminal being designed in three layers, namely:

- Session layer: coordinates with the server-side learner manager component to secure the exchange of users' confidential information and detect their geographical location.
- Collaboration layer: it allows users to openly post their contents, it interacts with the indexing engine to host these contents at the server level.
- Retrieval layer: it fulfills the role of a prospector by helping users efficiently and adaptively browse available content in conjunction with the server-side search engine.

On the other hand, the server-side is composed of four main modules, namely: learner manager, an indexing engine, a search engine, and resource manager.

4.1 Learner manager

This component aims to manage the learning sessions of the various users who subscribed to the system while allowing them to browse and share their content adaptively according to their profiles and current geographical location, it consists of two parts, namely: a session controller and learner profiles.

4.2 Indexing engine

The Voluntary deposits of user-generated content take place through this server-side component in coordination with the collaboration layer of the client-side educational terminal. The whole process consists of three consecutive steps, namely: annotation, optimization, and model generation.

1. Annotation step: allows learners to manually introduce metadata attached to the document, such as keywords, which will help us in the search phase. This metadata will be stored in the semantic signature database and will then be used in the model generation step.
2. Optimization step: it analyzes all filed documents by extracting the essentials, and they compress while keeping the essentials. This information will be stored in the signature database and will be used then in the model generation step.
3. Model generation step: creates models for the shared document that the system will use when learners take on the search assignment. The model generation process uses the metadata and information extracted during the optimization step.

4.3 Search engine

This engine operates in coordination with the retrieval layer of the client-side educational terminal to provide an efficient prospecting service on the shared contents to its users. It interacts with its users to provide results relevant to the search topic adaptively based on their profiles and current geographical locations. It consists of two parts, namely: queries receiver and signature assessor.

The queries' receiver acts as a helpmate for learners by offering logistical support when they will search for contained resources in the system.

It works interactively with the user to deliver relevant search results. Besides, the signature assessor calculates the signatures of the queries submitted by learners and compares them with the ones stored in the database of the system. This assessor aims to extract and return the search results.

4.4 A resource manager

It ensures a seamless deposit and retrieval of user-shared contents. These contents are considered as OERs accessible to all without exception. It also stores metadata in the form of signatures to help the system satisfy users' requests. There are two types of stored signatures: raw and semantic.

5. Functioning of the system

The working principle of the proposed ICT-based solution must be explained to highlight the benefits to the user in the context of lifelong learning of cultural heritage. It's, therefore, necessary to have a clear understanding of the mechanisms of the proposed solution and how the data will flow. To achieve this goal, the following organigram exhibits the various possible scenarios that the user can implement in an educational session using the proposed mobile application for the voluntary sharing of cultural heritage-related content.

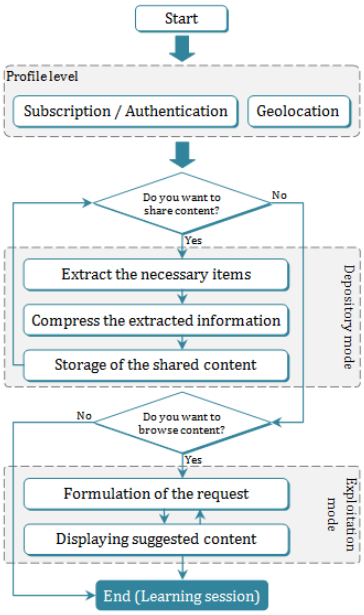

Fig. 3: Usage scenarios

Morphologically, the proposed solution is the result of integration of several principles and approaches, it's a hybrid approach that takes advantage of each component to promote lifelong learning processes. It gives the potential to learn where and when the user wants as a mobile application and avoids the costs associated with providing educational content as it is based on the principle of openness and free access to various data sources. The proposed tool offers its users to fulfill two main functions, namely to deposit or exploit the cultural heritage educational content.

5.1 Mode of depository

Posting data on the web is usually preceded by an indexing step to facilitate the subsequent search process. In fact, the contents indexing process consists of extracting its components, representing, and organizing them efficiently from a database. The contents that will be indexed are first presented with a digital signature that allows them to be determined according to certain criteria. This operation is performed at two levels, namely:

1. Analyzation level: extract the necessary items from the contents through capturing the characteristics of colors or textures, determining the faces or existing objects;
2. Optimization level: compress the extracted information while keeping the essentials. It's important to have compact signatures to avoid having too much data to store and process.

The signatures are organized in the best possible manner to optimize the search for content. The proposed educational tool has adopted a hierarchical structure to organize and facilitate access to relevant signatures. It's no longer limited to capturing visual content anymore, but researchers are currently working more closely to include semantic content in signatures automatically. The first steps in this direction are object and face detection, the progression continues further by automatically detecting higher-level concepts that will allow real content research similar to that performed on written documents. The database includes signatures representing its raw and semantic content and allows automatic mixed indexing.

5.2 Exploitation mode

Informational research relies on the set of processes needed to respond to a user's request. First, the user must build his request. This mission is clear to text and is more difficult for images and more for video. The user's request can include various data: an example (image, video, and sound), a drawing, or animation. In rare cases where semantic signatures are available, the user can then include keywords. In general, the difficulty is to correctly express the subject of the request by making the best use of the means offered by the system.

The user's request is then transformed into a signature following a process similar to indexing. This signature will be compared to those in the database to find the most relevant information. It's especially difficult to meet the needs of users with a single request. Also, it's useful to integrate a relevance loop including the user's opinion to improve the request based on the previously obtained result. Such a system also allows the user to clarify his request, which is often poorly formulated at the beginning of the search.

6. *Implementation*

It's the realization, execution, or putting into practice a plan, a method, or a concept for a specific purpose. The implementation is therefore the action that must follow a reflection to concretize it. In a computer engineering context, software or hardware implementation encompasses all the post-sale processes involved in making a component work in its environment. The implementation process can be described indeed as the stage of selecting programs and tools that fit the specificities of the desired software to be developed, then the translation of the conceptual model using the chosen tools in its operational shape.

Regarding the objective of this research, a prototype was developed in the form of a responsive client-server application based on the use of a mobile internet and smart devices to facilitate the process of knowledge and experience exchange between people interested in lifelong learning of cultural heritage. This prototype was named "XPShar" which means a tool for experience sharing. It was developed on Java language under the Android Studio development environment with adopting the Apache web server and SQLite for the creation and manipulation of databases.

Despite the variety of client-server architecture known in the web literature such as classical architecture, CGI architecture, and servlet-based architecture, they do not meet the specificities of the learning tool to develop. Therefore, novel client-server software architecture has been developed as shown in figure 4.

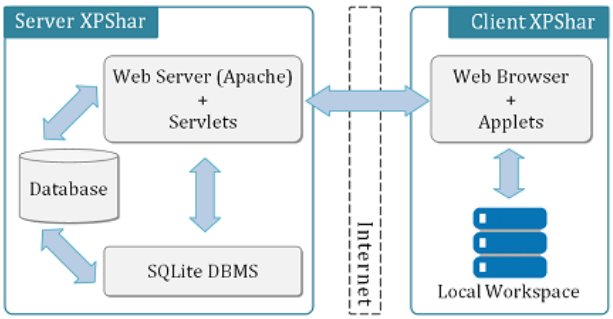

Fig. 4:XPShar software architecture

We can not classify software architecture of our system under a precise class of web client/server architecture because proposed architecture is a result of the hybridization of several types of architecture to satisfy the requirements of the system. Conceptually, "XPShar" software architecture is based on two main actors: the server (the object of the system that provides repository and search services for educational content) and the client for indexing and search services.

A prototype was provided to a group of people interested in open tourism. It was well-received by most of its users, with some comments about the ergonomic aspect of the system. The user feedback will be reflected in the revised version of the system, which will be released as soon as possible and will be available for free via the Google Play platform.

7. *Conclusion*

Among the merits of the technological advances we have been witnessing lately, especially concerning the development of artificial intelligence applications and the widespread use of a mobile internet in various parts of the world, is the fact that they have facilitated to peoples the practice of various daily tasks, especially intellectual ones. To keep up with these recent developments, this paper has

sought to strengthen open tourism by proposing an ICT-based solution while offering its users, the chance to share their knowledge about cultural heritage in a participatory way.

This paper has endeavored to take advantage of the openness principle and the freedom of access to information in learning by integrating it into the FC approach. In this context, a hybrid approach has been developed to support distance and lifelong learning, called the CFC approach. It characterizes by its ability to attain a high level of learner involvement anywhere and anytime, reduces learning costs, and avoids infringement of intellectual property of the learning material. Furthermore, a new educational system, called "XPShar", has been developed as a client-server application. It is based on the proposed CFC approach and mobile Internet to provide the best conditions for users who aspire to practice their lifelong learning process.

As future work, the authors are working on improving the quality of the search results provided by the proposed system through the integration of semantic web techniques and ontologies (Belazoui, Telli, & Arar, 2021). This project target to enrich and diversify the provided information sources by exploiting OERs available on the web. Afterward, the authors intend to conduct a large-scale field study to determine whether the proposed system has a beneficial effect on the lifelong learning process of cultural heritage.

REFERENCES

Agosti, M., Orio, N., & Ponchia, C. (2018). Promoting user engagement with digital cultural heritage collections. *International Journal on Digital Libraries, 19*(4), 353–366. https://doi.org/10.1007/s00799-018-0245-y

Arif, A. S. M., Du, J. T., & Lee, I. (2012). Towards a model of collaborative information retrieval in tourism. *Proceedings of the 4th Information Interaction in Context Symposium*, 258–261. https://doi.org/10.1145/2362724.2362769

Bassano, C., Barile, S., Piciocchi, P., Spohrer, J. C., Iandolo, F., & Fisk, R. (2019). Storytelling about places: Tourism marketing in the digital age. *Cities, 87*, 10–20. https://doi.org/10.1016/j.cities.2018.12.025

Belazoui, A., Telli, A., & Arar, C. (2021). Web-Based Learning Under Tacit Mining of Various Data Sources. *International Journal of Emerging Technologies in Learning (iJET), 16*(16), 153–168. https://doi.org/10.3991/ijet.v16i16.23405

Bourahla, M., Telli, A., Benferhat, S., & Chau, M. T. (2019). Classifying Non-Elementary Movements in Vietnamese Mõ Dances. In V. G. Duffy (Ed.), *Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management. Human Body and Motion* (pp. 128–139). Springer International Publishing. https://doi.org/10.1007/978-3-030-22216-1_10

Bujari, A., Bergamini, C., Corradi, A., Foschini, L., Palazzi, C. E., & Sabbioni, A. (2020). A Geo-distributed Architectural Approach Favouring Smart Tourism Development in the 5G Era. *Proceedings of the 6thEAI International Conference on Smart Objects and Technologies for Social Good*, 12–17. https://doi.org/10.1145/3411170.3411242

Burova, A., Kelling, C., Keskinen, T., Hakulinen, J., Kallioniemi, P., Väätäjä, H., & Turunen, M. (2019). Promoting local culture and enriching airport experiences through interactive storytelling. *Proceedings of the 18thInternational Conference on Mobile and Ubiquitous Multimedia*, 1–7. https://doi.org/10.1145/3365610.3365640

Chang, H. (2020). The Flipped Classroom Approach for Tourism English Learners. *ENGLISH TEACHING(영어교육), 75*(3), 93–107. https://doi.org/10.15858/engtea.75.3.202009.93

Chang, Y.-J., Yang, C.-Y., Kuo, Y.-H., Cheng, W.-H., Yang, C.-L., Lin, F.-Y., Yeh, I.-H., Hsieh, C.-K., Hsieh, C.-Y., & Wang, Y.-S. (2019). Tourgether: Exploring Tourists' Real-time Sharing of Experiences as a Means of Encouraging Point-of-Interest Exploration. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 3*(4), 128:1-128:25. https://doi.org/10.1145/3369832

Corpas, N., & Castillo, A. (2019). Tourism 3.0 and archaeology: Approaching tourists' generated-content of World Heritage sites. PASOS. *Revista de Turismo y Patrimonio Cultural, 17*(1), 39–52.

Davis, N. L. (2016). Anatomy of a flipped classroom. *Journal of Teaching in Travel & Tourism, 16*(3), 228–232. https://doi.org/10.1080/15313220.2015.1136802

Garlandini, A. (2021). Museums and Heritage in the digital age. The challenge of cultural change and technological innovation. *SCIRES-IT - SCIentificRESearch and Information Technology, 11*(1), 11–18. https://doi.org/10.2423/i22394303v11n1p11

Gomaa, H. (Ed.). (2011). Introduction. In *Software Modeling and Design: UML, Use Cases, Patterns, and Software Architectures* (pp. 3–13). Cambridge University Press. https://doi.org/10.1017/CBO9780511779183.003

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: Foundations and developments. *Electronic Markets, 25*(3), 179–188. https://doi.org/10.1007/s12525-015-0196-8

Hajirasouli, A., Banihashemi, S., Kumarasuriyar, A., Talebi, S., & Tabadkani, A. (2021). Virtual reality-based digitisation for endangered heritage sites: Theoretical framework and application. *Journal of Cultural Heritage, 49*, 140–151. https://doi.org/10.1016/j.culher.2021.02.005

Kesorn, K., Juraphanthong, W., & Salaiwarakul, A. (2017). Personalized Attraction Recommendation System for Tourists Through Check-In Data. *IEEE Access, 5*, 26703–26721. https://doi.org/10.1109/ACCESS.2017.2778293

Laddha, S. S., Koli, N. A., & Jawandhiya, P. M. (2018). Indian Tourism Information Retrieval System: An Onto-Semantic Approach. *Procedia Computer Science, 132*, 1363–1374. https://doi.org/10.1016/j.procs.2018.05.051

Logesh, R., Subramaniyaswamy, V., & Vijayakumar, V. (2018). A personalised travel recommender system utilising social network profile and accurate GPS data. *Electronic Government, an International Journal, 14*(1), 90–113. https://doi.org/10.1504/EG.2018.089538

McGookin, D., Tahiroğlu, K., Vaittinen, T., Kytö, M., Monastero, B., & Carlos Vasquez, J. (2019). Investigating tangential access for location-based digital cultural heritage applications. *International Journal of Human-Computer Studies, 122*, 196–210. https://doi.org/10.1016/j.ijhcs.2018.09.009

Melvin, J., Winklhofer, H., & McCabe, S. (2020). Creating joint experiences—Families engaging with a heritage site. *Tourism Management, 78*, 104038. https://doi.org/10.1016/j.tourman.2019.104038

Nisi, V., Dionísio, M., Silva, C., & Nunes, N. J. (2019). A Participatory Platform Supporting Awareness and Empathy Building Between Tourists and Locals: The Há-VitaCase Study. *Proceedings of the 13th Biannual Conference of the Italian SIGCHI Chapter: Designing the next Interaction*, 1–10. https://doi.org/10.1145/3351995.3352049

Psomadaki, O. I., Dimoulas, C. A., Kalliris, G. M., & Paschalidis, G. (2019). Digital storytelling and audience engagement in cultural heritage management: A collaborative model based on the Digital City of Thessaloniki. *Journal of Cultural Heritage, 36*, 12–22. https://doi.org/10.1016/j.culher.2018.07.016

Telli, A., Chau, M. T., Bourahla, M., Tabia, K., & Benferhat, S. (2018). An Ontology for Classifying Vietnamese Dance Movements. *Proceedings of the International Conference on Pattern Recognition and Artificial Intelligence*, 23–29. https://doi.org/10.1145/3243250.3243253

Yu, Q., Pickering, S., Geng, R., & Yen, D. A. (2021). Thanks for the memories: Exploring city tourism experiences via social media reviews. *Tourism Management Perspectives, 40*, 100851. https://doi.org/10.1016/j.tmp.2021.100851

Zhou, X., Tian, J., Peng, J., & Su, M. (2021). A Smart Tourism Recommendation Algorithm Based on Cellular Geospatial Clustering and Multivariate Weighted Collaborative Filtering. *ISPRS International Journal of Geo-Information, 10*(9), 628. https://doi.org/10.3390/ijgi10090628