# DigiCulture

## *O2.3 - Technical development of the Digital Skills for Culture Course resource*

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# Executive Summary

This document provides an overview of the technical development process behind the Digital Skills platform, which is based on the popular open-source Learning Management System Moodle.

# Objectives of this document

The main objective of this document is to provide readers with a list of technical challenges that the development teams have faced in adapting the aforementioned LMS to the required functionalities, as well as the solutions which were ultimately implemented.

# Who is this document for?

This document can prove useful to LMS administrators and/or learning platforms architects, who may seek solutions to similar technical problems as those described here, as well as any person curious to the inner workings of modern online platforms. A basic web-development experience can be useful in better understanding some of these concepts. Familiarity with Moodle further facilitates this goal.

# What topics are addressed in this document

The main topics of this document include a brief history and overview of the particularities of the final DigiCulture platform, the extensions which were either found in the official Moodle plugins repository, tested and deployed, or developed from scratch in order to provide the necessary functionality, as well as the main Moodle tools and facilities which were ultimately used in shaping the current form of the platform.

# 1 Aims and Scope

The aim of this report is to present an overview of the technical considerations regarding the development of the digital culture courses framework. As the most popular open-source learning management system, Moodle needs little introduction, therefore most of this report focuses on changing the default Moodle configuration with the help of custom or third-party extensions, as well as using less common features that the platform provides.

# 2 Background and rationale

There is a shortage of digital skills in Europe as reported in 2016 in the “European Digital Progress Report EDPR” [1] of the European Commission. The report states that 45% of Europeans have insufficient or no digital skills at all. Based on the Digital Economy and Society Index (DESI) [5] from 2017, there seem to be significant differences between the countries that are partners in this project. Denmark has one of the most advanced digital economies in the EU, while Lithuania and Austria are in the middle, however Romania and Italy have the lowest scores on the DESI scale. Studies performed by the authors in the cultural and creative industries [4], in the last 3 years in different countries showed a large majority of respondents scoring lower or basic level for the 21 digital competences [6]. The use of web, mobile, social and analytical tools permeates most of culture and creative industries, areas which until recently have been reluctant to embrace the use of

the new technologies. Eurostat 2017 [2] identifies young adults from the creative industries as the most at risk for unemployment from the 22-36 years old, while noting their lack of entrepreneurial and digital skills.

As part of the DigiCulture Project, we helped create a sustainable and efficient open education program, dedicated to adult learners with low digital skills and low-qualified adults involved in the creative industries sector. This report presents the instructional modelling for an open, online environment dedicated to a training program, based on the Massive Open Online Course model as well as the UniCampus virtual environment [7]. The modelling takes into consideration the existing UniCampus platform, which is further developed in order to integrate the requirements of low digital skills adults, Open Education, e-assessment and a mobile environment. The DigiCulture educational program is fully integrated in the UniCampus as an online component, a blended learning model and easy-to-access features in the mobile app.

# 3 Methodology, tools and research

The main research question of this report is: how to best adapt an existing Learning Management System (LMS), namely Moodle, to the specific requirements of non-technical learners, with the purpose of increasing the platform's effectiveness and level of adoption.

In order to answer this question, a qualitative approach was considered best suited. An exploratory analysis of the features considered essential for the adoption of the platform by low-skilled learners was based on the authors' multi-year experience in designing the necessary tools and the courses themselves, as well as in tutoring said courses.

The vast array of tools made available the open-source LMS Moodle was trimmed to the necessary minimum, and a large emphasis was placed on the functional usability of the platform from the point of view of the target audience. Starting with the building of a custom graphical interface, and continuing with testing and validating a suite of third-party extensions which provide –in part– the stated objective, we designed a simplified version of Moodle, aimed at non-technical learners, with limited digital skills as a whole, and e-Learning experience in particular.

# 4 Expected results / Intermediate results

The UniCampus platform started as an attempt to provide the first Romanian language MOOC-like Massive Open Online Courses courses. Development began in 2014, and by 2016 three courses were completed and piloted, with an additional two in advanced planning stages [7].

The platform was based on Moodle, the popular open-source learning management system, which was completed with third-party extensions aimed at complementing and facilitating the learning process, all the while providing course participants with social media connections in line with the constructivist philosophy that Moodle promotes [8]

Since its launch, UniCampus was constantly adapted to the needs of the users (course participants, course tutors, managers, etc.) and many extensions were functionally tested and uninstalled if found to be insufficiently useful. Moodle itself was affected by multiple updates, which were tested and validated inside the development environment, then applied to the production environment. Currently the UniCampus

platform uses the latest Moodle 3.9 stable version, as well as the latest versions of the handful of extensions that were deemed useful for the aims of the platform.

Some of the plugins were not adapted by their developers once the newer Moodle versions were released, which led to broken functionalities. If those features were considered crucial to the platform, they were sometimes replicated by the developer team behind UniCampus.

One such extension is the graphical interface itself, which for the latest Moodle version required a complete rewrite. The current UniCampus theme was therefore entirely developed in-house, with the obvious advantages of complete control over the user interface and experience, as well as the possibility of functional optimizations, which are crucial for any MOOC-like platform catering to multiple concurrent users

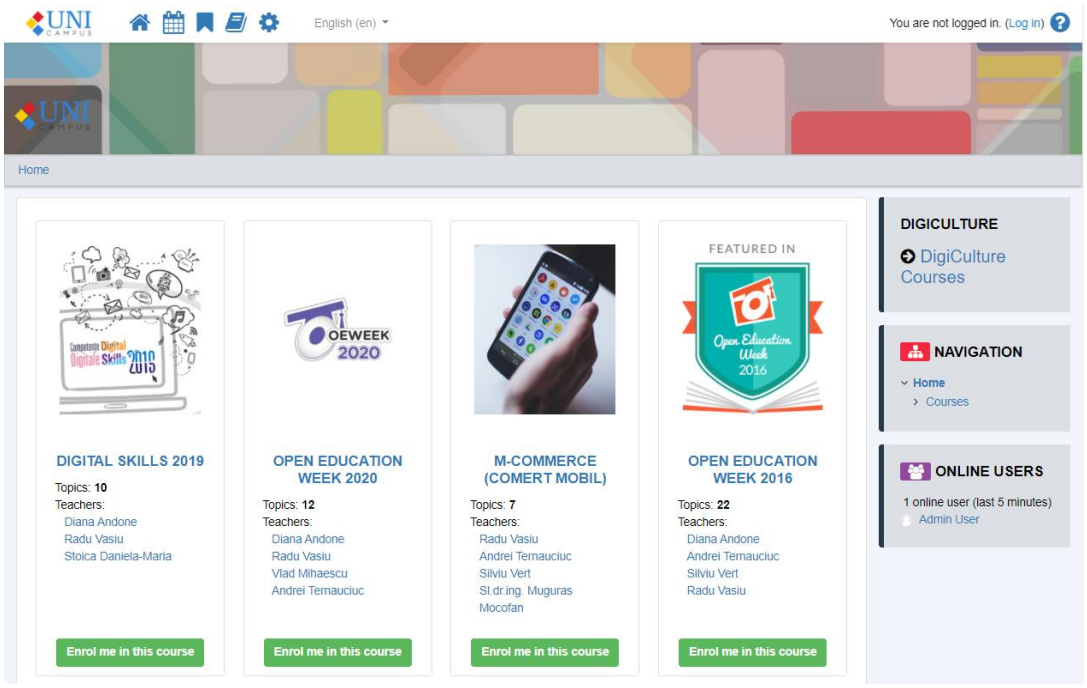



Figure 1. The UniCampus Frontpage

The starting point of the current interface was represented by the Classic theme, which was extended with the appropriate colors and graphical elements of the platform's visual identity.

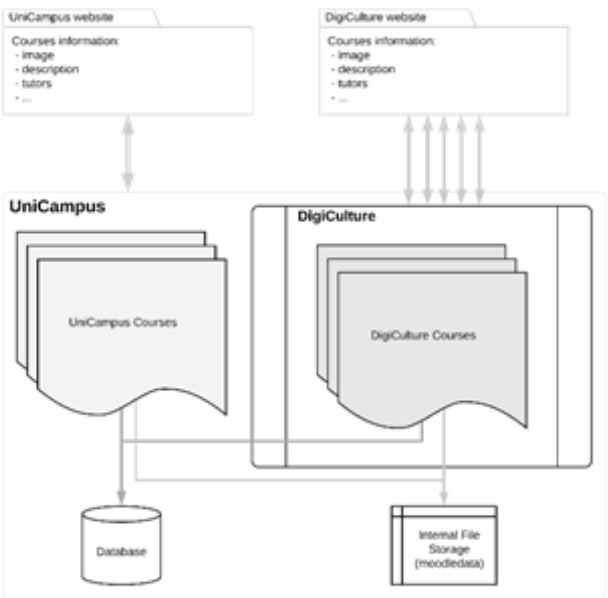
Aside from simplicity, another directive of the graphical design philosophy was based on redundancy: controls we considered essential were duplicated in a top menu, via graphical icons leading users to a handful of critical aspects, such as the events calendar, the file repository, or the control preferences interface. The regular way of accessing these settings is also present, allowing users familiar with Moodle to continue to use the platform efficiently.

The same information is provided on the presentation website for the UniCampus courses, which is actually a completely different application than the Moodle-based UniCampus platform. The purpose of this interface was to provide an external perspective on the main platform's content, which suffers from most of the content management systems' shortcomings: adherence to strict mechanisms due to the Moodle

framework, unnecessary complex handling of access controls, vulnerability to potential errors in the LMS's source code, etc. A simple presentation website, which reads the information directly from the database, provides unauthenticated visitors with all the necessary information needed before committing to the creation of an account with which to enroll in existing courses.

Figure 2. UniCampus presentation website

The existing UniCampus platform thus represents a mature solution, which was built from a standard Moodle standard installation and adapted to provide MOOC-like courses to users from a wide variety of cultural backgrounds.




This is the reason why for the development of the DigiCulture application aimed at hosting instructional courses, we decided to extend the existing UniCampus platform.

The most obvious difference is the graphical interface. The DigiCulture platform needed to follow the visual identity guides provided by the project, but still adhere to the restrictions of a Moodle theme.

A visually different interface was developed in line with the visual identity established for the DigiCulture Project. The DigiCulture Theme is automatically applied to content (courses) which belongs to the DigiCulture Courses category (and existing subcategories).

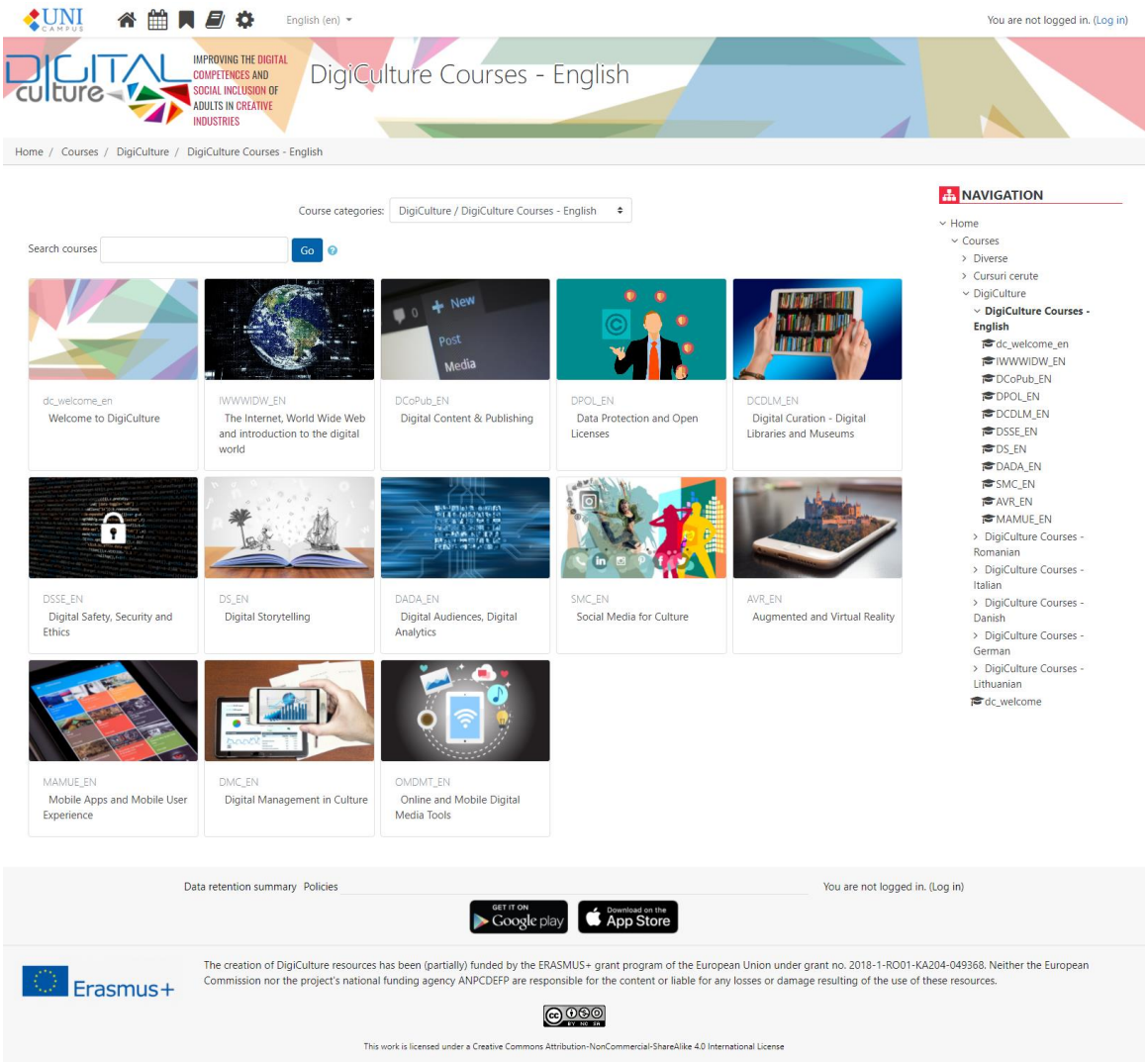



Figure 3. The list of courses available in the DigiCulture category of the UniCampus platform

Stemming from the experience of presenting course previews outside of the main platform, a custom API was developed, in conjunction with the introduction of a series of custom fields for adding specific information to each of the DigiCulture courses. This allows visitors of the main DigiCulture project Website (https://digiculture.eu/en/courses) to consult relevant information before accessing the DigiCulture section of the UniCampus platform in order to enrol in those courses.

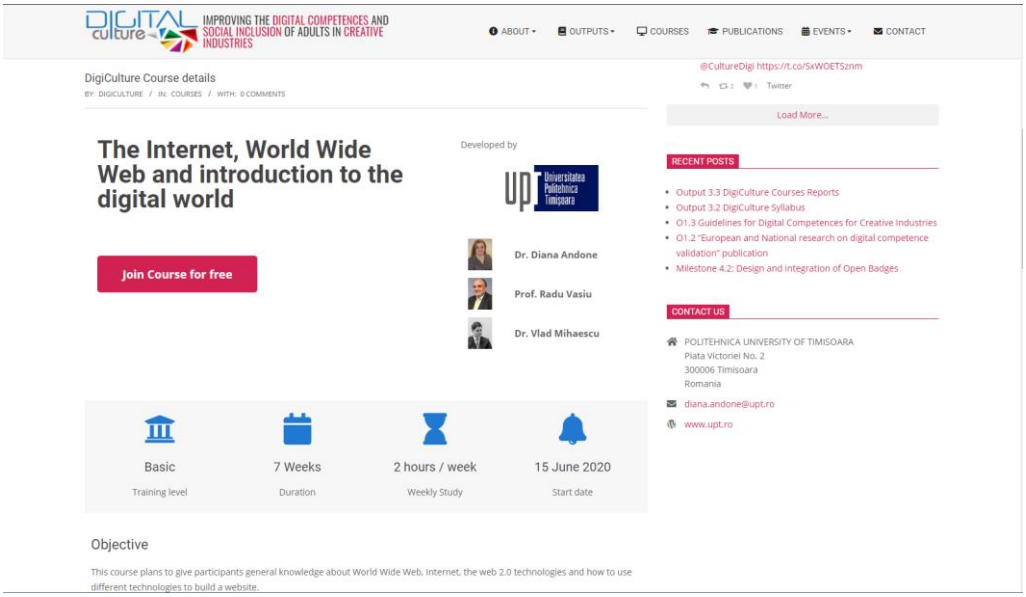



Figure 4. Course preview on the DigiCulture Project Website

Another necessary change was caused by the need for more interface languages. While UniCampus was aimed at Romanian users (and therefore provided only Romanian and English language packs), the DigiCulture project has partners from 6 different countries, which prompted the need for four additional language packs; these, luckily, were provided officially by Moodle via the administration interface.

Because of the need for interaction simplification, as well as a necessary boost to course participant motivation, the default course format was replaced for all DigiCulture courses with the Tiles Format, a third-party extension available in the Moodle official plugin repository [9]. Several other formats were tested, but ultimately rejected in favor of the Tiles Format which provides an intuitive interface, while separating the content into visually pleasing units.

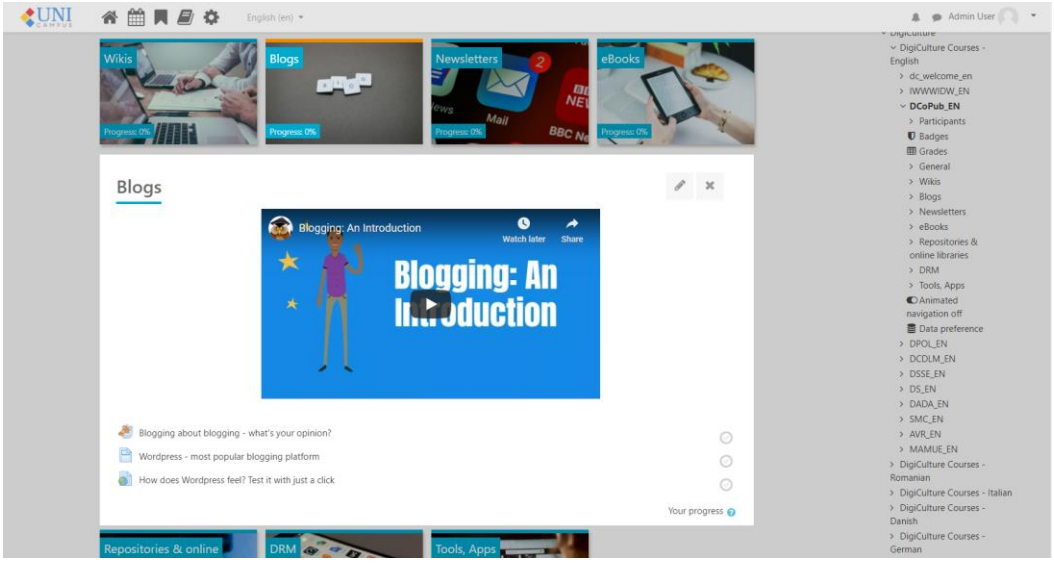



Figure 5. The Tiles course format in a DigiCulture Course

Digital Badges were created and integrated into the Moodle mechanism for awarding users as recognition for their work upon course completion. The default external digital backpack service Badgr [10] was also configured, in order to allow exporting the badges that each user has earned from the UniCampus/DigiCulture platform, as well as import back badges that were claimed elsewhere.

And last but not least, the existing User Policy (in Romanian) was adapted for international users in compliance with the GDPR adopted in the European Union during the summer of 2019.

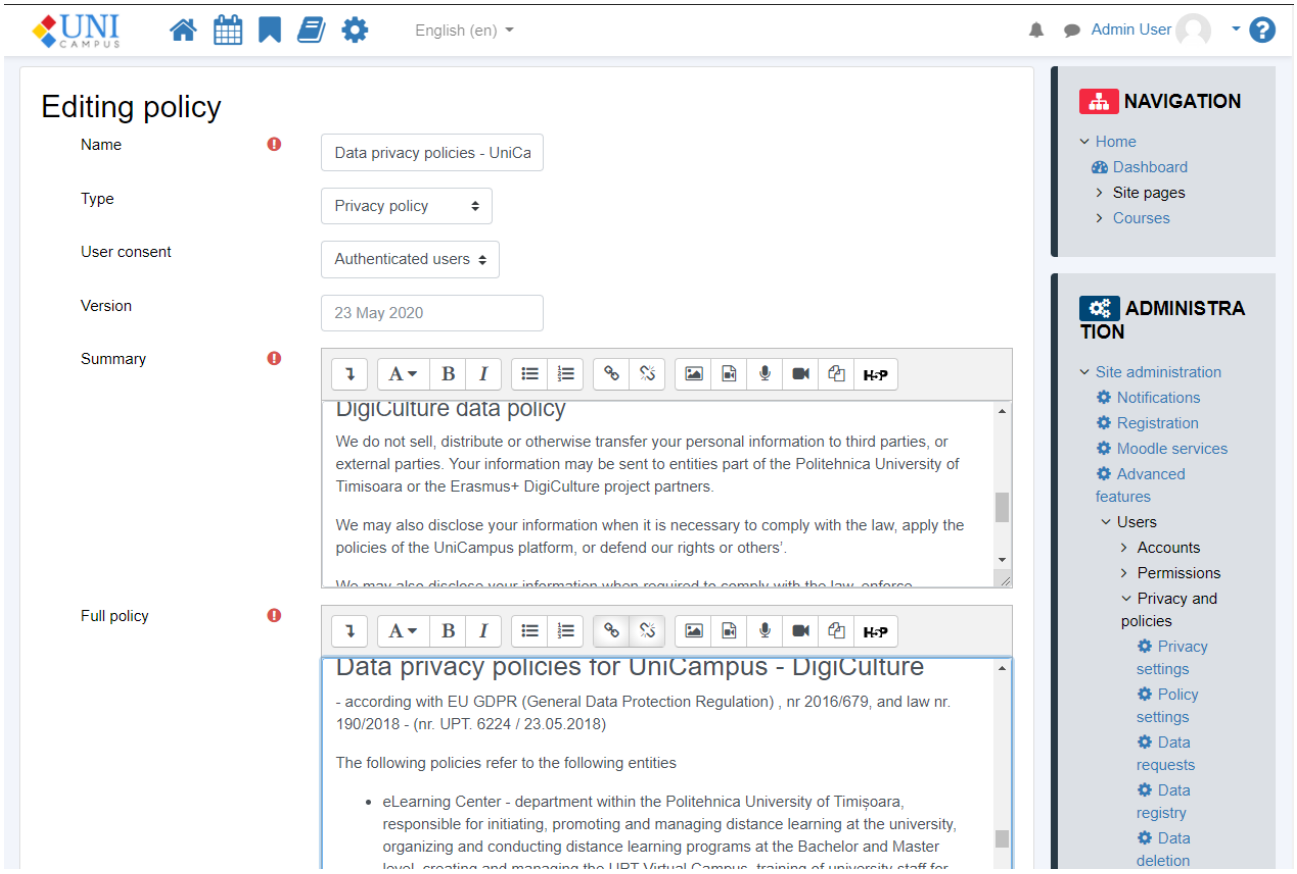



Figure 6. The GDPR-compliant policy for DigiCulture users

# 6 Conclusions

The DigiCulture Virtual Learning Hub was developed as an innovative multilingual ICT-based environment to promote collaborative learning using connectivist social networking as an instructional method, OERs as the main content, and open digital credentials as recognition and validation of digital skills which can be applied to all ages, genders, cultural backgrounds and levels of digital education in order to promote social inclusion at a digital level. Technical challenges were overcome with a combination of third-party plugins, custom extensions as well as the full extent of capabilities available in the Moodle-based learning management system on which the platform is constructed.

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