ANGEL

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R2.6. ANGEL Guidance (i.e. VLE)

WP2 Setting up the ANGEL Ecosystem

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Project Information

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Executive Summary

The ANGEL Guidance report provides a comprehensive overview of the online platform, detailing the user requirements, system specifications, and key features that support its functionality. It provides explanations regarding the design and development process of the platform, highlighting how it was created to meet the needs of users engaged in green entrepreneurship and leadership training across the ASEAN region.

The report also covers the modular online content available on the platform, which is designed to facilitate microlearning and ensure an engaging experience for users. Furthermore, it explains how the Open edX system, the platform's technical architecture, enables efficient course delivery, user progress tracking, and certification. Through this report, readers gain insight into how the ANGEL platform was developed to support the ANGEL project's objectives of fostering green leadership and entrepreneurship through high-quality, accessible online education.

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1 Introduction to the ANGEL VLE

The objective of this document is to present the contextual and technical aspects of the design and development of the ANGEL e-learning platform. The ANGEL e-learning platform followed the latest technology in Online Training to allow for collaborative interaction between its users through both learning and assessment activities. The ANGEL e-learning Platform is linked to the project website https://angel-project.eu/, and accessible at the subdomain: https://vle.angel-project.eu/.

ANGEL objectives

ANGEL aims to build the necessary capacity in eleven ASEAN Universities for balancing the high potential economic growth and innovation in the partner countries with their lack of capacities in green entrepreneurship as well as resolving entrenched issues and challenges of poverty, low-quality jobs in the informal sector, the digital divide and filling leadership gaps.

Its objectives are:

- to address green entrepreneurship and transformational leadership and social innovation challenges,
- to build a high calibre network of future green entrepreneurial leaders with effective and efficient styles of management, who will uphold ethics and good governance while being able to connect with the local/regional and international market ecosystem while producing a multiplier effect in the ASEAN region.
- With the above general aims of ANGEL, the project specifically undertakes the following objectives in the hope to develop an innovative green entrepreneurial-leadership ecosystem that will foster:
- Guidance: Creation of an online guide that will offer practical, personalized information for building and leading a green enterprise; a targeted training programme which will be complemented with personal coaching and will support the creation of start-ups.
- Engagement: Build a university network that will reach and mobilize both internal and external stakeholders through its ANGEL- Innovate Unit. Internal stakeholders will include faculty members, administrative staff, researchers, students and relevant external partners who will be social entrepreneurs, start-ups and government agencies that relate to green entrepreneurship.
- Exchanges and sharing: the ANGEL-Hub will be a centre for the development of early-stage start-ups in green technologies, energy and sustainable development.
- Support: the ANGEL-Enterprise team will have the mission to support and advance ANGEL in the long term through the development of expertise in the commercialization of Universities' knowledge and technology, and partnership-building with the external regional/national/international entrepreneurial ecosystem.

Methodology

The ANGEL online platform is based on the **Open edX software**. The Open edX software is an open-source technology focusing on learning easier and faster. It was created by MIT and

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Harvard university and was quickly supported by universities such as UC Berkeley, Georgetown and Stanford and companies such as Google and Microsoft.

This software platform is designed to engage students and teachers in an interactive and modular manner. It promotes active learning by using video snippets, interactive components, and game-like experiences.

Open edX powers edx.org MOOC portal with more than 6 million users, more than 500 available courses and around 50 involved international universities and business organizations and it is considered as a global success hosting blended and online courses all around the world.

The ANGEL MOOC was designed and implemented in an iterative manner. In order to understand and agree on the delivery of the final product several main factors had to be taken into consideration including:

- The main content development team consisted of 3 different groups with complementary areas of expertise that needed to be reflected in the content: Entrepreneurship, Financing and funding strategies, networking and family business.
- The MOOCs would be a completely 100% online learning experience. This affected the role of the instructor. The instructor should act more than a facilitator/mentor/moderator rather than a Professor lecturing on a campus class environment.
- All ANGEL online resources were released under the Creative Commons Attribution-ShareAlike meaning that a user has to:
    - Give appropriate credit, provide a link to the license, and indicate if changes were made. The user may do so in any reasonable manner, but not in any way that suggests the licensor endorses the user or his use.
    - Distribute his contributions under the same license as the original given any remix, transformation, or build upon the material.
    - From a technical point of view, the platform should be up and running 24/7 for about three years. During this wide uptime service duration, updates and maintenance tasks should also take place so the “maintenance tasks” should be implemented during low traffic time zones.

It was clear from the very beginning that the realisation of such a complex process should take place in different and concrete steps including small iterative cycles where it was feasible.

ReadLab, as coordinator of the development of the MOOC platform, adopted the main points of the ADDIE instructional design model, towards splitting the tasks between the different actors and facilitate parallel work for time effectiveness. The key phases of the ADDIE model are depicted in the following picture.

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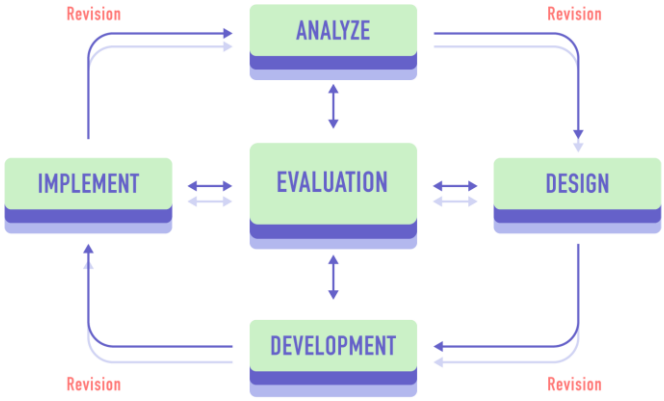

Figure 1 ADDIE instructional design model (Wikipedia)

Design

During the design phase and based on a set of learning objectives the following key concepts were defined:

Instructional strategy.

The main outcome was to combine various resources and tools for delivering the content and be able at the same to allow flexibility on module level. The majority of the modules were designed to include video lectures as the basic delivery method, while the rest of the modules were structured around a combination of text/pdf and short videos – including external sources. The instructional strategy was reflected in the Course Outline template where a clear learning sequence per lesson was defined.

Horizontal aspects.

All modules included a set of assignments at the end. In addition, all video lectures included downloadable scripts and subtitles. All pdf files were downloadable.

User engagement.

Engagement of learners strongly depends on the user experience of the online course. A user-friendly interface along with a clear learning sequence design ensured a smooth flow of topics and builds on learned concepts and ideas. Each lesson was unlocked upon successful completion of the previous one, in an effort to create “internal goals” during the participant’s learning path. Learners were encouraged to create their own material and content (Final assignment).

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Development

During the development phase the platform (OpenEdx) was installed and configured according to the design specifications. The developed content followed the micro-learning approach and was split in several learning components.

Define roll-out timeline. The final dates of each MOOC were depending on the progress of the two major tasks:

- Installation, user acceptance testing and configuration of the learning platform
- Development of the content and integration into the platform.

The first, stand-alone, task was finalised before the actual learning material was developed. ReadLab created a testing environment for deploying and testing the needed features of the application. Internal testing and manual QA tasks were performed in order to ensure stability and smooth operation of the application. The next step was to deploy the application to an identical environment - "production environment" – where the learning material would be hosted.

The second task was implemented in short iteration cycles. The work was organised around the "first come – first served" concept. Each individual piece of learning material was created by the content developers uploaded in the platform and tested online.

Users profile

Upon its release the Asian project partners promoted the MOOC to their networks.

Figure 2 ANGEL MOOC launch

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The ANGEL MOOC has currently 425 registered users. Most of the users are undergraduate students from the partner ASEAN countries, with a higher gender representation in women (60% women, 40% men).

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2 Technical overview

The ANGEL learning platform is a web-based implementation for creating, delivering, and analyzing online courses. The platform has been installed on a dedicated server supported by ReadLab.

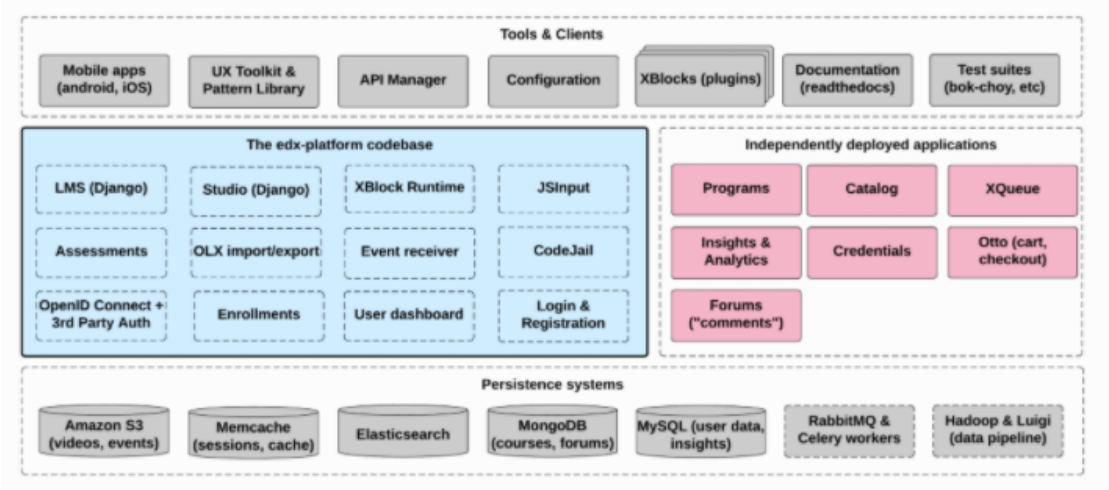

Figure 3 Open Edx reference Architecture

The platform is supported by a collection of autonomous web services called independently deployed applications (IDAs) in order to address scaling and expandability needs. The vast majority of the back end or server side services are implemented in python, the front-end is based on the Django web application framework, while the browser-side code is written primarily in Javascript supported by SaaS[1], Backbone.js[2] and Bourbon[3] frameworks. At the centerpiece there are the two key components: the ANGEL Learning Management System (LMS) and the ANGEL Content Management System (CMS). The CMS or Studio, is the authoring tool where the CCT creates, updates and manages the course. A number of several heavy tasks are performed by separate background workers rather than in the web applications themselves. These tasks are queued and distributed using Celery and RabbitMQ[4].

Examples of such tasks, that were performed in the ANGEL platform are:

- Generating distribution reports related to learner progress
- Producing Certificates of Course completion

The ANGEL learning platform supports the latest versions of the most common browsers. For best performance Chrome and Firefox were recommended. The application also supports the latest versions of Microsoft Edge, Microsoft Internet Explorer and Opera.

[1] https://sass-lang.com/
[2] https://backbonejs.org/
[3] https://www.bourbon.io/
[4] https://www.rabbitmq.com/

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3 The ANGEL Learning environment

Branding

The ANGEL platform is in line with the project's visual identity. This means that the front-end system is configured and developed according to the project's color scheme with the aim to provide a consistent look & feel. The landing page below present the branded version of the ANGEL training platform, which is available in 6 languages, English, Indonesia, Cambodian, Lao, Malay, and Vietnamese.

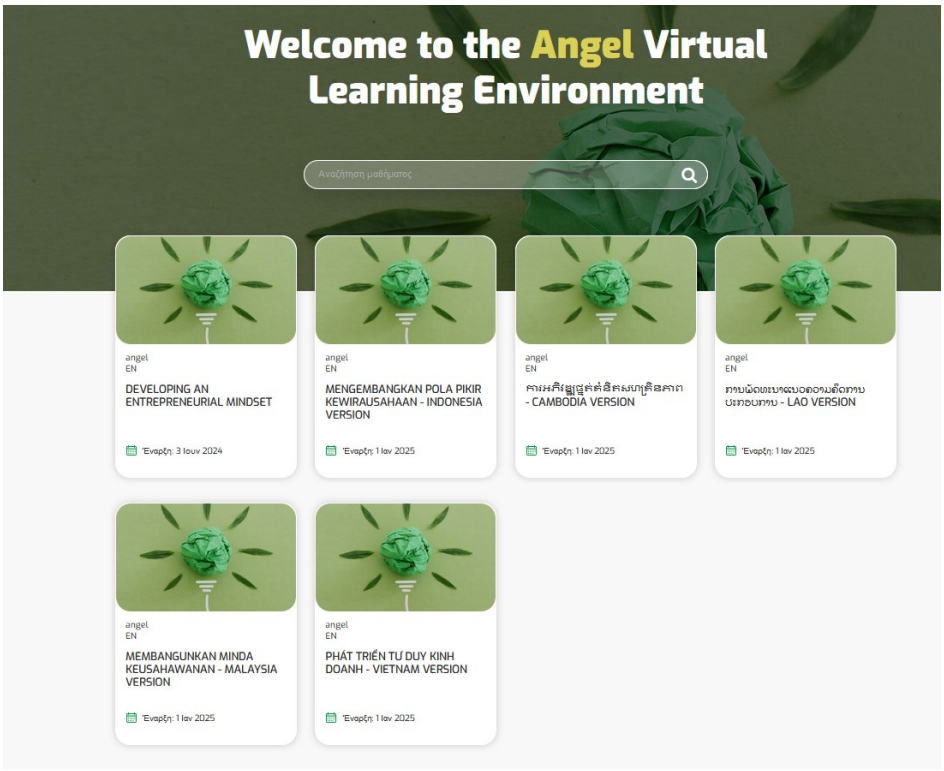

Figure 4 ANGEL MOOC landing page

Course description

The course description page includes the following information:

- A general description of the online course including pre-requisite information and target groups
- Main learning objectives and outcomes
- An overview of the course syllabus and the structure of the modules
- General information about the course including estimated effort, delivery language, course type, i.e. self-paced vs instructor paced, prerequisites and social media sharing.

The course description page is handled (edit, update) through the ANGEL CMS.

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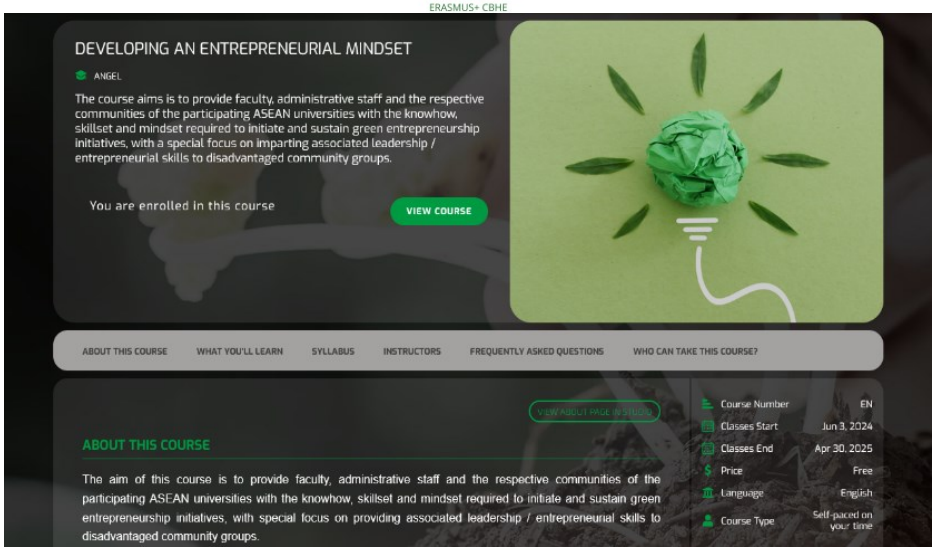

Figure 5 Course description web page

Registration

To get started the user needs to create or register an account to the ANGEL platform. Upon creating a ANGEL account, the user has then the possibility to access/enroll in all ANGEL available courses.

The registration functionality is a two-steps process. The user creates the account by filling in Email, Full Name, Public Username and Password. The second step is to activate his/her account through an activation link sent to his/her registration email. The registration process is performed only once. Having the account activated, the user can login/log out or change the password.

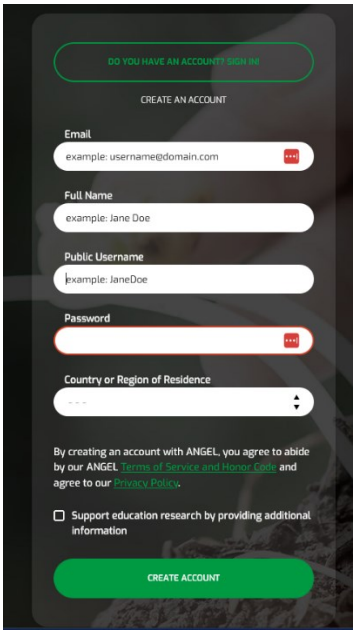

Figure 6 Registration form

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The ANGEL online course was open to all users around the world, targeting mainly students and university staff from Southeast Asian countries. The users upon registration had the chance to enroll and attend the ANGEL online course.

Account features

Each registered user had access to specific course contents, profile and account settings.

Dashboard. The dashboard provides information of the status courses where the user is enrolled. It includes, Start/End date, email settings and acquired certificates. The user has also access to the content of archived courses with limited functionalities e.g. no certifications are generated after course completion.

Account settings. Includes registration information and additional optional fields such as Education Completed, Gender, Year of Birth, and preferred language. Finally, through this feature the user can link or unlink his/her social media accounts to the ANGEL platform.

Profile Page. The profile page allows to share information with the ANGEL community by defining a full profile. The learners' profile can be displayed through the discussion page upon selection of its username.

Course content and navigation

Each registered user has access to course contents upon enrollment and given that the course is released. All ANGEL courses are open to registered users (Educators, students, professionals, self-learners).

The following section describes the structure of the ANGEL courses along with the underlying instructional design methodology and the navigation al capabilities of the platform.

The microlearning approach

The ANGEL user interface offers a brief course outline that help learners see the full scope of the course contents and facilitates the learners to return to the last content area they were viewing. In the following picture the outline of the "ANGEL: Developing an entrepreneurial mindset" course is presented. The course is structured in a modular manner and organized in sections (Weeks or Modules) and subsections (lessons).

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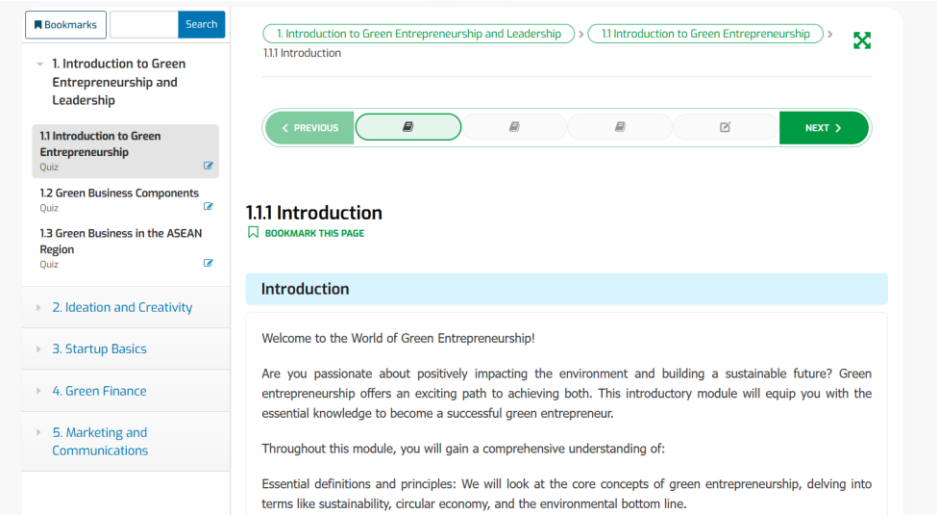

Figure 7 ANGEL Module outline

This is in line with the relatively new microlearning concept. With microlearning, the content is broken down into bite-sized pieces of learning material. This instructional approach is very efficient when incorporating various learning styles and the basic design elements adopted during the ANGEL online courses.

Modularity – navigational form

As a consequence of the micro-learning approach, the ANGEL training material was built up of many bite-sized components including different learning components. This was a major challenge as the content developers needed to switch from the traditional campus classes which are structured around hour-long lectures.

The modular approach is more suitable for online settings and provides several benefits. Learners can more quickly find compactly organized reference information about a specific topic without having to scroll through a bunch of texts or scrub through an hour-long video to find the one piece of information they were looking for.

Learning modules are organized so that learning material (e.g. video modules/reading material/PowerPoint presentations) alternate with exercises. This structure facilitates any updates or re-organizations needed during the course lifetime since it minimizes the impact on adjacent material.

In this context, the architecture of the ANGEL courses, included the following general building blocks:

- The course outline is the container for all the course content. The outline contains one or more sections.
- Course sections (Modules/Weeks) are at the top level of the course and typically represent a time period. A section contains one or more subsections.

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- Course subsections (Lessons) are parts of a section, and usually represent a topic or other organizing principle. Subsections are sometimes called “lessons” or “learning sequences”. A subsection contains one or more units.
- Course units are lessons in a subsection that students view as single pages. A unit contains one or more components.
- Course components are objects within units that contain the actual course content: Videos, reading material, problems/quizzes and discussion forums.

The ANGEL course consisted of 5 sections (modules) and several subsections (lessons and quizzes) per module.

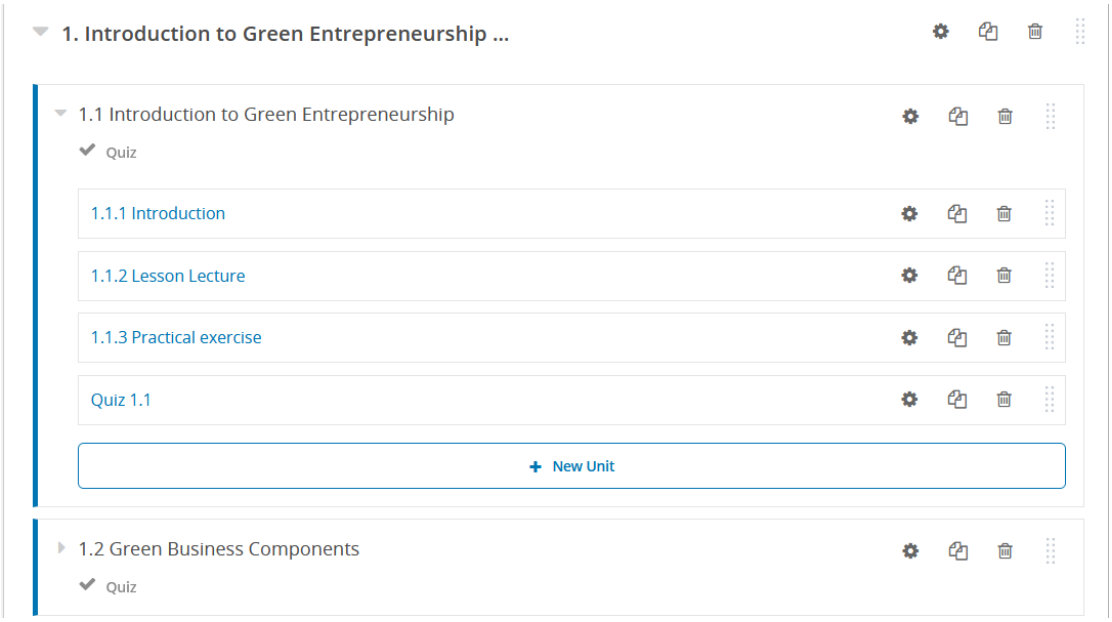

Figure 8 ANGEL Course structure

More specifically, the ANGEL course was structured around the following online modules:

- Module 1: Introduction to Green Entrepreneurship and Leadership
- Module 2: Ideation and Creativity
- Module 3: Startup Basics
- Module 4: Green Finance
- Module 5: Marketing and Communications

This structured approach helped to quickly switch between modules and lessons. Navigation between lessons during the learning process is intuitive and the learners could always see where they stand and how many lessons are left for the current lesson/subsection. In addition, it was easy to understand whether there were some assessments to complete. The following picture depicts a part of the course outline (Module 3) organised in three lessons. For each lesson there is a “tag” word notifying that the lesson includes a Quiz unit.

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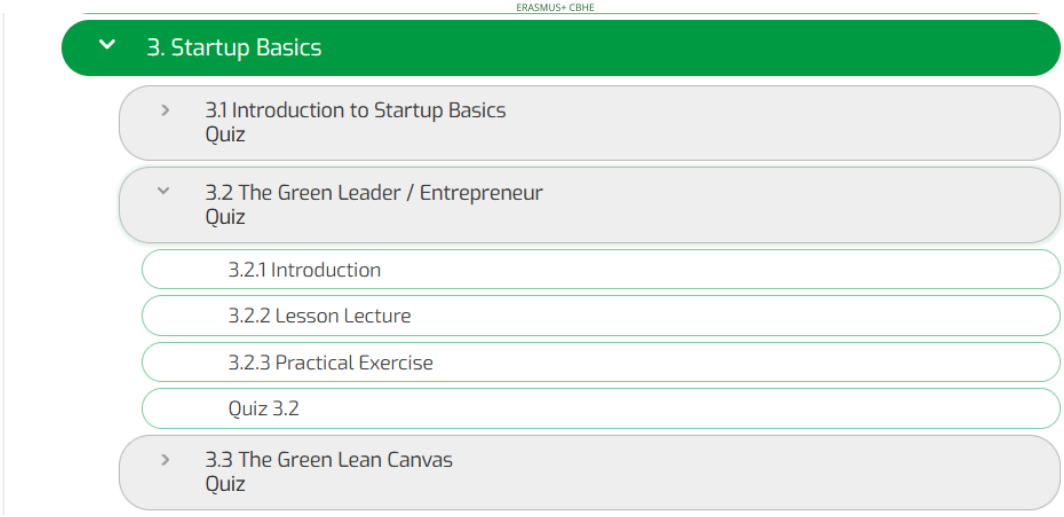

Figure 9 Example of course outline and navigation

Learning components

The following methods of delivering the learning material (Xblocks) were employed.

Html component

A significant part of the learning material was presented as text utilising HTML code that is formatted and presented by the supported browsers. The following picture displays an example of such a component. All relevant elements (headings, color, size, forn family, etc) are handled through the ANGEL Studio application and the built-in HTML editor.

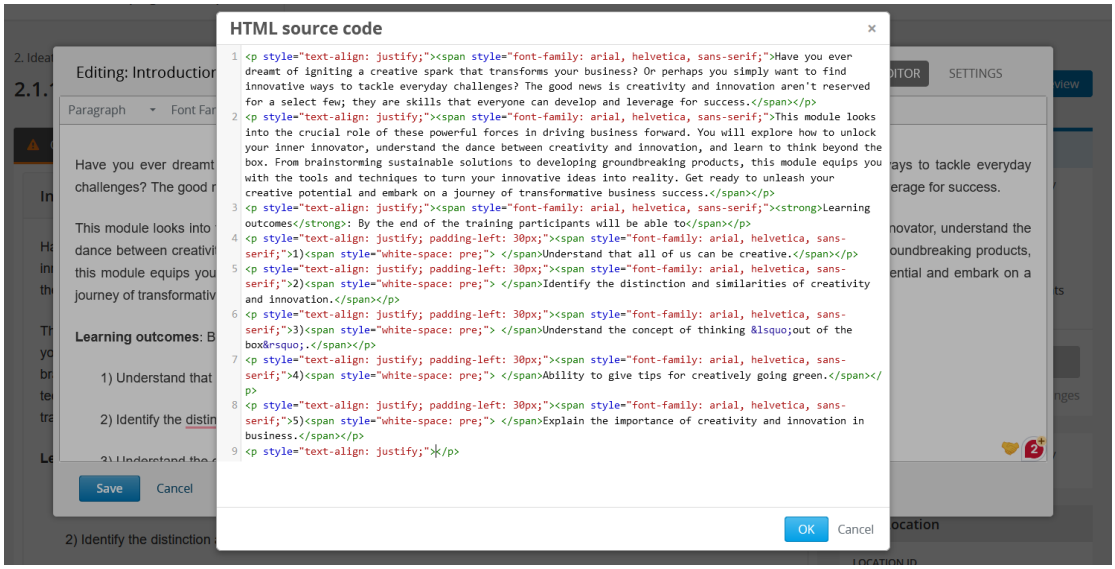

Figure 10 HTML component example

PDF component

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PDF component allows to integrate PDFs files into the MOOC environment. Each pdf is hosted in the MOOC platform and it is presented inside a single unit. The file can be directly scrolled, printed or downloaded by selecting the appropriate control buttons.

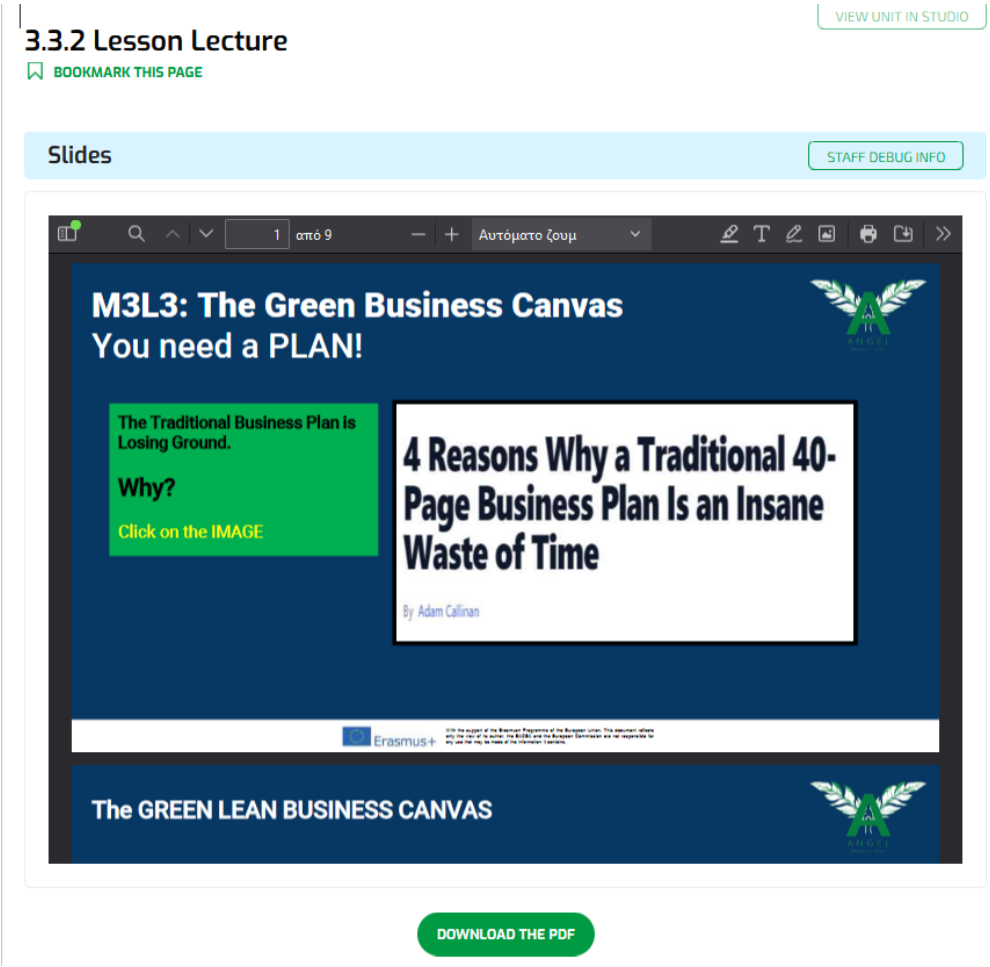

Figure 11 PDF component

Problem component

The assessment of the learners' progress was realised through a set of problem components in the form of multiple choice questions. At the end of each lesson (learning sequence) the user had the chance perform this kind of activity and acquire instant feedback. In addition, after the final submission the learner had the opportunity to see the correct answers.

The score obtained by the Quizzes contributed to 59% of the total grade (see section Grading Policy for more details).

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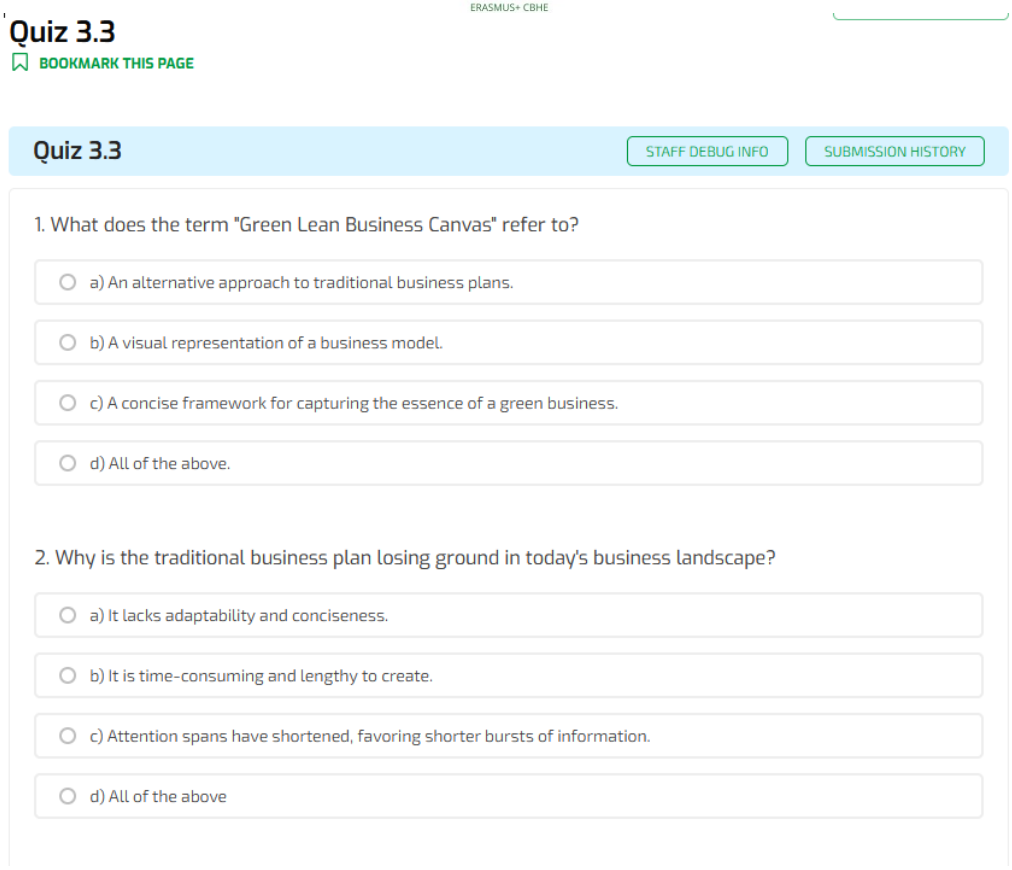

Figure 12 Quiz Component

Progress page

A dedicated web page was configured to display the progress of each learner. A column-based graph was automatically updated based on the results of the problems. The participant had the opportunity to check real-time his progress per specific problem and understand the level of progress achieved. The "passing" threshold was set to 60% of the total grade. Scoring above this threshold, the participant was able to claim his online certificate of course completion through the progress page. A total of 15 quizzes are displayed in the progress page highlighting the individual and total scores achieved.

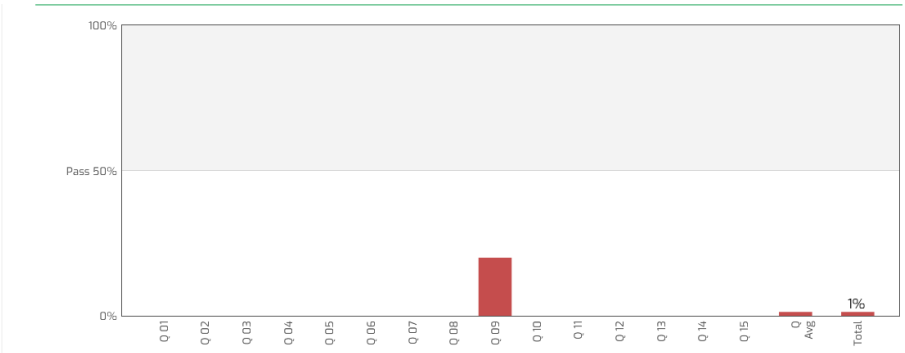

Figure 13 Learner Progress dashboard

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4 ANGEL Course Management

This section describes the built-in tools and features used throughout the ANGEL MOOC duration. The features were available to all Course Team members and the main operations were performed both from the LMS and CMs applications.

Instructor dashboard

Course management was mainly performed through the Instructor Dashboard in the LMS. The following features were configured in order to be accessible be the ANGEL Course Team.

Review Course information. This dashboard provided information regarding the current enrollments, the total number of sections, the grade cut-offs, Course start and end dates, etc. This feature was used by all instructors since they were able to have a quick overview on the basic figures of the MOOC.

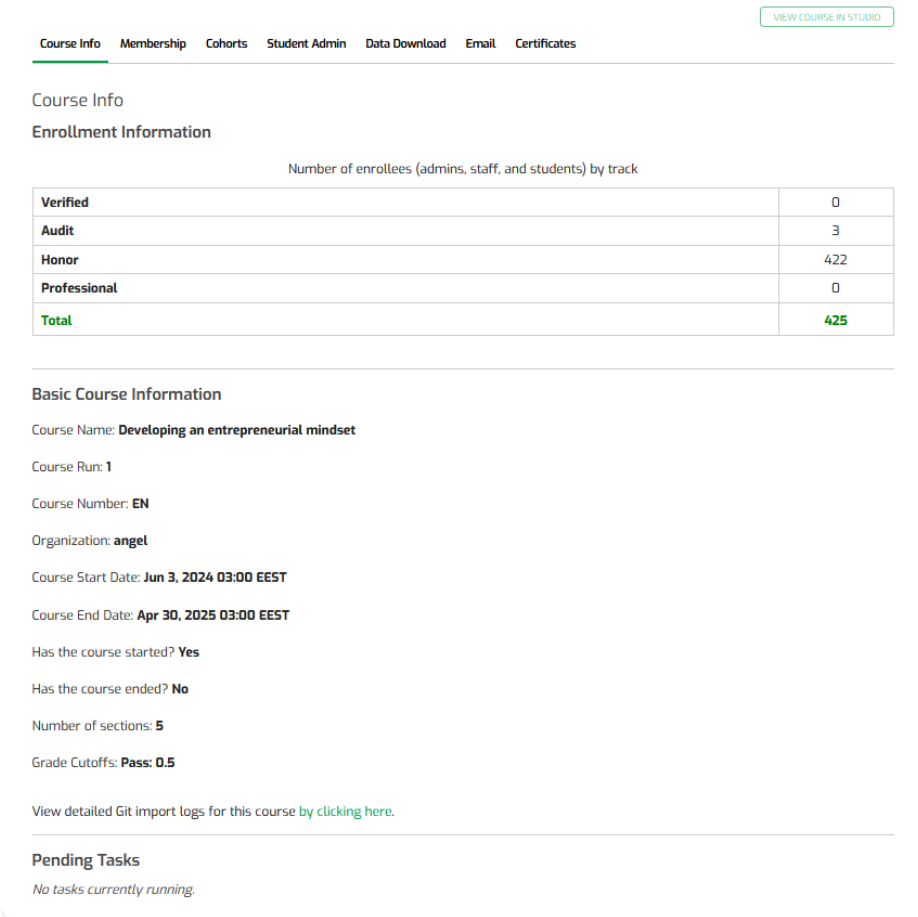

Figure 14 Course Overview dashboard

Manual enrolments. An important number of course participants were experts or professionals in trauma-care. This target group was mainly enrolled through in-platform invitations exploiting the network of consortium members. Each course instructor had the

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chance to auto-enrol learners, through the Membership page. All prospect participants were notified by a course invitation email automatically generated by the platform.

Grade reports. For each of the course, the instructor was able to generate grade reports. The reports are in csv format and downloadable and scores are presented by assignment for unique learner ID. To prevent the accidental distribution of learner data, the reports were downloadable by selecting the internal links generated by the platform as depicted in the picture below. These links were expiring within 5 minutes - copying and re-using them after this short period of time was not an option.

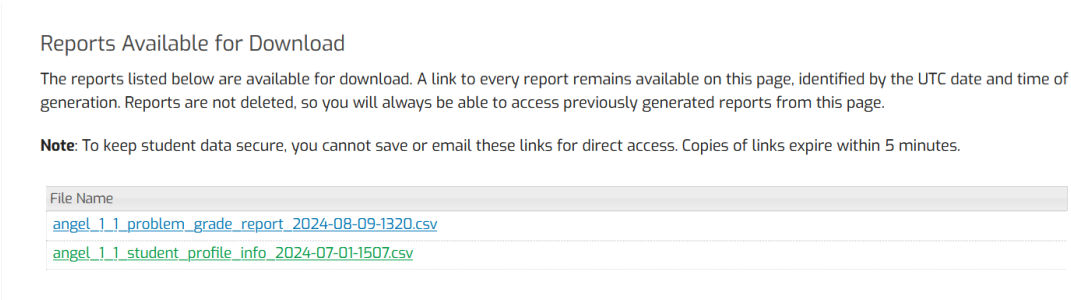

Figure 15 MOOC grade reports

Grading Policy

The grading policy was agreed and configured after discussions with MOOC content developers. The main rules governing the grade configuration are:

- 15 quizzes were createds covering all lesson (Category **Quiz**)
- The overall grade was a Pass/Fail configuration. The level as set to 50% of the total grade.
- No number of droppable assignments were defined. In other words, all assignments were contributed to the final grade and the learner was not given the opportunity to "drop" lower scoring problems.
- No restriction on dates or grace periods to deadlines were defined, given that the MOOC was configured as a self-paced learning experience.

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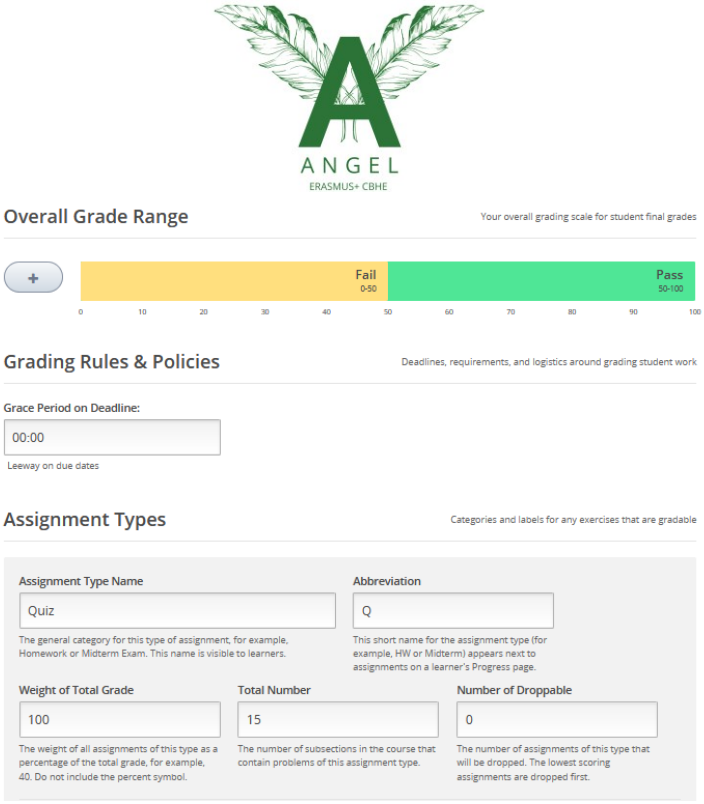

Figure 16 MOOC grading policy

On-line Certificate

The MOOC platform was configured to allow learners to claim their online certificate upon successful completion of the course and not waiting the end of it. The view certificate functionality automatically appears in the progress page on each learner as depicted in the following figure.

Each certificate is accompanied with a unique ID that was generated from the system. This was a must-have functionality in order to secure uniqueness and verification procedures if needed by an official accreditation authority.

Figure 17 Certificate of Completion

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Conclusion

Through the ANGEL platform, instructors were able to create engaging learning sequences which promoted active participation as learners had the possibility to alternate between learning concepts and solving simple exercises to check their understanding and knowledge. As already mentioned, the course content was presented through learning sequences: a set of reading material and exercises.

Participants could move at their own pace following a self-regulating learning process while they received instant feedback upon completion of different types of assessments providing superior pedagogy.

Concluding, the ANGEL MOOCs were designed and developed adopting the following general best practices and features offered by the platform:

- Create a clear grading policy by setting a passing score and defining assignment types. All assignments add up to 100%.
- Design and enable course certificates
- Build diverse learning sequences. Empirical studies and research show that a diverse content experience drives learner engagemen. Each ANGEL module included readings in text and pdf formats, and problems.
- Manage unit depth. Each ANGEL unit should not contain many components. Breaking up course contents into manageable pieces promotes learner engagement. Thus, no more than 3 components per unit were used in the ANGEL courses.
- Include time text captions in case of media based content.

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