



SMARTEN

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eLearning modules for serious games

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Lead institution	University of Nis
Author(s)	Milan Gocić, Milica Ćirić, Mladen Milanović, Slaviša Trajković, Zakhar Maletskyi
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Introduction

This document is part of WP4 eLearning modules for serious games created under the project SMARTEN “Serious games for digital readiness of water education” (Project number 2020-1-NO01-KA226-HE-094221).

The main intellectual outputs of the WP4 are 6 eLearning modules that can be used within various Learning Management Systems (LMSs). Modules are a “shell” for serious games and collaboration tools that create a learning path inside the curriculum. Using eLearning modules improves learning outcomes by making them measurable and easy for evaluation.

Since 6 digital workshops were developed as a part of intellectual output O1, eLearning modules were developed around them, each module for one digital workshop.

1. eLearning

In the 21st century it is hard to imagine the learning process including solely a teacher and a hardcopy textbook. Projectors, computers, and other digital tools help in achieving a clearer presentation of the material and add a different approach to learning. The modernization of education will not replace human communication. Information communication technologies, if used appropriately, can enhance the quality of education. Modern technologies also give the option to perform teaching at different times and in different places. eLearning is developing in parallel with the development of information communication technologies and is mostly based on Internet technologies.

eLearning can be defined as delivering learning materials, activities, and education programmes by using digital media. It is a complex system with the following elements:

- Remote teaching and learning including time and space distance,
- Learning materials in printed, audio or video format,
- Individual or group learning process,
- Tutoring with a combination of different forms of communication,
- Interactive student groups,
- Application of multimedia technologies,
- eLearning infrastructure.

Online education is a narrower term compared to eLearning because it comprises educational programmes that are completely or almost completely based on Internet.

eLearning requires different planning, different teaching methods and different ways of communication compared to traditional education. In practice, eLearning and traditional learning methods are often combined as referred to as blended learning (Figure 1).



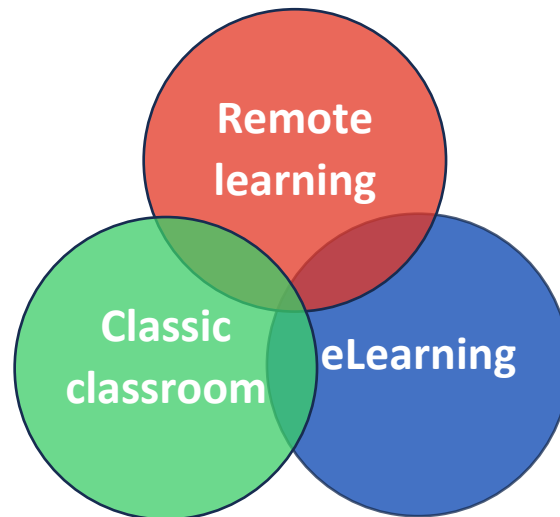


Figure 1 Blended learning

Benefits of eLearning are:

- Time and space flexibility – Students can learn at their own space and can choose where they want and when they want to learn. This makes education available to those that cannot come to the classroom.
- Lower cost – The cost of eLearning is lower compared to traditional learning. Courses created once can be repeated multiple times for different groups of students. For the same price, we can educate more students and in a shorter time frame. Space related expenses are also lower, but IT infrastructure investment is greater.
- Participant interaction in the education process – Computer-aided communication is direct and intensive. eLearning is based on interactive multimedia content.

The main problem in eLearning is the lack of communication, whether it is between students or between students and the teacher, and this lack of communication can have a negative impact on the learning process.

2. eLearning Systems

There are many computer applications that are used as a support in the education process. The following terms are often used interchangeably:

- Learning Management System (LMS),
- Virtual Learning Environment (VLE),
- Content Management System (CMS),
- Learning Content Management System (LCMS),
- Managed Learning Environment (MLE),
- Learning Support System (LSS),
- Learning Platform (LP).



Executing a learning program within an LMS consists of activities performed by teachers, the administrator, students, and other participants. Each participant must have their own unique account for accessing the LMS, as well as access to tools and services corresponding to their role.

Students from eLearning programs expect the same level of quality of education and interaction as in the traditional learning process. To reach that level of quality it is necessary to address problems in information integration, adapting and delivery of learning materials during the development process of the LMS.

Learning Management Systems (LMSs) are based on software solutions that enable creating and organizing online courses. The core services of an LMS are:

- Educational LMS services – services for searching, creating, and adapting learning materials. This includes services for the integration of standardized learning materials from external sources.
- LMS support services – some examples include managing online courses, reporting systems, grading method adjustments, and acquiring student grading reports.
- Communication services – this includes electronic mail, instant messages, video conferences, chat, forum. Communication can be synchronous or asynchronous, private, or public.
- Infrastructure services – services like user account management, LMS configuration, log tracking.

Online courses within an LMS are created and designed by teachers. Teaching materials and content can be created with the help of dedicated software tools.

Educational LMS services		LMS support services	
Content search	Quizzes	Reporting	User services
Adaptive services	SCORM API	Notifications	
Communication LMS services			
Instant messages	Chat	Email	Forums
Infrastructure LMS services			
Authentication	Authorization	Log tracking	Configuration

3. Standards and learning objects in LMSs

The complexity and distributed nature of potential learning contents in eLearning resulted in problems with multiple uses of learning materials for different courses and contexts. For this reason, LMS software solution vendors focus on support, development and adopting standards for the whole learning process and, especially, for creating learning materials. Standards enable transferring learning content from one LMS to another. In today's market there are four main standards for data exchange in LMSs: SCORM, IMS, IEEE and AICC. The most often used standard is certainly SCORM. Standards view educational content as a learning object which is a basic element of the model for creating and distributing content in



LMS. Any independent information that can increase the knowledge level can be viewed as a learning object, e.g. a book chapter, a map, a multimedia resource, a simulation, diagram. The basic idea of the learning object concept is that the content creator can make small teaching units that can be reused in different contexts. Even though there are different definitions of learning, the following characteristics are emphasized: independence, reusability, smaller scale, and ability to aggregate. Modern LMSs should provide reusing, sharing learning objects and interoperability. One of the methods for implementing these requirements is applying semantic web technologies by using annotations.

3.1 Gamification of learning

Gamification of learning is a hybrid approach to learning that relies on visual material, narrative game types and less formal and didactic address styles. It includes educational and entertaining software. Such educational games contribute to developing concentration level, decision-making process, problem-solving skills, logical thinking, creativity, teamwork, and IT skills. Using games for learning creates a positive, constructive, and efficient environment that increased student motivation.

The concept of gamification of learning can be implemented using specific software tools, and integration with the LMS, within virtual worlds and social networks. It can be introduced into an LMS by adapting existing activities and resources or by integrating new activities created with a software tool, a social network, or a virtual world.

4. Lifelong learning

Considering that science and technologies develop quickly, the basic level of knowledge required for performing business activities is increased each day creating the need for lifelong learning. The ability to recognize the need for lifelong learning and the aspiration for independent improvement of skills are important requirements for building a successful career for each individual.

Instead of passively reacting to changes in the environment, educational institutions should be the drivers of change. Recognizing and continually developing key skills should be integrated as the most important goals in higher education institution (HEI) curricula. Adopting and implementing lifelong learning education programs at HEIs can influence the democratization of the educational process in accordance with market trends. Some quick and simple actions that can be taken to improve lifelong learning are:

- Promoting and raising awareness of the necessity and benefits of applying lifelong learning concepts,
- Creating an environment for implementing free open online courses, as well as making partnerships with existing providers of open courses,
- Entering international programs of lifelong learning,
- Incorporating eLearning technologies for implementing lifelong learning concepts due to their flexibility and availability.



5. Main takeaways

Applying modern technologies, and especially ICT technologies in the education system results in simpler and more flexible time and space-wise learning while persevering the natural face-to-face feeling. Other benefits include the cost-effectiveness achieved through the reuse of learning materials, and better collaboration caused by simpler communication between students but also teachers and students. Successful realization of eLearning heavily cannot be achieved without incorporating concepts such as learning management systems, learning objects and standards defined for them, such as SCORM and gamification of learning. Furthermore, the implementation of those concepts by the higher education institution in combination with free open courses will create great support the providing accessible lifelong learning to everyone.



6. eLearning modules

As a part of the SMARTEN project, six workshops were developed using two serious games (SIM4Nexus and Adaptive Planning) and three digital collaboration tools (GroupMap, Miro, Zoom break-out rooms) (Figure 2).

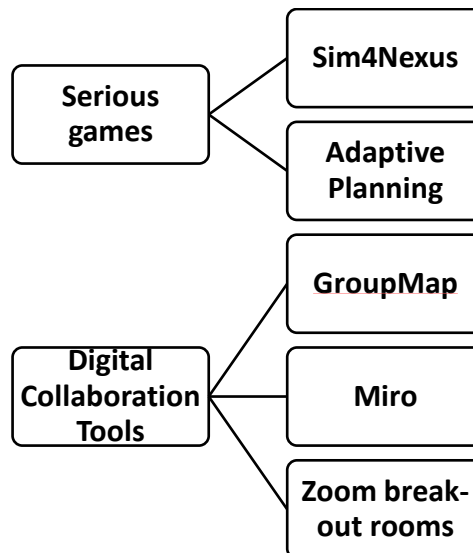


Figure 2 Serious games and digital tools used in developed workshops

Each workshop contains some input lectures including slides and video material, instructions for the group task, information about the role division and links to external resources such as serious games platforms or digital tools templates. In developing eLearning modules, the goal was to incorporate the workshop material as well as create a shell around it that would enable teachers from different HEIs and with different LMSs to easily incorporate it into their existing courses.

The Sharable Content Object Reference Model (SCORM) was created to address eLearning interoperability, reusability, and durability challenges. This model is supported in virtually all LMSs which is why developing SCORM packages emerged as a logical pathway to achieving our goal. Each module is based on one of the developed workshops and includes appropriate resources for that workshop.

Each module is constructed as a single activity in an LMS course. Modules can all be incorporated in one course, individually in different courses, or as some combination of these two ways. One module can be reused in as many courses as is necessary. Accessing the module is possible by clicking on its name in the activities list. After accessing the module, the user can see the following information:

- Number of attempts allowed,
- Number of attempts you have made,
- Grade for each of the attempts,
- Grading methods, and
- Grade reported.



Grades are shown in percentages and are defined by knowledge check results the user has achieved. Since the grading method is defined as the highest attempt, the user can retake the knowledge check and improve their grade. Each time the user accesses the module, they choose whether to resume the module or start a new attempt.

The remainder of this section is structured as follows. The first six subsections describe the structure of one of the developed modules. Section 6.7. describes the process of incorporating a SCORM package into courses on three globally most used LMSs (Figure 3).

Spring 2017 Market Share: Higher Ed LMS in 4 Global Regions

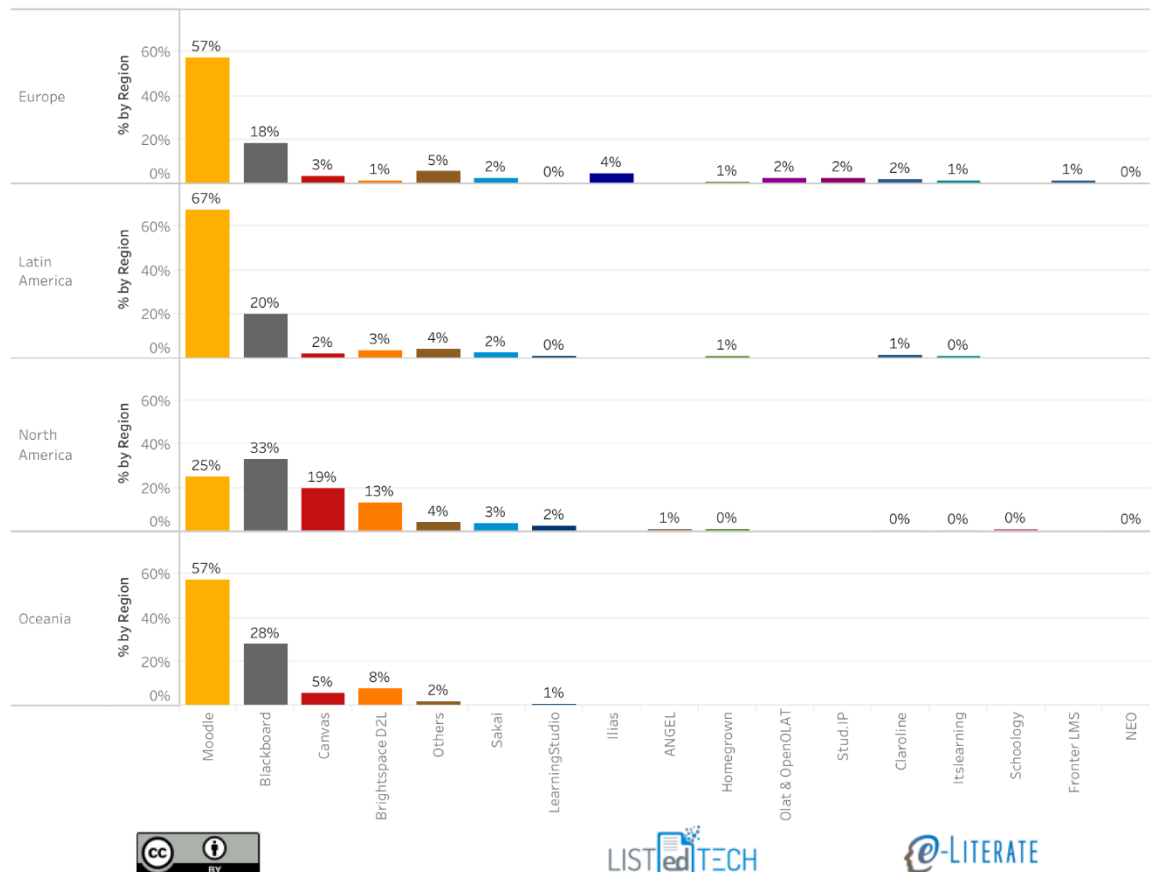


Figure 3 Higher education LMS market share in 4 global regions [15]

6.1. PESTLE analysis of water crisis

This module focuses on identifying Political, Economic, Social, Technological, Legal, and Environmental factors in the global water crisis. The first part of the module contains slides with background on the water crisis topic (Figure 4).



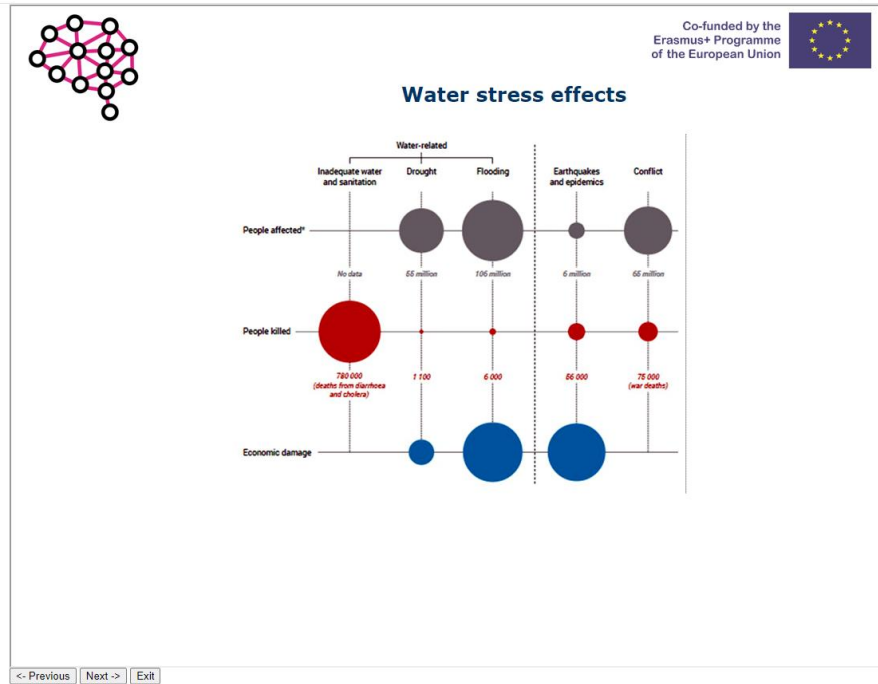


Figure 4 PESTLE module water crisis background

Next, details of the PESTLE analysis are given: defining the framework and contributing reasons for each type of factor, as well as practical examples of conducting this type of analysis (Figure 5).

PESTLE in practice

Reconstruction and building the water intake system Bezdan in Vojvodina Province in Serbia:

- Political factors:**
 - changes in development policy within the system
 - the influence of the stakeholders in the Gornje Podunavlje natural reserve
 - influence of the EU and the Danube countries in the field of protection of the Danube River
- Economic factors:**
 - changes in economic and financial conditions within the system and in global plan
 - cost of building and reconstruction of the system
 - maintenance costs of the water intake system and channel network HsDTD and RHS
 - economic development of the environment and new activities under the influence of the system
- Social factors:**
 - changing social conditions within the system and the environment
 - increase in the number of employees in the system and their educational structure
 - general social development of local communities in the region
 - preventing outflow of population from the region
 - increasing employment in other sectors and increasing the educational structure

Source: Bajcetic, R., Srdjevic, Z., Srdjevic, B., Determining criteria set for decision-making in water management based on SWOT/PESTLE analysis, Proceeding of 22th international symposium, "Safe food production", 19-25 June 2011, Trebinje, Bosnia and Herzegovina

Figure 5 PESTLE module - Practical example of analysis

The following part of the module introduces the groupwork task, the process for performing the task, the division of roles and other guidelines (Figure 6). As the workshop this module is



based on, the module also uses GroupMap digital tool for collaboration in the groupwork task, specifically the PESTLE analysis template.

PESTLE analysis of water crisis

PESTLE Analysis (Score: 63)

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PESTLE Analysis of Water Crisis

Task: Let's identify the Political, Economical, Social, Technological, Legal and Environmental factors that impact Water Crisis

Process: Let's brainstorm the six key factors that influence Water Crisis

Political Policies and events that impact Water Crisis P	Economical Industry and economy indicators E	Social Trends impacting Water Crisis or people S
Technological Opportunities or disruptions impacting Water Crisis T	Legal Changing laws or compliance issues L	Environmental Natural or geographical factors that impact Water Crisis E

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Figure 6 PESTLE module - Introduction of the groupwork task

Finally, a brief knowledge check is conducted to evaluate the level of adopting the material. Results are visible to the user immediately after performing the check (Figure 7) and can be improved by retaking the test in a new attempt. Results are also visible to the teacher and administrator of the course, but not to the other student users.

PESTLE analysis of water crisis

PESTLE Analysis (Score: 63)

Knowledge Check

Score: 50

Question 0
Correct

Question 1
Correct

Question 2
Incorrect
Your answer:
Correct answer: groundwater

Question 3
Correct

Question 4
Incorrect
Your answer: 2050
Correct answer: 2030

Question 5
Incorrect
Your answer: false
Correct answer: true

Question 6
Correct

Question 7
Incorrect
Your answer:
Correct answer: holistic

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Figure 7 PESTLE module - Knowledge check results



6.2. Water-Energy-Land-Food and Climate Nexus for resource efficiency

This eLearning module aims to explain the Nexus approach and interconnection of the water, energy, and food by utilizing the SIM4NEXUS serious game. First, the overview of the NEXUS approach is given to the students (Figure 8).

Review mode

Water-Energy-Land-Food and Climate Nexus
for resource efficiency

SIM4NEXUS (Score: 17)

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The NEXUS Approach

Managing and availability of water, energy, land and food resources rely on each other, and all of them on supporting ecosystems.

The Nexus approach refers to coordinating, integrating and cost-effective planning and management of natural resources between the sectors. Properly addressed exchange and smart synergy achieving can provide more optimal total resource safety compared to traditional fragmented approach.

The Nexus approach aids in recognizing the benefits and synergies in natural resources management in order to achieve:

- Water, energy and food safety
- Preserving ecosystems and their functions
- Increased climate resilience

It is entirely in compliance with and supports Agenda 2030 and the transition of countries to green economy.

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Figure 8 SIM4NEXUS - The Nexus approach

The slides are followed by the video lecture “Sustainable Integrated Management for the Nexus of Water-Land-Food-Energy-Climate for Resource Efficient Europe: the SIM4NEXUS project” by Professor Chrysi Laspidou from UTH (Figure 9).

Review mode

Water-Energy-Land-Food and Climate Nexus
for resource efficiency

SIM4NEXUS (Score: 17)

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Sustainable Integrated Management for the Nexus of Water-Land-Food-Energy-Climate for a Resource Efficient Europe: the SIM4NEXUS project

Water4Cities SIM4NEXUS UNIVERSITY OF THESSALY

Water4Cities Webinar
Chrysi Laspidou
Associate Professor
Civil Engineering Dept.
University of Thessaly
Member of the Steering Committee
of the Nexus KAN of Future Earth
Sept. 19, 2018

0:00 / 53:20

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Figure 9 SIM4NEXUS - Professor Chrysi Laspidou's lecture about the Nexus of Water-Land-Food-Energy-Climate

Afterward, the SIM4NEXUS serious game is introduced with multiple videos, external links, role division for the groupwork task, directions for playing (Figure 10) and results slides template that students should fill and send to the teacher.



Review mode

Water-Energy-Land-Food and Climate Nexus
for resource efficiency
SIM4NEXUS (Score: 17)

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Step 2. Login to the game

1. Use the link <http://seriousgame.sim4nexus.eu/>.
2. Login with "Play as guest"
3. Select Greek case study on the map
4. Select **Normal** mode → Play
5. Complete Pre-Game questions

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Figure 10 SIM4NEXUS - Instructions for playing the game

The concluding part of the module is the knowledge check (Figure 11) evaluating the attained information about the connection of the individual components of the Nexus of water, land, and energy.

Review mode

Water-Energy-Land-Food and Climate Nexus
for resource efficiency
SIM4NEXUS (Score: 17)

Knowledge Check

Considering that a Mediterranean country is water-stressed, what would be better for farmers to cultivate?

Cotton
 Pulses
 Maize

Which irrigation system is better for farmers to use in order to combine low-cost and water savings?

Sprinkler
 Drip
 Furrow

Water plays a key role in energy production for...

Industrial cooling
 Hydroelectric plants
 Energy crops
 All the above

Which of the following is a threat of elevated ocean levels? Select all that apply

Submersion of coastal property and infrastructure
 Coastline erosion
 Stronger droughts
 Saltwater intrusion into freshwater aquifers

Which of the following is true about the relationship between land and renewable energy? (Select all that apply)

Renewable energy often requires a lot of land.
 Renewable energy generation sites are often suitable for dual use.
 Renewable energy generation sites are mostly located in densely populated regions or those that compete with land for agriculture.
 Renewable energy always damages the land it requires.

Which best describes primary energy?

Primary energy is the first choice of energy by power plants.

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Figure 11 SIM4NEXUS - Knowledge check

The student can see their results and, if they desire, make a new attempt to retake the test and improve their results.

6.3. Adaptive planning for Infrastructure and Water Management

The module Adaptive Planning deals with the topic of planning water utilities for the future and shows this process by using the serious game Adaptive Planning.



The Introduction offers video material about the process of Adaptive planning and the Adaptive planning serious game (Figure 12).

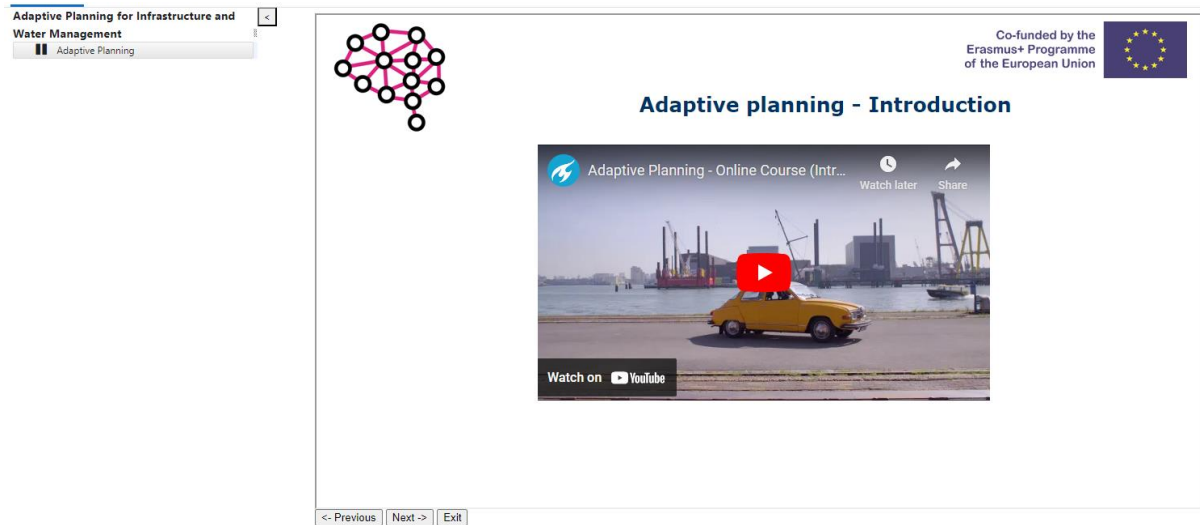


Figure 12 Adaptive planning - Introduction video from TU Delft

The second part of the module is reserved for the theoretical background of adaptive planning, shown in the example of Oslo (Figure 13).

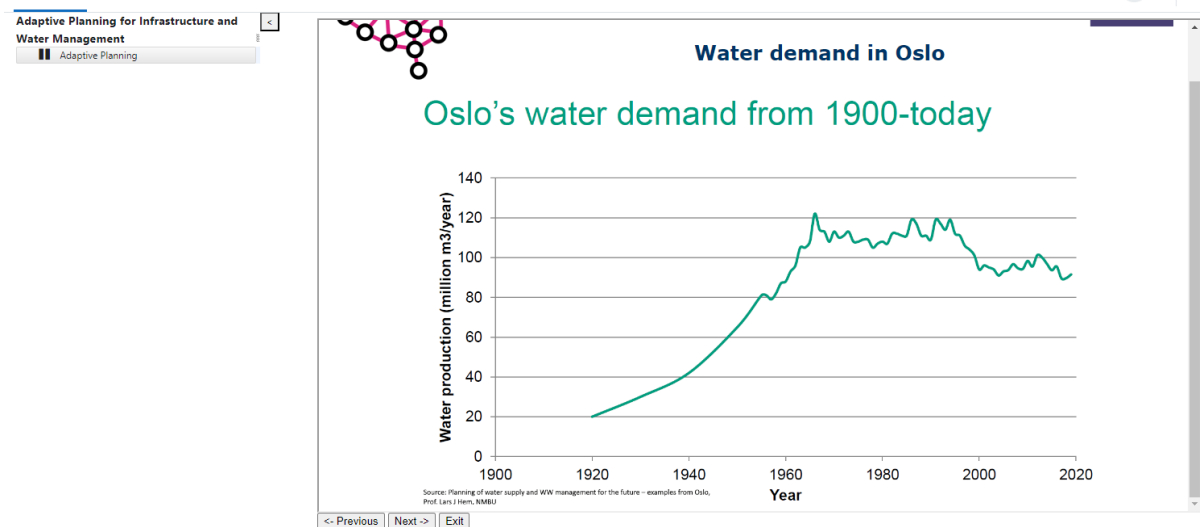


Figure 13 Adaptive planning - Theoretical background

Detailed information about the Adaptive panning serious game is given in the following segment of the module (Figure 14).





Figure 14 Adaptive planning - Instructions for playing the game

The last section is the knowledge check, available for retaking in the case of dissatisfaction with the results (Figure 15).

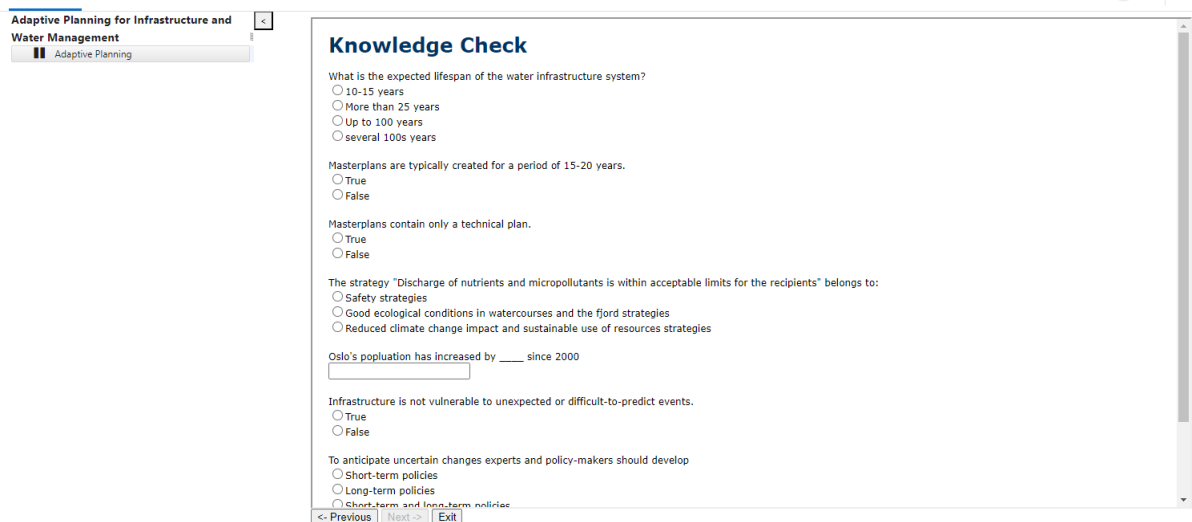


Figure 15 Adaptive planning - Knowledge check

6.4. Water Quality Monitoring

Given that the Water Quality Monitoring module is based on the eponymous workshop, the topics processed are modern analysis techniques for water pollutants, and Water quality monitoring, including sampling and online monitoring.

The first segment deals with the topic of sampling and online monitoring (Figure 16), while the second segment reviews the topic of modern analysis for water pollutants (Figure 17).



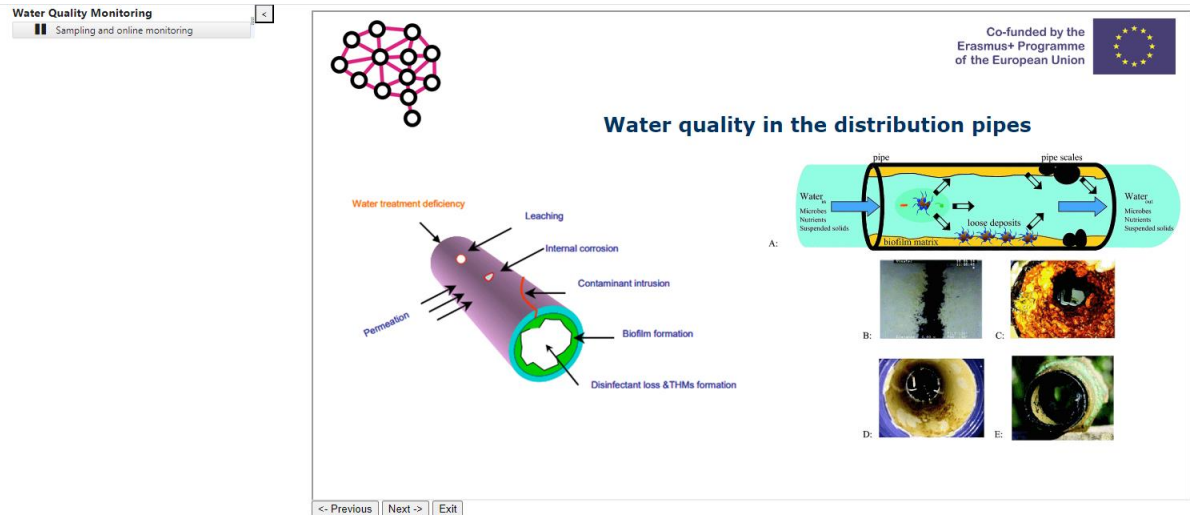


Figure 16 - Water quality monitoring – sampling and online monitoring

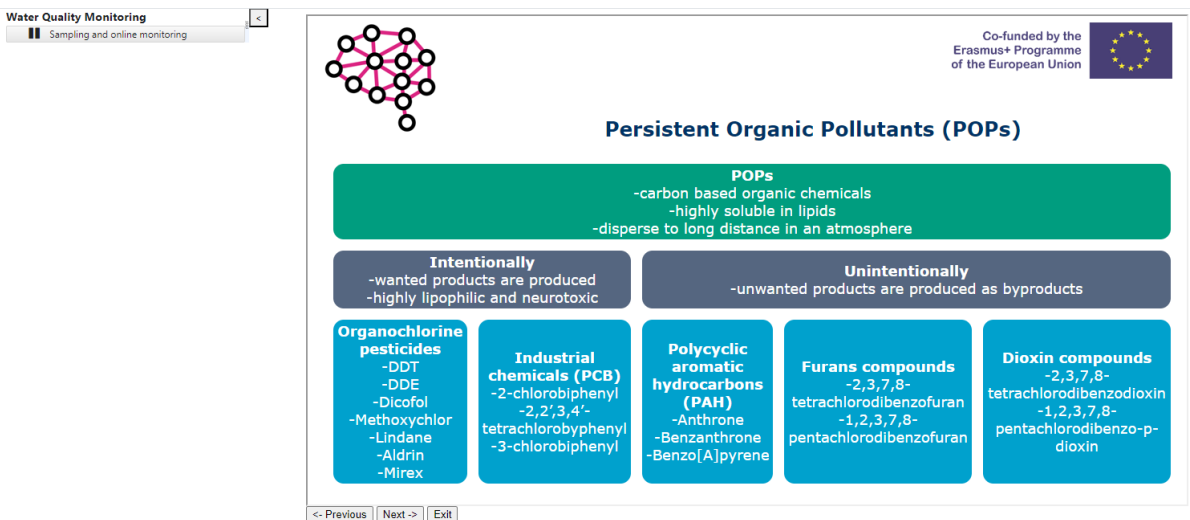



Figure 17 Water quality monitoring - modern analysis techniques for water pollutants

Designing a water quality monitoring plan using Miro digital tool is the group work task in this module (Figure 18).



Water Quality Monitoring
Sampling and online monitoring

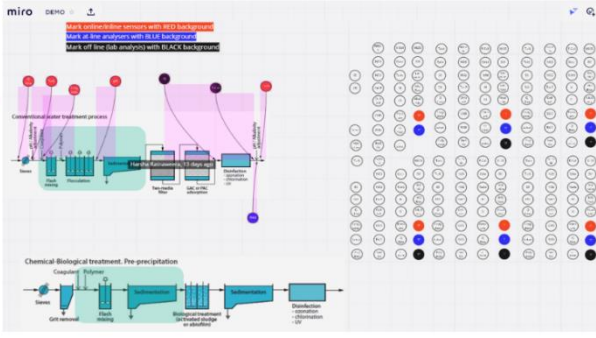
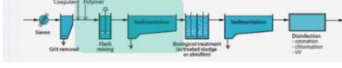
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Groupwork task

The groupwork task is to design a water quality (WQ) monitoring plan by exploring two options:

- The conventional water treatment process.
- The chemical-biological treatment.

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Figure 18 Water quality monitoring - Groupwork task instructions

Knowledge check that evaluated the acquired knowledge in the water quality monitoring field is the final segment of the module (figure 19).

Water Quality Monitoring
Sampling and online monitoring

Knowledge Check

One of the reasons for water quality analysis and sampling is to monitor specific risk points and problem areas on the collection/distribution systems.
 True
 False

Which of the following options best describes Time-proportional test in Water Quality analysis and sampling?
 A sample consisting of several random samples taken over a longer period of time, often over a day.
 One mixed sample which consists of equal samples taken at a constant time interval over a longer period, e.g. a sample every five minutes.
 The entire sample volume is taken out at once.

Which are the main types of uncertainty in an analysis result? Select all that apply.
 Uncertainty related to impurity
 Uncertainty related to sampling
 Uncertainty related to timing
 Uncertainty related to the chemical analysis

Sources of error in sampling are ____ and random errors.

Types of surveillance systems are at line, off line, online and ____.

POP is short for Persistent Organic Pollutants
 True
 False

Which of the following is not a sample preparation technique
 Dispersive liquid-liquid microextraction
 Molecularly imprinted materials
 Evaporation extraction
 Cloud point extraction

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Figure 19 Water quality monitoring - Knowledge check

6.5. Risks Arising from Digitalization in the Water Sector

This module introduces the concept of digitalization in the water sector, the benefits and risks arising from this process and uses the GroupMap Risk Assessment template to analyse potential risks in digitalization and appropriate actions.

The first part of the module is dedicated to digitalization in the water sector and the resulting benefits (Figure 20).





Water digitalization as a top priority for utilities in post-Covid world

- Global mission should be to lead the change in building a Water Smart and Resilient world.
- There is a need for understanding and discussion around the critical challenges in the water sector and how Smart water meters and how Digitalization of Water can lead to the future development of the water sector.
- Handwashing and sanitization safety and health protocol under COVID-19 **increased a daily use of 20-40 litres** if per person cleans their hands at least 10 times a day instead of the average 5 times per day. This generates a 20-25% **increasing in water demand, generation of wastewater from human settlements and additional pressure on overstretched water utilities.** Result would be **further exploitation of goundwater.**
- Digitalization of water can be the greatest resolve for utility bodies to **fight the water stress and avoid Day Zero.**

Figure 20 Digitalization risks - Introduction to digitalization in the water sector

The following section introduces risks associated with digitalization, especially cybersecurity related risks and proposed actions to prevent, respond and recover from these attacks.



Figure 21 Digitalization risks - Risks arising from digitalization

The last two sections are focused on real-life examples of cybersecurity breaches in water utility companies. The first video lecture is concerned with one specific incident that, fortunately, didn't end badly (Figure 22).





Figure 22 Digitalization risks - Explanation of a real world cyber-attack example

In the second video lecture the user is walked through the key cybersecurity issues facing water utilities today, and the technology needed to address them (Figure 23).

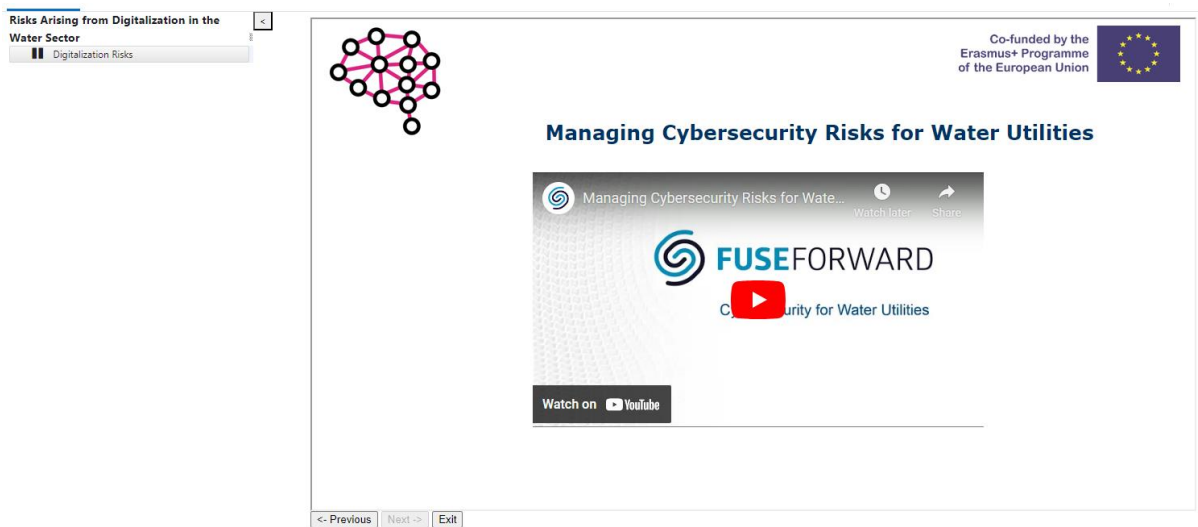


Figure 23 Digitalization risks - Video about key cybersecurity issues in water utilities


6.6. Circular economy

The Circular economy module deals with topics of sustainability, resource recovery, circular economy, and bio-economy, all within the domain of wastewater management.

The theoretical background segment of the module consists of three parts: the broad picture (Figure 24), energy recovery and nutrient recovery (Figure 25).



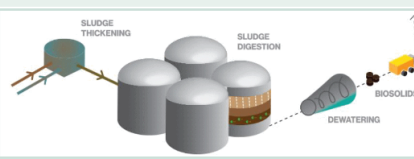
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How to handle and process sludge?

Handling or Processing Method	Function
Pumping	Transport
Preliminary operation (Grinding, screening, degritting, storage)	Particle size reduction, removal of fibrous material and grit, sludge homogenization
Thickening	Volume reduction
Stabilization	Stabilization, mass reduction, resource recovery
Conditioning	Improve dewatering
Dewatering	Volume reduction
Advanced thermal oxidation	Volume and mass reduction, resource recovery
Biosolids application to land	Beneficial use and disposal
Conveyance and storage	Transport and storage of biosolids


→ Anaerobic digestion: energy recovery



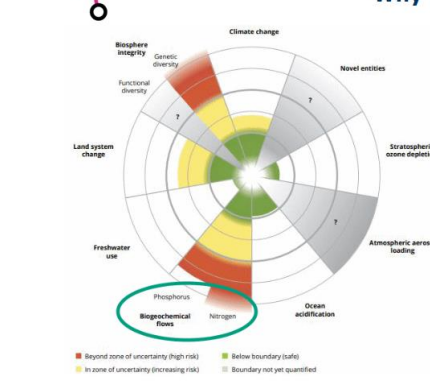
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Figure 24 Circular economy - Approaches in wastewater management

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Why recover nutrients?



Keep N and P flows within safe ecological boundaries:

- Nitrogen (N) and phosphorus (P) flows exceed planetary boundaries
- EU exceeding safe boundaries by a factor of 3.3 for N; by a factor of 2.0 for P
- Environmental pollution on water, soil, air
- Biodiversity and ecosystems services loss
- Human health risks
- Overall costs of Nr €70-€320 billion per year, of which 75% related to air pollution effects and 60% to human health

Source: Klasinc, 2021

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Figure 25 Circular economy - Nutrient recovery

The group work task instructions are given in the following section using Zoom break rooms as its only digital tool (Figure 26).



Circular economy
Circular bioeconomy

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Groupwork task

The groupwork task is to design a water quality (WQ) monitoring plan by exploring two options:

- Break out rooms to talk/think about the meaning of the following terms:
Sustainability
Resource recovery
Circular economy
Bioeconomy
- Select one spoke person who will be responsible of noting down key words of your discussion and share and explain
- The rules are simple : **DO NOT GOOGLE these terms** , do not search on the books/dictionary. Just tell or guess what these words remind you!
- 8 MIN discussion + 2 MIN WRAP UP for the spoke person

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Figure 26 Circular economy - Groupwork task instructions

The last section is reserved for the knowledge check and reviewing the results achieved (Figure 27).

Circular economy
Circular bioeconomy

Knowledge Check

The view of wastewater has shifted from waste to ____.

What are the resources in wastewater? Select all that apply.

Water
 Energy
 Light
 Nutrients
 Heat
 Land

Sludge characteristics vary depending on the origin of the sludge

True
 False

Globally, wastewater treatment consumes about ____ % of total energy consumption.

Anaerobic digestion can transform sludge to:

Energy
 Water
 Biogas

Pyrolysis is thermal degradation of molecules at low temperatures and in the absence of O₂.

True
 False

What nutrients can we recover from wastewater? Select all that apply.

Vitamins
 Phosphorus

<- Previous | Next -> | Exit

Figure 27 Circular economy - Knowledge check

6.7. Incorporating the modules into LMSs

One of the main advantages of the SCORM model and standard is the easy integration of the developed packages in different LMSs and reusability in different courses. The process of adding a SCORM package to an LMS course is relatively easy and similar in different LMSs. However, for the sake of clarity, the process of adding a SCORM package as an activity in an online course is described for three globally most used LMSs: Moodle, Canvas and Blackboard.

6.7.1. Moodle

In order to add a SCORM package as an activity it is first necessary to turn on the Edit mode by clicking the switch shown in Figure 28. Afterward, the option to add a new activity will be shown (Figure 28).



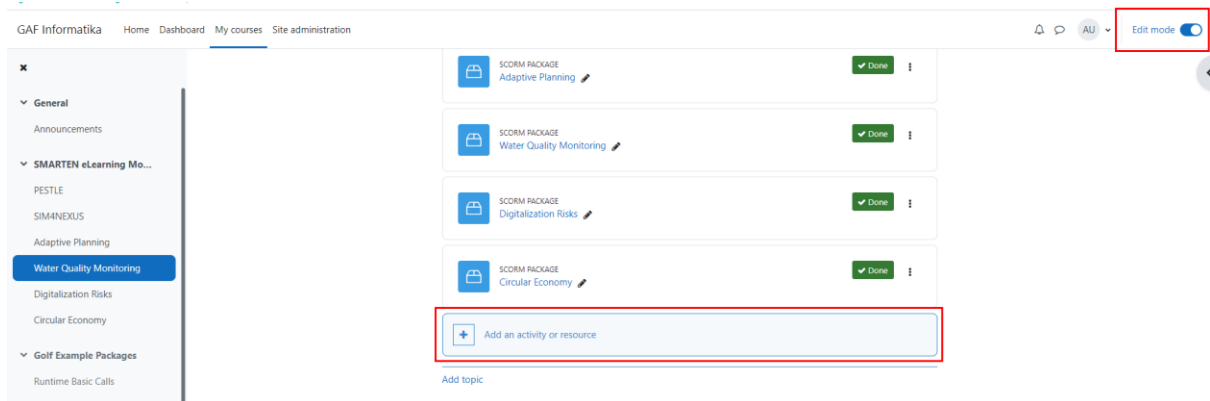


Figure 28 Moodle - Adding an activity to a course

After clicking on the link, a window with all available activity types will be shown. Click on the SCORM package option (Figure 29).

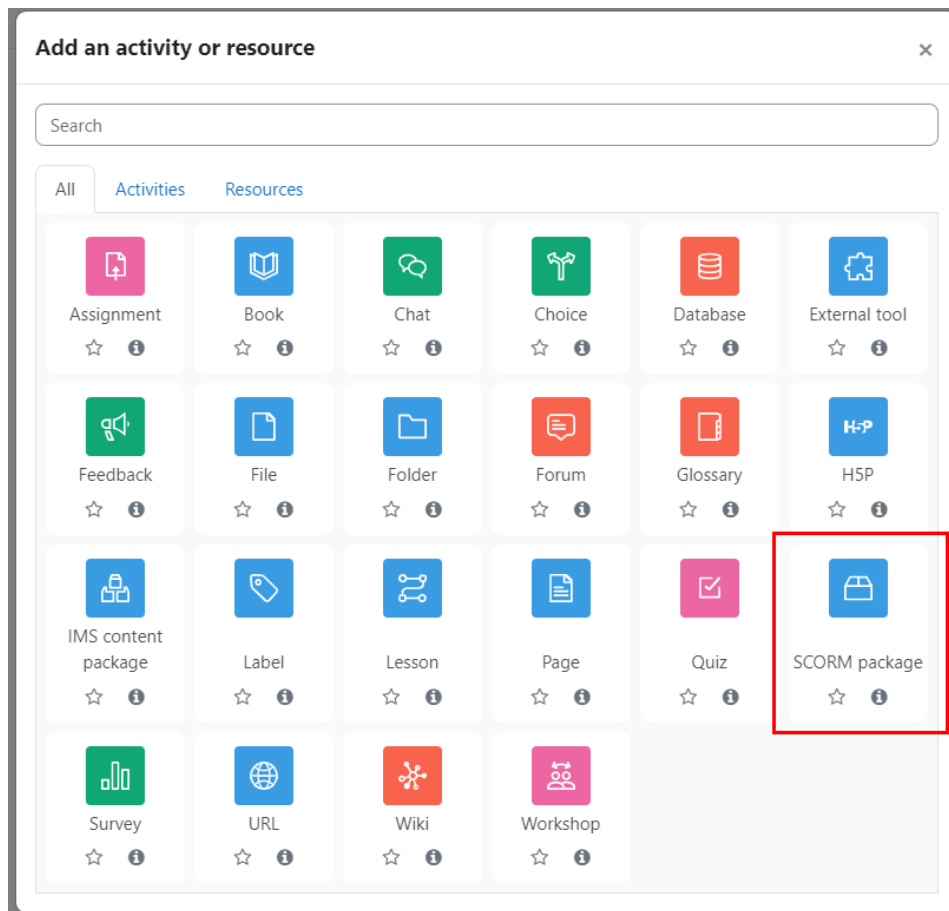


Figure 29 Moodle - Choosing SCORM package as an activity type

When the page for adding a SCORM package is loaded, define a name for the package and click on the button shown in Figure 30 in order to open the upload form.



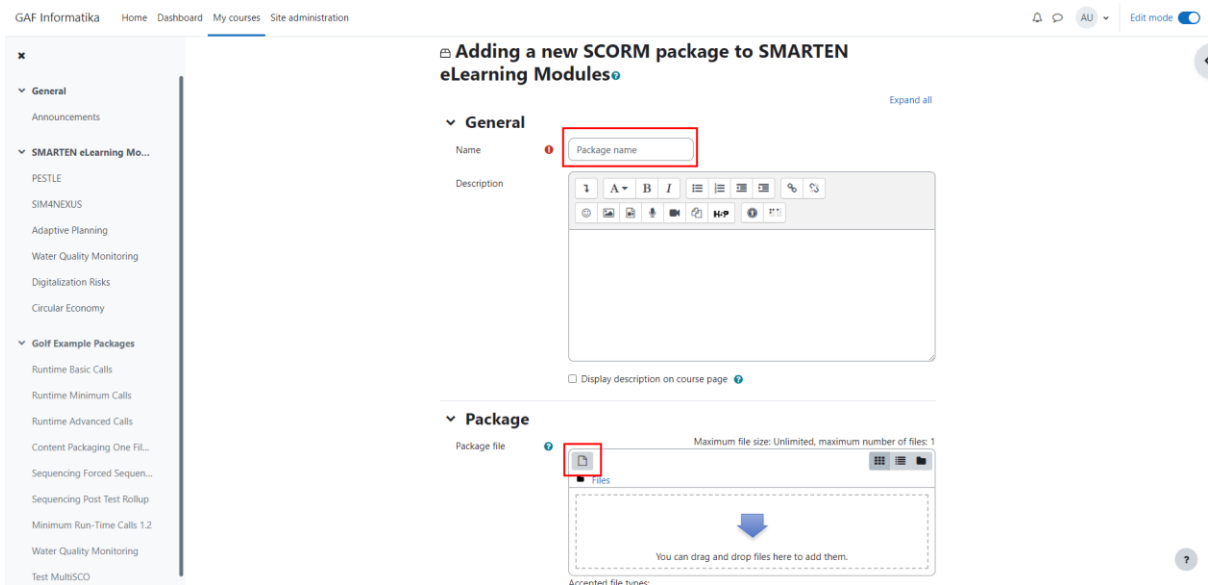


Figure 30 Moodle - Adding a package name

In the upload form, click on the Choose file button, browse to the desired file, select it and click on the Open button (Figure 31).

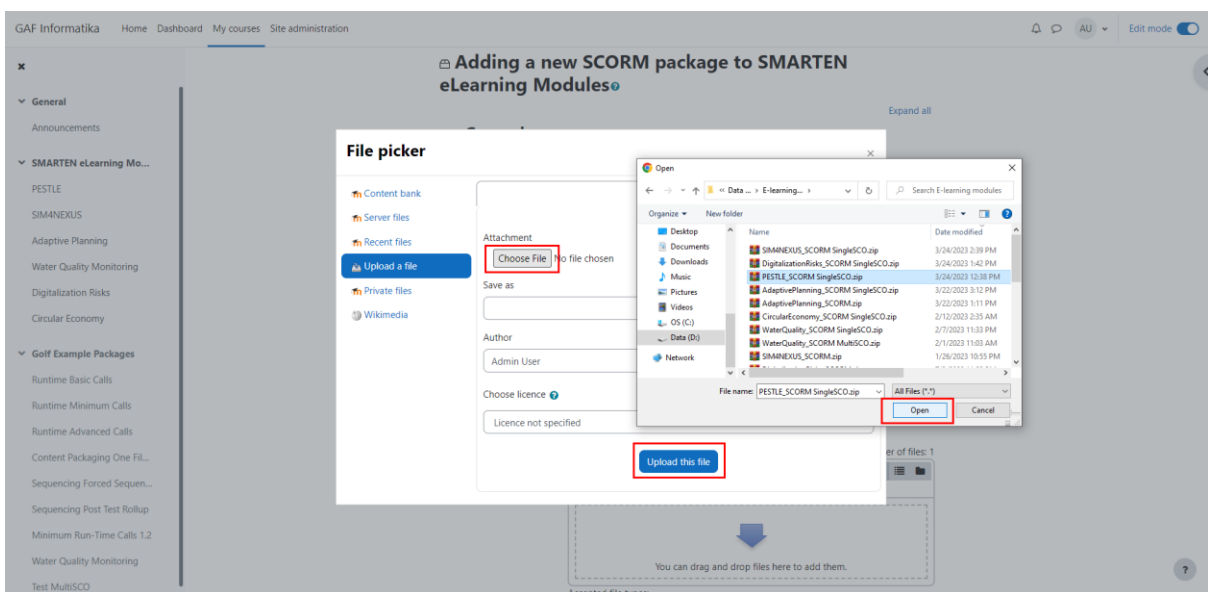


Figure 31 Moodle - Uploading the SCORM package file

After the upload is finished, click on either of the buttons Save and return to the course and Save and display (Figure 32).



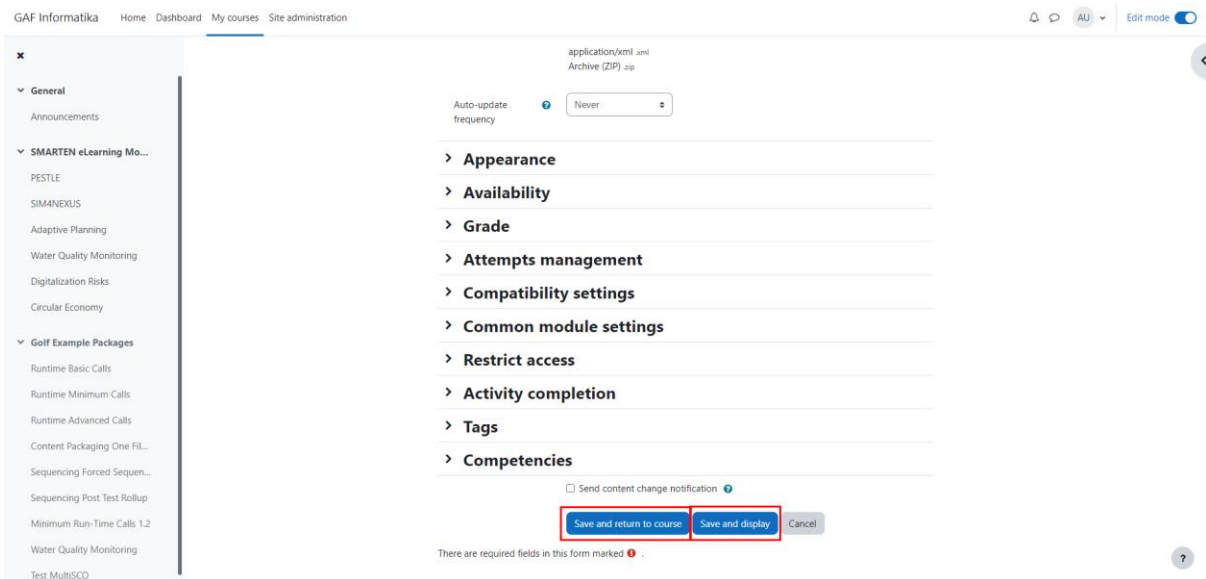


Figure 32 Moodle - Saving the activity

6.7.2. Canvas

If the institution has enabled the SCORM LTI, you can upload SCORM ZIP files as assignments and as pages in your course (per the applicable package content). SCORM is a technical standard for many e-learning products and is often used to create course content. Once enabled, the SCORM Link will appear in the Course Navigation menu. SCORM packages are imported as External Tool Assignment submissions.

To enable your SCORM content as a stand-alone HTML site, you may need to re-export your SCORM content.

In Course Navigation, click the SCORM link (Figure 33).

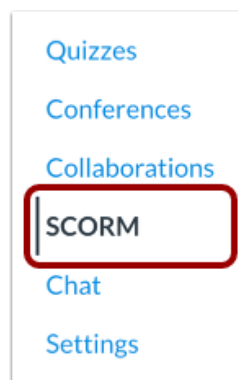


Figure 33 Canvas - Selecting SCORM in Course navigation

Click the Upload button (Figure 34).



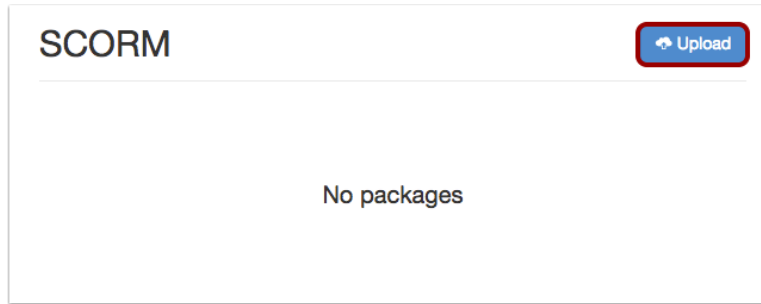


Figure 34 Canvas - Upload button

As in Figure 35 select the file from your computer (1) and click the Open button (2).

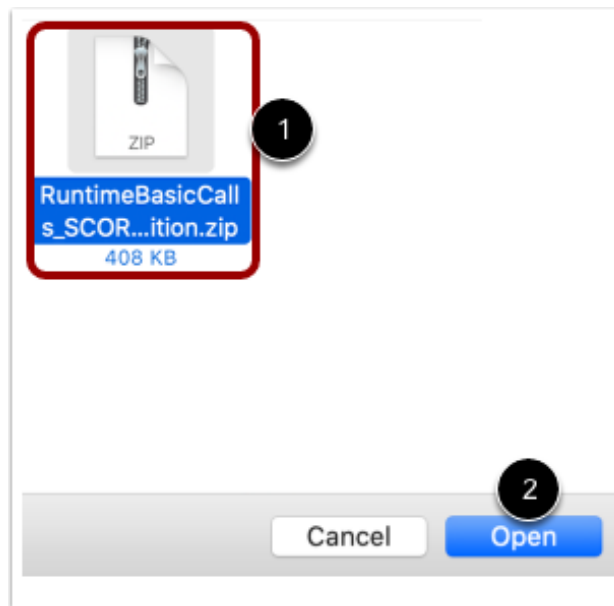


Figure 35 Canvas - Adding the SCORM package file

Once the file is uploaded, select the object import type. Click the Choose Import Type menu (Figure 36) and select an option. You can import the file as a graded assignment, an ungraded assignment, or a page.

Note: The import type selected when importing a SCORM file is permanent and cannot be changed in Canvas. If a SCORM file is uploaded as an ungraded assignment, the assignment is not worth points, the assignment is not added to the gradebook, and students cannot earn a grade for the assignment.

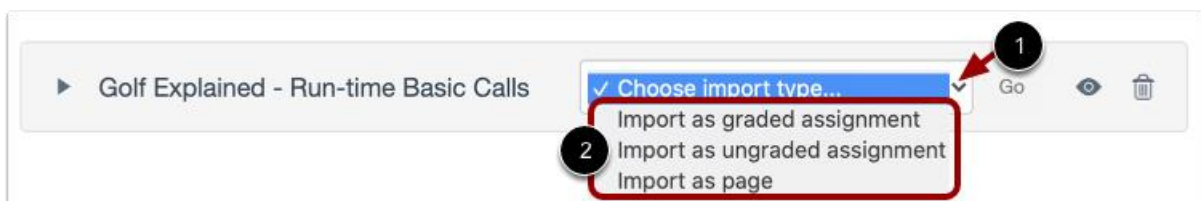


Figure 36 Canvas - Selecting the import type

Click the Go button (Figure 37).



Note: If content does not immediately load, your LTI tool may need to be reconfigured. Please contact your admin for assistance.

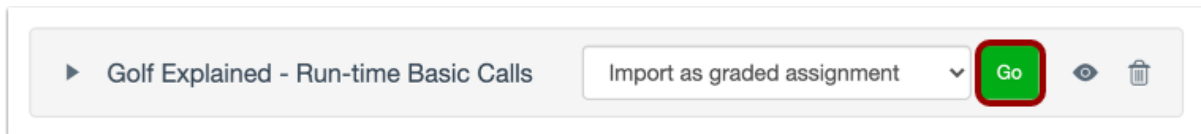


Figure 37 Canvas - Go button

To view the assignment in Canvas or to edit assignment details, click the Assignment icon (Figure 38).

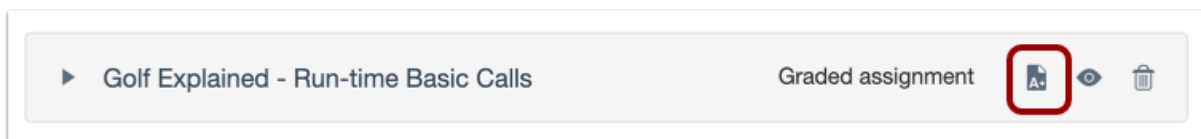


Figure 38 Canvas - Viewing the assignment

Imported SCORM assignments also display on the Assignments Index page (Figure 39). Once imported, you can move the assignment to an assignment group and add it as a module item.

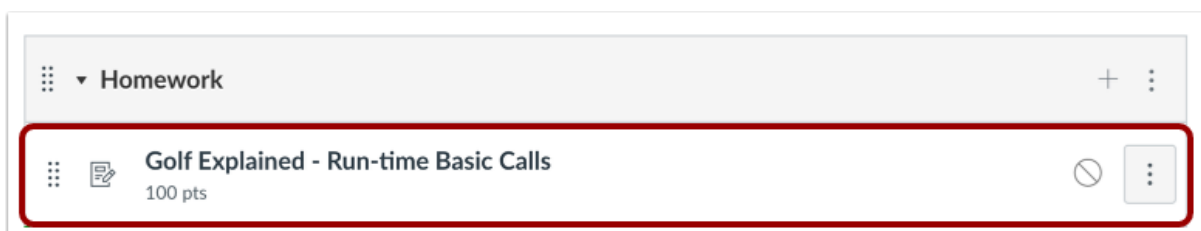


Figure 39 Canvas - Viewing the assignment in the Assignments Index page

6.7.3. Blackboard

Your institution controls whether the SCORM Engine is enabled. If enabled by your institution, the SCORM Engine B2 becomes the default content player for all newly uploaded content packages, as well as any existing content packages that are re-uploaded.

The SCORM Engine supports content that conforms to the SCORM 1.2 standard, the SCORM 2004 standard, as well as AICC and the playing of Tin Can API packages. Blackboard Learn currently doesn't include a Tin Can Learning Record Store (LRS) however basic data passed will be viewable in the gradebook.

You don't need to determine ahead of time what the content type is, as the additional content option uses the same process for all supported types. For example, in the case of uploading IMS content packages, a message may appear saying Some issues were found with this course which may affect playability and a sub-message that the package isn't in SCORM format and it will assume it's an IMS Content package.

Add a SCORM package to your course the same as any other piece of content.

1. On the Course Content page, select the plus to add content (Figure 40).



2. In the menu, select Create to open the Create Item panel. Select the SCORM package.
3. In the SCORM Settings panel, select Upload SCORM package or Browse Content Collection.
4. Locate and select the SCORM package to upload.

After the file has been uploaded and checked, the SCORM Settings panel appears where you can set the content package details.

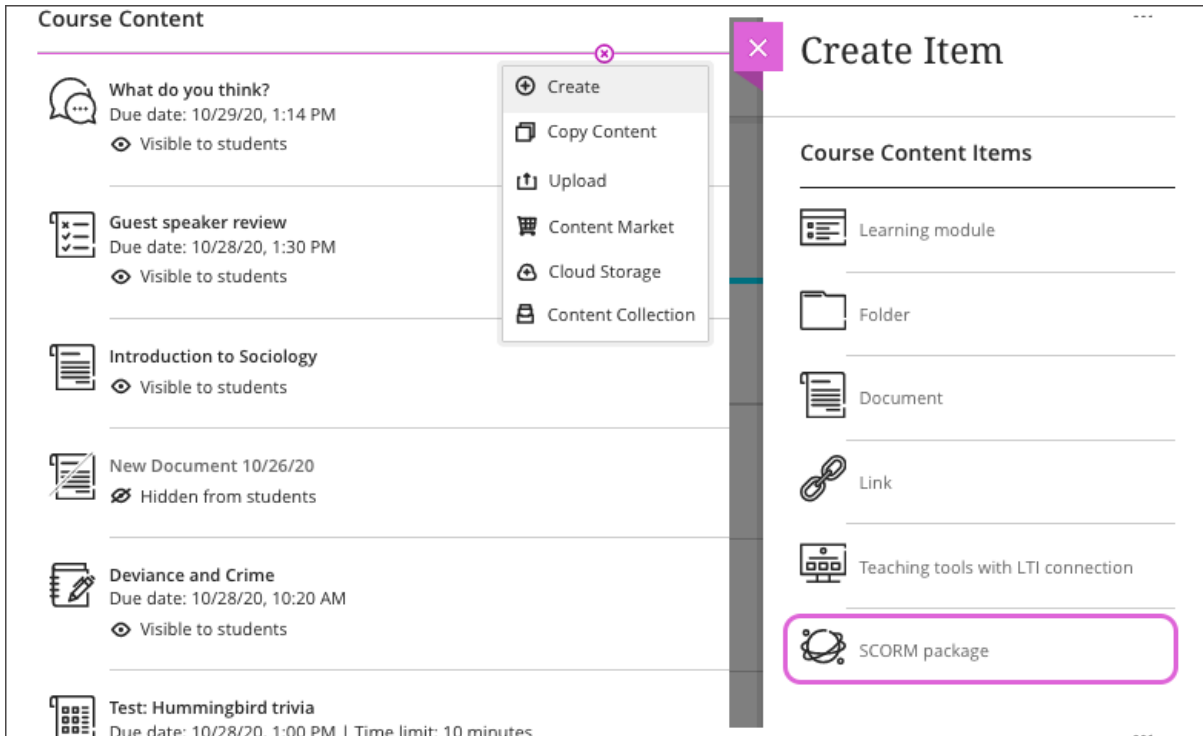


Figure 40 Blackboard - Adding a SCORM package

1. In the Details & Information area, type a Title and select Due date. You can also allow class conversations for students to have quick exchanges about the SCORM package.
2. In the Grading & Submissions area, select the Grade category and number of Attempts allowed (Figure 41). By default, a graded SCORM with multiple attempts uses the Last attempt with a grade to determine the final grade. You can't change this setting.
3. Select Grade SCORM to add a gradebook entry for the package. Select the grading schema and maximum score. You can't change the grade settings after you import the SCORM.
4. Select Grade individuals SCOs to add a gradebook entry for selected parts of the SCORM package. When you select this option, the list of SCOs within the package appears. For each SCO you select, you can also select the grading schema and maximum score.



Grading & Submissions

Grade category
Homework


Attempts allowed
1

Grade SCORM

Grade using
Score

Maximum score
100

Grade individual SCOs
Create a gradebook entry for individual SCOs in the SCORM package.

1 Climate Change: Energy and Environment - Index 

Grade using
Score
 Score
 Completion
 Satisfaction

Maximum score
100

Reveal grade
On SCORM completion
 On SCORM completion
 On SCO completion (First attempt)
 On SCO completion (Last attempt)

Figure 41 Blackboard - Grading & Submissions area

5. When you grade individual SCOs, the Reveal grade option appears. You can reveal the grade to students after SCORM completion.
6. Optionally, type a Description.
7. Select Save to finish the import.

After you import the SCORM package, you can change its visibility, align goals, and edit other settings. You won't be able to change grading options after you import the SCORM package.

You can edit SCORM settings from the Course Content page and the gradebook (Figure 42). Open the menu and select Edit to open the settings. From the Grades & Submissions page, select the gear icon.

Show or hide the SCORM package - Students can't see a SCORM package until you choose to show it. You can create all your content ahead of time and choose what you want students to see based on your schedule. You can also set availability conditions based on date, time, and



performance on other items in the course gradebook. On the Course Content page, students can see when you set the SCORM to show.

Allow class conversations - What if your students have questions about a SCORM package? You can allow conversations within a SCORM package, and anyone can contribute. As the conversation develops, it appears only with the relevant content.

Change the grade category - You can change the SCORM's grade category to be part of one of the custom gradebook categories you set up in your course. You can create new categories to customize how coursework is grouped in your course. Custom categories can be useful when you set up the overall grade.

Determine the number of attempts - You can let your students submit more than one attempt at a SCORM. By default, a graded SCORM with multiple attempts uses the Last attempt with a grade to determine the final grade. You can't change this setting.

Add goals and standards - You can align a SCORM package to one or multiple goals. You and your institution can use goals to measure student achievement across programs and curriculums.

Add an optional description - The description appears with the SCORM title on the Course Content page.



Climate Change: Energy and Environment

SCORM Settings

Details & Information

Title

Due date

Allow class conversations

Grading & Submissions

Attempts allowed


Grade SCORM

Grade using

Maximum score

Grade individual SCOs
 Create a gradebook entry for individual SCOs in the SCORM package.

Additional Tools

 **Goals & standards**
You need to save the SCORM before you can edit the aligned goals. Save the SCORM and return.

Description

Figure 42 Blackboard - SCORM settings



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