



FuseGI - "Cooperation for fusing skills on Cloud-based Open Geoinformatics: Innovative Environmental Management"

IO3

Virtual Learning Environment (VLE) platform

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INTELLECTUAL OUTPUT 3 FINAL REPORT CREATION

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TABLE OF CONTENTS

SUMMARY	1
ABBREVIATIONS.....	2
1 Introduction.....	3
1.1 Overall objectives, implemented activities and results of the FuseGI Project.....	3
1.2 Interrelations of project Intellectual Outputs	4
1.3 Scope and Objectives of Intellectual Output 3.....	5
1.4 Structure of the Intellectual Output 3 report.....	6
1.5 Intellectual Output 3 Sub tasks	6
2 VLE Preparation Analysis	7
2.1 VLE Requirements/Specifications.....	7
2.2 Reviewing Underlying System Solutions	8
2.2.1 Proprietary or Open-Source Solutions	9
2.2.2 On-Premise or Hosted Solutions	10
2.3 Underlying System Solution Selection Verdict	12
3 Installation, Deployment and Configuration of the System Server and the Platform	13
3.1 Installation and Configuration of the System Server	13
3.1.1 Basic Installation.....	13
3.1.2 Installation and Configuration of the Firewall.....	13
3.1.3 Installation of the Packages for Activating Security Certificates	13
3.1.4 Installation of prerequisite packages	13
3.1.5 Installation of Remote Server for Hosting Backups.....	14
3.1.6 Installation of the backup scripts	14
3.2 Deployment and Configuration of the Online Platform	14
3.2.1 Database Installation and Configuration.....	14
3.2.2 Installation of the Special Packages for the Platform Operation	14
3.2.3 Installation of the Platform Software	14
3.2.4 Configuration of the Platform to Meet the Project’s special requirements ...	15
4 Documentation of the FuseGI VLE Platform	15
4.1 Instructions for Trainees.....	15
4.1.1 Access and Registration.....	15
4.1.2 Organization of Modules and Courses	16
4.1.3 Dashboard	21
4.2 Instructions for Trainers	22
4.2.1 Course Creation	22

4.2.2	Course Editing.....	24
5	Innovation, Tangibility and Transferability.....	31

SUMMARY

AVIGNON UNIVERSITE, in cooperation with DEMOCRITUS UNIVERSITY OF THRACE, EE4S, INSTITUTE OF INFORMATION AND COMMUNICATION TECHNOLOGIES, MAISON REGIONALE DE L'EAU, INTERNATIONAL HELLENIC UNIVERSITY and OLYMPOS PC, has undertaken the implementation of the project entitled "**FuseGI – Cooperation for fusing skills on Cloud-based Open Geoinformatics: Innovative Environmental management**" under the Agreement n° 2019-1-FR01-KA203-062767 with Agence Erasmus + France. (Call 2019 Round 1 KA2 - Cooperation for innovation and the exchange of good practices KA203 - Strategic Partnerships for higher education)

This report presents the implementation and the tangible results of Intellectual Output 3 "Virtual Learning Environment (VLE) platform".

This IO aims to deliver an innovative evidence-based E-learning online platform in order to support remote training and teaching on open geoinformatics.

This IO builds upon the findings of IO1 "Research and field review" that contributes to defining the set of VLE requirements associated with the teaching and learning needs of the users, as well as the findings of IO4 "Training toolkit" that provides the learning/teaching/training material that is provided through the VLE.

The findings of IO3 were used as input data in terms of providing an online environment for hosting the outcomes of IO2 "Draft curricula", IO5 "Final curricula", but mainly for the training material produced in IO4 "Training toolkit".

It is highlighted that the "Output Type" of this intellectual output IO3 titled "Virtual Learning Environment (VLE) platform" is "Services / structures – E-learning platform" and is delivered as such and specifically as software deployed on a hardware infrastructure in the form of web service, available at the URL <https://fusegi.cs.ihu.gr/vle/>, where it is fully functional and openly available for any interested party. The current document constitutes the report which inseparably accompanies the deployed service providing useful information about the development of the intellectual output IO3.

ABBREVIATIONS

GI	Geoinformatics
GIS	Geographic Information Systems
IO	Intellectual Output
IT	Information Technology
LMS	Learning Management System
MCQ	Multiple Choice Question
O#	Output #
PDF	Portable Document Format
URL	Uniform Resource Locator
VLE	Virtual Learning Environment

1 Introduction

1.1 Overall objectives, implemented activities and results of the FuseGI Project

The FuseGI consortium had identified a gap between what the academic world provides towards its teachings and what the environmental labor market requires in terms of Geographic Information Systems (GIS) skills. Skills that are nevertheless essential for environmental and health risks management.

The goal of this consortium was to conduct an in-depth study (qualitative and quantitative) on the subject and then to design, develop and make available an adapted online tool to fill this GIS skills shortage to students and young professionals for the needs of the labor market. The FuseGI consortium is composed of experts in the fields of water management, forestry and health (from both the academic world and the private sector) as well as computer scientists capable of setting up and sustaining online training tools. It was therefore relevant from the perspective of the project. ERASMUS+ through the projects "Cooperation in innovation and exchange of best practices" was the ideal and most relevant framework to achieve a project in this direction.

The overall objectives of the FuseGI project were:

1. Establishment of a transnational, interdisciplinary and open collaboration between academia and industry within the EU to address the training needs in GIS for a better functionality and better environmental and health risks management.
2. Knowledge transfer and bridging of gaps in academic and professional experience of the partners in the use of GIS applications in different key environmental and health sectors.
3. Improved professional skills in the use of open GIS platforms for interdisciplinary collaborative data processing.
4. Development, implementation and validation of a virtual learning environment (VLE).
5. Design of the architecture of an adapted curriculum, corresponding to the needs of the market world, for master's degree courses.

The implemented activities of the FuseGI project can be resumed on:

- A quantitative research and needs analysis of GIS skills.
- The design and development of an original training course based on the results of the above analysis.

- The design and creation of a GIS training program focusing on the skills acquired. Case studies covering the fields of water management, forestry and health are also proposed to capitalize on the knowledge.
- The development of a state-of-the-art virtual learning environment (VLE), scalable, free, available and open to all, to host the GIS training program.
- Testing and validation of the architecture and materials developed through three pilot training activities that took place in three different countries at different phases of the project as well as the transdisciplinary cross-section of consortium members and our partners.
- The finalization of an adaptive international curriculum (from postgraduate to continuing education for engineers) targeting skills acquired in GIS.
- Dissemination activities through the organization of three multiplier events in three different countries and through the exploitation of social networks and other communication channels (such as mailing lists, etc.).

Five transferable, innovative, and tangible outputs:

IO1: Research and field review

IO2: Draft Curricula

IO3: Virtual Learning Environment (VLE) platform

IO4: Training toolkit

IO5: Final Curricula

1.2 Interrelations of project Intellectual Outputs

The concept and the methodological approach of the FuseGI project allowed strong interactions between all intellectual outputs. Each intellectual output represents an innovative, transferable, and tangible result also as a necessary step for the project finalisation.

The following scheme (Figure 1) represent the interrelations and connectivity of the FuseGI intellectual outputs.

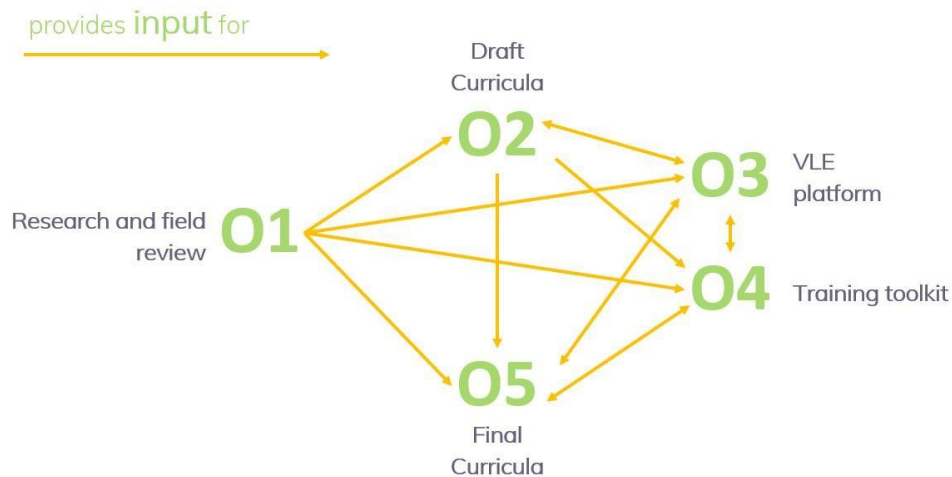


Figure 1 : Scheme of interrelations of FuseGI intellectual outputs

This intellectual output (i.e., IO3) has strong interactions with all intellectual outputs of the FuseGI project, since it provides the software and hardware platform, which serves as the central point that realizes the remote GI training to all participating students and young professionals on environmental sciences. In more detail, this intellectual output is informed by the findings of the Research and Field Review for the suitable identification of the related requirements, it hosts and organizes the training material produced by the Training toolkit, and offers a reliable educational service for realizing the outcomes of the second, fourth, and fifth intellectual outputs.

1.3 Scope and Objectives of Intellectual Output 3

The scope of this intellectual output is to produce a new educational platform that relies on an effective Learning Management System (LMS), in order to enable distance learning for openly accessible training on geoinformatics within the FuseGI project.

The main goal of IO3 is to provide to trainees, focusing on graduates and young professionals on environmental studies, a holistic and openly accessible learning environment that allows them to significantly enhance their skills on GIS, while enjoying an effective remote learning experience and hands on practice on exercises based on realistic cases that reflect the three key domains of FuseGI, namely, water, forest, and health management through geoinformatics. This main goal of IO3 reflects to a number of objects, with an indicative list provided below:

- Divide the training material in effective parts following educational principles
- Host the total teaching content generated within the project

- Support variety of multimedia types of training resources
- Provide a cloud location for keep educational content
- Allow interconnections with external training resources
- Enable an interactive learning platform, the increases student engagement
- Promote collaboration between groups for trainers and trainees

1.4 Structure of the Intellectual Output 3 report

The content of this report is organized as shown below.

1st section provides an introduction that refers to all the project outputs, the overall objectives and results, the interrelations between IOs, as well as the specific scope and objectives of this intellectual output (IO3).

2nd section delineates the VLE requirements and specifications analysis that led to the decision regarding the platform, as well as to design and configuration decisions.

3rd section provides technical details about the installation deployment and configuration of the VLE platform.

4th section presents the VLE platform, providing detailed and explanatory documentation with step-by-step guidelines for its usage.

5th section explains the innovative, tangible and transferable characteristics of the current intellectual output IO3.

1.5 Intellectual Output 3 Sub tasks

IO3 Sub task
Requirements identification
Hardware infrastructure setup and software deployment
Web platform design and configuration
Training material addition and organization
Registration of users, updates, and evaluation

2 VLE Preparation Analysis

This section delineates the VLE requirements and specification analysis that led to the decision regarding the platform, as well as to design and configuration decisions.

2.1 VLE Requirements/Specifications

The VLE platform is intended to support remote training and teaching material in the context of GI as addressed within the FuseGI project. Toward this direction, an extensive list of requirements and specifications have been identified by the consortium as important to be covered by the VLE platform. The respective list is provided below:

- The platform needs to enable the mapping of the curriculum (i.e., breaking curriculum into sections that can be assigned and assessed), serving in that way the respective educational purposes.
- All the FuseGI learning resources and training materials need to be able to be included in the platform, in order to allow for a unified place that host the whole educational content.
- The platform should be able to support multimodal learning materials presented in different media formats such as text, audio, and video, so that various types of multimedia training content can be supported to enhance student engagement.
- The platform needs to realize a resource hub, where mentors will have online storage space for ppts, docs, worksheets etc., in order to keep all related files in a single place.
- The platform needs to be either secure or shared with students, depending on the decided type of access.
- Links to outside sources should be enabled through the platform, so that pathways to all other online learning spaces are allowed.
- Administrative information about each course must be provided within the platform, in order to facilitate its management.
- Information feeds from various key FuseGI stakeholders should be enabled, so that the material can be continuously updated and informed.
- The platform should provide user feedback/comment facilities, in order to encourage users to give valuable information about their learning/teaching experience, which can be then exploited to make improvements.
- The platform needs to realize an interactive system, e.g., taking self-tests, uploading assignments, etc, to allow learner-learner-, and/or learner-teacher collaboration, e.g., via audio/video conference, blackboard, chat, forum, etc.

- Protected online discussions / blogs needs to be offered as features of the platform, in order to enhance interactivity, as well as peer-to-peer learning.
- The platform should give the option for online support for both teachers and students, who need help in using it.
- The ability to track progress and achievement of all participating students needs to be among the features of the platform.
- The platform has to use an appealing styling and to provide a pleasant user interface that facilitates long engagement of the users.
- Open access to participants to consult learning material and resources after the training is over should be provided by the platform.
- The platform should promote communication and collaborative learning, such as the use of forums, chat and email for discussion and feedback as well an exchange of information between users, HEs institutes and SMEs.
- Students using the platform should be able to be set a 'task' to complete at their own pace, time and location encouraging independent learning and increasing students' motivation to learn.
- All stakeholders should be able to request free access to the platform, so that the open nature of the VLE is ensured.

All above requirements are considered important for the successful adoption of the FuseGI platform, and based on the resulted output it is confirmed that the finalized outcome fulfills the above list of requirements at a fully satisfactory degree.

2.2 Reviewing Underlying System Solutions

E-learning solutions (including remote distance learning) is evidently on the rise. This trend has been currently highly boosted due to the pandemic. The related market is expected to reach \$275 Billion in 2022 (Global E-Learning Market Research Report and Forecast to 2017-2022). More and more options become available, so choosing the right one is challenging. The selection of the underlying system depends on the target audience as well as the accessibility that one wants to give to the VLE platform, but also on numerous criteria that are affected by the specific characteristics and conditions of the e-learning environment. In what follows, these criteria are detailed.

Virtual Learning Environment (VLE) and Learning Management System (LMS) are two terms that are typically used interchangeably (however, some argue that they are not identical). Two key criteria for selection are:

- whether a VLE is proprietary or open-source
- whether a VLE is deployed on-premise or hosted

2.2.1 Proprietary or Open-Source Solutions

Table 1 lists the characteristics of the proprietary and open-source solutions in terms of the license fee.

Table 1. Comparing proprietary and open source based on the license fee

License Fee	
Proprietary Solutions	Open Source Solutions
COST-BASED	NO COST
Such VLEs can require different types of licensing fee:	(does not include any license fee)
- Per license validity period	To launch such VLE you have to spend time and effort
- Per number of courses	It comes with a price:
- Per user	(People + Hardware)

Table 2 lists the characteristics of the proprietary and open-source solutions in terms of the time and effort required.

Table 2. Comparing proprietary and open-source solutions based on the time and effort required

Time and Effort Required	
Proprietary Solutions	Open-Source Solutions
Quite Easy	Can require advanced technical skills and great costs
(included in license fee)	

Table 3 lists the characteristics of the proprietary and open-source solutions in terms of support and maintenance issues.

Table 3. Comparing proprietary and open-source solutions based on support and maintenance issues

Support / Maintenance	
Proprietary Solutions	Open-Source Solutions
Technical support withing the service agreement	Requires additional costs for a dedicated team or third-party support provider

Table 4 lists the characteristics of the proprietary and open-source solutions in terms of the level of customization easiness.

Table 4. Comparing proprietary and open-source solutions based on the ease of customization

Ease of Customization	
Proprietary Solutions	Open-Source Solutions
VLE customization is performed by vendor's developers	All projects may be implemented as much as the VLE architecture allows

2.2.2 On-Premise or Hosted Solutions

Table 5 lists the characteristics of the proprietary and open-source solutions in terms of the location of deployment.

Table 5. Comparing proprietary and open-source solutions based on the deployment location

Web service deployment for VLE (domain, hosting, support, storage etc.)	
On-Premise Solutions	Hosted Solutions
REQUIRED	NOT REQUIRED can be installed on the vendor's domain

Table 6 lists the characteristics of the proprietary and open-source solutions in terms of the need for a dedicated internal IT team.

Table 6. Comparing proprietary and open-source solutions based on the requirement for maintenance team

Dedicated Internal IT Team	
On-Premise Solutions	Hosted Solutions
REQUIRED	NOT REQUIRED the vendor's IT team handles all IT activities

Table 7 lists the characteristics of the proprietary and open-source solutions in terms of the IT support costs.

Table 7. Comparing proprietary and open-source solutions based on the IT support costs

IT Support Costs	
On-Premise Solutions	Hosted Solutions
HIGH	LOW

Table 8 lists the characteristics of the proprietary and open-source solutions in terms of hardware and maintenance costs.

Table 8. Comparing proprietary and open-source solutions based on hardware and maintenance costs

Hardware and Maintenance Costs	
On-Premise Solutions	Hosted Solutions
HIGH especially in case of a stand-alone setup	LOW included in subscription fees

Table 9 lists the characteristics of the proprietary and open-source solutions in terms of customizability.

Table 9. Comparing proprietary and open-source solutions based on customizability

Customizability	
On-Premise Solutions	Hosted Solutions
On-premise platforms allow for complete customization including gamification modules, adaptivity engines, and other high-level customizations	Cloud-based VLEs come as a package deal

Finally, Table 10 lists the characteristics of the proprietary and open-source solutions in terms of security.

Table 10. Comparing proprietary and open-source solutions based on security

Security	
On-Premise Solutions	Hosted Solutions
System security is usually guaranteed by the supplier company	The hosting organization must take measures to protect all data in the hosted platform

2.3 Underlying System Solution Selection Verdict

Given that the project requires an open/free access platform, a highly customizable environment that can match the various requirements, hosting is possible at leading partner's premises (IHU), and support/maintenance can be provided by the experienced IHU IT team, open-access on-premise solutions constitute the main option. Three such VLEs were considered: Sakai, edX, and Moodle. Moodle has yielded as the best option.

Moodle characteristics:

- Flexible, Modular Open-Source LMS
 - Moodle stands for Modular Object-Oriented Dynamic Learning Environment. A freely available and modular platform, Moodle allows users to create a flexible, personalised, open-source LMS designed to reach specific eLearning goals in every sector of learning
- Superior Product & Functionality capabilities

- Outside of Moodle’s core functionality, a user can choose from thousands of free plugins created and supported by the open-source community
- Powerful, Safe, and Secure eLearning
 - With over 175 million learners, Moodle LMS is backed by a large community of developers, it regularly upgrades with new and improved features, and supports several options for authentication in Moodle that allow for a seamless user experience.

3 Installation, Deployment and Configuration of the System Server and the Platform

3.1 Installation and Configuration of the System Server

The platform that hosts the courses requires the installation of a server. Due to cost, performance, and security, the Linux distribution Ubuntu 20.04 LTS was selected as the operating system. The effective installation of the server needs a series of configuration steps, namely: Basic Installation, Firewall installation, Installation of packages for activating security certificates, installation of prerequisite packages on which the VLE depends on (such as, MySQL Database Server, PHP, Apache2, ...), and installation of remote server for hosting backups and writing backup scripts.

3.1.1 Basic Installation

Installation of Linux distribution Ubuntu 20.04 LT (ubuntu-20.04.2-live-server-amd64.iso).

3.1.2 Installation and Configuration of the Firewall

Using Ubuntu – apt-get, the ferm firewall 2.5 was installed and configured.

3.1.3 Installation of the Packages for Activating Security Certificates

Using Ubuntu – apt-get, certbot (<https://certbot.eff.org>) was installed for publishing free certificates from Lets Encrypt (<https://letsencrypt.org>).

3.1.4 Installation of prerequisite packages

This task is described in the next section (Deployment and configuration of the online platform).

3.1.5 Installation of Remote Server for Hosting Backups

In order to protect against unpredictable hardware failures of the server, an additional server is installed to host backup copies of the online platform. On that server, the NFS service was installed and configured (package `nfs-kernel-server`), so that it can accept backup files.

3.1.6 Installation of the backup scripts

In order to protect against unpredictable hardware failures of the server, a number of scripts have been developed, which automate the duplication of the online platform files, as well as the platform's database files to the remote server. The access to the remote server (NFS Service) is performed through the NFS Client (`nfs-common`).

3.2 Deployment and Configuration of the Online Platform

The platform hosting the courses requires a series of configuration steps to function effectively, such as: installation of the database, installation of the special packages for the platform operation, installation of the basic platform files, installation of the platform software, configuration of the platform to meet the project's special requirements.

3.2.1 Database Installation and Configuration

After Moodle version 4.0.1 (`moodle-4.0.1.tgz`), the Ubuntu – `apt-get` tool was used to install the MySQL Database Server (package `mysql-server`). Next, a user was created on the Moodle database schema.

3.2.2 Installation of the Special Packages for the Platform Operation

Using Ubuntu – `apt-get`, the following software packages were installed, since they are required for the operation of the platform:

Graphviz, aspell, ghostscript, clamav, php7.4-pspell, php7.4-curl, php7.4-gd, php7.4-intl, php7.4-mysql, php7.4-xml, php7.4-xmlrpc, php7.4-ldap, php7.4-zip php7.4-soap, php7.4-mbstring, git

3.2.3 Installation of the Platform Software

The file `moodle-4.0.1.tgz` was decompressed and all installation steps were followed successfully.

3.2.4 Configuration of the Platform to Meet the Project's special requirements

The extra features of the FuseGI project were added and several configurations were made on the platform, so that the VLE is ready to host the developed educational material and support remote training.

4 Documentation of the FuseGI VLE Platform

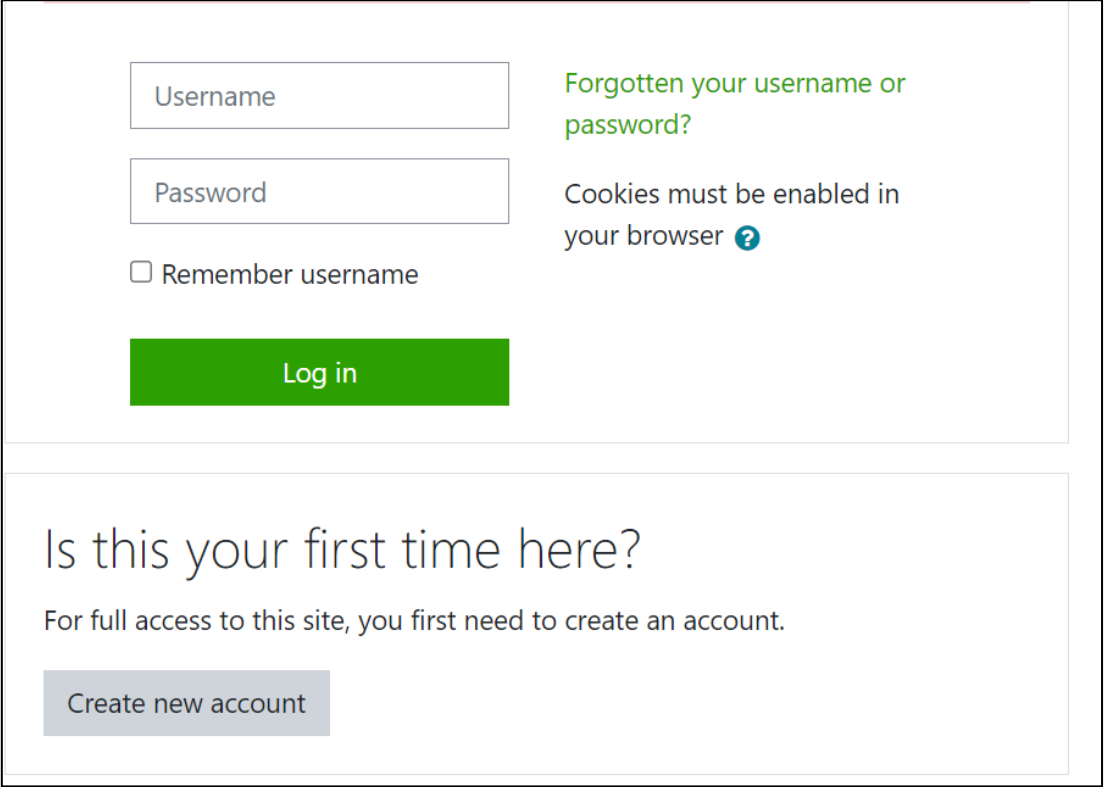
The IHU, International Hellenic University, is responsible for hosting the platform, but also for taking care of the related logistics and techniques, as well as monitoring the platform. The platform is available on the Internet through the following link: <https://fusegi.cs.ihu.gr/vle/>.

4.1 Instructions for Trainees

In this subsection, step-by-step instructions for trainees using the FuseGI VLE platform are provided.

4.1.1 Access and Registration

Access is simple and free, but requires registration on the platform. Registration and connection to the platform are done by clicking at the top right of the platform on the "log in" link (Figure 2).



Username

Password

Remember username

Log in

Forgotten your username or password?

Cookies must be enabled in your browser ?

Is this your first time here?

For full access to this site, you first need to create an account.

Create new account

Figure 2. FuseGI VLE platform login page

Registration is fast, just entering a username, password and email address. A registration confirmation email is sent at the end of the process; new users will then have to go to their mailbox and confirm their address using the confirmation email received (Figure 3).

Figure 3. FuseGi VLE Platform Registration Page

4.1.2 Organization of Modules and Courses


Once connected to the platform, the users can find on the home page of it the different course modules. The first module fills the GIS gaps, while the second module teaches how to use GIS applied to water, health, or the environment. The courses are then divided into these two modules.


Each of the courses is accessible after a very simple registration, without password, just by clicking on the "enroll" button to access the course.

All the pages of the courses are organized in the same way; the examples given in the next parts are taken from the first course of module 1.

4.1.2.1 Introduction and Short Description of the Course

Each course in each module firstly includes an introduction briefly explaining the general idea of the course (Figure 4). This description is intended to explain the purpose of this course and not the content.

Your progress 


Introduction/short description of the course 

In order to bridge the gap between what academia provides and what environmental market requires, FuseGI aims to develop skills and knowledge related to Geographical Information Systems. The necessary theory of Geographic Information Systems is presented through short courses as well as the practical application through open source software. In this first lesson we learn about the basic definition and history of GIS. The uses and applications of GIS in many scientific and professional fields are mentioned below, as well as the most common GIS software. Finally, in order to understand the importance of GIS as a tool, its benefits in work and research are presented. Nowadays, geospatial technology is establishing itself as an essential tool and is a useful advantage for any employee.

Figure 4. Description of Course 1 of Module 1 of the FuseGI VLE platform

4.1.2.2 Course Summary

As with the descriptive introduction to the course, the summary summarizes the general idea of the course. In particular, it summarizes the various points covered in it and the most salient notions of the course (Figure 5).

Summary 

- Nowadays, geospatial technology is establishing itself as an essential tool for different kind of organizations and businesses. High demand in GIS applications and software is an indisputable fact in the market.
- GIS is characterized by a huge variety of applications and it's now the main working tool for many professions.
- In every field such as health, ecology or environmental protection GIS software is used in different ways and bring different benefits.
- In the years ahead cloud-based geographical information systems will gain traction due to the complexity associated with the storage and management of huge amounts of data.
- Modern GIS is able to modelize natural, social, economic processes and analyze their relationships and interactions.
- Urban planning and technical project planning are based on GIS analyzations. Geographic technologies are necessary for human life and spatial location of objects is used to make decisions at any level.
- The management of natural resources and forests are based on GIS applications and tools.
- Trends are monitored while sales are increasing.

Figure 5. Summary of FuseGI VLE Platform Module 1 Course 1

The summary can be effectively used as a reminder after following this additional training in order to recollect the most important concepts.

4.1.2.3 Presentation: the Course

Then, the course itself is found, available in PowerPoint format or in the form of a video directly viewable on the platform itself (Figure 6).

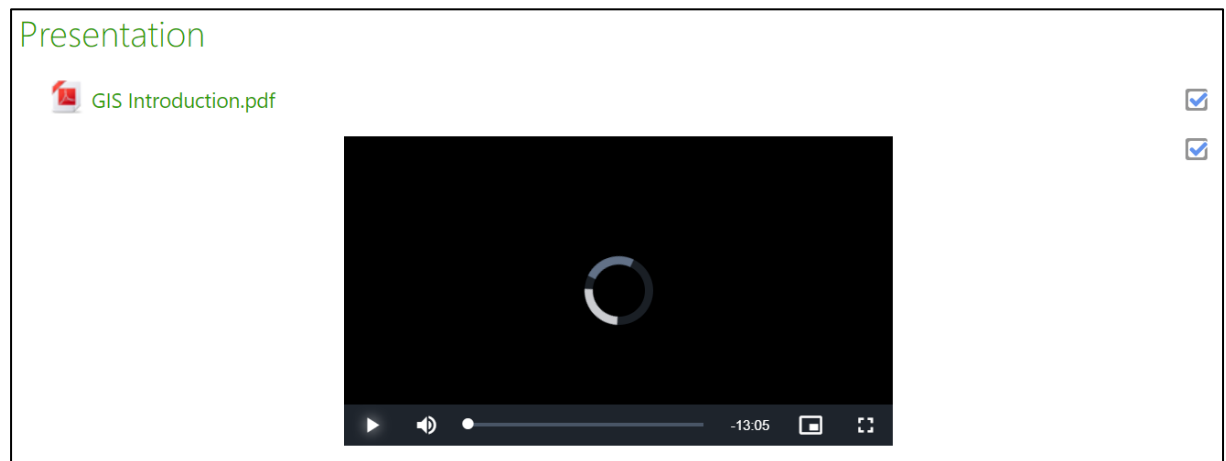


Figure 6. Chapter of the presentation, with the course available in PDF and video on the FuseGI VLE platform

The video has been dubbed and all the text visible in each slide is played. Users of the platform can choose the method that suits them best between reading the course through the video or studying the course themselves via the PowerPoint file.

4.1.2.4 Keywords and Sources

The keywords are available following the course part. They can be very useful when a user, already familiar with GIS, would like to find a course on a specific topic to practice. In addition to keywords, all sources used are cited. The trainee can, thus, find an article or a book to deepen even more in an aspect of the course (Figure 7).

Key words & sources

Key Words: Geographical Information Systems, History of GIS, Applications of GIS, Open Source GIS Software.

- Al-Fareed, A., Ambusaidi, K., Al-Lamki, B., Al-Farsi, A., & Al-Busaidi, K. (2008). The role of GIS on the decision making process at muscat municipality: A SWOT analysis. In 10th IBIMA Conference on Innovation and Knowledge Management in Business Globalization (pp. 1181-1187). International Business Information Management Association, IBIMA.
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- <https://www.esri.com>
- <https://gis-university.com/>
- <https://gisgeography.com/gis-applications-uses/>
- <https://www.gislounge.com/open-source-gis-applications/>
- <https://www.geospatialworld.net/blogs/four-major-trends-in-gis-market-by-2024/>

Figure 7. Keywords and sources from FuseGI VLE Platform Module 1 Course 1

4.1.2.5 Additional Data

To go further, additional data is available for each course in each module. This additional data can be books, articles, references or courses from other universities (Figure 8). It is also possible to find useful data to practice on GIS.

Supplementary material

-  Course 1 Supplementary material
-  Books
-  References

Figure 8. Additional data available for FuseGI VLE Platform Module 1 Course 1

4.1.2.6 The Quiz

After studying the chapter course, a quiz is provided. This allows users of the platform to self-assess their acquired knowledge and check if they have correctly assimilated the course (Figure 9).

Evaluation test


-  Quiz

Figure 9. Link to the online self-assessment for Course 1 of Module 1 of the FuseGI VLE platform

The quizzes are quick to take, since they only include about ten questions. They can be in the form of "true or false", multiple choice questions (MCQs), texts with missing words or more visual questions (Figure 10).

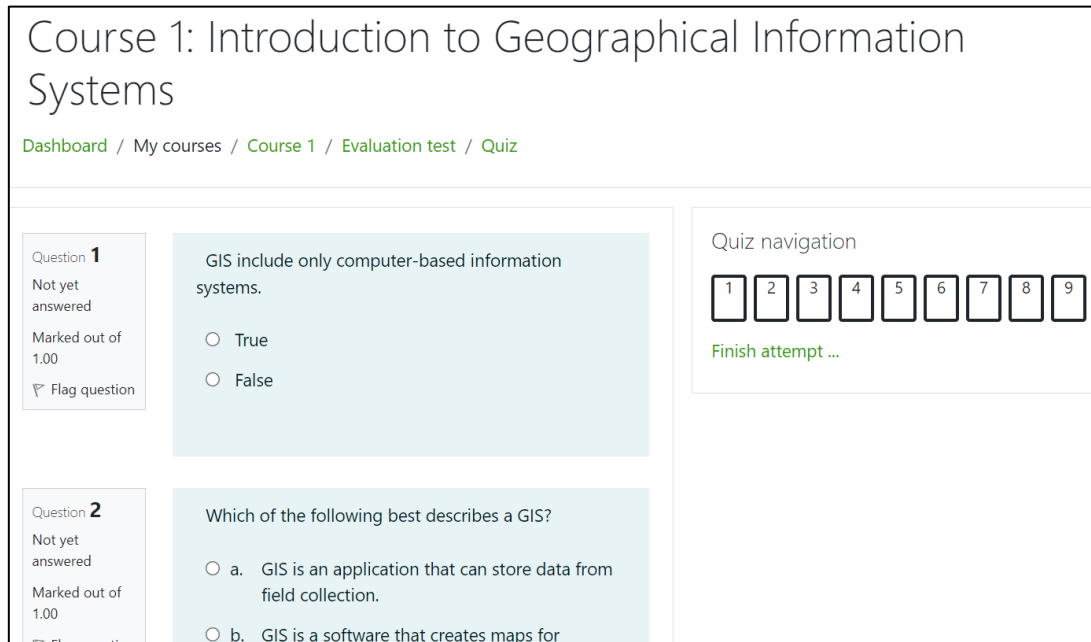


Figure 10. Example of the FuseGI VLE Platform Course 1 self-assessment questions

Once the quiz is completed, it is possible to take it again. Answers are also available after the first attempt (Figure 11).

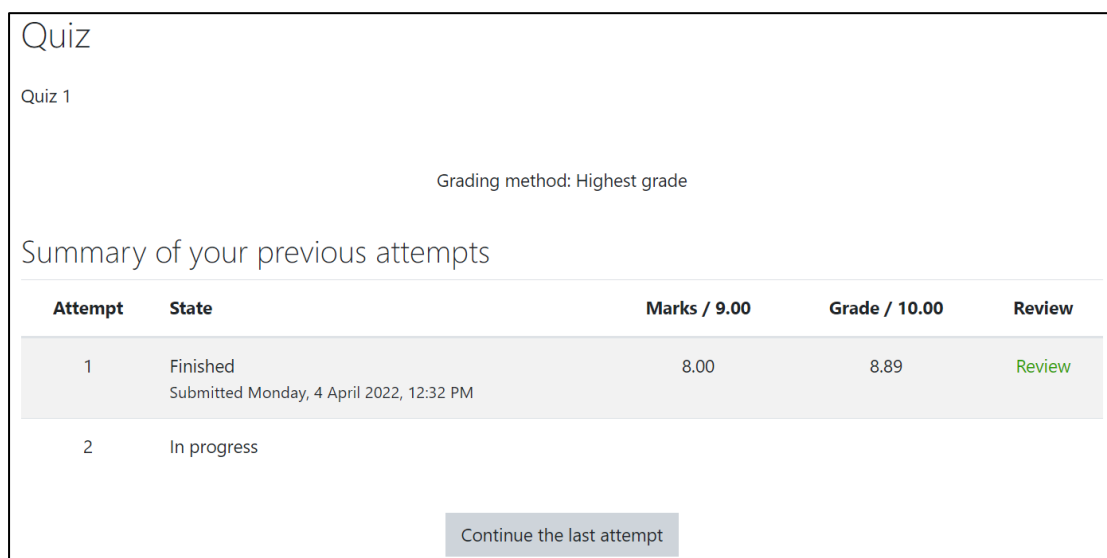


Figure 11. List of different attempts to complete the quiz and link to continue the last one or to start a new one

4.1.2.7 Evaluation

An assessment is available in the course parts of each module. The course evaluation is very important and allows the trainers responsible for the courses to modify them, improve them and also adapt them to the trainees' needs. All course evaluations have the same style (Figure 12).

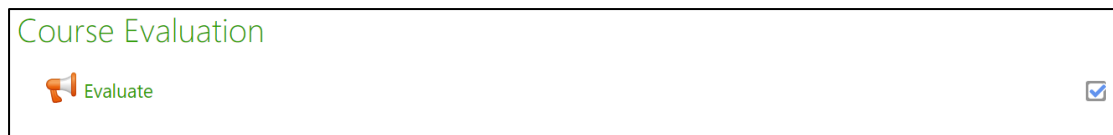


Figure 12. Link to the evaluation of FuseGI VLE online course 1

4.1.2.8 The Forum/Chat

For each course, a forum and chat are available. They allow the trainee to ask a question to other trainees or trainers; anyone can answer it. This makes it possible to avoid getting stuck on a misunderstood notion (Figure 13).



Figure 13. Links to the FuseGI VLE platform chat and online forum

4.1.3 Dashboard

The dashboard has many uses. In particular, it is possible for the trainee to know their own progress in the courses where they have registered. It is also possible to see upcoming activities and events, private files stored in the platform, as well as other users connected in the last five minutes (Figure 14).

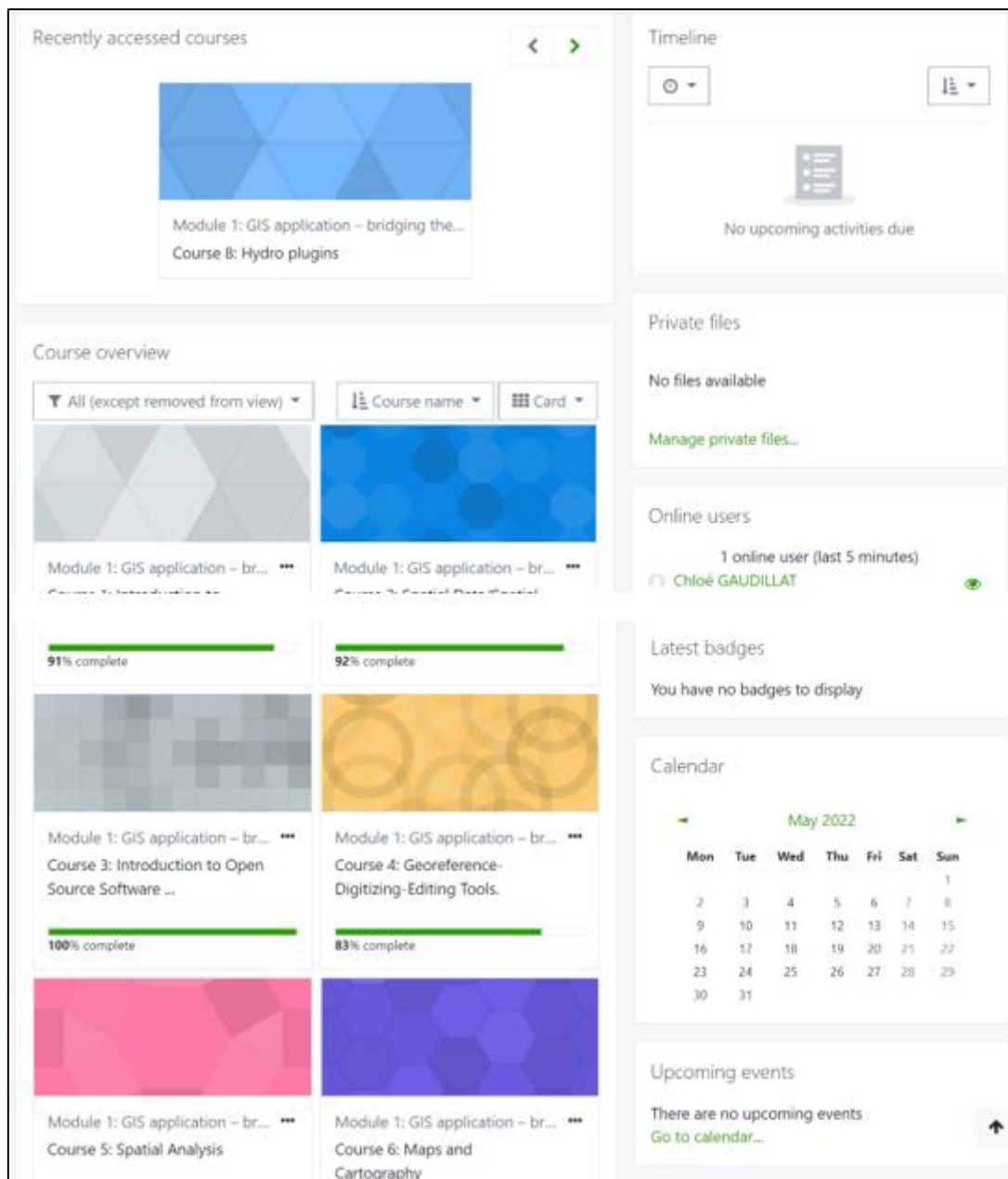


Figure 14. An overview of the various features of the FuseGI VLE Platform dashboard

It is also possible to have private conversations between the different participants.

4.2 Instructions for Trainers

In this subsection, step-by-step instructions for trainers using the FuseGI VLE platform are provided.

4.2.1 Course Creation

For a new course to be created, the trainer needs to contact the platform administration, since they only have permission to create new courses (Figure 15).

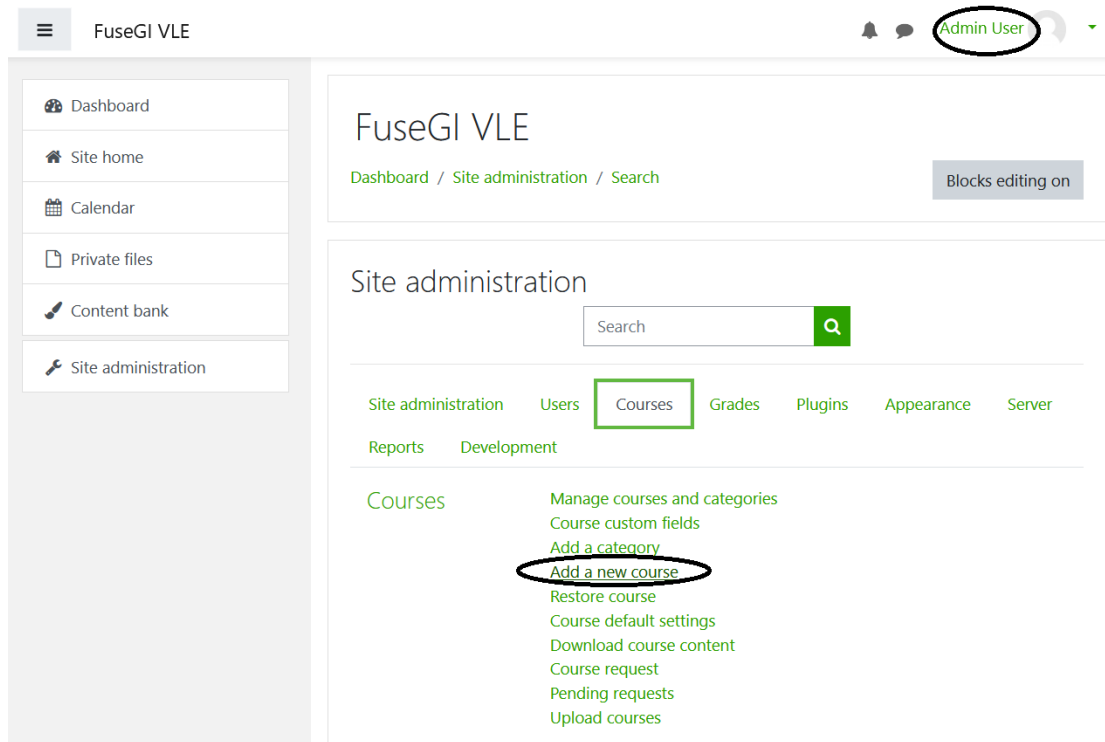


Figure 15. Adding a new course on the platform

In order to be able to upload training material, a user needs to have been assigned the "Teacher" role (Figure 16).

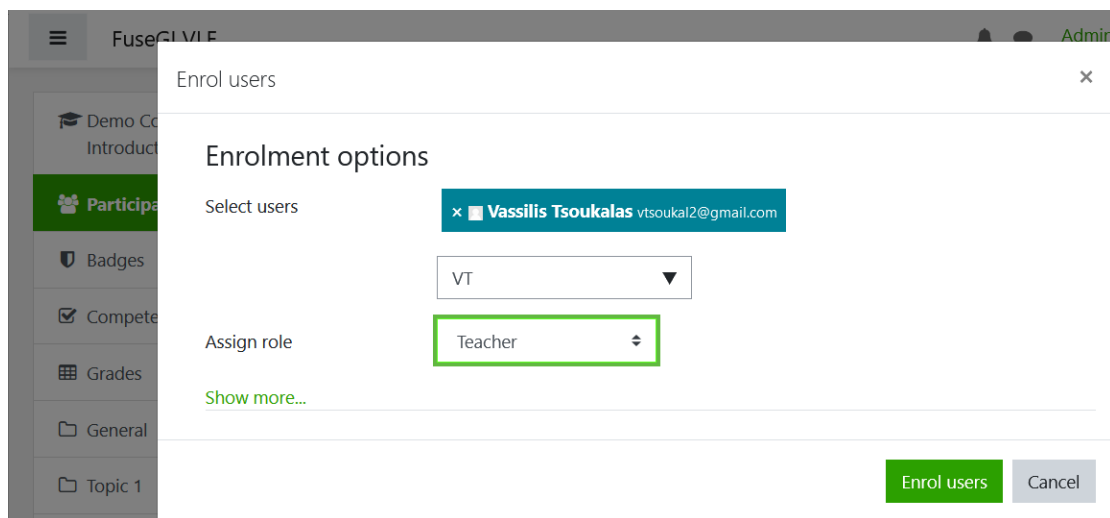


Figure 16. "Teacher" role assignment

4.2.2 Course Editing

For course editing, the instructor (trainer) needs to select the course to be edited (Figure 17), edit the initial section (Figure 18), fill in the summary field (Figure 19), complete the summary topic, and save changes to update the course content.

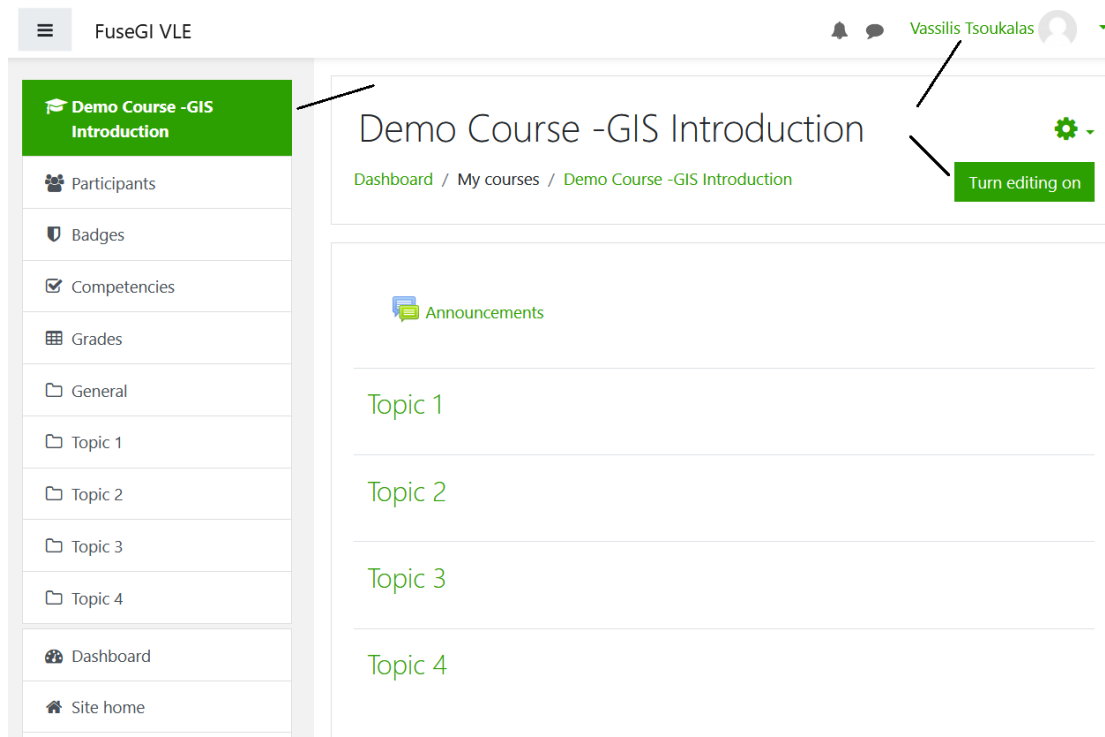


Figure 17. Editing of selected course

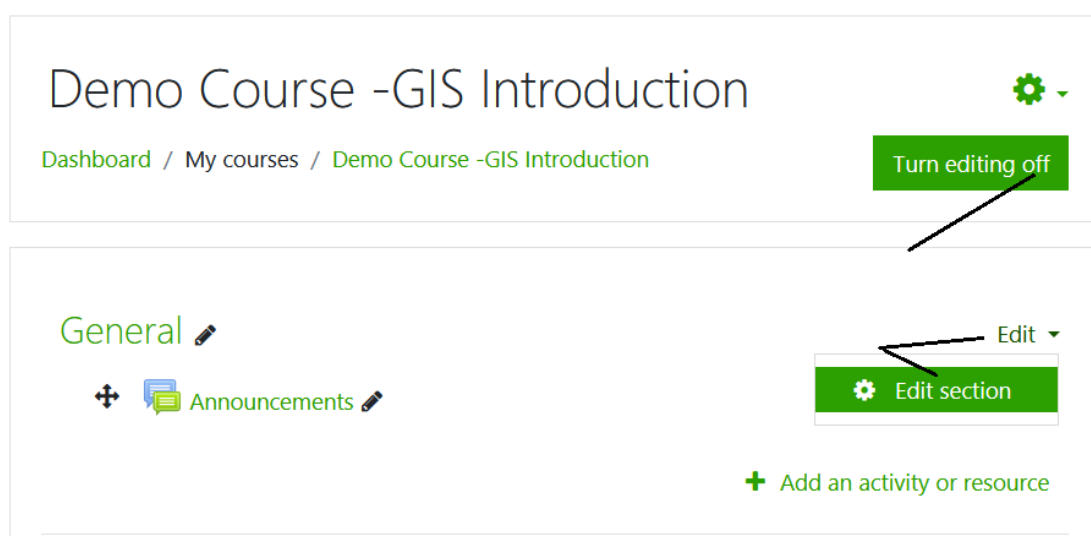


Figure 18. Filling in the summary field of the course

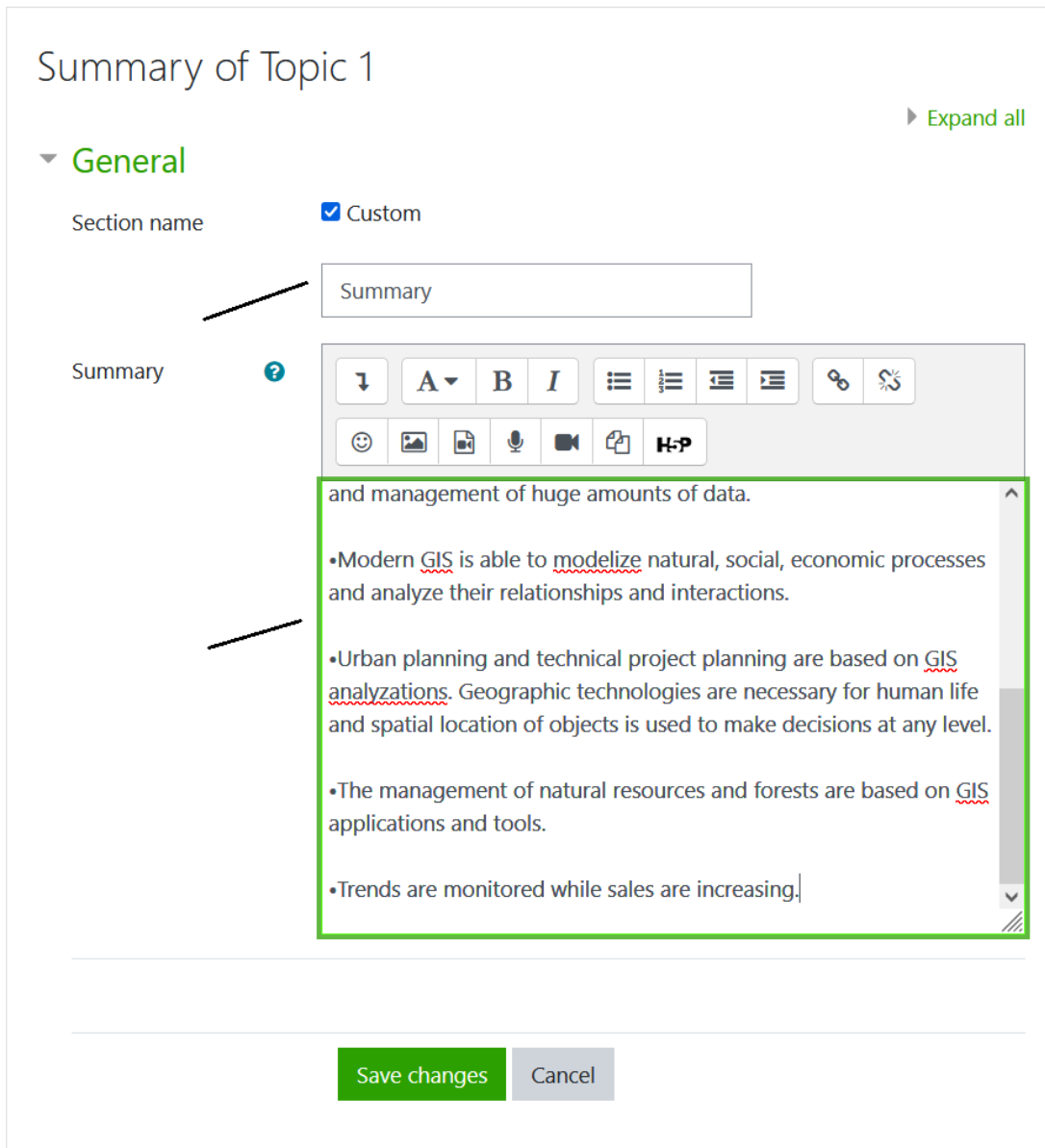


Figure 19. Completing the summary topic

4.2.2.1 Attaching Documents and Videos

The trainer is able to add different types of attachments to a course, such as documents (Figure 20) or videos (Figure 21).



Figure 20. Uploading a PDF presentation

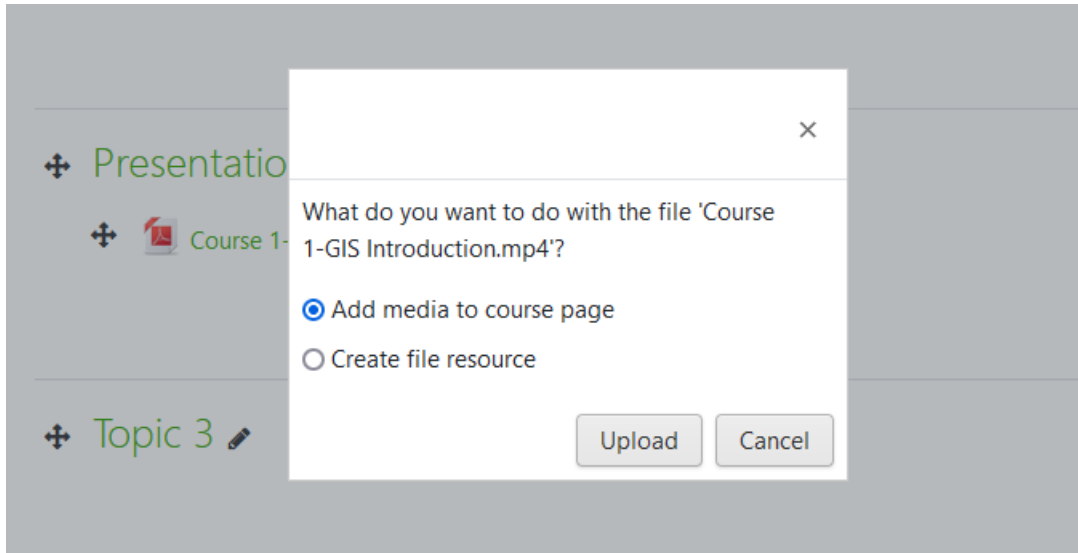


Figure 21. Uploading an mp4 video

4.2.2.2 Adding Supplementary Material

In order to add supplementary material to a course, an activity needs to be selected (Figure 22) and then added, such as a folder for book sources (Figure 23).

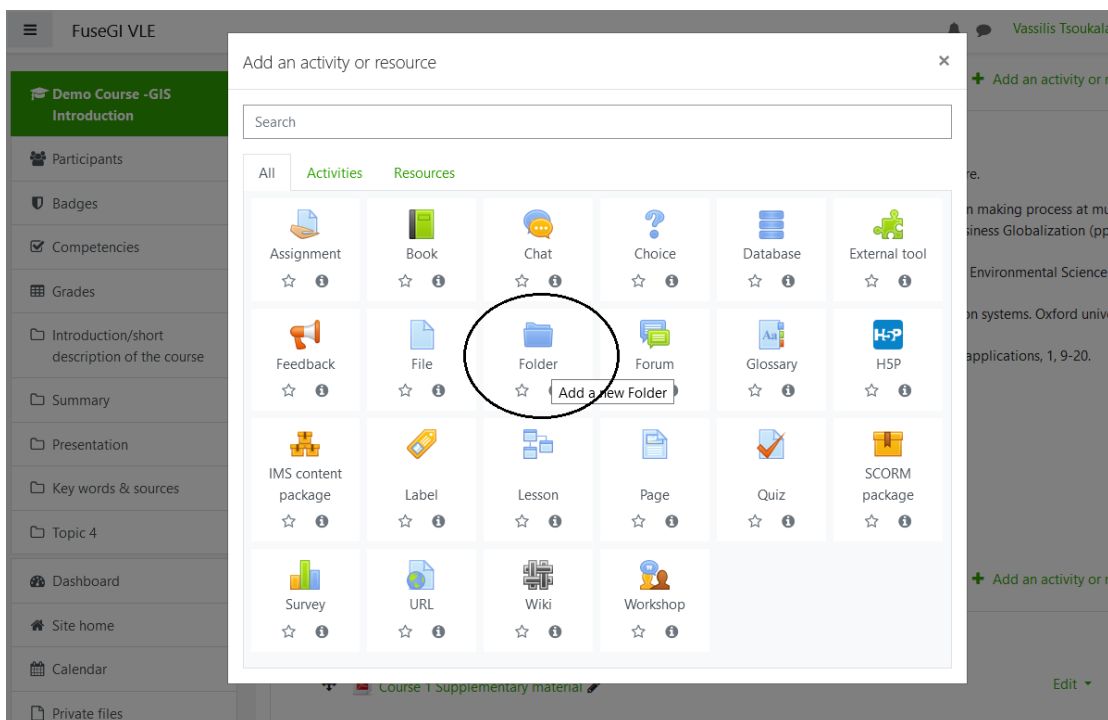


Figure 22. Adding an activity as supplementary material

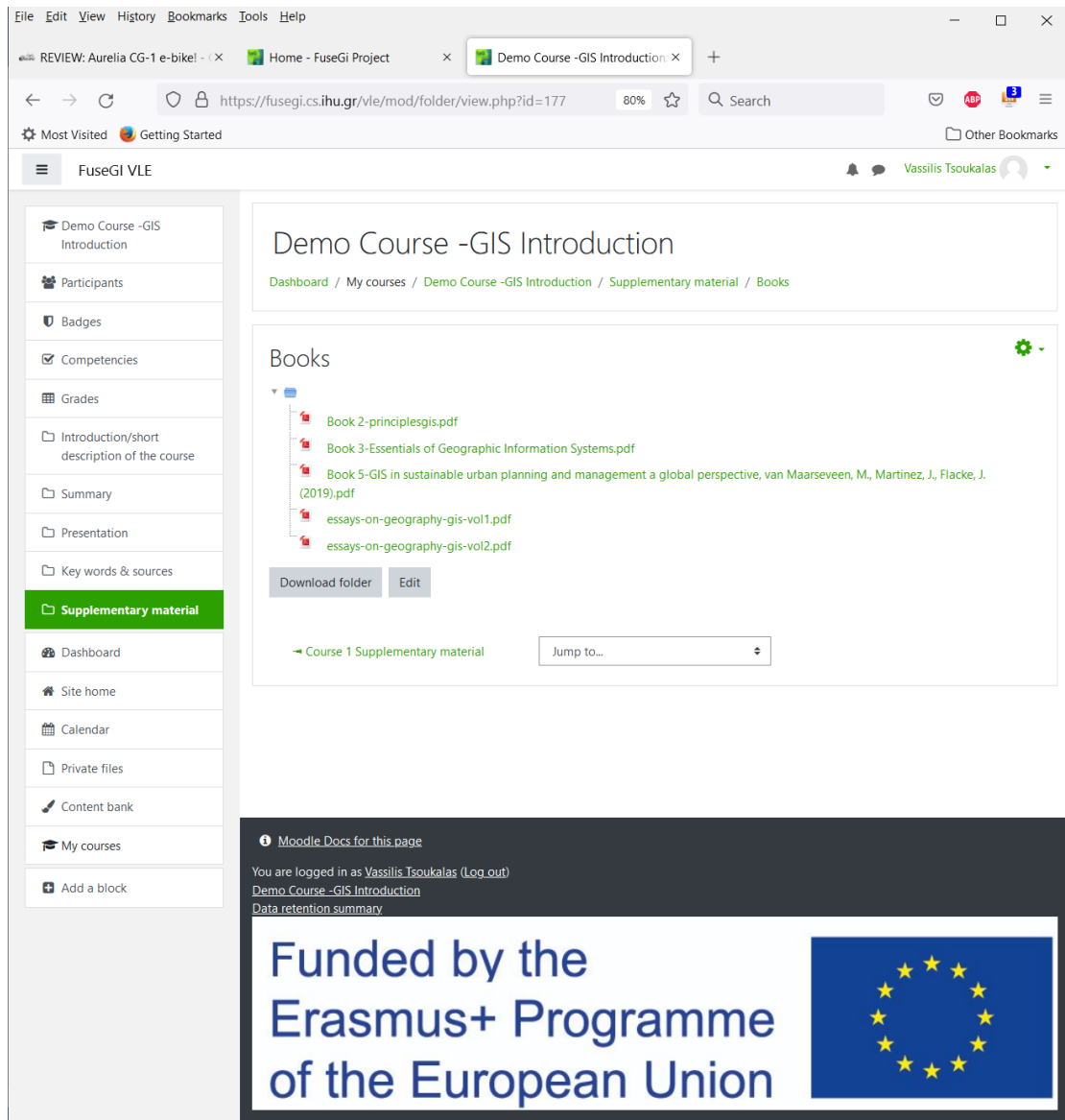


Figure 23. Adding a folder of book sources

4.2.2.3 Adding Quiz

When adding a “Quiz” activity, the instructor has the ability to set up the weight of each question (Figure 24).

Editing quiz: Quiz

You cannot add or remove questions because this quiz has been attempted. (Attempts: 14)

Questions: 9 | This quiz is open Maximum grade Save

Repaginate Total of marks: 9.00

Shuffle

Page 1

1	⋮ ⚙	GIS include only computer-based information systems. GIS include onl...	🔍	1.00
2	⋮ ⚙	Which of the following best describes a GIS? Which of the following bes...	🔍	1.00
3	⋮ ⚙	GIS components are GIS components are	🔍	1.00
4	⋮ ⚙	The first GIS was created to help with the land inventory of which coun...	🔍	1.00
5	⋮ ⚙	GIS can be used only by engineers: GIS can be used only by engineers:	🔍	1.00
6	⋮ ⚙	Assessing the environmental vulnerability of marine resources with res...	🔍	1.00
7	⋮ ⚙	Comparing historical data to current conditions with satellite data can ...	🔍	1.00
8	⋮ ⚙	ArcMap is a free GIS software that enables code changes while QGIS wa...	🔍	1.00
9	⋮ ⚙	Using GIS software can: Using GIS software can:	🔍	1.00

Figure 24. Adding a quiz and setting weight per question

4.2.2.4 Adding Feedback

The ability of trainees to provide feedback is considered of great importance. The process of offering the respective feature is demonstrated in Figure 25.

Evaluate

[Overview](#) [Edit questions](#) [Templates](#) [Analysis](#) [Show responses](#)

Multiple choice (rated)

Required

Question

Label

Multiple choice type

Adjustment

Hide the "Not selected" option

Do not analyse empty submits

Multiple choice values

Figure 25. Adding the "feedback" feature

4.2.2.5 Adding the Activities "Forum" and "Chat"

In order to enhance trainees' engagement and peer-to-peer learning capabilities, the instructor adds a forum (Figure 26) and a chat room in each course (Figure 27).

Course 1: Introduction to Geographical Information Systems

[Dashboard](#) / [Courses](#) / [Module 1: GIS application – bridging the knowledge gap](#) / [Course 1](#) / [Forum/Chat](#) / [Forum](#)

Forum

[Add a new discussion topic](#)

Discussion	Started by	Last post ↓	Replies	Subscribe
☆ Introduction to Geographical Information Systems	Thomas Lagkas 4 Apr 2022	Thomas Lagkas 4 Apr 2022	0	<input type="checkbox"/>

[← Evaluate](#) [Chat ▶](#)

Figure 26. Adding forum in a course

Course 1: Introduction to Geographical Information Systems

[Dashboard](#) / [Courses](#) / [Module 1: GIS application – bridging the knowledge gap](#) / [Course 1](#) / [Forum/Chat](#) / [Chat](#)

Chat



[Click here to enter the chat now](#)

[Use more accessible interface](#)

[View past chat sessions](#)

[← Forum](#)

Jump to...



Figure 27. Adding chat in a course

5 Innovation, Tangibility and Transferability

IO3 “Virtual Learning Environment (VLE) Platform” constitutes a standalone and complete output that effectively carries all the training material that was produced in the context of the FuseGI project. Its development was based on a thorough system engineering methodology, with a detailed requirements analysis, design, implementation, and piloting. The development of IO3 efficiently relied on different types of resources, namely, hardware resources for hosting the VLE on an Internet accessible server with adequate computing and network resources to support multiple simultaneous users, software resources for the required operating system, services, and underlying software platform, as well as human resources, for conducting the needed analysis, configuring the hardware, deploying the software, implementing the numerous features, performing material updates, and maintaining the system. The resulted outcome manages to completely fulfil all set of requirements and allow effective distance learning experience. In what follows, detailed justification is given for the innovative, tangible, and transferable nature of this intellectual output, in line with the initially accepted description provided in the proposal Form ID KA203-14AC0F01.

Innovation

Considering the definition of innovation as “the practical implementation of ideas that result in the introduction of new goods or services or improvement in offering goods or services”, the main innovation characteristics of this intellectual output “IO3 Virtual Learning Environment (VLE) platform” are listed below:

- The FuseGI VLE was developed in the context of this project. A new domain was created and used, a new server was used, new deployment activities and configurations were performed as described in the current deliverable.
- The platform allows the effective mapping of the newly produced GIS training material.
- The platform enables a number of features that efficiently support the educational methodology innovations adopted in FuseGI. Indicatively:
 - Teaching and learning through multimodal material

- Self-learning capabilities with links to external sources and self-pace pathways
- Constructive alignment of teaching, assessment, and feedback with respective online activities
- Distance learning enablement for remote learners with Internet accessibility
- Peer-to-peer learning through activities that encourage trainees' interactions
- Open education via the provision of an open and freely available educational environment

Tangibility

A main goal of IO3 is to produce a clearly tangible outcome, which by definition means “a result that is clear enough or definite enough to be easily seen, felt, or noticed”. In more detail:

- The FuseGI VLE platform is freely and openly accessible via a public URL at <https://fusegi.cs.ihu.gr/vle/>
- It is offered as an option of the FuseGI project website at <https://fusegi.cs.ihu.gr/>
- The VLE platform is a standalone entity that is deployed as software on a hardware infrastructure at the premises of the International Hellenic University
- The environment has been built in an appealing manner with styling characteristics (format, structure, colours, etc.) that facilitate user engagement
- Any interesting party can register in the platform and enrol in the courses to experience it through viewing, interacting, navigating, and watching multimedia training material on GIS

Transferability

Taking into account the definition of transferability as “the degree to which the results of study can be applied in other contexts and studies”, it is evident that the VLE platform (IO3) constitutes a perfectly transferable output. Specifically:

- The platform can host material from any discipline, since it is by no means restricted only to GIS related material
- The VLE platform is openly available to be used by any group of users (trainers and trainees), which can adopt it and utilize it in the frame of any educational project

- The platform is highly adjustable, configurable, and scalable. New material can be added, along with new teaching activities, quizzes of different types, and various features, while supporting an increasing number of participants (flexible adaptations to the underlying computing/networking resources are also straightforward).
- The platform can simultaneously provide distance learning services to multiple groups of participants of different teaching domains, by supporting the creation and the agile structuring of different modules, courses, and user roles