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Deliverable D6.10

MOOC 1st run

A first version of the MOOC „Nature-based Urban Regeneration“ on the global e-learning platform edX

Work package: 6

Task 6.3 MOOCs

Dissemination level: public

Lead partners: RWTH

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Partner organisations

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1	Rheinisch-Westfälische Technische Hochschule Aachen	RWTH	Germany
2	Fachhochschule Westfalen	SWUAS	Germany

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4	Politecnico di Torino	POLITO	Italy
5	Stadt Dortmund	DORTMUND	Germany
6	Die Urbanisten EV	URBA	Germany
7	Comune di Torino	COTO	Italy
8	Orti Generali		Italy
9	Associazione Orti Alti	OA	Italy
10	Ningbo Municipal Center for Forestry Science & Technology Services	IUE-CAS	China
11	ICLEI European Secretariat GmbH	ICLEI	Germany
12	Europäische Föderation Bauwerksbegrünungsverband	EFB	Germany
13	Grad Zagreb	Zagreb	Croatia
14	Udruga Zelene I Plave Sesvete	Zips	Croatia
15	Parco Scientifico Tecnologico per Ambiente Environment Park Torino Spa	Envipark	Italy
16	Starlab Barcelona SL	SL	Spain
17	Fundacion Privada Instituto de Salud Global Barcelona	ISGlobal	Spain
18	Consiglio Nazionale delle Ricerche	CNR	Italy
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Abbreviations

edX: global e-learning platform

FRC: Front-Runner Cities

LL: Living Lab

MOOC: Massive Open Online Course

NBS: nature-based solution

proGlgreg: productive Green Infrastructure for post-industrial urban regeneration

verified track: MOOC learners choosing to obtain a course certificate at a fee of 49\$

Executive summary

This report outlines the developed concept of the Massive Open Online Course (MOOC) **“Nature based Urban Regeneration”** and an evaluation of the 1st course run on the leading global e-learning platform edX as part of WP6, Task 6.3: EdX MOOC training module with global outreach. Led by RWTH Aachen University, a number of proGlgreg experts from universities, research institutions, municipalities, NGOs, industry and practitioners have contributed to the MOOC. The course is free, with an optional upgrade to a paid (verified) track for obtaining a certificate.

The 5-week MOOC summarizes the findings of exploring and implementing innovative nature-based solutions (NBS) in proGlgreg’s Front-Runner Cities (FRC) in Europe and China in their need to transform cities and neighbourhoods into more sustainable and liveable environments and for enhancing quality of life. In proGlgreg Living Labs (LL) NBS have been tested to evaluate their viability and to develop replicable methodologies and approaches. These experiences have been channelled into a MOOC to showcase how cities are harnessing NBS for their green transformation processes, together with local communities. The LL are living proof that NBS can be cost-effective and inclusive solutions to many challenges in industrial and post-industrial areas, when co-created with local stakeholders incl. marginalized groups.

The MOOC provides theoretical and practical knowledge on how to set up a nature-based urban regeneration strategy, evaluate the impacts of NBS and develop sustainable business models. The first course modules provide the basics of NBS and how they can contribute to circular economy, urban food production and climate change adaptation. In subsequent modules participants learn about the impacts of NBS on environment, health, wellbeing and social dynamics and how to apply scientific methods to monitor and assess these. The course also explores business models to help kick-start nature-based urban renewal projects. The target learner base includes graduate level students and professionals interested in urban regeneration with nature who can explore collaborative design, implementation and evaluation of nature-based solutions for urban renewal with local communities.

The MOOC was successfully communicated through various EU and proGlgreg channels, social media and edX, attracting in total 804 enrolments from 96 countries in the course. The geographical reach spans all continents, but European enrolees and certificate holders dominate with 56% and 71% respectively. 60% of enrolees are female and nearly 70% are professionals from environmental planning and engineering, architecture, urban and regional planning, urban design and landscape architecture among others, seeking to expand their knowledge in the field of NBS practice. Online surveys conducted on edX at the start and end of the course showed high overall course satisfaction ratings, with more than 70% of learners finding the MOOC very useful to useful, mostly matching expectations. Almost 80% rate the quality, usefulness and inspiration of the videos good to excellent. Content difficulty and the requirements to obtain a certificate were perceived as adequate, however, learners

needed to invest more time to complete the course work than initially planned. Comprehensibility of recap questions is typically a key area of adjustment after a 1st run of a MOOC across edX RWTH MOOCs, hence improvements for the proGReg MOOC will be made for the second course run in 2022.

Benchmarking the proGReg MOOC against around 20 other RWTH MOOCs on edX showed that the course performed more or less in line with averages. However, RWTH MOOCs typically cover basics in engineering and economics disciplines, consequently addressing a larger target group than subjects such as NBS currently do. Given the limited awareness of the fairly new concept of NBS outside of Europe, enrolment numbers and US-American participation were lower than RWTH averages. In contrast, the proGReg MOOC's verified track rate exceeds RWTH averages while course completion rates on par. The MOOC only underperforms in regard to the learner pass rate in ratio to the number of verified track learners. Reasons are not clear, but could be down to the level difficulty and effort necessary for the final assignment, notably given the close timing to Christmas.

The next steps of Task 6.3 include optimising the MOOC based on the evaluation results and preparing for the 2nd run starting on October 3rd 2022. Key improvement areas include:

- Content:

- updating and expanding the existing content with new project results
- correcting minor mistakes in the videos and scripts

- Course material:

- adjusting recap questions,
- reviewing grading and timing of the peer-review system for assignments

- Evaluation:

- adjusting the online surveys with more targeted questions regarding module content, quality and video formats

The addition of a 6th module by the EU project GoGreenRoutes will complement and expand the existing NBS benefit assessment content. The module will focus on the impact of NBS on health and wellbeing by introducing different approaches and NBS implementations.

Explore the course on [edX](#) and watch the [trailer](#).

1. Introduction

1.1. Introduction to the proGReg project

Productive Green Infrastructure for post-industrial urban regeneration (proGReg) is developing and testing nature-based solutions (NBS) co-creatively with public authorities, civil society, researchers and businesses. Eight NBS, which will support the regeneration of urban areas affected by deindustrialisation, have been implemented or are going to be deployed in four front-runner cities: Dortmund (Germany), Turin (Italy), Zagreb (Croatia) and Ningbo (China). The follower cities of Cascais (Portugal), Cluj-Napoca (Romania), Piraeus (Greece) and Zenica (Bosnia and Herzegovina) in the meantime receive support in developing their strategies for improving nature-based solutions at local level through co-design processes. The NBS to be tested are:

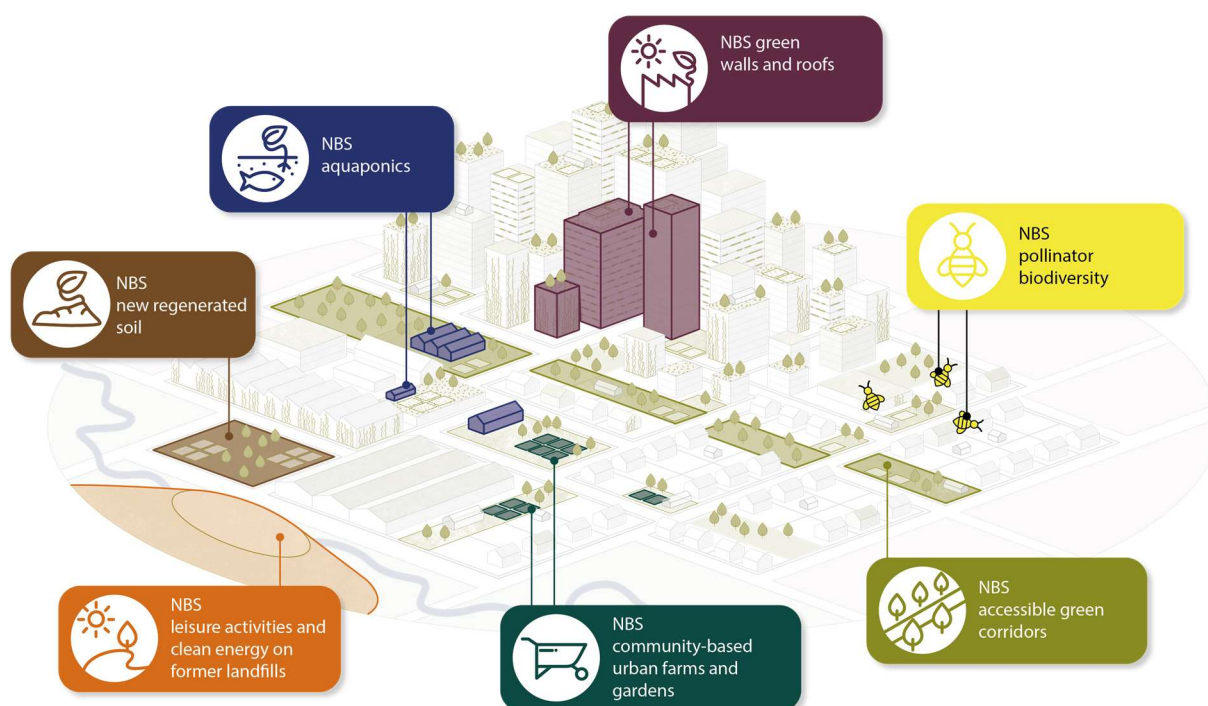


Figure 1 Spatial representation of proGReg NBS (RWTH)

- NBS 1: Renaturing landfill sites for leisure use and energy production
- NBS 2: New regenerated soil thanks to biotic compounds for urban forestry and urban farming
- NBS 3: Community-based urban farms and gardens
- NBS 4: Aquaponics
- NBS 5: Capillary GI on walls and roofs
- NBS 6: Making post-industrial sites and renatured river corridors accessible for local residents
- NBS 7: Establishing protocols and procedures for environmental compensation at local level

1.2. Task 6.3 EdX MOOC training module with global outreach

Led by RWTH, the objective of Task 6.3 (M18-M60) is to develop and produce a 5-week Massive Open Online Course (MOOC) covering the topic of “Nature-based urban regeneration” with global outreach. The MOOC aims at distributing methods developed and results of the proGlgreg project as a long-term open source content training offer via the global platform edX and knowledge transfer outside of the project. Most course content is free of charge and archived for all learners who enrolled in the course, only certificates are billed.

1.2.1 What is a MOOC?

- Massive Open Online Courses (MOOCs) are free online university-level courses in a wide range of disciplines available for anyone to enrol. Certificates require a fee
- Reaching a global and diverse learner community
- MOOCs provide an affordable and flexible way to learn new skills, advance career and deliver quality educational experiences

1.2.2 Global e-learning platform edX

Founded by the Massachusetts Institute of Technology and Harvard University in May 2012, edX is an open access global e-learning platform for MOOCs. More than 140 schools, non-profit organizations, and corporations offer or plan to offer courses on the edX website. EdX was a non-profit organisation and runs on the free Open edX open-source software platform. It needs to be noted that edX has been taken over by education technology company 2U at the end of 2021. Under the agreement, edX will be converted to a public benefit entity that is fully owned and operated by 2U. However, RWTH has assurance that the proGlgreg MOOC will continue to offer open access to learners during and at least five years beyond the duration of the proGlgreg project.

Schools and Partners

EdX offers the highest quality online courses from institutions who share our commitment to excellence in teaching and learning.

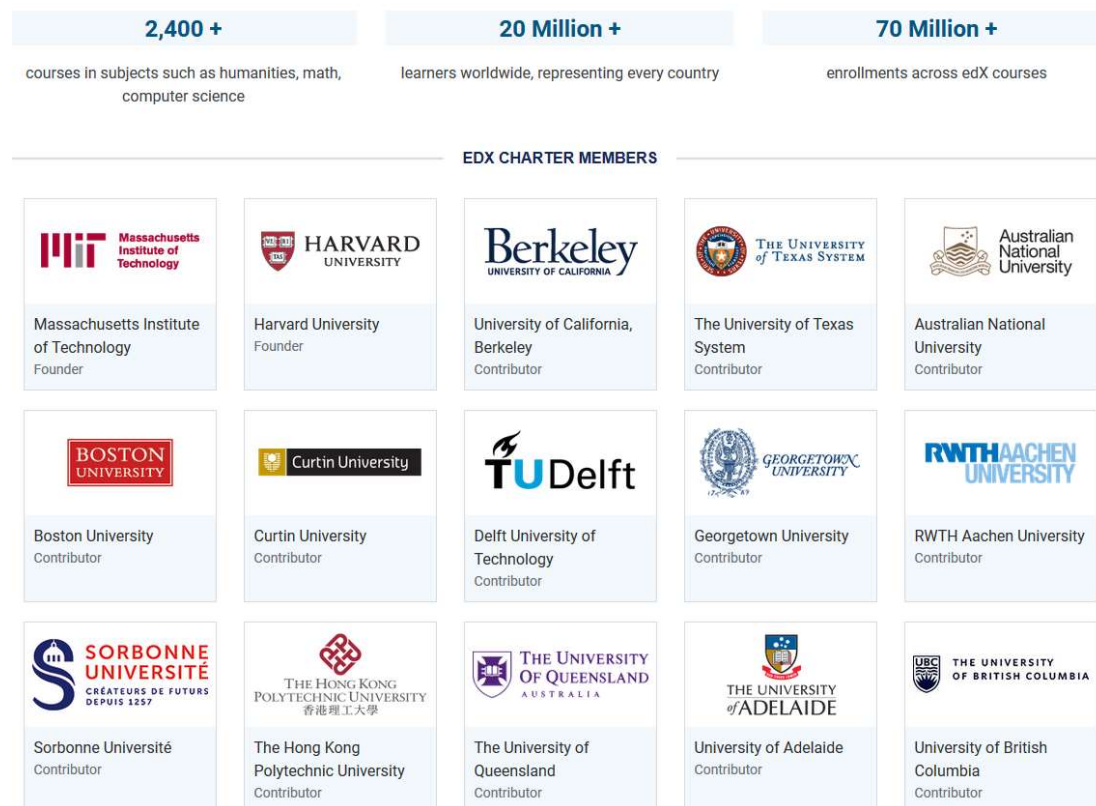


Figure 2 Overview of edX Charter members

EdX courses consist of:

- weekly learning sequences (module/units)
- each learning sequence is composed of short videos (max.8-10 min.)
- interactive learning exercises, where students can immediately practice the video concepts.

EdX key target groups are a worldwide student body and professionals.

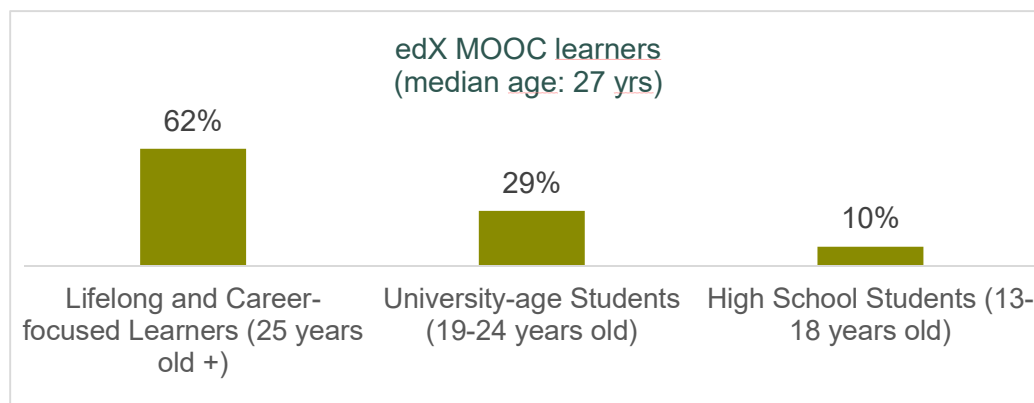


Figure 3 Learner profile of edX (https://www.edx.org/sites/default/files/mediakit/file/edx_media_kit_-_march_2020_web-site_2.pdf)

EdX completion rates in general are as follows:

→ 5% up to 80% per course, depending on:

- course subject
- whether student is an active learner
- whether learner is enrolled in a verified certificate track.

1.2.3 Timeline

The proGlgreg **MOOC “Nature-based Urban regeneration”** follows the subsequent steps from the first run (ran from November 1st to December 18th 2021) until the final version is developed due in the last project year in May 2023 (see fig. 3):



Figure 4 MOOC timeline and course dates

The final version of the MOOC will stay on the edX platform for self-paced learning beyond the proGlgreg project's duration. In addition, each partner university website can provide access to videos and e-learning material, however, the MOOC as a certified course is only accessible via the edX platform (*MOOC as a certified online course is legally bound to the edX platform!*).

The pro-Glgreg MOOC will be accessible and certifiable on edX in two formats:

- audit course: free access, no cost, no certificate available
- verified course: free access but certificate upon successful completion for a fee of \$49 (min. fee set by edX)

In addition, selected MOOC contents will be available on the proGlgreg website after the first run. Videos explaining specific NBS and videos from the LL in the FRC have been adapted and can be found in the respective topical areas of website (e.g. NBS, LLs, Glossary etc.). Contributing partners are also marketing their inputs within their own channels.

2. ProGlgreg MOOC “Nature Based Urban Regeneration”

2.1. Introduction and methods

The five-week Massive Open Online Course (MOOC) summarizes the findings to date of proGlgreg’s exploration and implementation NBS in its Front-Runner Cities (FRC) in Europe and China and their need to transform cities and neighbourhoods into more sustainable and liveable environments through enhancing life quality. Developed replicable methodologies and approaches for NBS have been tested in Living Labs to evaluate their viability. These experiences have been channelled into an innovative MOOC to showcase how cities are harnessing NBS for its green transformation processes, together with local communities.

RWTH LA coordinated the task in respect to developing the course concept and content, devising the timeline and deadlines, ensuring content coherence over the five modules to avoid unnecessary duplications as well as marketing the MOOC. Around 20 proGlgreg partners contributed to developing and producing the course. The internal communication platform basecamp was used to exchange information between the contributing proGlgreg partners and the task leader. RWTH organised a number of group meetings and bi-lateral conversations via zoom to manage the complex task of producing the MOOC.

RWTH Media for Learning was responsible for all technical issues including recording and editing video lectures and other video formats, providing technical assistance to contributing partners and feeding the course onto the edX e-learning platform while assisting learners in relation to all technical questions of the edX platform during the 1st run of the course.

Some involved proGlgreg partners provided fully edited videos and course material, other partners contributed parts that were compiled and post-produced by RWTH. RWTH Media for Learning sub-titled all videos to adhere with edX standards. During the 1st run, all contributing instructors attended to the discussion forum to answer learners’ content queries and technical questions.

2.2. MOOC content structure

In distinction to already existing MOOCs on NBS covering specific aspects and applications such as climate change mitigation, global metropolises etc., the proGlgreg MOOC focuses on NBS for inclusive post-industrial urban regeneration in cities as industrial and post-industrial areas need special attention: they are vulnerable to climate change effects and often inhabited by marginalized groups. ProGlgreg’s Living Labs are living proof that NBS can be a cost-effective and inclusive solution to many of these challenges, when co-created with local stakeholders.



Figure 5 MOOC Nature-based Urban Regeneration banner

The MOOC provides theoretical and practical knowledge on how to set up a nature-based regeneration strategy, evaluate the impacts of NBS and develop sustainable business models. The course begins with the basics of NBS and how they can contribute to circular economy, urban food production and climate change adaptation. Participants learn about the impacts of NBS on environment, health, wellbeing and social dynamics and how to apply scientific methods to monitor and assess these. It also explores business models to help kick-start their own nature-based urban renewal projects. The target audience addressed are those familiar with basic scientific methods at graduate level and anyone interested in urban regeneration with nature and introduces participants to collaborative design, implementation and evaluation of nature-based solutions for urban renewal with local communities.

The 5-week course consists of five modules (1 module per week), each module comprising five units/videos + course materials incl. re-cap questions and assignments after the first four modules and a final assignment at the end. A discussion forum enables exchange between learners and instructors during the course (see fig. 5):

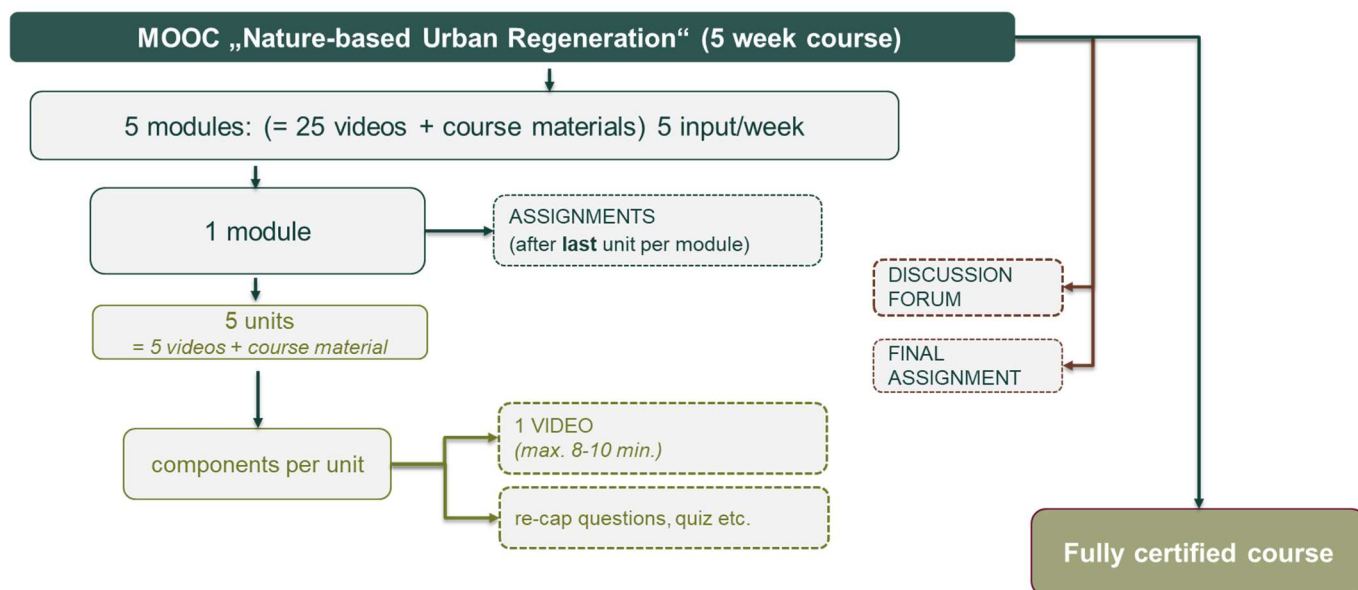


Figure 6 MOOC structure | edX, RWTH MFL

Table 1 gives an overview of the weekly schedule and topics covered in the MOOC “Nature Based Urban Regeneration” by modules, units that form the e-learning experience.

Table 1 Overview of MOOC structure and content

Modules	Units
Module 1 The challenges of urban regeneration and the potential of nature-based solutions	Unit 1: Post-industrial cities in transformation Unit 2: When industries leave: The cases of Dortmund and Turin Unit 3: Transformation and growth: Zagreb and China Unit 4: What are NBS? definitions, principles, benefits Unit 5: Integrating NBS in wider regeneration approaches
Module 2 The city as a Living Lab for co-creating NBS	Unit 1: Living Labs as transdisciplinary innovation formats Unit 2: Co-creation: Engaging local communities (definitions, principles) Unit 3: Co-creation prerequisites: spatial dimension, stakeholder mapping Unit 4: Co-creation in cities: proGlgreg Living Labs Dortmund and Zagreb Unit 5: Co-creation in cities: proGlgreg Living Lab Turin
Module 3 Productive solutions using nature for renewal	Unit 1: Applied nature-based urban regeneration Unit 2: New urban soils Unit 3: Urban Agriculture Unit 4: Aquaponics Unit 5: Green roofs and walls
Module 4 NBS benefits and how to assess them	Unit 1: Introduction to NBS benefit assessment Unit 2: Social benefits Unit 3: Human health and well being Unit 4: Environmental and ecological benefits Unit 5: Economic and labor market benefits
Module 5 Sustaining NBS: overcoming barriers, creating business models and upscaling NBS	Unit 1: Overview of potential technological and non-technological barriers Unit 2: Overcoming barriers Unit 3: Integrating NBS into self-sustained business models Unit 4: Examples of Business models Unit 5: Upscaling strategies for regional and city-to-city level knowledge transfer

Table 2 details topics and key points to be covered of each module and unit, incl. formats of each unit. It also indicates the responsible proGlgreg partner for producing the videos and course materials (introductory description per module/unit, re-cap questions, assignments etc.). All of this preliminary and requires further refinement by each responsible partner.

Table 2 Weekly schedule by topics. learning effects and responsibilities

Weekly schedule (module)	Content (unit)	Learning effect	Responsibility
Week 1 Module 1	The challenges of urban regeneration and the potential of nature-based solutions - 5 videos (c. 10 min) + course materials	learn about the potential of nature-based urban regeneration in post-industrial sites in FRC	Lead: RWTH Contributions: FRC, ZIPS, IEUCAS
Week 2 Module 2	The city as a Living Lab for co-creating NBS spatial dimension, multi-scale and context - 5 videos + course materials	Master the spatial analysis on multiple scales through your surroundings and local environment	Lead: RWTH Contributions: COTO, ZIPS, MIRAFIORI, ICLEI, POLITO, URBANISTEN, Dortmund
Week 3 Module 3	Productive solutions using nature for renewal Introduction to NBS used in proGlgreg - 1 introductory lecture, 4 NBS-specific videos + course materials	Get an overview on various nature-based solutions and how to apply them	Lead: RWTH Contributions, COTO, DUAL, ENVIPARK, MIRAFIORI, Orti Generali, SWUAS, EFB
Week 4 Module 4	NBS benefits and how to assess them - 5 videos (Introduction plus one on each assessment domain) + course materials	Learn about multi-scale, replicable assessment methods and using tools to assess and evaluate the range of NBS benefits to society and the environment	Lead: CNR (content) Contributions: UNIBA, ISGLOBL, STARLAB

Week 5
Module 5

5a) Sustaining NBS: overcoming barriers and creating business models

- 4 videos + course materials

5b) Upscaling

strategies for regional and city-to-city knowledge transfer

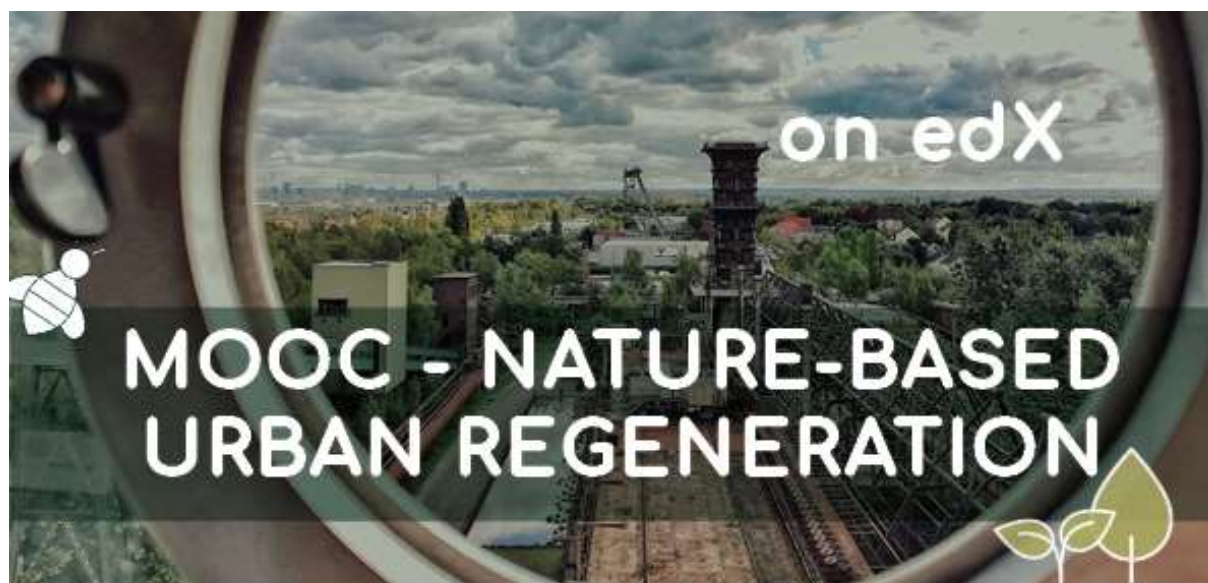
- 1 video + course materials

A final practical assignment will help you to transfer the knowledge from the course to potential applications in your local environment

Lead: SWUAS

2.3. MOOC syllabus

The following pages present the MOOC syllabus providing a structured overview of all relevant course information including topics covered, learning outcomes, target groups, type of exams/assignments, grading etc as communicated via the course about page on the edX platform and all other communication channels:



Interested in learning about using nature to improve life in our cities? You want to learn how to co-create nature-based solutions with local communities, how to make environmental, economic and social benefits of NBS measurable and translate these into sustainable business models? This course will equip you with the knowledge to set up your own nature-based regeneration strategy!



COURSE CONTENT

Cities around the world are seeking new, greener ways to transform former industrial districts. These areas suffer from social and economic inequalities, lack of green spaces and are significantly more vulnerable to climate change effects and natural hazards. Nature-based solutions (NBS) can contribute to improving environmental quality, social life and local economies in urban areas.

This course will show you how co-creating NBS can transform post-industrial neglected and abandoned areas into liveable and productive green urban environments, with empowered local communities and fostering local economies.

You will learn about different types of NBS and how they can be implemented in varied local contexts. The course delves into citizen engagement jointly with municipalities, private sector companies, NGOs and academia, as this supports long-term sustainability of NBS. Engagement strategies place emphasis on the inclusion of marginalised and vulnerable groups. The course showcases NBS and their co-benefits to circular economy, urban food production and climate change adaption. You will learn how to measure the effects of NBS on environmental quality, human health and well-being, socio-cultural inclusiveness, local economy and labour market by applying scientific methods to monitor and assess them. Having measurable NBS benefits helps developing successful business models for NBS implementation and management, and supports sound decision- and policy making.

The course draws on research results from Living Labs in European cities where innovative nature-based solutions have been developed and tested under the umbrella of the EU Horizon 2020 Innovation Action funded project proGireg (productive Green Infrastructure for post-industrial urban regeneration).

The course will guide you in setting up a nature-based regeneration project suited to your local context. The methods you will learn entail NBS co-design, co-implementation, benefit assessment and sustainable business models.

Join us as you start on your journey towards inclusive urban regeneration by using nature for renewal



THIS COURSE PROVIDES

1. Knowledge for designing NBS in post-industrial urban regeneration and NBS benefit assessment and monitoring methodology in four domains.
2. Journeys to 'Living Labs' – proGlgreg test sites in cities across Europe - to explore the dynamics of co-creation of NBS in action!
3. Applications of how to assess and overcome technological and non-technological barriers in integrating NBS, how to develop and upscale self-sustained business models to achieve sustainable and productive green infrastructure.

We have developed an attractive and challenging course for you. We hope by the time you finish the course you will be inspired to embrace an inter- and transdisciplinary nature-based urban regeneration approach to achieve liveable and productive spaces. NBS have great potential to transform underused spaces into productive and co-owned public places, delivering economic benefits and services to strengthen local communities.

WHAT YOU'LL LEARN

Theory and practice of nature-based urban regeneration:

- defining the potential of nature-based solutions for urban regeneration
- leading co-creation processes for developing multi-scale and context-specific green infrastructure with citizens and other local stakeholders
- applying methods to monitor and assess NBS benefits
- identifying technical and non-technical barriers to NBS implementation and learning how to over-come them
- developing sustainable business models for NBS in urban regeneration
- building your own nature-based urban regeneration project



WEEK 1: The challenges of urban regeneration and the potential of NBS

Scheduled: November 1st, 2021

The first module introduces you to the challenges of urban regeneration and the potential of NBS in transforming post-industrial cities, including the integration of NBS into wider regeneration approaches

→ [Assignment 1 \(Due date: 3rd December 2021\)](#)

WEEK 2: The City as a Living Lab for co-creating NBS

Scheduled: November 8th, 2021

Module 2 provides methods and examples of context-specific analysis and locally adaptable trans-disciplinary innovation formats to engage local communities in developing liveable urban environments

→ [Assignment 2 \(Due date: 3rd December 2021\)](#)

WEEK 3: Productive solutions using nature for renewal

Scheduled: November 15th, 2021

This module presents processes, applications and benefits of different types of productive nature-based solutions in detail, e.g. urban agriculture, aquaponics and green roofs and walls

→ [Assignment 3 \(Due date: 3rd December 2021\)](#)

WEEK 4: NBS benefits and how to assess them

Scheduled: November 22nd, 2021

The fourth module introduces you to methods of monitoring and assessing a range of NBS benefits to society, economy and the environment

→ [Assignment 4 \(Due date: 3rd December 2021\)](#)

WEEK 5: Sustaining NBS: overcoming barriers, creating business models and upscaling

Scheduled: November 29th, 2021

The final module shows how to overcome barriers in NBS implementation and to create business models for productive green infrastructure to allow NBS upscaling to city level.

→ [Final Assignment \(Due date: 17th December 2021\)](#)



TIME COMMITMENT

This course runs over 5 weeks. You will spend approximately 5-6 hours per week incl.:

- watching lecture videos
- exploring literature and website recommendations, toolboxes etc.
- completing recap questions (quiz)
- completing assignments
- participating in the discussion forum

Please keep all deadlines for the verified track in mind towards end of the course, so you will hand in everything on time and receive your certificate.

GET READY FOR THE QUIZ AND ASSIGNMENTS

Quiz questions

After watching the lecture videos of each unit, you will be asked to answer a series of questions revising what you've learned.

Assignments

Learners who want to receive a certificate for this edX course have to complete the recap questions, the last three module assignments and the final assignment.

Each module will conclude with an assignment, representing building blocks for completing your final assignment.

Final assignment

Your assignments over the course of five modules provide the building blocks for writing your project proposal of a nature-based urban regeneration strategy, bringing the different tasks together.



GRADING

Your assignments will be graded by peer reviews.

The final grade is constituted by:

10% Recap Questions, 30% Assignments and 60% Final Assignment

To receive a certificate, participants need to obtain at least 60% of the total points.

Deadline to upgrade to the verified track: 21st November 2021.

DISCUSSION FORUM - WELCOME TO THE COMMUNITY

As a learner of the course **Nature-based Urban Regeneration** you are part of a diverse and interdisciplinary learning community. The discussion forum is an essential part of this online course. You can post questions, start discussions etc. The instructors will monitor the forum regularly. An active and healthy learning community starts with some basic rules. Please take a moment to read the **Discussion Guidelines** in the hand-out section.

ACADEMIC HONOUR CODE

By participating in this course, you pledge to follow the edX honour code (<https://www.edx.org/edx-terms-service>). Explicitly, we expect you to be a diligent student and contribute to the course.

We believe it is not too hard to achieve a good grade when participating regularly and you will learn a lot about the topic at hand. We put a lot of effort in creating a great course for you and highly appreciate your feedback and suggestions!



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2.4. MOOC video production

2.4.1. Technical recommendations for MOOC video production

The RWTH Media for Learning team was responsible for all technical issues regarding video production and post-production and provided information and assistance on the technical requirements for producing video material such as:

- Resolution of 2160p / 25 – if not possible using a resolution of 1080p / 25
- Using a tripod when recording
- No filming of interviews against the light
- 3-point illumination recommended lighting during interviews
- Reducing camera movements to a minimum
- No use of zoom while recording
- Always recording interviews with an additional microphone
- VideoCodec: ProRes or XAVC or DNXHR
- setting up aperture & focus manually
- Using log gamma curves (S-Log, C-Log, V-Log)

2.4.2. MOOC video formats

The MOOC “Nature-based Urban Regeneration” sought to offer a mix of video formats to create an attractive and versatile course including video lectures, animation films and on-site film footage of the proGlgreg Living Labs incl. interviews with local stakeholders. Some units consisted of a mix of different formats, requiring varying efforts to produce (see fig. 6):

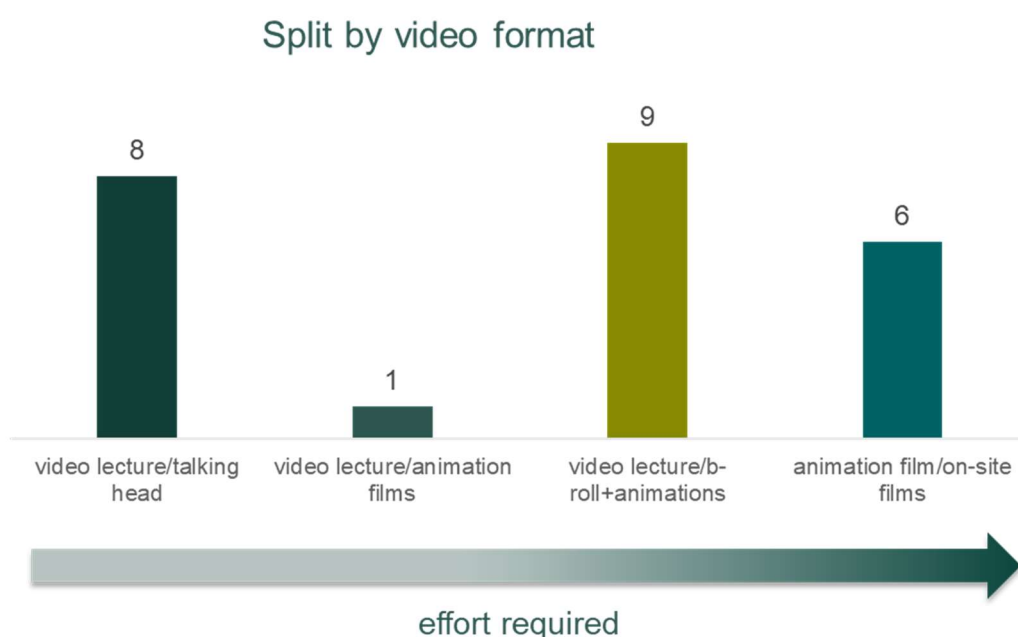


Figure 7 MOOC “Nature based Urban Regeneration” split by video format (1st run)

2.4.3. Lecture videos

Lecture videos are the classic MOOC video format, also called “talking head videos”, whereby an instructor is lecturing, mostly using a presentation. Given the short time frame of around 10 min. for each video per unit, the greatest challenge is presenting information concisely by using the power of visuals and graphics and movement to augment the content that’s being spoken. For this, scripts were written outlining the storyline of the planned video by focusing on key questions and presenting well-structured and visually attractive information, images and examples.

2.4.4. On-site and animation videos

Preparation for on-site and animations videos included writing storyboards/shot lists, e.g. for producing videos about the Living Labs in the FRC and explanations of specific NBS. RWTH developed and produced a series of explanatory animation films on specific NBS in regard to typologies, technologies and benefits, including urban agriculture, aquaponics, new soil and green roofs and walls, together with the respective expert partners (making up the majority of units in module 3). Each video was supplemented by film footage and interviews of applications in the LL in different FRC.

Table 3 provides an overview of facilities and services required for the production of each video format and key responsibilities.

Table 3 Overview of requirements and responsibilities by video format

Video format	Requirements	Responsibility
Video lecture/ „talking head“	Recording studio (green or white screen) or ppt	RWTH MfL, proGlgreg partners
Video lecture with b-roll + animations	<ul style="list-style-type: none"> – Voice-over recording – Script/storyboard, B-roll and animations in ppt 	RWTH MfL proGlgreg partner
Video lecture/ animation film	<ul style="list-style-type: none"> – Voice-over recording – Script – Animation films by CoFilms – Final post post-production 	RWTH MfL RWTH LA RWTH MfL/LA
Animation/on- site films	<ul style="list-style-type: none"> – Drawing, storyboarding, script – Animation – Interviews/film footage of Living Labs – Final post post-production 	RWTH LA RWTH MfL proGlgreg partners RWTH MfL/LA

2.5. MOOC video post-production

RWTH coordinated the process of video post-production and creating the MOOC web presence on the edX platform. This included:

- Sharing MOOC video and course material
- Cutting, editing and sub-titling videos (incl. creating intro and outros, credits)

RWTH Media for Learning set up a project space on Sciebo for uploading edited videos files in MP4 format or other project files to enable editing by RWTH. In addition, all course material was uploaded on the sciebo box for open access to all project partners.

- Creating the MOOC edX profile

RWTH MfL handled the technical integration of the videos and all accompanying course materials into the edX platform including sub-titling each video to meet edX requirements.

2.6. MOOC video material by module/unit and YouTube links

Each unit is accessible to watch via the YouTube links provided in Table 4, to view the videos please **copy the youtube link in the table and insert in YouTube**:

Table 4 MOOC modules and units incl. YouTube links

RWTH proGlgreg MOOC sub-titled videos	
module / unit	YouTube Link
Module 1 - The challenges of urban regeneration and the potential of nature-based solutions	
Unit 1: Post-industrial cities in transformation	https://www.youtube.com/watch?v=AfEXvf2EnUc
Unit 2: When industries leave: The cases of Dortmund and Turin	https://www.youtube.com/watch?v=nGabBV4x0nY
Unit 3: Transformation and growth: Zagreb and Ningbo	https://www.youtube.com/watch?v=X7CVdTZHCiA
Unit 4: What are NBS? definitions, principles, benefits	https://www.youtube.com/watch?v=koZ4B71XfQA
Unit 5: Integrating NBS in wider regeneration approaches	https://www.youtube.com/watch?v=0ZeFMUITZfo
Module 2 - The city as a Living Lab for co-creating NBS	
Unit 1: Living Labs as trans-disciplinary innovation formats	https://www.youtube.com/watch?v=ETZ3vLvnvUM
Unit 2: Contextualising Living Labs	https://www.youtube.com/watch?v=TY_i7VcGeqw
Unit 3: Co-creation: Engaging local communities	https://www.youtube.com/watch?v=TB3Yd4UWfXE
Unit 4: Co-creation in cities: proGlgreg Living Labs Dortmund and Zagreb	https://www.youtube.com/watch?v=qfarYNC07Ew
Unit 5: Co-creation in cities: proGlgreg Living Lab Turin	https://www.youtube.com/watch?v=iMFFOjd_qtI
Module 3 - Productive solutions using nature for renewal	

Unit 1: Applied nature-based urban regeneration	https://www.youtube.com/watch?v=F2XmhqP0sh4
Unit 2: New urban soils	https://www.youtube.com/watch?v=u1Nv2mfjAA8
Unit 3: Urban Agriculture	https://www.youtube.com/watch?v=rPm6rP-TXWs
Unit 4: Aquaponics	https://www.youtube.com/watch?v=j6DkX3z198Y
Unit 5: Green roofs and walls	https://www.youtube.com/watch?v=aSexf8RKcho
Module 4 NBS benefits and how to assess them	
Unit 1: Introduction to NBS benefit assessment	https://www.youtube.com/watch?v=vDCZIH0ITaQ
Unit 2: Assessment domain – Environmental and ecological benefits	https://www.youtube.com/watch?v=U3PgOO3qy-U
Unit 3: Assessment domain - social benefits	https://www.youtube.com/watch?v=DwchnYFLfZk
Unit 4: Assessment domain - Human health and well being	https://www.youtube.com/watch?v=NjNAtkZ-ffl
Unit 5: “assessment domain – Economic and labor market benefits”	https://www.youtube.com/watch?v=pcYx-Rma798
Module 5: Sustaining NBS	
Unit 1: Overview of potential technological and non-technological barriers	https://www.youtube.com/watch?v=okTwSBM6L-s
Unit 2: Overcoming barriers	https://www.youtube.com/watch?v=BpSjHzKitlw
5a) Creating Business models	
Unit 3: Integrating NBS into self-sustained business models	https://www.youtube.com/watch?v=gV0lhKNcZ-Y
Unit 4: Examples of Business models	https://www.youtube.com/watch?v=buNoS5cAv_w
5b) Upscaling NBS	
Unit 5: Upscaling strategies for regional and city-to-city level knowledge transfer	https://www.youtube.com/watch?v=8b4zSNTpup4

2.7. MOOC course material

The MOOC course material comprises all written information that will be visible to the learner on the course webpage on the edX platform. It comprises the following information:

- instructor CVs
- module and unit descriptions
- re-cap questions per unit
- assignments per module and final assignment
- module visuals
- literature recommendations, additional material etc.
- video scripts and presentations in PDF format

RWTH provided templates for capturing the above information that are published on the edX course webpage. A sciebo box was used for uploading all videos and course materials accessible for all partners.

3. Communication and MOOC promotion

3.1.1. Communication plan to promote the MOOC before and during the course

Any eLearning action requires a communication plan. RWTH and ICLEI developed a communication and marketing strategy to generate interest and increase the number of registrations and minimise learner drop-out rates. Figure 7 outlines key communication steps:

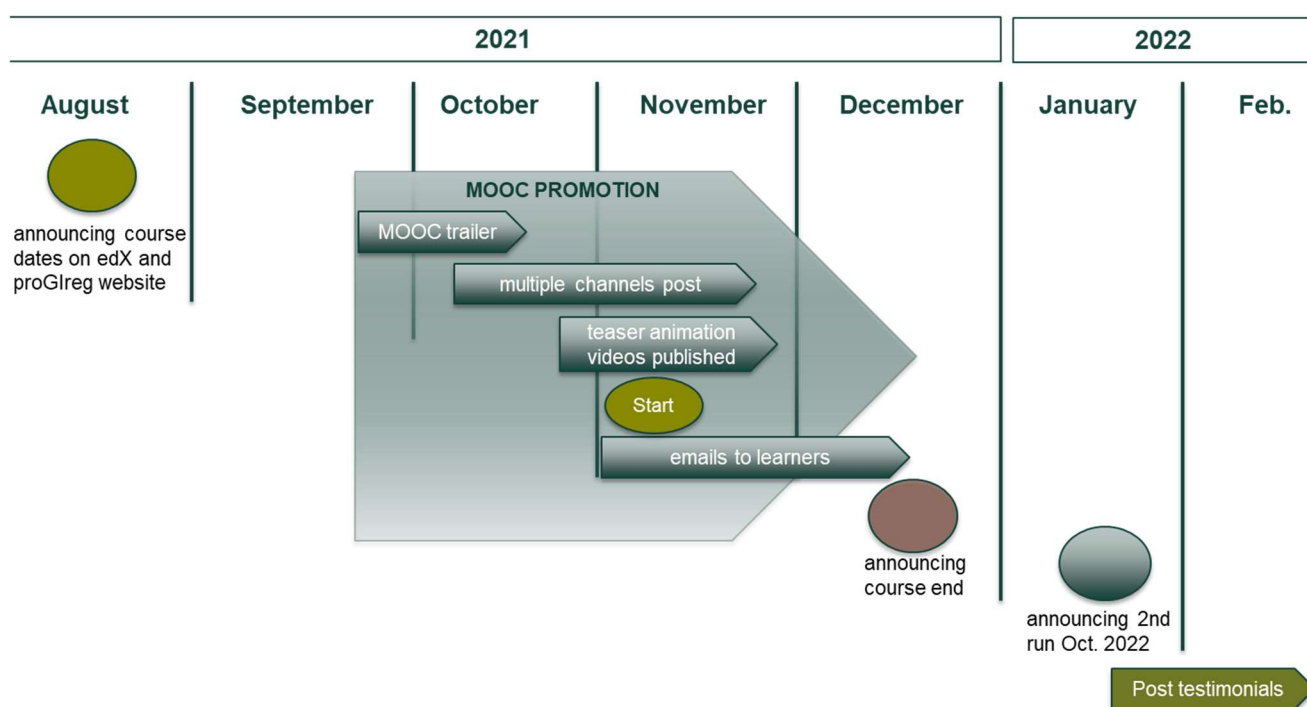


Figure 8 MOOC communication timeline

- 1) Communication started **3 months before the MOOC launch date** (1st November 2021). Messages and visuals (social media cards and GIFs) drafted for conventional and social media networks, by ICLEI and RWTH, helped to increase the number of participants. A link to the MOOC alongside visuals and course announcement was added to the proGlgreg website.
- 2) All available proGlgreg and partner university and other proGlgreg partner communication channels (EFB network, newsletters, websites, social media; Instagram, Facebook,

twitter, ResearchGate and LinkedIn, YouTube, blog, groups; google & LinkedIn), and nature-based solutions channels such as Oppla and NetworkNature, announced that registration is open using the teaser video produced by RWTH and the visuals.

- 3) Regular posts on social networks in the last 2 weeks before the start and in the first 2 weeks of the course were stepped up, tagging specifically youth/environment related accounts. During the course regular posts on the MOOC and its benefits ran, participant posts were engaged with, and after a closing announcement made after the course end.
- 4) Short NBS animation video sequences were released as teaser material to create further interest in the MOOC in the beginning of November. In addition, towards the end of the course, animations videos about specific NBS were released on the proGlgreg NBS webpages (see table 5):

Table 5 YouTube links to NBS animation videos published on proGlgreg website (under respective NBS pages) during the MOOC 1st run

NBS animation video	You tube link (<i>click to watch</i>)
New urban soil	https://youtu.be/Au5ZtD7qCH4
Aquaponics	https://youtu.be/h1kGGTWgLz4
Green walls and roofs	https://youtu.be/D2LMLRFO3pE
Urban agriculture	https://youtu.be/319TvxN5WS8

- 5) The MOOC was shared among the EU NBS Clustering Task Force 4 NBS Communicators with copy text and visuals for promotion to help share the word via EU-funded NBS project channels. It was listed on the NetworkNature events calendar and ICLEI Europe events for most of the duration of the course. See below stats for posts on social media channels (note search functions are limited, and exclude MOOC posts that use different key words, implying there are more posts than the ones tracked in table 6):

Table 6 Overview of channels used and reach

No. of posts	Posts by channel	Timing	Reach

61	Twitter posts mentioning “pro-Glgreg” and “MOOC”	during course run	20K
31	LinkedIn posts mentioning “proGlgreg” and “MOOC”	time bound analytics for course period not available	526 total contacts
16	proGlgreg Facebook posts	during course run	1,242-page views
24	Instagram stories and 6 feed posts	time bound analytics for course period not available	216 total followers
-	MOOC related videos on YouTube	n/a	648 views

- 6) RWTH sent out emails during the course to keep the learners’ interest in the course at the beginning of the course/each week while indicating important deadlines for assignments etc.

Below pie chart (fig. 9) shows the main communication channels learners found out about the MOOC and suggests that future communication and marketing activities to promote the course should be stepped on LinkedIn:

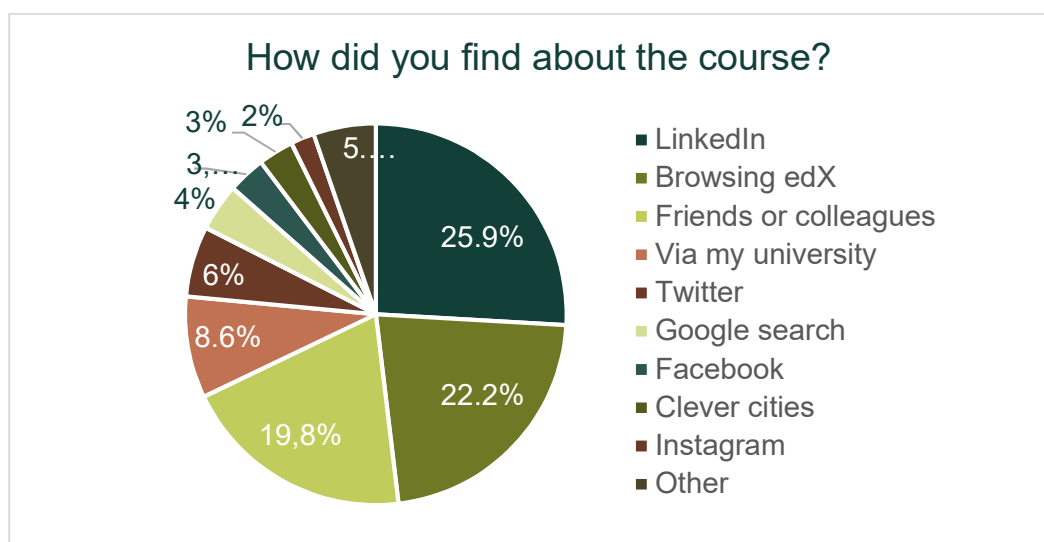


Figure 9 Key communication channels to learn about the MOOC, Online survey on edX Part I (n=81)

3.1.2. Post-MOOC 1st run communication

After the course is completed, communicate on course success stories, new initiatives, provide learner testimonials, and publish course statistics. This “reporting” phase can lead to additional press coverage in the proGlgreg communication channels and beyond.

The closing of the first course was announced via social media, and the learners posting on socials about the course engaged through proGlgreg channels. An article with course statistics and testimonials from participants will be published in early 2022, and re-shared in the autumn campaign for the next round of the course in the relevant social media channels.

The next course date (1st October 2022) has been announced on the edX course page in the beginning of January 2022. When registration opens, a more intense subsequent campaign in the two months of the run-up to the course will start through all channels to promote enrolment. This campaign will utilise learner testimonials, statistics and materials from the first course, entailing:

- Social media platforms such as LinkedIn, Facebook, Instagram, Twitter etc.
- 1-3 posts weekly from proGlgreg channels,
- newsletter announcement, via proGlgreg newsletter, partners and external platforms (where possible)
- Announcements via all partner channels, EFB, NetworkNature and Oppla, Google Biodiversity group and with other NBS projects engaged to share information through EU NBS Clustering Task Force 4: NBS Communicators.

4. Evaluation of the MOOC's 1st run

4.1. Methods

Following the instructor-paced runs of the MOOC “Nature-based Urban Regeneration” during the proGReg project, the course is being reviewed and analysed with quantitative and qualitative methods. Performance indicators established before the start of the training course allow determining whether the course was successful or not and to understand required improvements for the MOOC's 2nd run. Data analysis is mainly based on two quant data sources and qualitative analysis as follows:

- I. **edX analytics via edX insights** – **large sample size (based on total no. of enrollees)**
- II. **Online surveys** among learner base (voluntary participation) – **limited sample size:**
 - a. Part 1: conducted at course start (n=78-81)
 - b. Part 2: after the last module before the final assignment (n=27)

The two online surveys conducted at different times during the course provide comparisons on how expectations were met. However, sample sizes are generally smaller, vary significantly between the surveys depending on course progress, thus limiting the representativeness of the survey results.

- III. **Manual collection** of testimonials, commentaries and other data on various channels incl. the course discussion forum, LinkedIn, proGReg emails etc.
- IV. **RWTH MOOCs average** for benchmarking the performance of the MOOC “Nature-based Urban Regeneration”. Please note that some of the data may be slightly skewed given the RWTH is traditionally a technical university with a MINT-biased offering.

4.2. Course analysis

The following chapter provides statistics on:¹

- general parameters of the learner base
- learner interaction with the course
- levels of satisfaction with course content, assignments and grading

¹ *Please note: rounding errors may occur in the following data analysis*

4.2.1. Breakdown of the learner base by enrolment, geography, demographics, professional background

This sub-chapter provides an overview of the learner base extracted from the edX analytics/insights and data collected via Part I of the online survey.

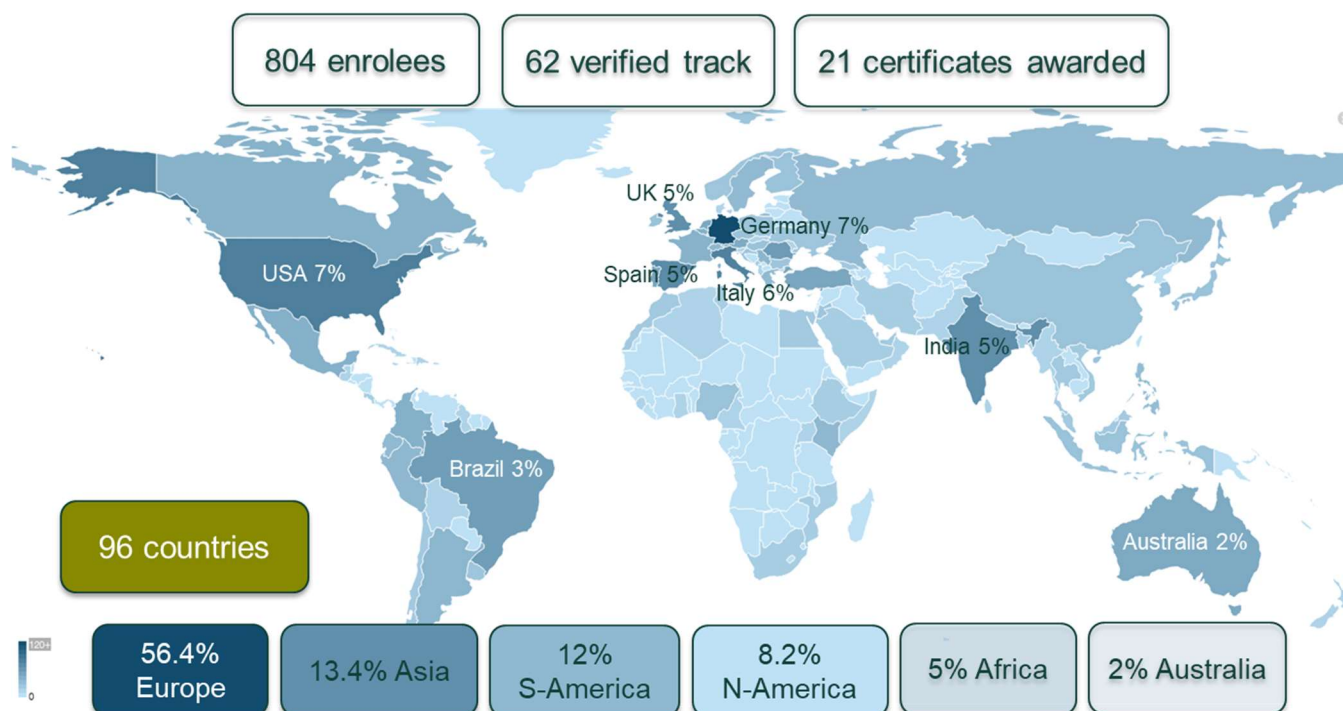


Figure 10 Geographical breakdown of the learner base and breakdown of the course enrollees (n=804) Source: edX insights

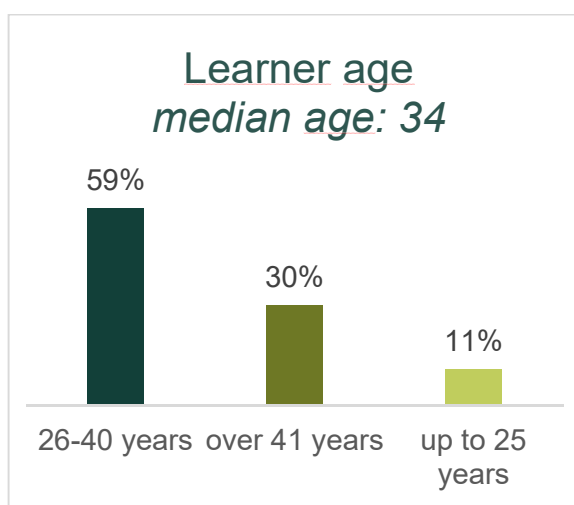


Figure 11 Figure 9 Learner base by age, edX insights (n=488)

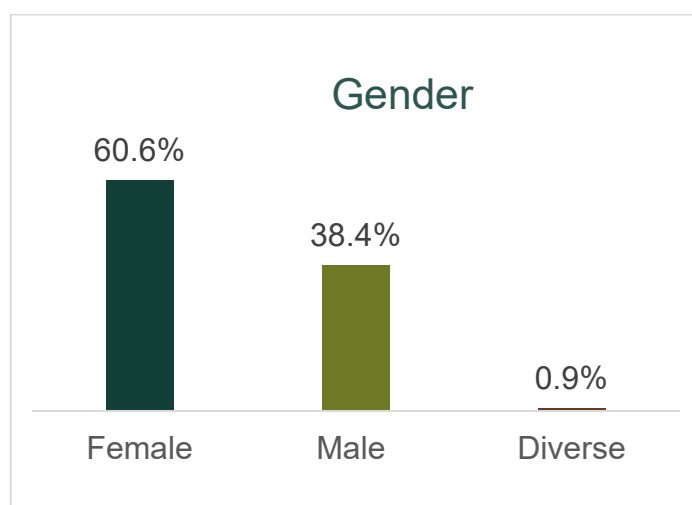


Figure 12 Learner base by gender, edX insights (n=475)

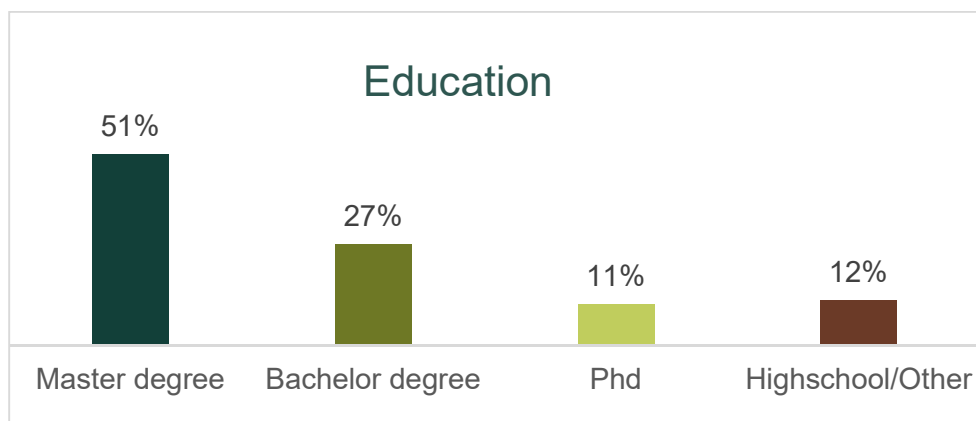


Figure 13 Learner breakdown by level of education, edX insights (n=791)

Looking at the educational background of the learner base, environmental planning and engineering, architecture, urban-regional planning and urban design are the dominant disciplines (fig. 13). Based on the online survey, a third of enrolees are students with the majority of learners being professionals in companies, local authorities, governmental bodies or self-employed (fig. 14). Figure 16 illustrates learners' motivation for registering in the course "Nature based Urban Regeneration".



Figure 14 Key disciplines of the learner base. Source: Course discussion forum

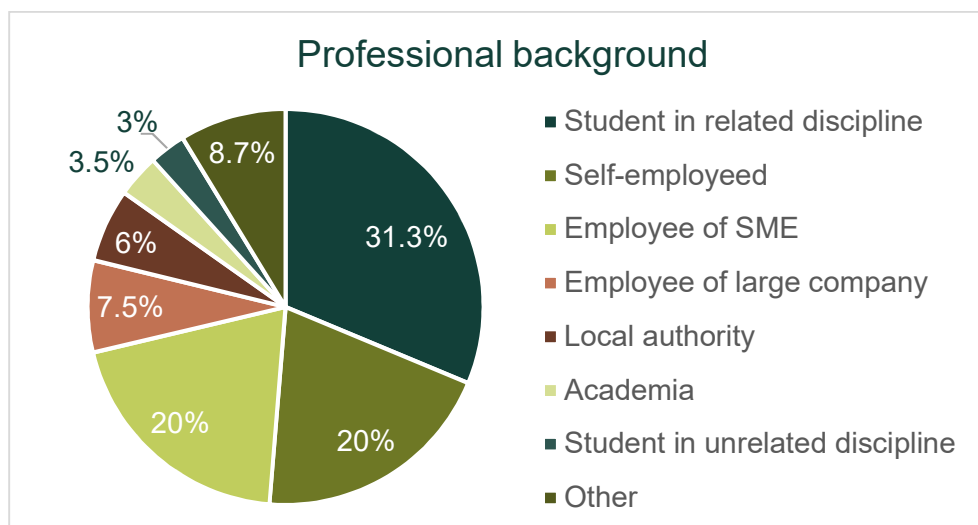


Figure 15 Professional background, Online survey results Part 1 (n=81)

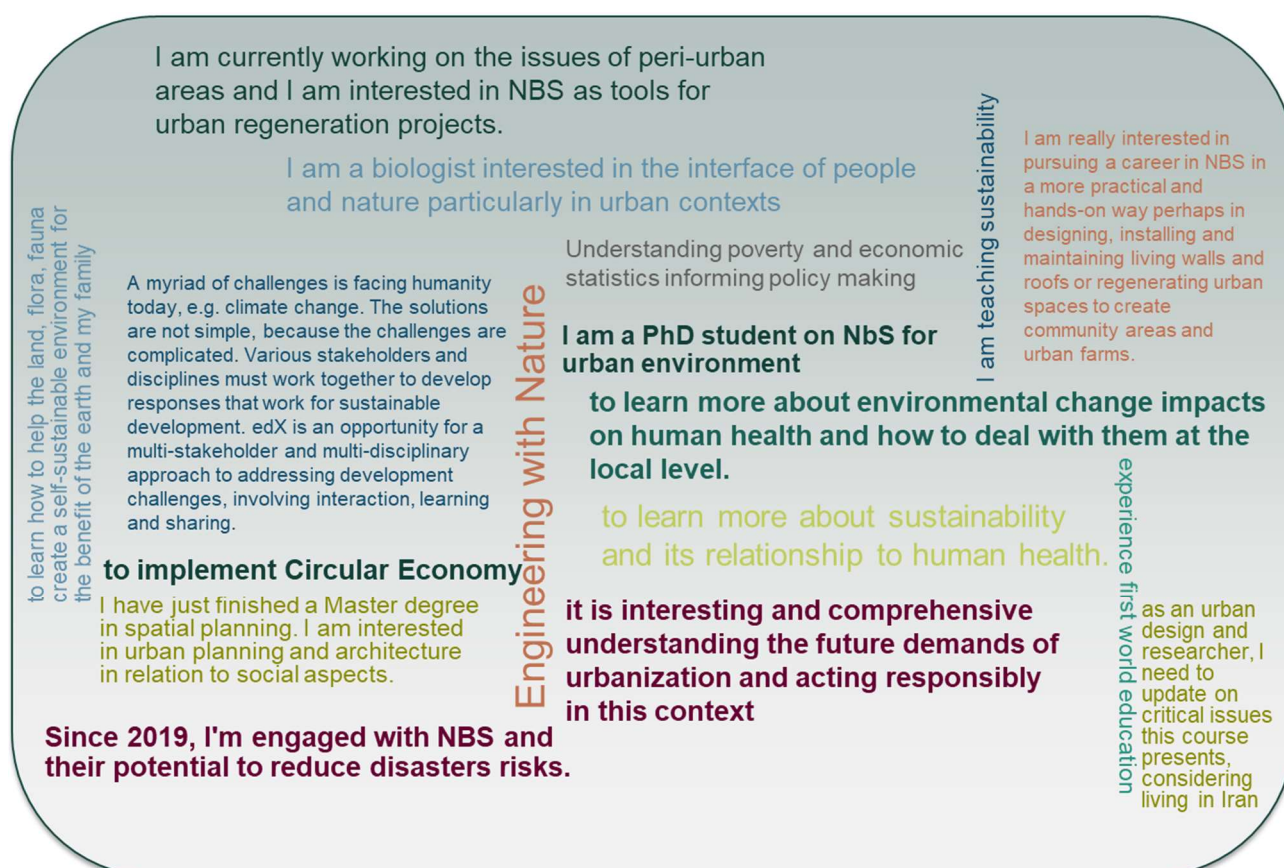


Figure 16 Motivation statements by learners, extracted from the edX discussion forum and online survey Part I

4.2.2. Course interaction of learners

The following data analysis provides an overview of user motivation, user activity and changes over time during the instructor-paced course and beyond. The time learners needed to invest in the course is based on Part I and II of the online survey conducted among the learner base, at the start of the course and after completion respectively.

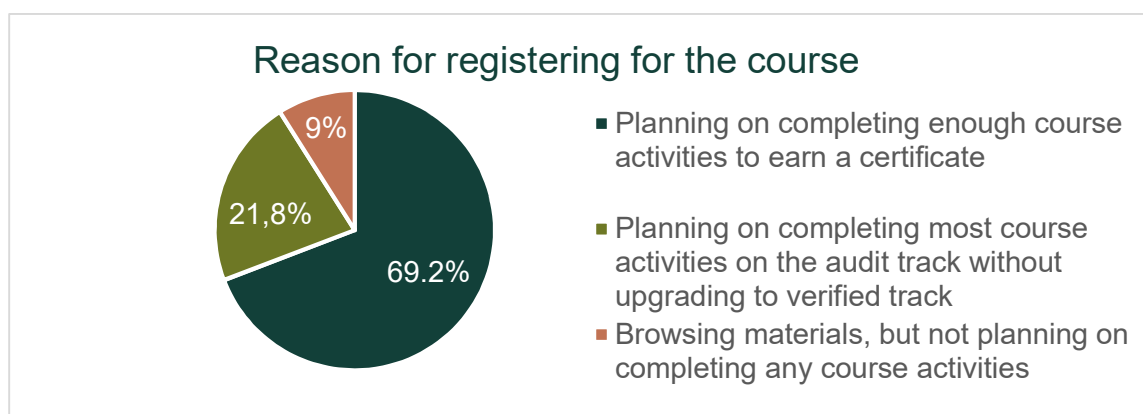


Figure 17 Course online survey Part 1 (n=78)

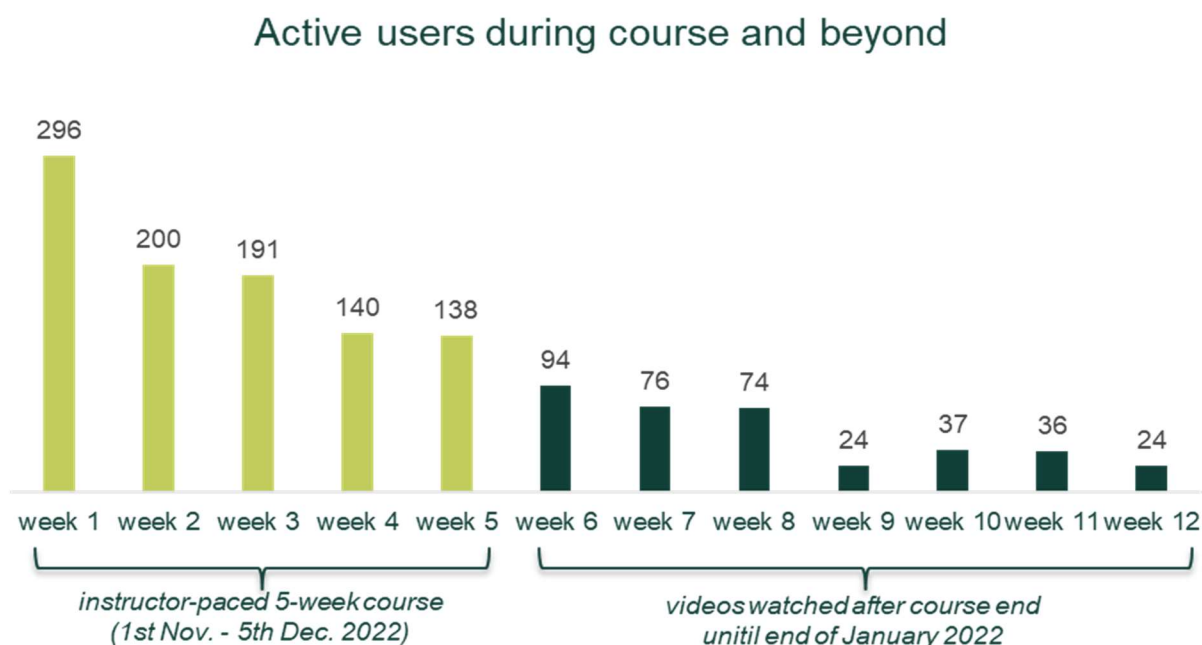


Figure 18 Total no. of active users during and beyond course, edX insights

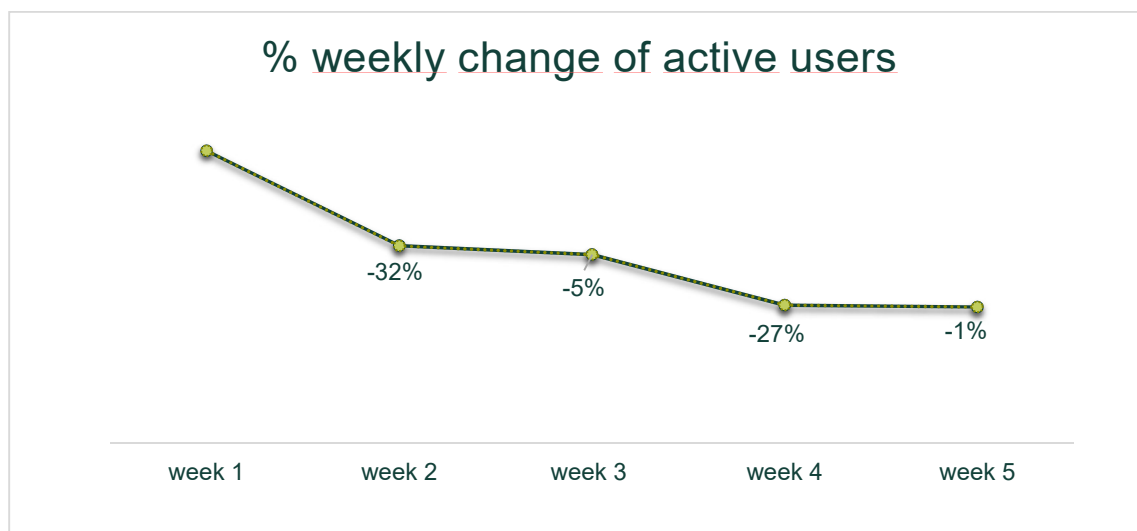


Figure 19 Percentage decrease of active users during the 5-week course (n=296)

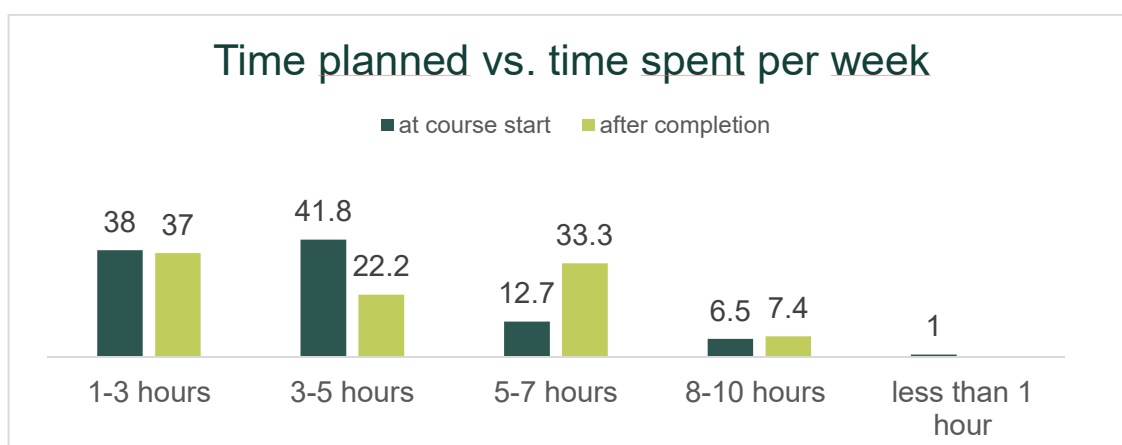


Figure 20 Online course survey (Part 1 at course start: n=79; Part 2 after completion: n=27)

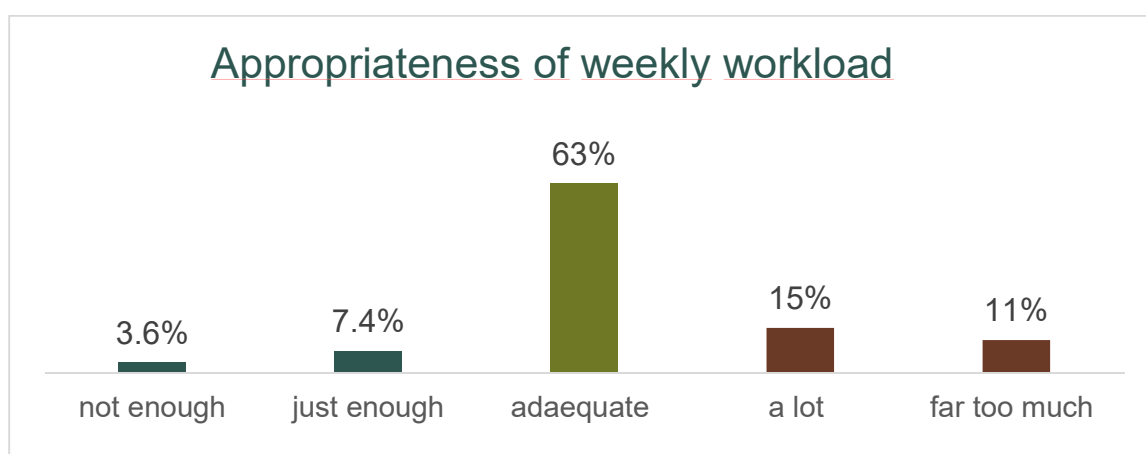


Figure 21 Online course survey results Part 2 (n=27)

4.2.3. Course satisfaction

This sub-chapter shows data analysis on overall course experience, quality and satisfaction based on the online survey Part 2 conducted on edX after course completion. It appears that mostly verified track learners completed Part 2 of the survey with a sample size of 27, thus limiting the representativeness of the survey results compared to the total learner base.

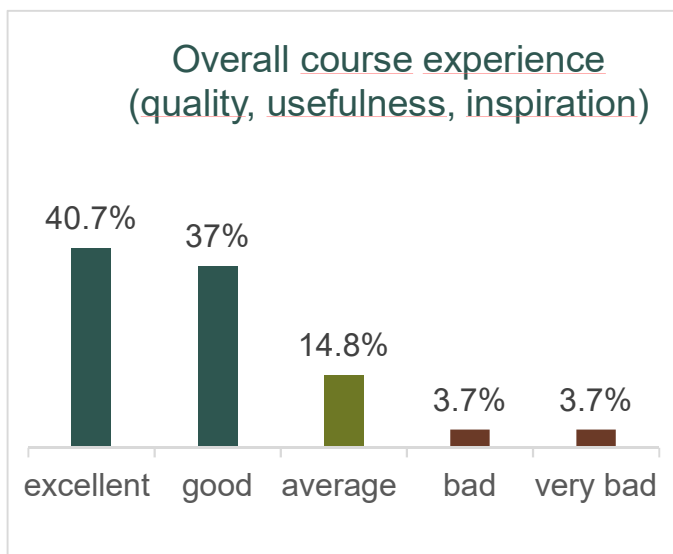


Figure 22 Online course survey Part 2 (n=27)

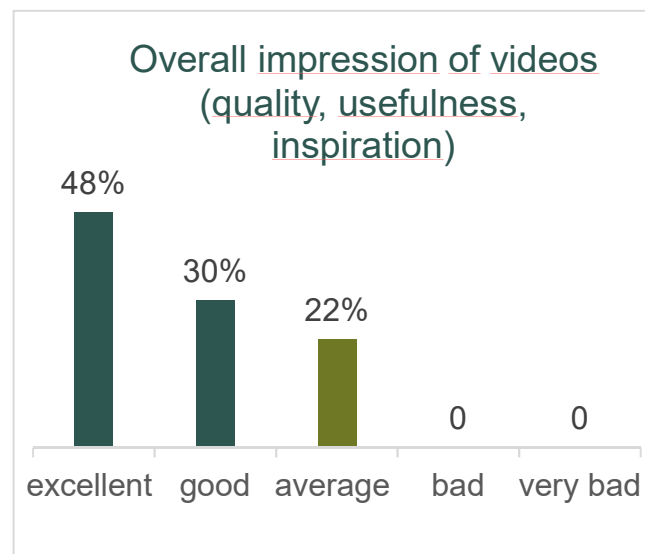


Figure 23 Online course survey Part 2 (n=27)

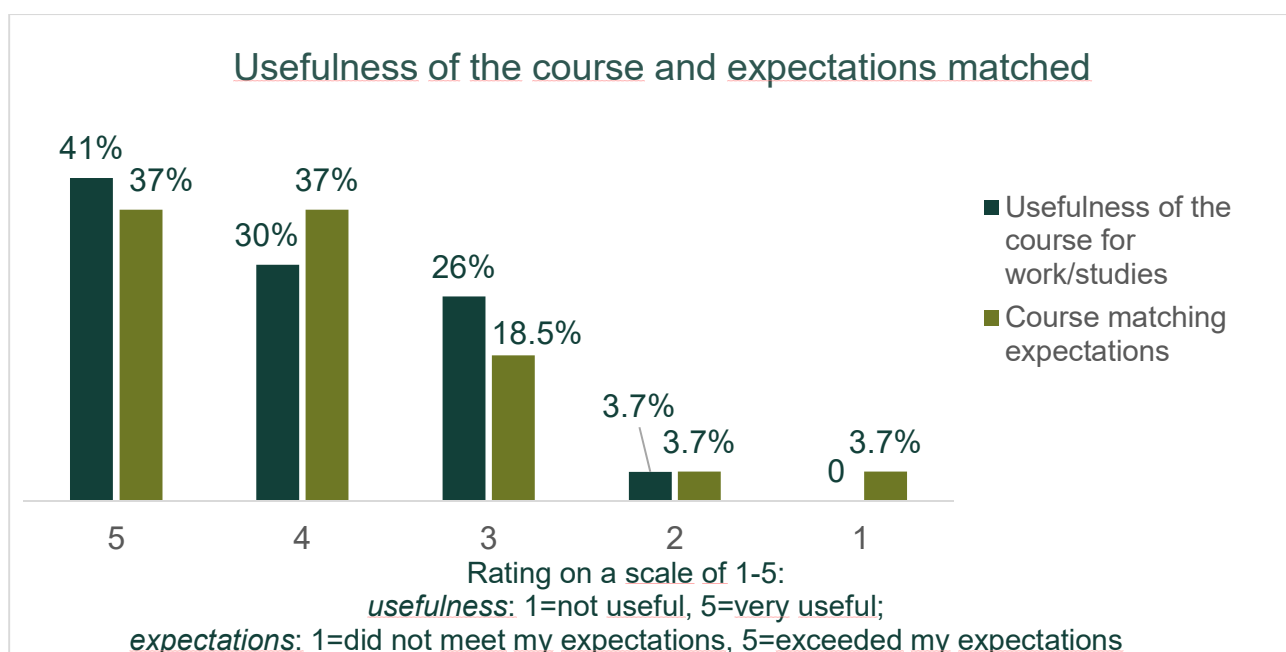


Figure 24 Online survey results Part 2. Ratings on usefulness of the course compared to expectation met (n=27)

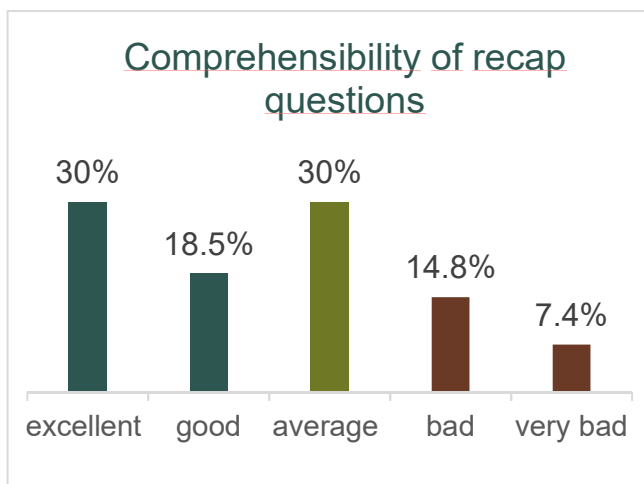


Figure 25 Online course survey Part 2 (n=27)

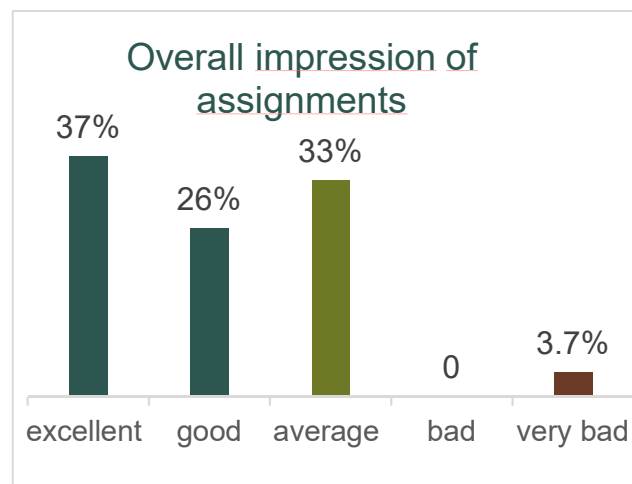


Figure 26 Online course survey Part 2 (n=27)

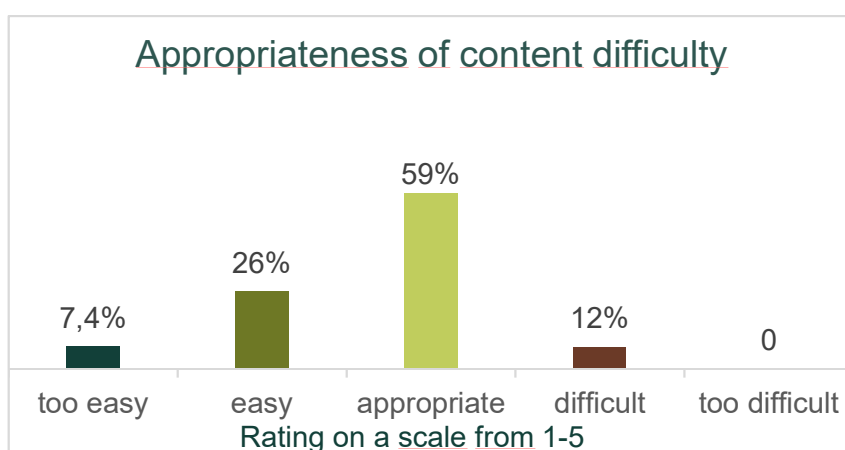


Figure 27 Online course survey Part 2 (n=27)

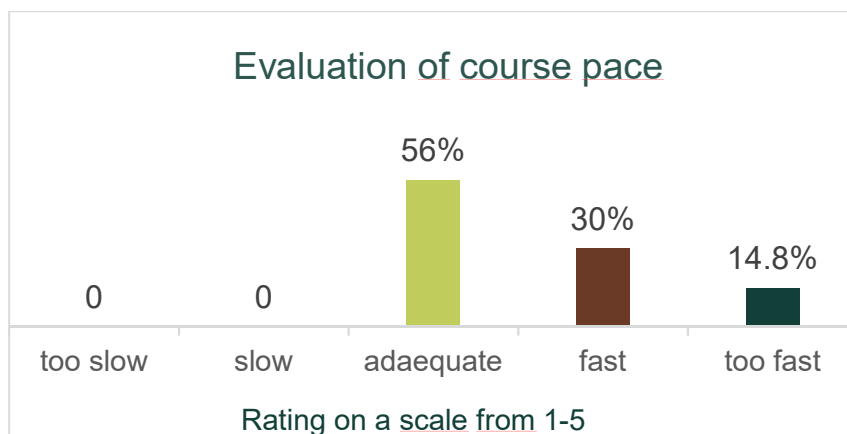


Figure 28 Online course survey (n=27)

The following data sets show the proportion of learners who watched the videos in full per module and development as the course progresses:

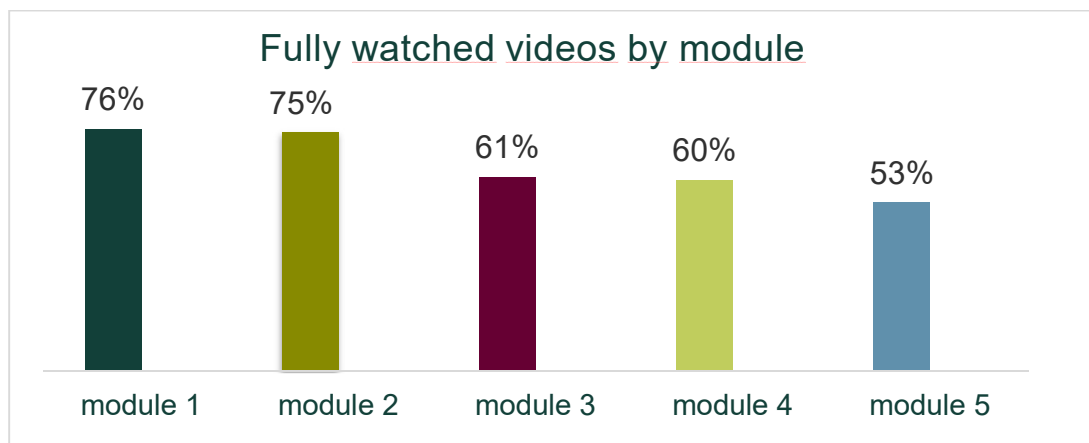


Figure 29 Percentage of learners who watched the videos to the end by module, edX insights, RWTH

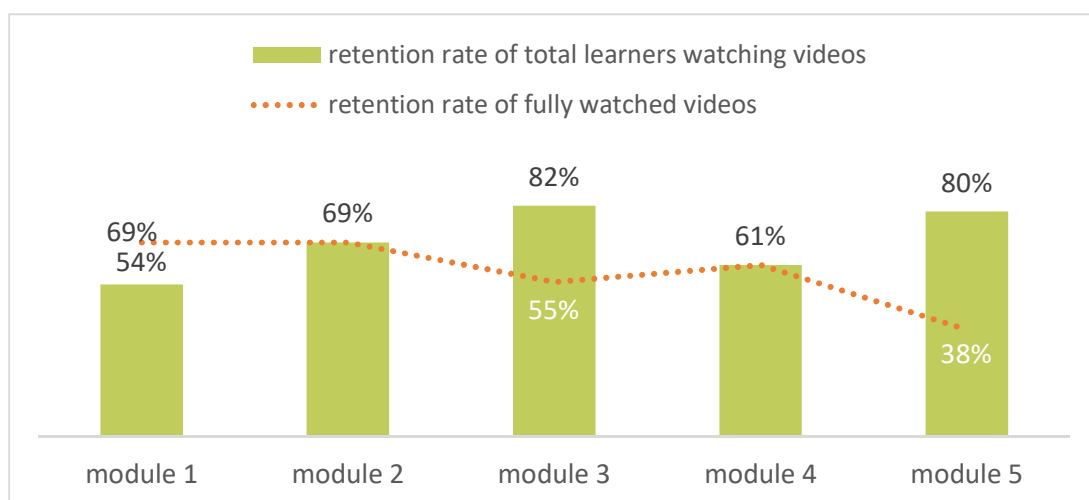


Figure 30 Percentage retention rate of learners watching videos vs. fully watched videos. edX insights, RWTH

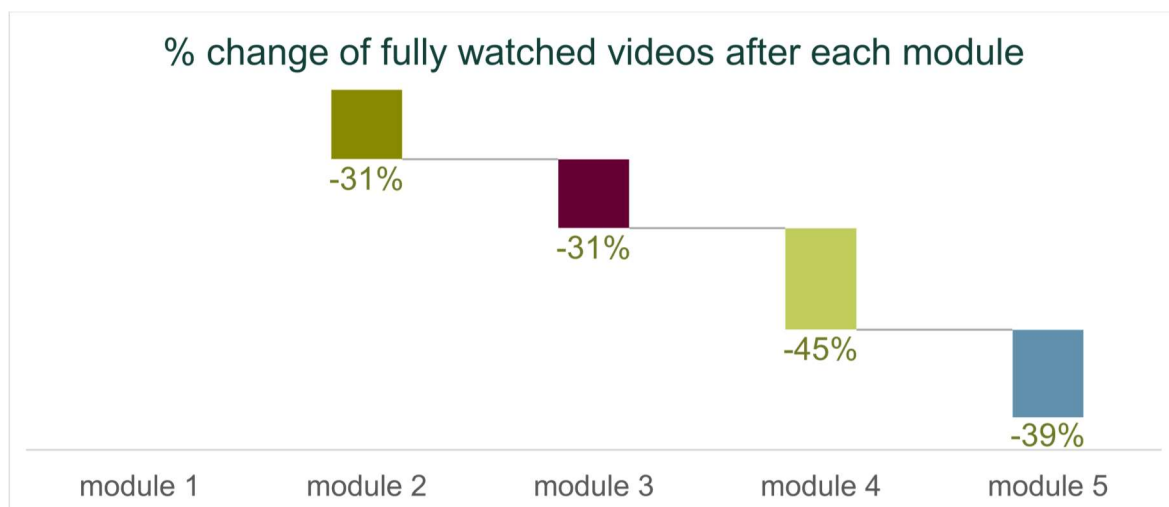


Figure 31 Percentage of learners lost over the duration of the course. edX insights, RWTH

4.2.4. Course completion rates

This sub-chapter gives an overview of the structure of the verified track learner base in regard to gender, age and educational background. It also gives a geographical overview of selected urban regeneration areas the verified track learners chose for their assignments.

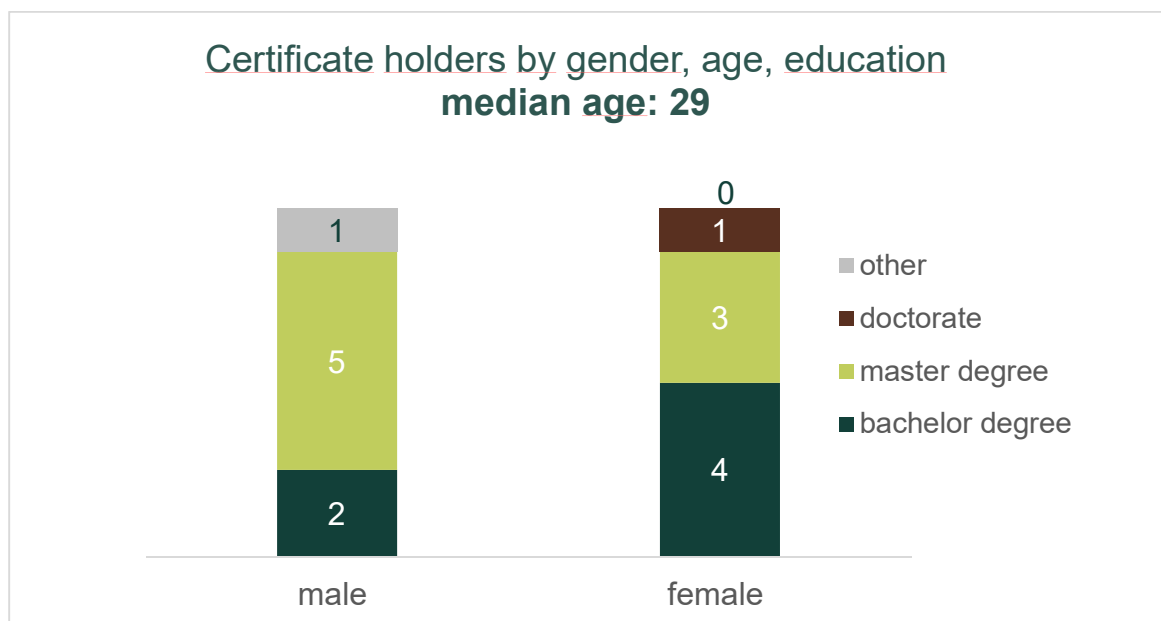


Figure 32 Certificates awarded by gender and degree (n=18)



Figure 33 Geographical breakdown certificate holders (n=21)

The following maps locate the cities chosen as study cases for the assignments of learners who obtained a course certificate. The world map shows overall distribution and locations. Given the high proportion of European learners, the majority of urban regeneration areas are located in European cities in Germany, Italy, Belgium, France, Spain, Croatia and Russia. Please see second map for detailed overview of cities.



Figure 34 Cities chosen for urban regeneration in the assignments worldwide (n=21)



Figure 35 Detailed map of Europe with cities chosen for urban regeneration (n=12)

4.3. Benchmarking the MOOC “Nature-based Urban Regeneration” with RWTH MOOCs

This chapter benchmarks the MOOC “Nature based Urban Regeneration” against comparable instructor-paced English language RWTH MOOCs on edX of the last five years on key performance indicators of MOOC such as:

- No. of enrollees
- Gender
- Level of education
- Geographical coverage
- Verified track rate and learner pass rate

To ensure consistency and comparability, sample sizes of the RWTH MOOCs varies by type of analysis. Most of the data is based on a sample of 20 MOOCs, the smallest six courses due to data collection changes over time (will be indicated accordingly). Some of the presented data relates to the total no. of enrollees as well as to verified track learner data

only. Given the RWTH is a technical university, at least half of the selected courses teach basic knowledge in engineering disciplines and economics as opposed to more niche topics such as nature-based urban regeneration (see Annex for detailed overview).



Figure 36 Comparison of enrollees of proGReg MOOC vs. RWTH MOOCs average (n=20)

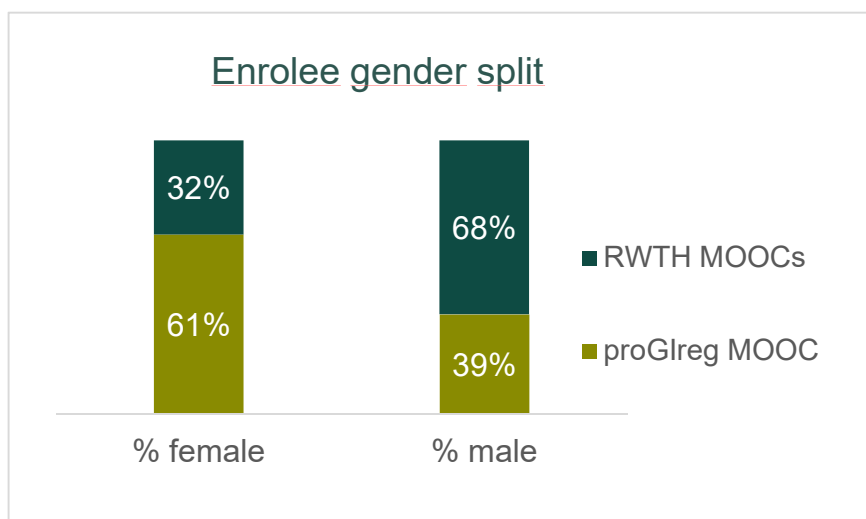


Figure 37 Gender split of proGReg MOOC vs. RWTH MOOCs (n=20)

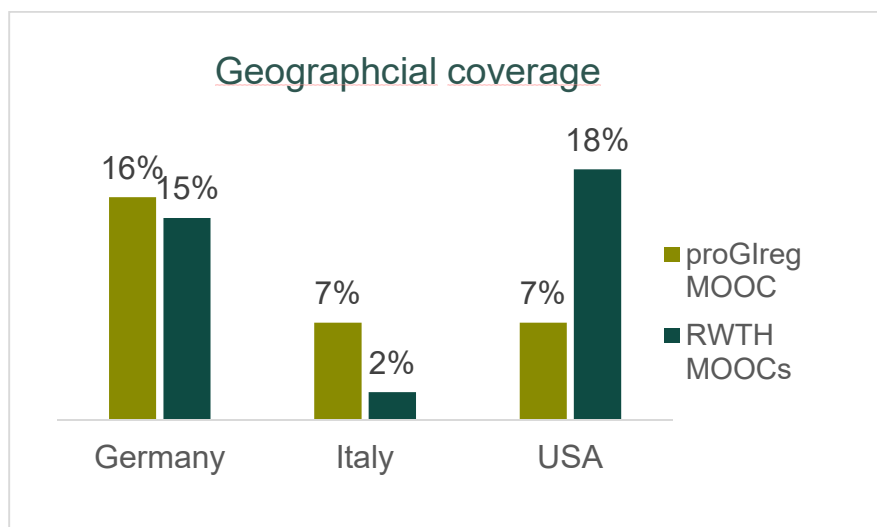


Figure 38 Geographical coverage proGlgreg MOOC vs. RWTH MOOCs

2

No. of verified track enrollees and certificates awarded proGlgreg MOOC vs. RWTH average

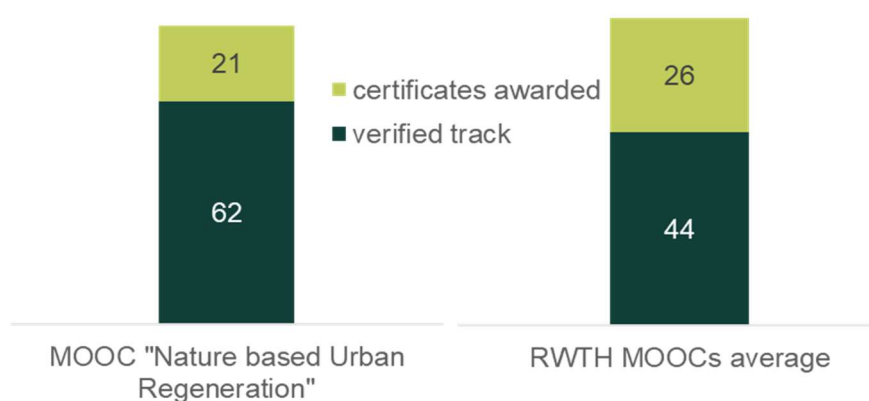


Figure 38 Verified track enrollees and track rate proGlgreg MOOC vs. RWTH MOOCs (n=20)

² Verified track rate denotes the number of enrollees signed up for the verified track. Learner pass rate denotes learners who signed up for the verified track and obtained a certificate. Course completion rate includes all learners who were active until the last course week, but not necessarily signed up for the verified track.

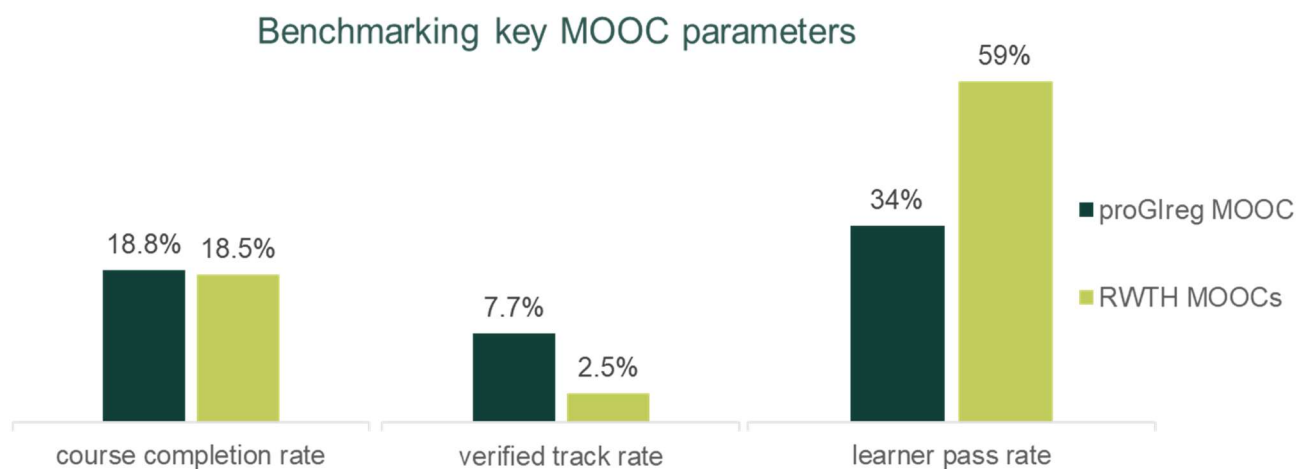


Figure 39 Benchmark on key MOOC parameter (n=20 apart from course completion rate (n=18))

4.3.1. Testimonials

„I watched all videos. Very enlightening with many practical examples of NBS applications, well done! But I had no intention to obtain a certificate.“

„The course is quite complete and very interesting. It takes some work and research, but it was the best course I've taken online so far! It was very enriching to see real-life examples of NBS and learn about their successes as well as the difficulties faced when implementing them.“

„It is a complete and good course. However, improving some platform bugs and the percentage given to jobs that deviate from being better distributed. It is a very interesting course that is worth taking.“

„Now, I loved the course contents, the applications in the real world, and how the assignments made me think about a possible plan. Additionally, I liked the wide approaches of the contents, from ecological angles to social and business models, and the processes to make a NBS plan, from design to sustainability. Also, the examples provided were inspiring and clear. I can see the effort put in this course, congratulations!!“

„inspiring and with foresight“

„Thank you very much. Super introduction to the issue. Clearly arranged. It will definitely spread further. It would be good to have all the presentations available.“

„the content of the course was great! I did really get inspired by all the projects already implemented. However, would have loved to have more time to watch carefully all the lectures and do the assignments. I was (still am) pretty busy with teaching, working on my project, and studying. I hope the time for the last assignment is enough. But thanks very much for putting together such a great course! I hope there are funding opportunities for projects in Latin America :)“

„great course, thank you, it would be great to get involved in one of the NBS projects“

„Good contents and examples. Recap questions contain errors, like the peer-review method for the assignments. It's difficult to find the time to do it. Thanks a lot for everything :)“

„I found the content load per week too heavy to have a complete and rewarding experience, it didn't give me the time to analyze, comprehend and discuss with peers all the valuable information provided. I suggest a wider deadline to complete the course plus the assignments, and some recap questions are tricky and difficult to understand.“

„I would like to compliment you for this project! You are doing an amazing job by regenerating industrial cities into cities for the future, by incorporating nature-based solutions! While watching the videos I got inspired to do something useful: there is so much to be done, everywhere!“

„Yes, make the course available again so that I can earn my certificate. Thank you.“

Figure 40 Online survey Part II on edX (n=28)

5. Outlook

Following the 1st run of the MOOC from November 1st to December 18th 2021, the evaluation and optimisation phase will address raised issues for improvement. This also includes adding pending results that were not available at the time of production in 2021, e.g. post-implementation results in WP4: NBS benefit assessment and WP5: concluding research on barriers and compiling the business model catalogue. Figure 41 outlines the schedule until the 2nd instructor-paced course run in the beginning of October 2022 on edX.

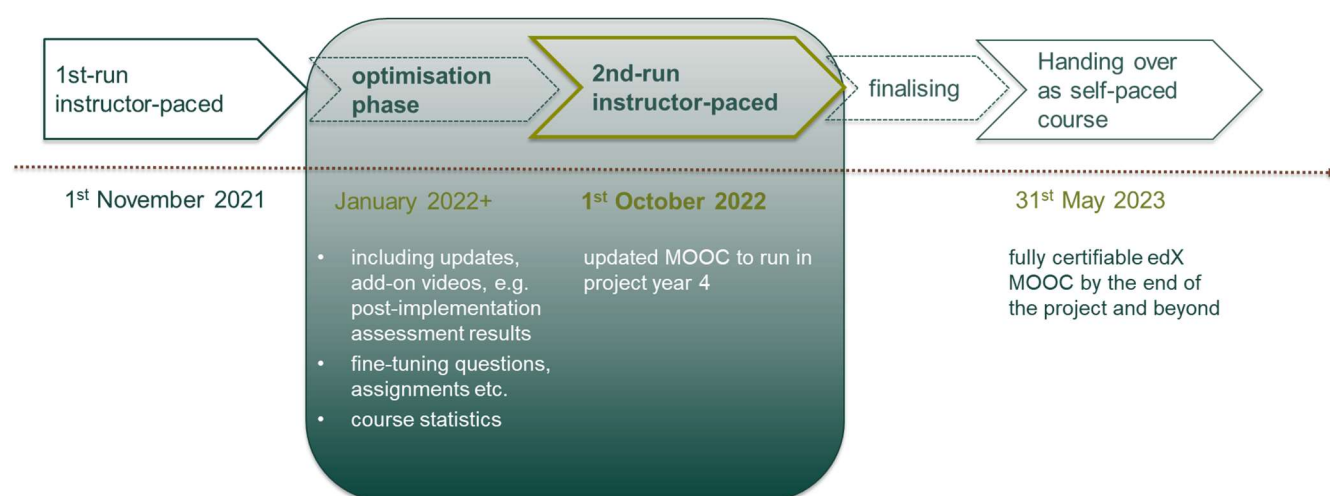


Figure 41 MOOC Nature based Urban Regeneration timeline 2022 - next steps

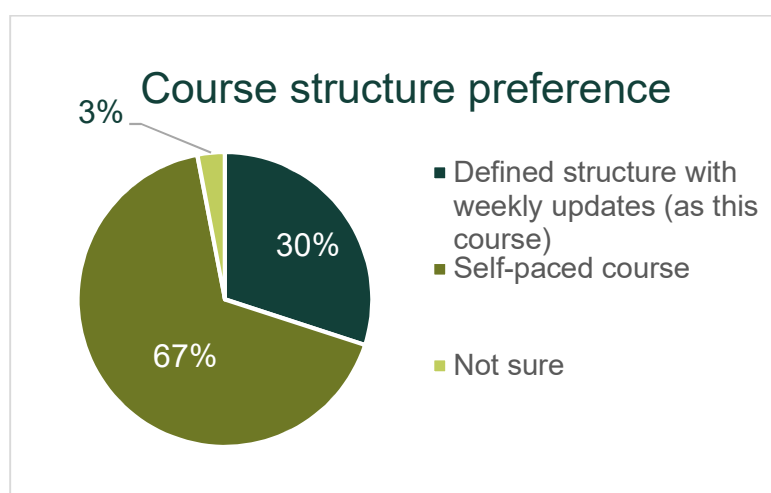


Figure 42 Online course survey Part II (n=27)

Learners preference for a self-paced course structure (67%) underlines the intention to run the MOOC as a self-paced course after the 2nd run as planned towards the end of proGlgreg (see Fig. 42).

5.1. Optimising the MOOC

In the coming months, the MOOC will be fine-tuned according to participant feedback and the evaluation outcomes of the 1st run. Currently, the following changes are envisaged for the 2nd run in October 2022.

- **Content:**

- updating and expanding the existing video contents with new project results, e.g. NBS benefit assessment (module 4 / WP4), barriers and business model catalogue (module 5 / WP5)
- correcting minor mistakes in the videos and scripts

- **Course material and tasks for verified track users:**

- adjusting recap questions,
- reviewing grading and timing of the peer-review system for assignments, notably in regard to deadlines for the final assignment

- **Evaluation:**

- fine-tuning the online surveys with more targeted questions regarding module content, quality and video formats

5.2. Addition of one module by GoGreenRoutes project

Within the research project 'GO GREEN: Resilient Optimal Urban natural, Technological and Environmental Solutions' (from this point on referred to as GoGreenRoutes), financed by the Horizon 2020 funding programme of the European Commission, it is planned to develop a module with 5 units for an edX MOOC on "Health and well-being impact of NBS". The module will be integrated into the proGlgreg MOOC - Nature-based Urban Regeneration in the 2nd run in October 2022.

GoGreenRoutes is made of a transdisciplinary consortium of 40 partners and can therefore draw on a broad range of expertise on the topic of NBS. The project focuses on rethinking nature-based solutions (NBS). In six Cultivating Cities in Europe (Lahti, Umea, Versailles, Burgas, Tallinn and Limerick) various studies are currently being conducted and the first temporary interventions will be implemented in summer 2022. The initial aim is to improve the relationship between people and their urban environment. Through different intervention formats, the understanding of benefits will be promoted and analysed. Based on these findings, permanent NBS interventions will then be implemented in these six cities from spring 2023 onwards.

The focus of the planned module is on health and well-being and how holistic and co-creative approaches can be used in transferring knowledge and implementing innovative interventions in urban space to help city dwellers experience green space in a new and better way. The kick-off event for the preparation of the module took place in February 2022 where the following first draft concept was developed, and will be further detailed and, if necessary, re-structured in the coming weeks.

The videos for the module are foreseen as lecture videos. This classic MOOC video format has the advantage that the various consortium partners can produce the lectures quite independently of location and workstation equipment, as there will be no recording meetings or visualisation programs needed to edit the content.

This process will be guided by a detailed introduction and preparation of the topic by the GoGreenRoutes task leader RWTH. In order to present the lecture content in a short and concise way, excerpts of animated videos produced by students of RWTH University during the winter semester 2021/22 as part of the seminar 'Co-Films: räumliche Transformationen animieren' may be included. The seminar was designed to producing videos aimed at contributing to the MOOC module focusing on health and health-related topics and innovative NBS. Post-production of the lectures (editing etc.) will be done by the proGlgreg partner.

Below table 7 outlines the first draft of the module's content structure:

Table 7 Preliminary content structure of the planned module

Module GoGreenRoutes Promoting Health and Well-being in cities through NBS interventions	
Unit 1	NBS for Health - a salutogenetic approach (Maynooth University), (Horizon Nua)
Unit 2	NBS as part of the "one health" approach
Unit 3	NBS - physical health benefits and how to assess them
Unit 4	NBS: Mental health and wellbeing benefits and how to assess them
Unit 5	Seedbed Interventions: Implementing temporary interventions and the health benefits of co-producing with people

6. Conclusions

The developed 5-week MOOC “Nature based Urban Regeneration” offers a comprehensive and insightful e-learning experience, showcasing methodologies, approaches and results of proGlgreg’s use of NBS for urban renewal to a global audience. Developing the course content structure, producing 25 e-learning videos in various formats, compiling all ancillary course material and promoting the MOOC required numerous work steps and a great deal of coordination and cooperation efforts by the task leader RWTH and the 20 contributing partners.

The course provides an overview of exploring and implementing innovative nature-based solutions to transform cities and neighbourhoods into more sustainable and liveable environments by enhancing quality of life. Tested research methods and results from proGlgreg’s Front-Runner Cities in Europe and China have been channelled into a MOOC to showcase how cities are harnessing NBS for their green transformation processes, together with local communities. The proGlgreg Living Labs show that NBS can be cost-effective and inclusive solutions to many challenges in industrial and post-industrial areas, when co-created with local stakeholders incl. marginalized groups.

Communicated through various EU, proGlgreg and social media channels and the edX platform, the MOOC attracted in total 804 enrolments from 96 countries. The geographical reach spans all continents, but European enrolees and certificate holders dominate with 56% and 71% respectively. 60% of enrolees are female and nearly 70% are professionals from environmental planning and engineering, architecture, urban-regional planning, urban design and landscape architecture backgrounds among others, seeking to expand their knowledge in the field of NBS practice. But also learners from non-planning disciplines such as economics, political sciences or tourism showed interest in using natural solutions to urban challenges. Hence, there is a growing awareness of the NBS concept and its inherent multiple benefits and co-benefits to a wider audience, as well as integrating NBS into the policy framework.

Learners’ feedback testifies that the course met expectations in teaching how to develop an urban regeneration strategy, apply and assess NBS in site-specific global contexts. Online surveys conducted on edX among the learner community at the start and end of the course show high overall course satisfaction ratings, with more than 70% of verified track learners finding the MOOC very useful to useful, mostly matching expectations. Almost 80% rate the quality, usefulness and inspiration of the course structure and videos good to excellent. Content difficulty and the requirements to obtain a certificate were perceived as adequate, requiring a minimum of five hours per week to complete the course work and reach at least 60% to pass. Analysing the active learner community shows that interaction with the course, and watching the videos in full length decreases over the 5-week time span. Reasons can be manifold but are difficult to measure: Learners are only interested in basic overview modules, typical interest decline and selection process, course content does not meet expectations etc. However, the MOOC continued to attract attention and videos were watched beyond the

duration of the instructor-paced course. A typical source of learner complaints across edX MOOCs includes the comprehensibility of recap questions. This issue will be addressed during the upcoming optimisation phase to improve clarity of recap questions. Having said this, multiple choice is prone to ambiguity but among the few types of questions possible on edX.

Benchmarking the proGlgreg MOOC against 20 RWTH MOOCs on edX showed interesting results. RWTH MOOCs typically cover basics in traditional engineering disciplines, consequently addressing a larger target group than a topic such as NBS. Given the still limited awareness of the fairly new concept of NBS outside of Europe, enrolment numbers and US participation were lower than RWTH averages. In contrast, the proGlgreg MOOC's verified track rate exceeds RWTH averages while course completion rates are on par. The proGlgreg MOOC underperformed on the learner pass rate of 34% compared with 59% of RWTH MOOCs. It will be interesting to see whether the timing of the 2nd run will produce different figures as the last phase of the 1st run overlapped with the countdown towards Christmas.

The next steps of Task 6.3 include improving the MOOC based on the evaluation results and preparing for the 2nd run starting on October 3rd 2022. Key improvement areas include the addition of a 6th module by the EU project GoGreenRoutes which will complement and expand the existing NBS benefit assessment content. The module will focus on the impact of NBS on health and wellbeing by introducing different approaches and NBS implementations.

Annex

Table 8 Overview of RWTH MOOCs used for benchmarking

No.	Name of RWTH MOOC	Discipline	Content/ subject
1.	Application in Communication Acoustics	Electrical engineering	Basic
2.	Fundamentals of Communication Acoustics		Basic
3.	Communication Acoustics		Basic
4.	Biobased Products for a Sustainable (Bio)Economy	Biotechnology	Niche
5.	Cultural Heritage in Transformation	Architecture & Planning	Niche
6.	Customer-Centric Innovation	Economics/ Business administration	Basic
7.	Innovation & Creativity Management		Basic
8.	Introduction to Venture Capital		Basic, very high enrolment rates
9.	Managing Disruptive Change		Niche
10.	Strategic Management: From Intuition to Insight		Niche
11.	Strategic Management: From Insight to Decision		Niche
12.	Thinking & Acting like an Entrepreneur		Niche
13.	Sustainable Development: The Water-Energy-Food Nexus	Civil engineering	Basic
14.	Flood Risk Management	Civil engineering	Basic
15.	Lightweight Design	Engineering	Basic

16.	Machine Dynamics with MATLAB	Engineering	Basic
17.	Mathematical Optimization for Engineers		Niche
18.	PsyHealth WorXs	Occupational medicine	Niche
19.	Innovation Strategies for Electric Mobility: The Streetscooter Case	Economics/Business Administration	Niche