SDG4U

Engaging SDGs for Transformative Education and Enhanced Sustainability in Universities

Mapping Tool

Deliverable of Work Package 2

December 2025

Co-funded by the European Union

About SDG4U

SDG4U key priority is to stimulate innovative learning and teaching practices through engaging SDGs to transformative education and sustainability practices in universities. The project will support and enhance the implementation of SDGs in higher education by embedding sustainability across teaching, research, operations, and community outreach.

The project is funded by the Erasmus+ programme of the European Union and spans over 36 months (December 2022 – December 2025).

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More at: https://www.sdg4uproject.eu/

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Abstract	The deliverable corresponds to the Mapping tool for recording SDGs engagement into universities' courses and operations.

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Executive Summary

This report outlines in detail the progress to date of WP2, concerning the development of a tool to map university modules/courses, activities and operations to the United Nations' Sustainable Development Goals (SDGs).

Firstly, the report outlines two scenarios of use, A and B, for the three end user categories; student, professor and administrator; of the SDG4U Mapping Tool.

Secondly, the report details the tool's development through the Agile method, highlighting how it evolved at each stage based on user feedback.

The interface and how to use the tool is then outlined in detail.

A comparison between the UCC SDG Toolkit and SDG4U tool is provided. Elaborating on the precise differences and advancements made by the SDG4U tool.

To increase user participation, the Mapping tool includes a gamification system that awards badges for milestones, encouraging users to actively map courses to SDGs.

The tool tracks KPIs to monitor SDG integration, user engagement, and overall project success. KPIs include metrics like SDG mentions, interdisciplinarity, and course evaluations from students and professors.

Feedback from partner universities highlights the tool's utility in enhancing SDG awareness but suggests further improvements, such as enhanced data accessibility for institutional reporting. User rankings show positive reception, supporting the tool's role in fostering sustainability in higher education.

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1. Scope/Purpose

The SDG4U project aims to support and enhance the implementation of SDGs in higher education by embedding sustainability across teaching, research, operations, and community outreach.

WP2 of the projects concerns the development and refinement of a Mapping Tool, designed to track how universities embed the 17 SDGs into their teaching. The tool's overall aims are: (1) to provide a snapshot of where higher education institutions stand in supporting the SDGs and (2) inspire education in sustainability. The tool was developed using Agile methodology. How this impacted the tool's development at each stage is explained in detail in section 4.

The tool allows professors and students to map a teaching module to relevant SDGs and SDG targets. Furthermore, the tool permits administrative personnel to submit records of sustainability initiatives and operational activities from each institution. The SDG4U Project consortium promoted and use the tool within their own institutions. The outputs serve two primary functions: first, they provide a foundation for developing new trans-disciplinary modules and courses at European Universities; and second, they inform operations and community engagement to integrate sustainability principles across all levels of university life.

The tool itself is available online (htt:ps//sdg4u.uoa.gr/mapping_tool/) where users can register as a professor(which also applies to researchers), student or university administrator. The code for the tool is open source and can be found (https://git.scanlab.gr/sdghub/2022-1-el01-ka220-hed-000088776). The tool is inspired in part by UCC's existing SDG Toolkit. Section 6 provides a detailed comparison of the two platforms, explaining how the SDG4U tool advances upon the former and outlining the features available in each tool.

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This deliverable's role is to elaborate on WP2's completion, which could not be included in the SDG4U project's final report due to word count constraints.

Section 2 outlines the possible scenarios an end user can experience with the mapping tool, focusing on the three main user types (professor, student and admin) and also addressing the experience of non-registered users with the public facing features.

Section 3 outlines in detail the evolution of the tool over each successive version. Five versions have been released consecutively over the lifetime of the SDG4U project were v1.1 being the latest release. The section showcases the tool's evolution by examining the tool feature-by-feature and showing how each feature has changed over the five versions.

Section 4 discusses in detail how the agile project management framework was utilised during the mapping tool's development. Agile is an iterative and collaborative methodology. A key element of agile is that user feedback is reflected in future iterations of software. The section showcases how feedback from the other consortium members influenced and improved the SDG4U Mapping Tool over time.

Section 5 provides a detailed breakdown of how the SDG4U Mapping Tool functions, drawing extensively from the manuals developed for the tool. It outlines how the platform differs for each user type professor, student and administrator,

Section 6 compares the SDG4U Mapping Tool in detail with the pre-existing UCC SDG Toolkit. There are considerable differences between the two platforms such as the user types, data visualisation and retention of mapped modules.

Section 7 outlines the role of gamification in the SDG4U Mapping Tool and how it was integrated in the latest release. Users can earn badges upon meeting specific criteria.

Section 8 presents the Key Performance Indicators (KPIs) of the project with metrics used to evaluate its success. These KPIs help ensure the project stays on track and achieves its objectives.

Section 9 provides an evaluation of the SDG4U Mapping Tool by project partner universities. It shares and analyses the results of the survey, and includes a five-star user ranking to assess different aspects of the tool.

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Section 10 details the impact of Mapping Tools in two key areas: first, in identifying superior educational practices and methodologies to propose new policies; and second, in serving as a standardized template to guide other higher education institutions in adopting SDG-related activities.

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2. Scenario of Use

Scenarios of Use:

Implementation of an Academic Mapping Tool for SDGs in a University Setting

The SDG4U project has implemented an online mapping tool to be used in Higher Education by embedding sustainability across teaching, research, operations, and community outreach. It is designed to help streamline course offerings mapping the connection of the Learning Outcomes to SDGs, campus operations, research planning, and resource management. The tool offers various interactive features, including mapping and user tracking. Below are two scenarios for each user group:

2.1 SCENARIO A

2.1.1 Student Use Case

Scenario: A sociology student with an interest in sustainability wants to select courses that align with specific SDGs for the upcoming semester. Using the mapping tool on their tablet, they search for courses that integrate SDG principles relevant to their interests. The tool offers a detailed breakdown of each course's learning outcomes, emphasising their SDG connections, which aids the student in making an informed decision.

Benefits

Informed Course Selection: Students gain insight into the content of university courses and their connection to the SDGs. They Can easily view how each course aligns with sustainability topics, allowing them to select courses that match their interests in specific SDGs. This feature can also help students choose courses based on the SDGs covered, especially if they are interested in specialising in sustainability issues.

Increased Awareness: By reading and answering the tool's questions, students become more aware of SDGs and learn how to integrate SDG values in their daily routine. The tool's interactive features especially engage students, encouraging them to understand and adopt SDG principles.

Feedback Mechanism: Through the tool, the students can provide feedback on how well their courses align with the outlined SDG goals, fostering accountability and transparency in course content. This also allows students to evaluate their professors' engagement with

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the SDGs, and to express concerns if the course does not match the information submitted to the Mapping Tool.

2.1.2 Professor Use Case

Scenario: A professor in the Environmental Sciences department is developing a sustainability-focused curriculum and seeks collaboration with colleagues across the university who also incorporate SDGs into their courses. By accessing the mapping tool, professors can identify colleagues in other departments who address similar SDG themes and initiate collaborations to enrich course materials and jointly develop projects.

Benefits

Enhanced Collaboration: The tool enables professors to easily find colleagues working on similar SDG topics and understand how they are being implemented. They can connect with other professors in their university who address the same SDGs from a different perspective, forming synergies to promote these topics at their institution and fostering partnerships that may lead to joint initiatives and interdisciplinary projects.

Resource Sharing: The tool can help professors create a network of teachers who are working to implement the SDGs in Higher Education. This would lead to an exchange of good practices, development of joint projects and initiatives. Professors from different fields can view shared resources related to SDG-focused courses, allowing for more efficient curriculum development.

Constructive Feedback: Through student evaluation and feedback, professors gain valuable insights into whether they have really addressed the SDGs as indicated in the mapping tool. This feedback allows them to make necessary adjustments to improve course alignment with sustainability goals.

2.1.3 University Administration Use Case

The university's administration is preparing a report on the institution's sustainability performance and SDG engagement across departments. They are drawing on recorded best practices from other universities, as captured by the Mapping tool, to guide policy makers in designing customised sustainability initiatives that address the university's specific needs and goals. This report will provide an overview suitable for transparency purposes or to support further institutional development.

Benefits

Comprehensive Evaluation: The use of the mapping tool benefits the university by providing a structured, data-driven approach to assess and improve sustainability

performance and SDG engagement. It enables administrators to benchmark their efforts against best practices from other institutions, helping policy makers develop customised sustainability initiatives that are more aligned with the university's unique needs and goals. It improves internal processes but also enhances the university's reputation as a committed and responsible institution in sustainability.

Best Practices Pool Access: University administrators will have access to a repository of best practices for sustainability activities, specifically focused on SDGs related to campus sustainability and operations.

Strategic Planning Support: The tool helps identifying high-impact areas for sustainable actions, guiding the development of future policies and initiatives.

2.2 SCENARIO B

2.2.1 Student Use Case

Scenario: An undergraduate student in the Environmental Studies program is interested in selecting courses that contribute to three specific SDGs they are passionate about. They log into the mapping tool on their smartphone and use the search function to check each course's alignment with these SDGs. The tool offers straightforward navigation and up-to-date information, helping them make an informed choice.

Benefits

Time-Saving: The student can access course details and SDG relevance without needing to consult an advisor or visit multiple campus offices.

Enhanced Resource Accessibility: Information on each course's focus allows the student to quickly assess course relevance to their specific SDG interests.

Improved Planning: The student can structure their course schedule more effectively by aligning it with sustainability topics, thus streamlining their academic planning.

2.2.2 Professor Use Case

Scenario: A professor in the Biomedical Sciences program wants to collaborate on an SDG-focused project related to the impact of climate change on human health, with faculty from other departments. Using the mapping tool, they locate relevant programs and courses, identifying colleagues working on aligned SDG themes. The tool's networking features display a map of potential collaborators and shared resources, enabling the professor to reach out directly via email and propose partnerships.

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Benefits

Enhanced Collaboration: The tool facilitates cross-departmental networking, enabling the professor to quickly find and contact colleagues engaged in similar SDG-related efforts.

Streamlined Resource Management: Course information and shared resources are easily accessible, making project planning and comparative studies simpler.

Increased Visibility: The professor's projects gain visibility within the university's community, attracting interest and support from students and other departments.

2.2.3 Administration Staff Use Case

Scenario: A member of the administration team, is coordinating the logistics for an upcoming academic report on SDG implementation. Various metrics can be retrieved from the online tool to inform their report.

Benefits

Efficient planning and data retrieval: They can manage data retrieval without spending time locating and identifying these data themselves.

Improved communication: The mapping tool provides real-time updates about changes to its content.

Cost-effective management: By optimising data retrieval, cost and time savings are ensured.

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3. Evolution of Tool between pilot phases.

This section outlines the evolution of the SDG4U mapping tool after each phase of development, or “sprint” in agile framework terminology. A comprehensive table details how features have changed over the tool’s development.

The evolution, both completed and ongoing, reflects a commitment to provide a robust, user-friendly platform that empowers universities to more easily align their teaching and learning with the UN’s SDGs effectively.

The Mapping tool was developed using PHP, CSS, HTML, and JavaScript as the programming languages, chosen to meet requirements for both functionality and transferability.

3.1 Evolution of Features per Version

3.1.1 Core Functionality (Plugin Dependencies and Custom Coding)

The initial release, v0.1, relied heavily on third-party plugins for the core functionality of the tool. While useful for creating a first draft of the product, it posed a risk of dependency on the stability of external code beyond the control of the SDG4U project consortium.

From the second release onwards, v0.5, the use of any third-party plugins was eliminated to mitigate the risk. They were replaced by custom-built code developed by the EKPA programming team. This evolution improved the tool’s performance, stability and the project consortium’s control over the platform. The custom code has remained within the tool’s architecture for subsequent versions, with periodic adjustments to improve stability and performance.

3.1.2 Data Visualisation

Data visualisation is essential for displaying end-user response to questionnaires in an accessible format. Without easy to understand visuals, the tool may not be successfully adopted by more professors, students and university administrators both within and external to the project consortium. Version 0.1 included a very basic data visualisation feature, implemented by using the wpDataTables plugin (Wordpress, 2024). From version 0.5 onward, as previously mentioned, all third party plugins were removed. The basic visualisation of tool outputs was continued by custom code from the programmers. The next release, v0.6, introduced Chart.js for more dynamic and interactive charts to engage end-users better with their outputs. The ensuing releases, v1.0 and v1.1, transitioned to ECharts, providing a smoother and more flexible visualisation. The latest release, v1.1, enhanced the usage of ECharts by including its implementation for public statistics too.

3.1.3 Statistics and Analytics

The initial release, v0.1, launched with tool-generated user statistics integrated with real-time visualisation (initially using plugins as previously explained, then custom code from v0.5 onwards). The next significant update to this feature came in v1.0, when course statistics were made publicly accessible, promoting transparency for current and potential users. The latest release at the time of writing, v1.1, further expanded analytics to include university-wide data collected via a questionnaire for university administrators.

3.1.4 User Roles and Engagement

The first tranche of SDG4U Mapping Tool releases, v0.1-v0.6, focused on two roles. These were ‘professors’ and ‘students’. Both roles concerned the mapping of university learning modules or courses to the UN’s SDGs. A ‘professor’ user can add a module/course to the platform. The ‘professor’ is then asked to complete a brief survey to map the module to the SDGs using a 1-5 scale. The course is then available to view on the mapping tool’s platform. A ‘Student’ from a course’s university can then complete a brief survey to map the module(s) to relevant SDGs, using the same 1-5 scale, based on their learning experience.

The next iteration, v1.0, broadly maintained the two roles of ‘professor’ and ‘student’. Albeit with improved features such as the visualisation feature: SDG correlation matrix.

The latest release, v1.1, added a new role, ‘administrative staff’, to the SDG4U Mapping Tool. Allowing for universities to self-assess their wider operational sustainability efforts beyond teaching and learning. The new and improved roles alike, enhanced engagement and uptake of the tool among the consortium universities’ communities.

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3.1.5 Latest Version's (v1.1) New Functionalities

The latest release of the SDG4U Mapping Tool, v1.1, includes the most robust set of features and functionalities to date. As noted in prior sections, a third user role—'university administrator'—was created in addition to the existing two. This new role enables a more comprehensive view of each participating university's sustainability performance and fosters collaboration between university departments. Administrators can self-assess their sustainability efforts and performance through a dedicated questionnaire adapted from THE Impact Rankings.

v1.1 is the most transparent of the iterations released so far. Course/module statistics are available for public viewing (without an account). Account holders are also able to export the tool's data as a CSV file for their own offline analysis. An aspect that can help participating universities in their own decision-making to become more sustainable and embed sustainability into their curriculums, and thus expands the analytical capacity that the tool can offer.

Another facet of v1.1 is the newly introduced gamification system. The system rewards users that spend time mapping modules to the SDGs with badges for different milestones depending on a specific metric (e.g. one user successfully mapped 5 modules). The gamification elements encouraged and motivated more active participation in sustainability initiatives from users.

Other enhancements in v1.1 include optimised software performance, with continual improvements to the custom code developed to replace third-party plugins used in the initial version (v0.1). Additionally, the ECharts data visualisation feature was further optimised, benefiting from the improved stability and performance of v1.1.

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Table 3.1 - Evolution of SDG4U Mapping Tool Across Versions					
Feature	**v0.1**	**v0.5**	**v0.6**	**v1.0**	**v1.1**
Core Functionality	✔ Basic features with plugins	✔ Plugins replaced with custom code	✔ Added Chart.js for data visualisation	✔ Switched to ECharts for visualisation	✔ Enhanced ECharts; optimised theme
Plugin Dependencies	**Yes** (Multiple plugins used)	**No** (Removed all plugins)	No	No	No
Custom Code Replacing Plugins		✔ **Introduced**	✔ Continued	✔ Continued	✔ Continued
Data Visualization	wpDataTables plugin	Basic custom charts	**Chart.js integration**	**ECharts integration**	**Enhanced ECharts visualisations**
Statistics and Analytics	Basic via plugins	Basic via custom code	**Added integrated statistics with Chart.js**	**Public access to course statistics**	**Public and private stats with ECharts**
User Roles	Students, Professors	Students, Professors	Students, Professors	Students, Professors	**Added Administrative Staff**
User Profile and Registration	Via Profile Builder plugin	**Custom code introduced**	Custom code	Custom code	Custom code
Course Mapping to SDGs	✔	✔	✔	✔	✔
Interactive Course Management	✔	✔	✔	✔	✔

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Table 3.1 - Evolution of SDG4U Mapping Tool Across Versions					
Feature	**v0.1**	**v0.5**	**v0.6**	**v1.0**	**v1.1**
Custom Forms	Via Forminator plugin	**Custom code introduced**	Custom code	Custom code	Custom code
Public Course Statistics				✔ **Introduced**	✔
Optimised Theme Structure				✔ **Optimised for performanc e**	✔ Continued optimization
University Sustainability Questionnaire					✔ **Added**
CSV Export Option					✔ **Added**
Gamification System (Badges)					✔ **Introduced**

Table 3.1 Legend:

- ✔: Feature present or continued
- **Bold text**: New or significantly updated features in that version
- **Yes/No**: Presence or absence of plugin dependencies

3.2 Summary of SDG4U Mapping Tool's Evolution

Overall, the mapping tool has evolved significantly since Version 0.1's launch in late 2023. Its performance and stability has vastly improved in the months since the first iteration. Third party plugins, that the tool's functionality was dependent on, were removed and replaced with custom code. The data visualisation features became more advanced over time, progressing from plugin-based tables to more sophisticated charts and e-charts. Another critical aspect of the tool's evolution is that its output (i.e., mapped university modules to the SDGs) is now available to the public, including those without an account. This added layer

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of transparency includes public access to the results and the option to export the tool's data as a CSV file for offline analysis. Additionally, gamification aspects of the tool were introduced to enhance user engagement with the interface.

The SDG4U Mapping Tool has evolved significantly from its first version, v0.1, to the latest release, v1.1. The tool continued to evolve based on end-user feedback throughout the remainder of the SDG4U project. The present deliverable, which concludes the project in December 2025, records these enhancements.

Source document from EKPA:

https://docs.google.com/document/d/1rl82rLimqbXXja0rqFqGAvQTMUuXLoBm/edit?usp=drive_link&ouid=103701185793897089833&r pof=true&sd=true

4. Agile Methodology in Tool Development

The development of the **SDG4U (Sustainable Development Goals for Universities)** project was guided by **agile methodologies**. Agile is a project management framework often utilised by teams delivering a software project. It is an iterative methodology wherein after every phase, teams reflect upon work to date and examine if there was anything that could be improved so they can adjust their priorities for the next phase. Overall the framework emphasises collaboration between team members and responsiveness to change (Larson and Gray, 2021).

Throughout the tool's lifecycle, feedback from project partners was integral in shaping each version, ensuring that the final product met the users' needs effectively. This section outlines how agile techniques were applied and how partner feedback after testing influenced the evolution of the project across versions 0.1, 0.5, 0.6, 1.0, and 1.1.

4.1 Agile Methodology and Implementation

As stated in section 4's introduction, agile project management frameworks prioritise, iterative development, continuous feedback, adaptive planning and a collaborative approach.

In the SDG4U project, these principles were applied throughout the project's lifecycle. The SDG4U Mapping Tool was developed iteratively, with each version building on the previous one in terms of features, user experience, and more. Regular, thorough testing was conducted after each release to identify areas for improvement. In addition to the programmers' testing, collaborative feedback was actively sought from university partners. Based on this feedback and testing results, modifications and new features were implemented, leading to the release of a new version and the beginning of another development cycle.
EKPA led the tool's development and programming. UCC shared their experience and reflections from developing their own SDG Toolkit for teaching and learning to influence the tool's development. The partner universities (UMU, ACG and UCC) all commented and provided feedback on the tool's progress at each iteration.

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4.2 Evolution of Tool using Agile Practices.

The features of the tool across each version are outlined in detail in this sub-section. A table summarising the evolution of the tool accompanies its concluding paragraph.

Version 0.1 Initial Release

The SDG4U Mapping Tool, Version 0.1, was released on 15th November 2023. Its features included: course mapping to SDGs, interactive course management, user profiles and registration, custom forms for mapping and feedback and data visualisation using third-party plugins.

The university partners appreciated the core functionalities (course mapping, interactive course management) of the initial release. However, they also expressed concerns regarding the mapping tool's reliance on multiple third party plugins which affected the software's stability, performance and maintainability.

As a result of the feedback, the team decided to replace the third party plugins with bespoke custom-built code for the next version.

Image 4.2.1 SDG4U v0.1 Map your module page. Results were missing from menus.

Version 0.5 Plugin Dependencies Removed

The next iteration, Version 0.5, was released on 25th January 2024. Significant adaptations regarding the mapping tool's coding were implemented. All third party plugins that the tool was dependent upon, during Version 0.1, were removed. They were replaced with custom code, developed by EKPA, for better performance for end-users, maintenance by the tool developers and control.

Project partners tested the new version, and they reported improved performance. However, they requested enhanced data visualisation capabilities.

Based on this feedback, the team planned and prioritised the integration of advanced data visualisation tools in the next version.

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Image 4.2.2 SDG4U v0.5 Map your module page. Results menus and Accessibility features were added.

Version 0.6 Enhanced Data Visualisation

The next release, Version 0.6, was released on 17th May 2024. There were two new features added for this release. Firstly, the mapping tool's advanced data visualisation provided via integrated chart.js. The format allows for dynamic real-time data visualisation. Secondly, the analytics were enhanced with interactive charts and graphs.

During testing, project partners found the new visualisations quite useful and engaging. There was also a suggestion to make the mapped course's statistics publicly accessible for better transparency.

With the feedback considered, the team proceeded to implement public access to course statistics and explore more robust visualisation libraries.

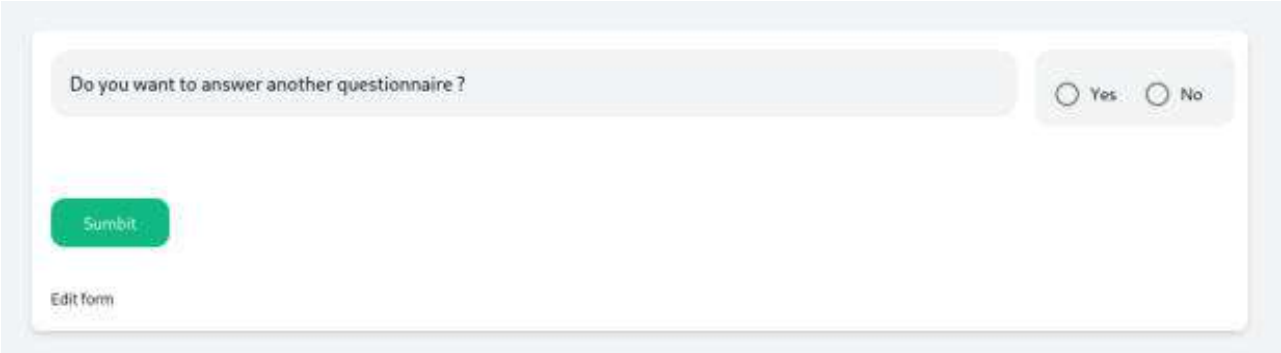

Image 4.2.3 SDG4U v0.6 Additional questionnaire was added to record opinions on SDGs engagement.

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Version 1.0 Public Course Statistics and ECharts Integration

The next iteration, Version 1.0, was released on July 26, 2024. This release introduced significant changes to the tool's user interface (UI) and structure to improve performance and scalability. Advanced data visualisation, previously implemented with Chart.js, was transitioned to ECharts, providing a smoother end-user experience and more flexible visualisation options. Additionally, mapped course statistics were made publicly accessible, allowing users to compare similar courses or modules in the same field of study based on their integration of SDGs into teaching.

The project partners gave positive feedback on the now publicly available statistics and improved visualisations. They also requested the addition of a third user role for a university administrator, along with an institution questionnaire inspired by the THE Impact questionnaire for this role. Additional feedback highlighted the need for offline data analysis capabilities.

As a result of the feedback, the team planned to add the administrator role, introduce data export options and enhance end-user engagement.

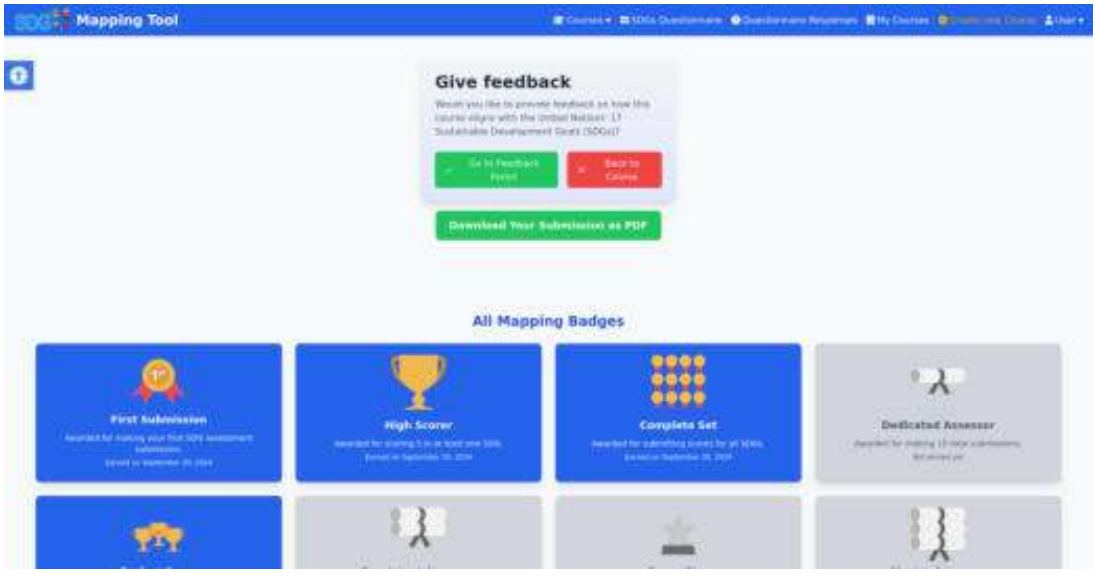

Image 4.2.4 SDG4U v1.0 Additional questionnaire was added to collect feedback from the mapping experience. A badges system was added to align with gamification requirements.

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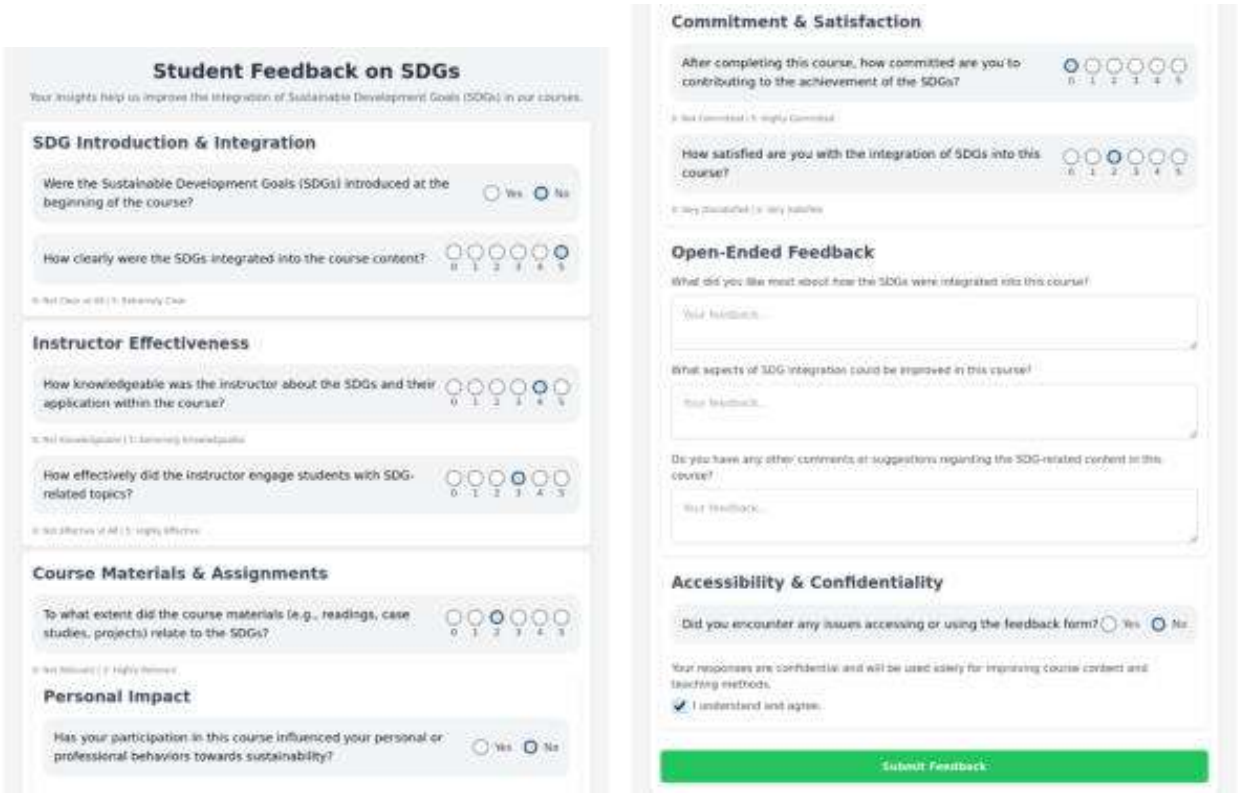

Image 4.2.5 SDG4U v1.0 Students feedback form.

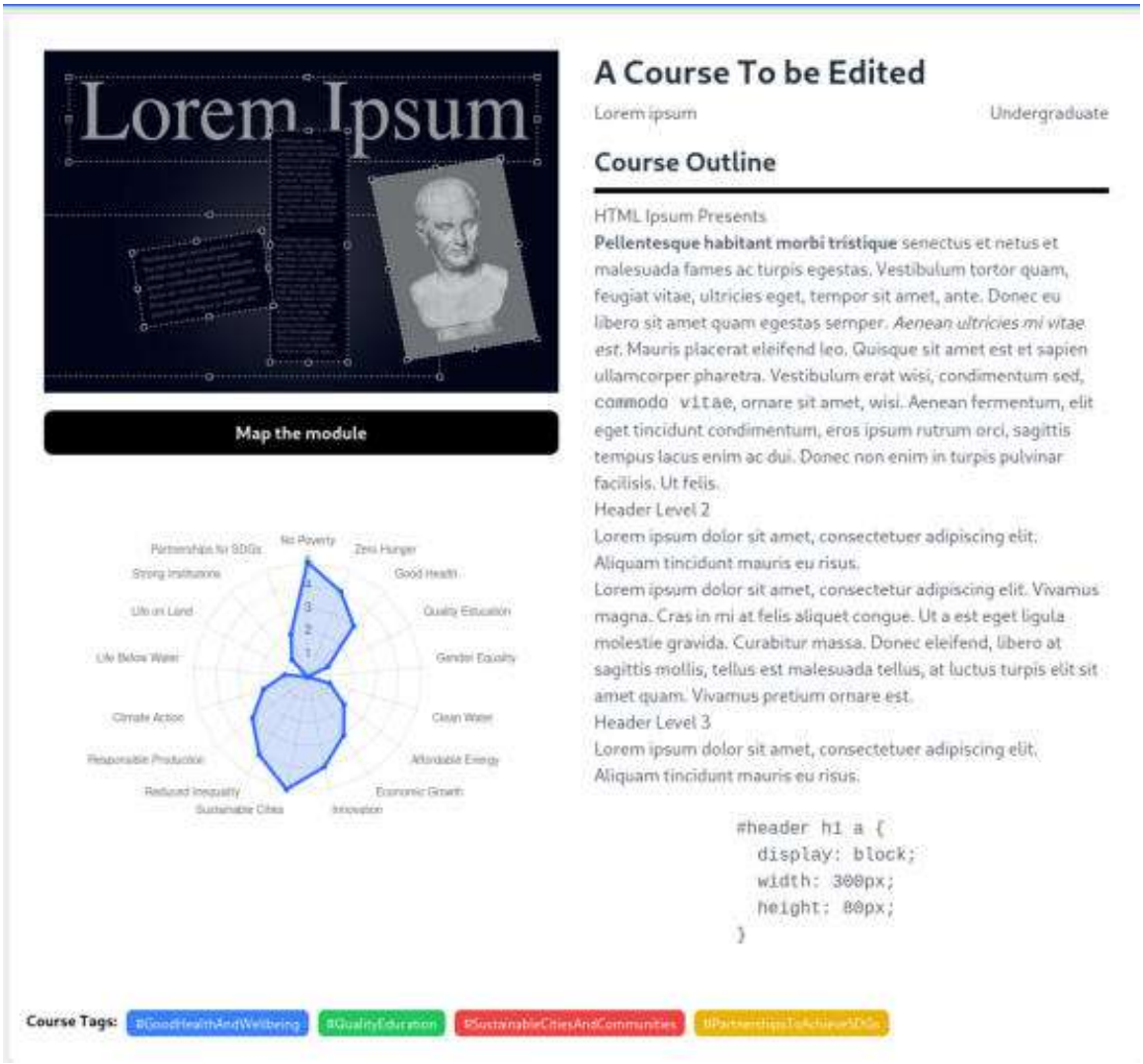

Image 4.2.6 SDG4U v1.0 Editable course outline was added along with the initial graphic.

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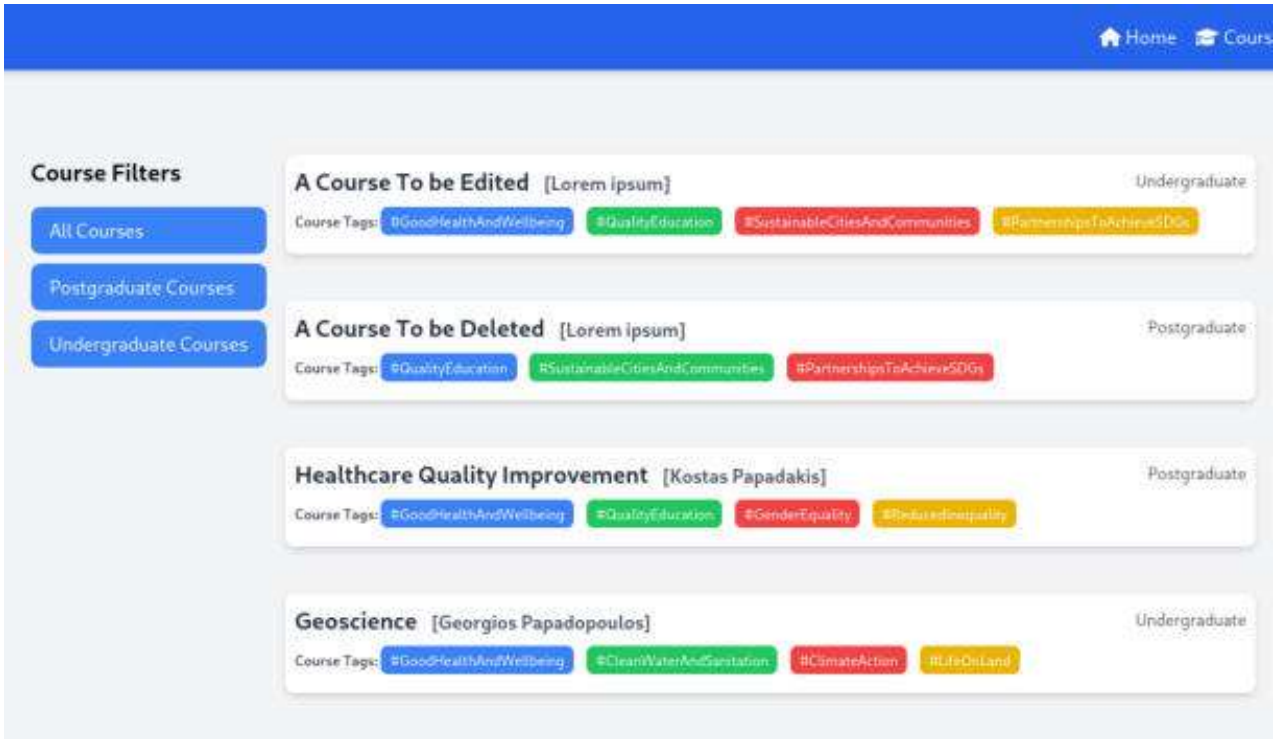

Image 4.2.7 SDG4U v1.0 Course filtering.

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Image 4.2.8 SDG4U v1.0 Frontpage of the Mapping tool before user login.

Version 1.1 Administrative Staff Roles, CSV Export, and Gamification

Version 1.1 launched on 16th September 2024 and added a considerable number of new features to the mapping tool, following the feedback from project partners after the previous release. Firstly, the new user role for university administrative staff, with specific permissions, was implemented.

The outputs of the university sustainability survey, entered by the administrator role, were also made publicly available to maintain transparency in line with previous feedback. The option to export the tool's outputs in .csv format for offline statistical analysis was added. Finally, a gamification system was implemented to enhance user engagement and encourage data submission. This system awards badges to users upon reaching specific milestones within the tool.

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Image 4.2.9 SDG4U v1.1 Frontpage of the Mapping tool before user login for all three target groups.

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Image 4.2.10 SDG4U v1.1 List of available courses.

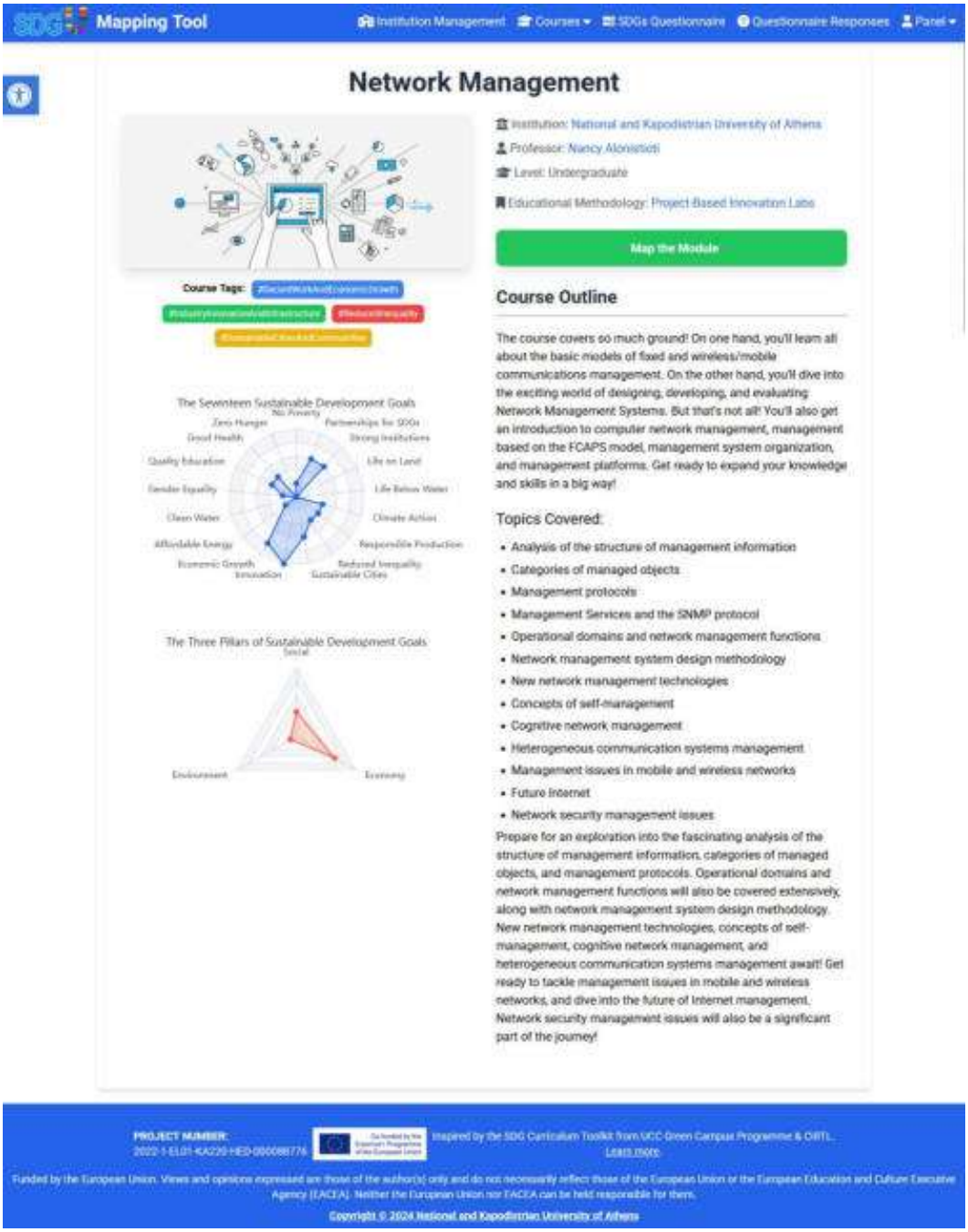

Image 4.2.11 SDG4U v1.1 Example of course description and mapping results with two graphics.

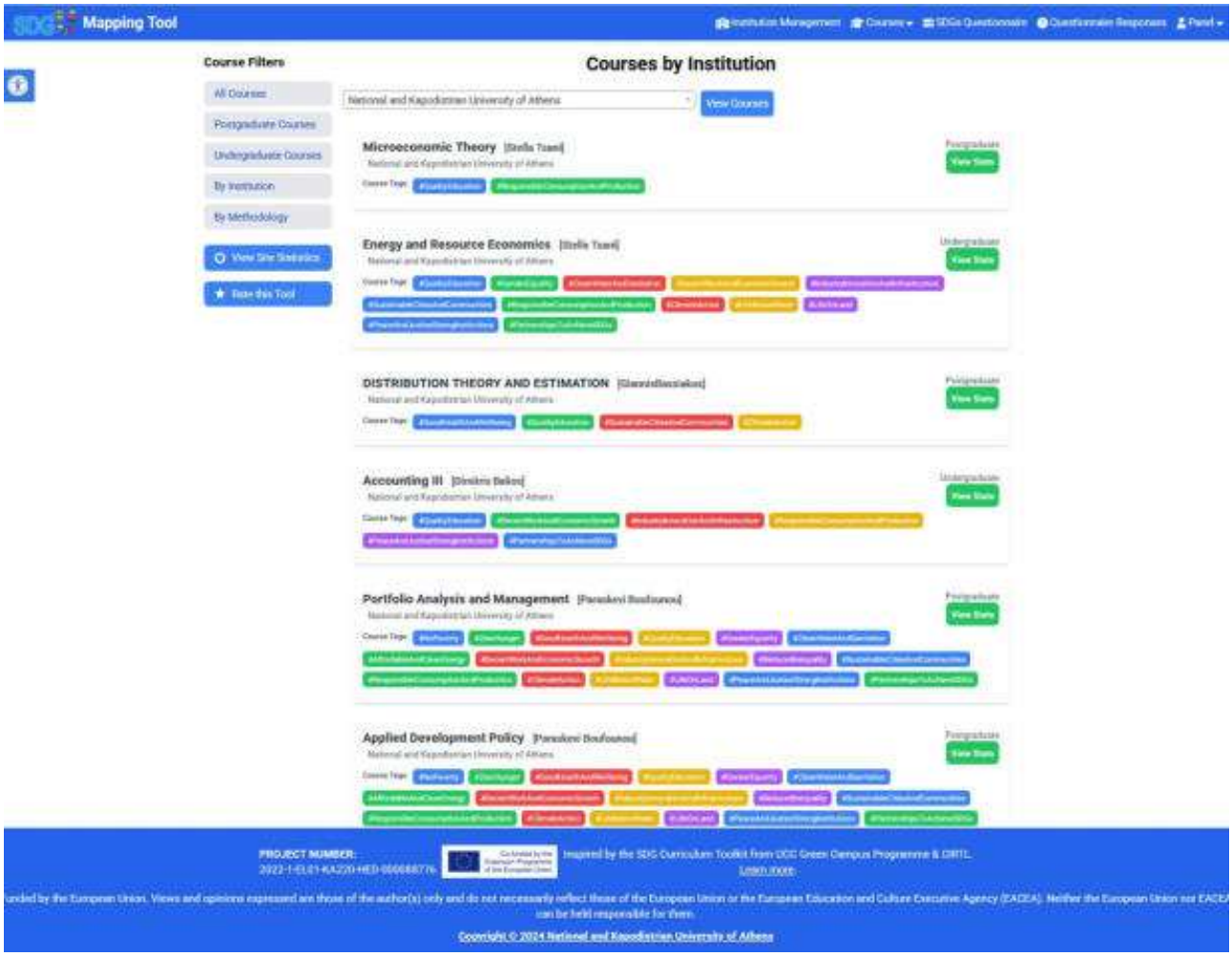

Image 4.2.12 SDG4U v1.1 List of courses and statistics for logged in users.

Project partners provided feedback on the most recent release, Version 1.1. They appreciated the new additional administrator functionality and the ability to export data for offline analysis. The gamification features increased user engagement.[1][2]

After five phases, or "sprints" in agile terminology, the SDG4U Mapping Tool met the partners' needs and expectations from the project and no changes have been made since apart from minor syntax and graphic corrections. The collaborative and interactive approach

[1] Swacha, J. (2021). "State of Research on Gamification in Education: A Bibliometric Survey." Education Sciences, 11(2), 691. https://doi.org/10.3390/educsci110200691

[2] Engagement Gamification: The Fun Way to Boosting User Engagement | Userpilot https://userpilot.com/blog/engagement-gamification/

allowed for partners to easily express their feedback and experience as end-users, demonstrating the effectiveness of the agile project management framework.

Table 4.1 - High-Level Summary of Mapping Tool's Evolution per Version.

Version	Changes Based on Feedback
0.1	Recognized the need to remove plugin dependencies for better performance and control.
0.5	Replaced plugins with custom code; feedback led to focus on enhancing data visualisation.
0.6	Integrated Chart.js; partners requested public statistics and better visualisation tools.
1.0	Made statistics public; switched to ECharts; optimised theme; partners wanted more roles.
1.1	Added administrative staff role; introduced CSV export; implemented gamification features.

4.3 Role of Partner Feedback

Per the Agile project management framework, feedback from the tool's end users (i.e. project partners) was instrumental to the tool's evolution over each successive version.

Partners were able to easily identify various pain points across early versions. An issue highlighted in early versions was the tool's dependency on third party plugins. Another issue identified by end users was the initial lack of data visualisation. Feedback pinpointing pain points guided the focus of the programmers for subsequent versions.

The end users also provided suggestions for new features throughout the tool's development. Examples include the introduction of publicly available statistics for the mapped courses, a third role for university administrators and the type of gamification implemented into the tool. The additional refined features greatly enhanced the SDG4U mapping tool's value and performance.

Overall, the continuous cycle of feedback ensured that the SDG4U Mapping Tool remained user-centric and actively addressed the needs of end-users.

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4.4 Benefits of using Agile Techniques in the SDG4U Project

The Agile project management framework offered several benefits to the project. Firstly, it gave the project flexibility, to be able to adapt quickly to changing requirements per user feedback. Secondly, it improved the quality of the mapping tool by spurring regular testing and allowed for feedback loops to both identify and fix issues promptly. Thirdly, it boosted stakeholder satisfaction. By involving partners in the development process, the programming team was able to ensure that the final product aligned with their expectations. Lastly, the agile framework also provided the project with incremental value delivery. Each successive version of the mapping tool delivered additional value. Ensuring that the platform improved progressively per iteration.

4.5 Conclusion

The use of agile methodologies in the SDG4U project facilitated a responsive and collaborative development process. By embracing partner feedback after each testing phase, the project team was able to make better informed decisions that enhanced the platform's functionality and user experience. The iterative approach ensured that the final product was not only technically sound but also met the practical needs of its users, aligning with the overarching project's goal of promoting sustainable development in universities.

By adhering to agile principles and actively incorporating partner feedback, the SDG4U project evolved into a comprehensive and user-friendly platform that effectively supports universities in mapping courses to the Sustainable Development Goals.

Source Document from EKPA:

https://docs.google.com/document/d/1Hhk_RMpUQEA2X4izIdYhCDWyMCe6N6GN/edit?usp=drive_link&ouid=103701185793897089833&rtpof=true&sd=true

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5. SDG4U Mapping Tool

The SDG4U Mapping Tool has its own dedicated website created by EKPA[3], and is linked within the main SDG4U project website[4]. The image below shows the tool's landing page, where users can register an account for one of three roles; student, professor and administrative staff. Scrolling down provides general information about the UN SDGs, and at the bottom of the page users can access publicly available information about any courses/modules mapped on the platform.

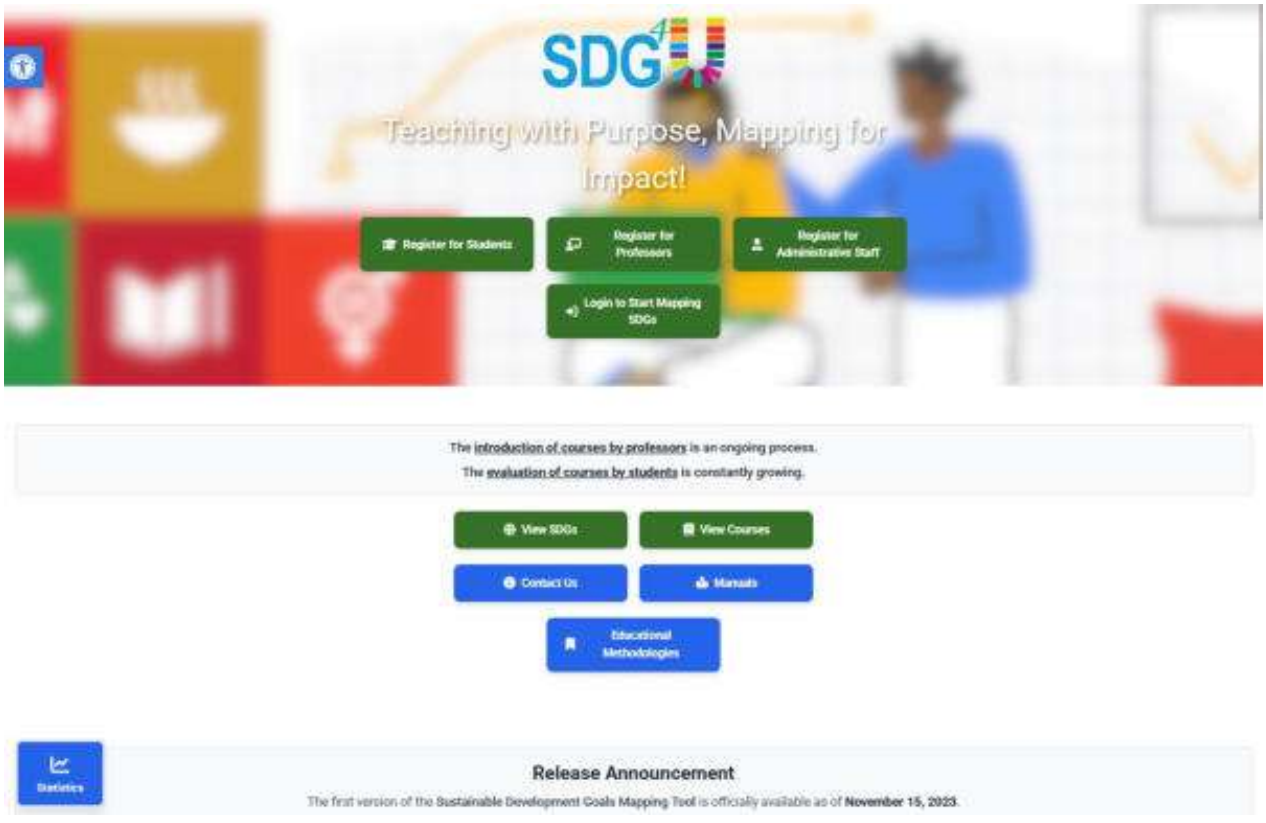

Image 5.1.1 Landing Page of SDG4U Mapping Tool

Section 5 of this deliverable summarises details about the last version of the SDG4U Mapping Tool (v1.1), including how to register and how to use the various features for each

[3] Full Hyperlink: https://sdg4u.uoa.gr/mapping_tool/
[4] Full Hyperlink: https://www.sdg4uproject.eu/the-sdg4u-mapping-tool-is-now-online/

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account type. More extensive information is available in the tool manuals linked in the annexes of this document.

5.1 User Types and Registration

5.1.1 Professor

A professor account initiates the mapping of any university module/course. The professor creates a page for their class. They can add a description (e.g. course content, learning outcomes) and tag the course (i.e. to make it easier to find when looked for). They also add the Educational methodology as per SDSN 2020[5], which is beneficial for the forthcoming tasks under WP3 where methodologies are needed for comparison and result extraction. Once created, the professor can now rank where they think each SDG fits into their teaching and learning using a 0-5 scale (scale descriptors showcased in image 5.1 below). Professors can also take part in an optional 5 question questionnaire to reflect upon their mapping (annex 11.1.2).

To register a professor account, the user will need their institution password in addition to their university email address.

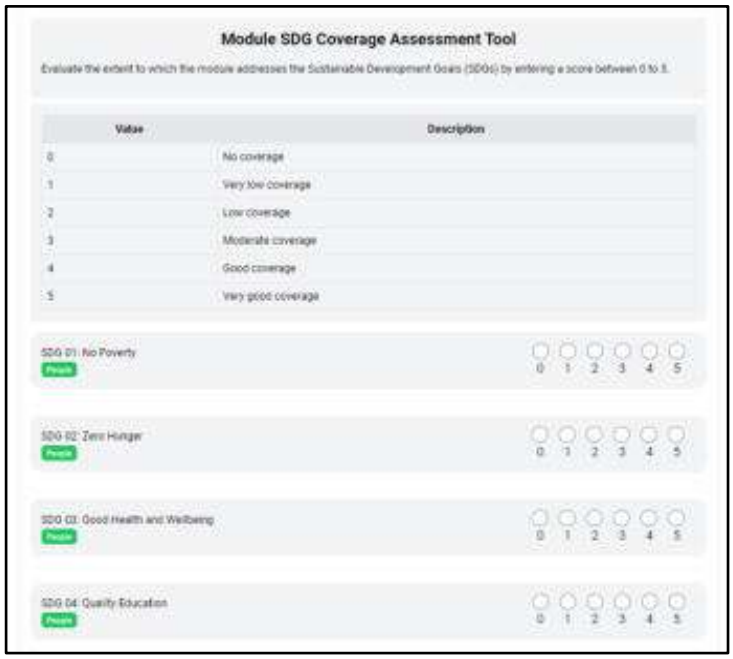

Image 5.1.2 SDG4U Mapping Tool 0-5 Scale Descriptors.

[5] https://files.unsdsn.org/accelerating-education-for-the-sdgs-in-unis-web_zZuYLaoZRHK1L77zAd4n.pdf

5.1.2 Student

A student can map a module/course that is live on the platform, once their professor has created it. Students evaluate the extent to which each of the 17 SDGs using the same 0-5 scale. An optional reflective questionnaire is also presented to the student after mapping a module (annex 11.1.1).

5.1.3 University Administrator

Similar to the professor account type, the institution password is needed to register an administrator account. Only one administrator account per university is needed to complete the relevant survey, which is adapted from the Times Higher Education Impact Rankings survey. The Administrator survey is available in annex 11.1.3.

5.2 Viewing the Tool's Outputs/Submissions

5.2.1 Professors Viewing their own course(s) statistics.

Professor users can view their own courses by clicking the 'My Courses' option along the top bar of the platform. All courses created by that user, and any submissions to them, can be viewed by the professor. Additionally, if another professor user is listed as an 'associate professor' or guest lecturer, they will also see that course listed in 'My Courses'.

Image 5.2.1 - SDG4U Top Tool Bar

The professor can view their courses' stat's by clicking the orange 'see submissions' button. Visual outputs include a spider diagram of the extent of a SDGs coverage in the course, both according to the professor(s) and students, and a correlation matrix. The professor(s) can also download anonymised submissions about their course in CSV format if they wish to conduct offline analysis or simply track how the SDGs have been embedded in their teaching over the years.

Image 5.2.2 - SDG4U Professor Account viewing their own Course

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5.2.2 Public Statistics

There is a comprehensive suite of public statistics and site metrics available without requiring an account. Firstly, general site metrics include registered users by role type, site views, number of survey responses and others. A full breakdown of the metrics available are illustrated in Image 5.2.3 below.

There is also information about courses/modules uploaded onto the platform. Site visitors without an account can view the course's description and see spider diagrams of the course's submissions. Further detail and more visualisation outputs are available to users with accounts.

Image 5.2.3 - SDG4U Tool Statistics Available to the public.

5.3 Sustainability Questionnaires

5.3.1 Professors and Students

The tool also prompts professors and students, to take part in an optional sustainability questionnaire, available in full in annex 11.1. The purpose of the questionnaires is to encourage users to reflect more deeply on the extent of sustainability considerations in teaching and learning. The outputs also helped inform the work of WP3 in developing a training course on embedding sustainability in teaching and learning, using the questionnaire results as direct input from the target audience (i.e. lecturers/professors at the project partner universities).

5.3.2 University administrators

Another core function of the tool is to facilitate a survey for university administrators, enabling them to map their institution's sustainability operations and actions. This process systematically records efforts in both institutional operations and community engagement, serving to embed sustainability principles throughout all levels of university life. This integration is achieved through targeted interventions in operational and engagement practices, which in turn establish positive paradigms for students, faculty, and staff. Furthermore, submissions from partner institutions foster a collaborative network, allowing all universities to share and promote exemplary practices across all 17 SDGs. It expands the scope of the tool's coverage from the universities' teaching to its operational and estate management. The survey is guided by questions adapted from the Times Higher Education Impact Rankings on Sustainability, the full list of which is available in Annex 11.1.3.

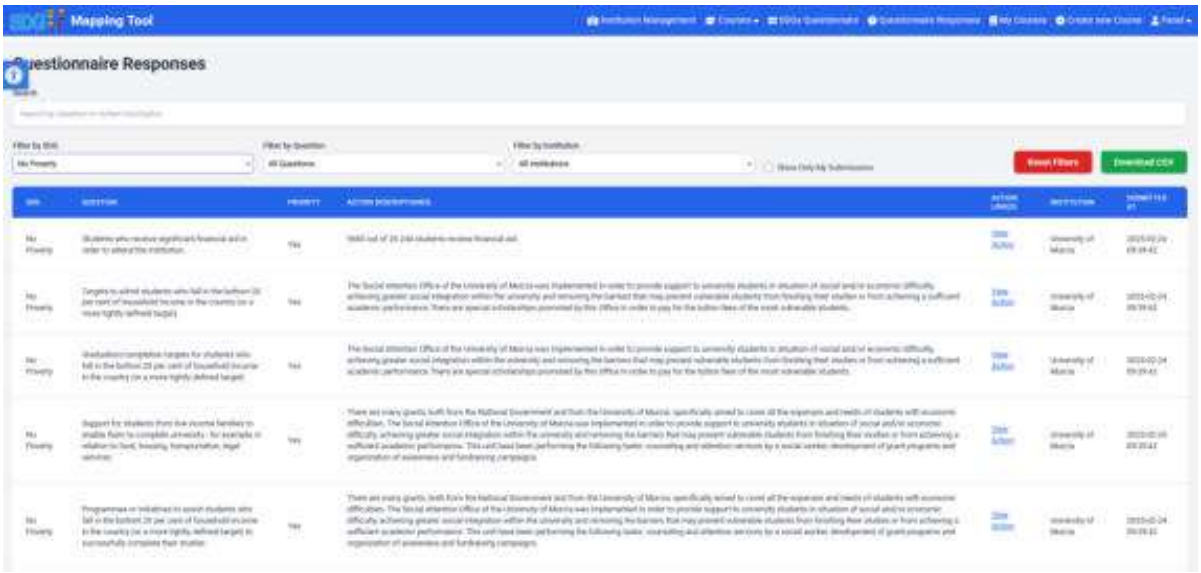

Image 5.2.4 - University administrator responses by SDG.

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5.4 Gamification

Gamification elements are included in v1.1 per specific feedback from project partners, discussed extensively in section 4. A user can view what badges they have earned by clicking on their user profile. There are 18 badges one can obtain each dependent on a user's activity. Gamification features are outlined in detail within Section 7 of this document.

5.5 Reference to UCC SDG Toolkit

The SDG4U Mapping Tool was inspired by and adapted from the interface of the UCC SDG Toolkit (Barimo et al., 2021) released in 2021. This is acknowledged in clear text at the bottom of all web pages comprising the SDG4U Mapping Tool. The UCC platform is linked in this reference so people can navigate to view if curious. A detailed comparative analysis of the SDG4U Mapping Tool and UCC SDG Toolkit is available in Section 6 of this report.

Image 5.5 - Reference and Acknowledgement of UCC Toolkit on SDG4U Platform

6. Comparison with UCC's SDG4U Toolkit

UCC launched its SDG Toolkit in Summer 2021. That project's aim is to foster the development of globally-minded and action-oriented citizens who are empowered to help create solutions for a sustainable future (Barimo et al., 2021). The toolkit curates resources to support teaching staff to begin/enhance integrating sustainability into their pedagogies. A mapping tool was also developed to help staff understand to what extent sustainability is featured within their teaching.

The SDG4U Mapping Tool draws some inspiration from UCC's SDG Toolkit, available freely under a creative commons licence. However, there are significant differences between the two platforms, and these are discussed in detail in this section. Table 6.1 compares the two platforms' features.

6.1 Core Functionality

Both platforms are accessed online. UCC's toolkit was developed using custom code which is open source and available under a creative commons licence. The SDG4U initially used third party plugins, later replaced by custom code for its core functionality. The UCC mapping tool can be downloaded as an Excel Spreadsheet, for all 4 configurations, for full use offline.

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Image 6.1 - Comparison Images of Landing Pages for both Platforms.

6.2 User Roles and Mapping Modules

SDG4U's Mapping Tool establishes 3 user types: professor, student and administrator. Users need to create an account using their university email address to access the mapping functions. The administrator user type is unique to the SDG4U tool. These outputs concern the operational sustainability of universities compared to the extent of SDG coverage with university courses, covered by the professor and student users. Whereas UCC's toolkit doesn't need an account to be setup. And it provides 4 configurations; mapping a university module, mapping a course of study, student mapping and research mapping. The research mapping configuration is unique to the UCC SDG Toolkit. It provides a self assessment tool for researchers to examine their research's relevance to the 17 SDGs.

The act of mapping modules is generally similar to both platforms, albeit with minor differences. Both platforms use a 0-5 scale on the extent of a SDG's coverage in a course of study. The descriptors for each platforms' scales differ, with SDG4U using a simplified 'no coverage' (0) to 'very good coverage' (5). Both scales are showcased in Image 6.2. UCC's SDG Toolkit has its data visualisations (17 SDG Spider Diagram and Social-Economic-Environmental Spider Diagram) alongside the data entry page.

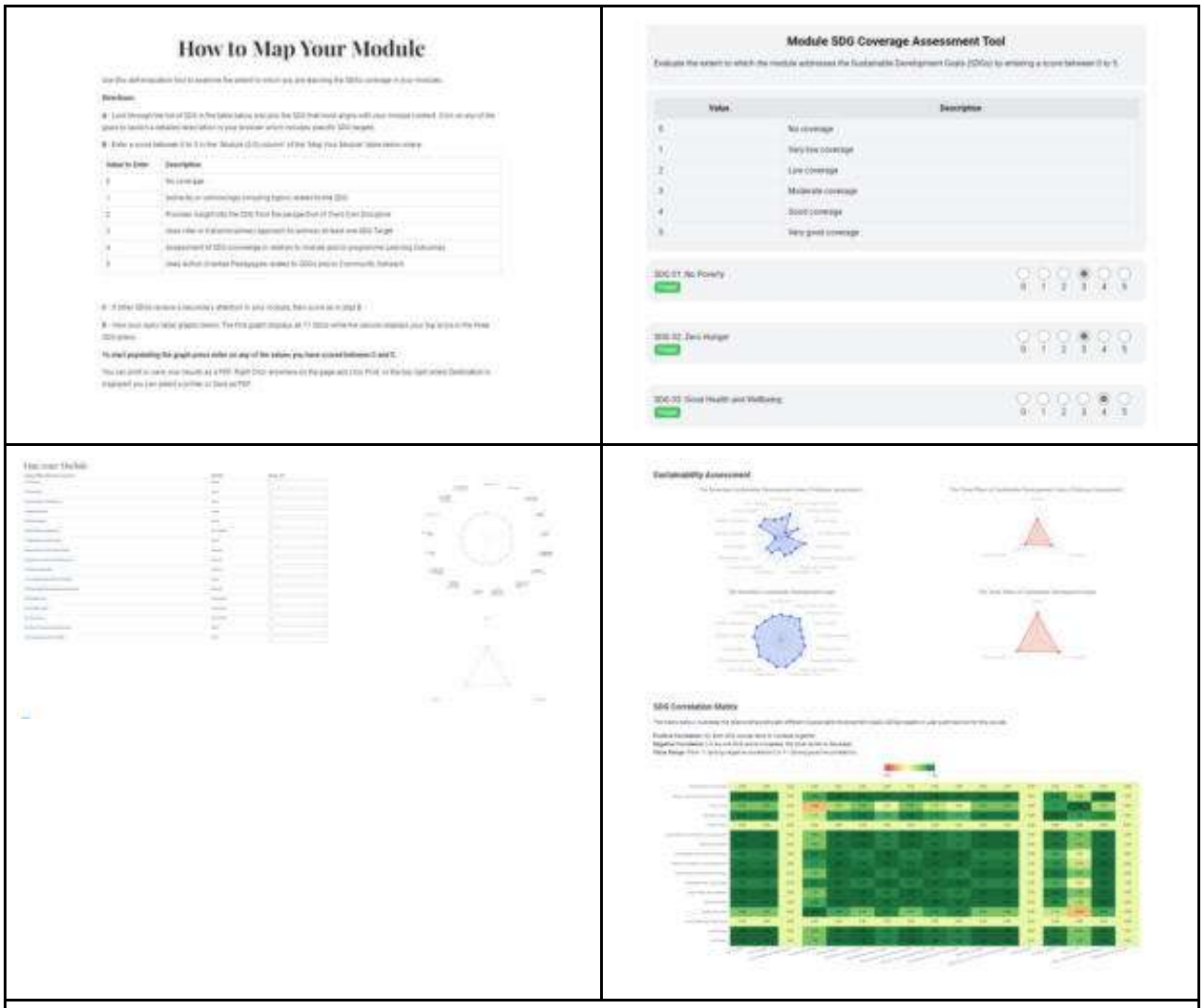

Image 6.2 - Comparison Images of Mapping Modules using both Platforms.

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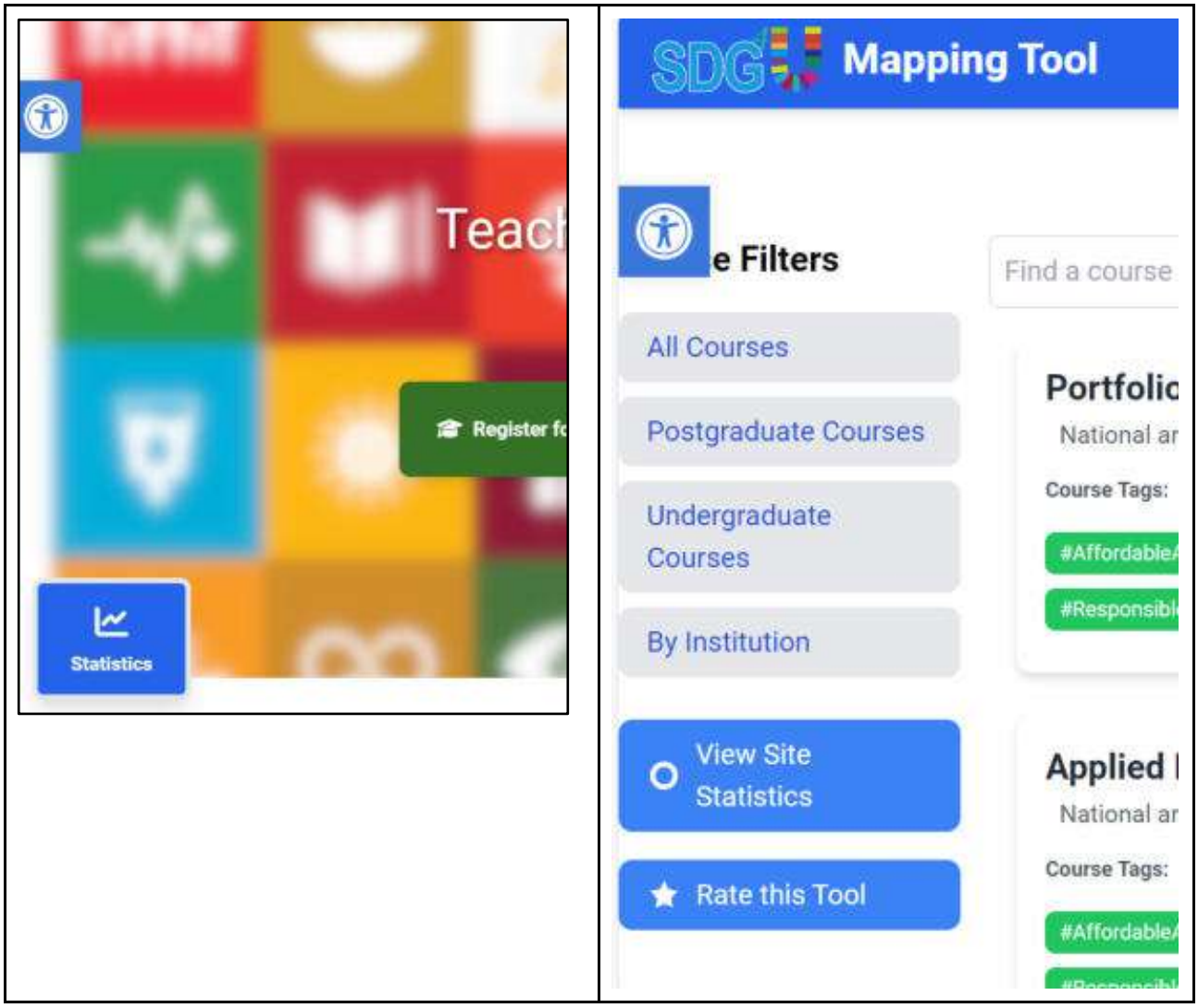
6.3 Statistics and Metrics

The SDG4U Mapping Tool has several pages of statistics and site metrics available publicly. This is accessed by clicking on the 'blue' statistics button on the tool's home page. Or by clicking 'view site statistics' on the left toolbar when logged into the platform. UCC's SDG Toolkit does not have an equivalent metrics page for mapped courses in its current iteration.



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Statistics Access from Home Screen	Statistics Access when Logged In.
Image 6.3 - How to view SDG4U Mapping Tool's Statistics	

6.4 Other

6.4.1 SDG Resource Library (UCC)

UCC's platform has pages dedicated to outlining the interdisciplinary connections to the 17 SDGs and a resource library linking to external sources for further reading by users. This is to help support users understand the SDGs and their linkages to teaching. SDG4U's platform provides minor resources to explain the context of SDGs and their links to teaching. The home page before logging into the platform has a page outlining the 17 goals.

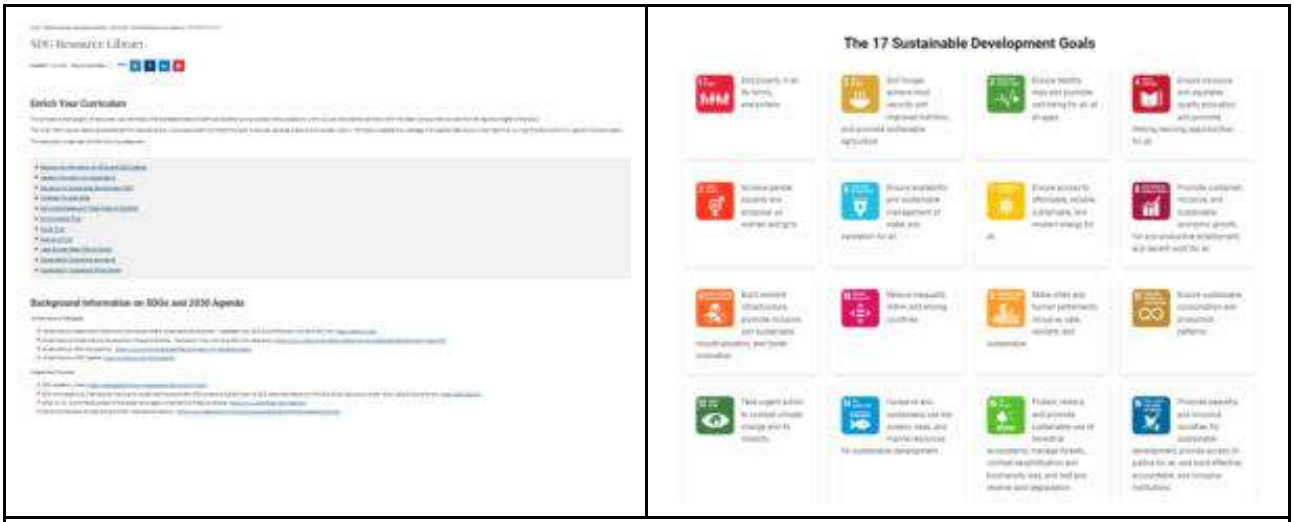

Image 6.4 - Comparing how the tool's contextualise the SDGs to Users (UCC - Left, SDG4U - Right)

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6.4.2 Administrator Survey (SDG4U)

UCC's toolkit is focused on mapping the extent of SDG coverage by teaching and research. SDG4U performs a similar function for the former but not the latter. Although the new platform has a new user type for university administrator. This expands the scope of the tool's coverage from the universities' teaching to its operational and estate management. The administrator survey is paraphrased from the Times Higher Education Impact Rankings on Sustainability. This can allow for comparison between universities'.

6.4.3 Gamification (SDG4U)

Gamification is another feature exclusive to SDG4U's platform. The UCC Toolkit has no gamification elements in any of its iterations to date. SDG4U users can be awarded badges once they achieve certain criteria while using the platform.

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Table 6.1 - Feature Comparison between Project Tool and UCC SDG Toolkit		
Feature	**UCC SDG Toolkit (2021)**	**SDG4U Mapping Tool (2024)**
User Roles	No specific user roles. One can access 4 different configurations of the toolkit: - mapping a university module, - mapping a course of study (e.g. MSc Marine Biology), - student interface, - mapping your research.	Users create an account on the platform. 3 different roles: - student, - professor - administrative staff
User Profile and Registration	No account registration or profile.	Users have a profile according to their account type; student, professor or administrator.
Core Functionality	Custom Code. Available for use through the UCC Website. Or downloaded for offline use as an Excel Spreadsheet.	Custom Code. Inputs made only on the online platform.
Module SDG Coverage Assessment Tool	0-5 scale. - 0: No coverage. - 1: Indirectly or unknowingly including topics related to the SDG. - 2: Provides insight into the SDG from the perspective of One's Own Discipline. - 3: Uses inter-or transdisciplinary approach to address at least one SDG Target - 4: Assessment of SDG knowledge in relation to module and/or	0-5 Scale. - 0: No coverage. - 1: Very low coverage. - 2: Low coverage. - 3: Moderate coverage. - 4: Good coverage. - 5: Very good coverage.

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	programme Learning Outcomes - 5: Uses Action Oriented Pedagogies related to SDGs and/or Community Outreach	
Resource Library	UCC Toolkit contains several webpages regarding the integration of sustainability into education and a resource library of links to other useful sources related to the SDGs.	No equivalent resource. Some explanation of the 17 SDGs on the tool's login page.
Output Storage	Displays output for individual user.	Displays and stores records of output of all registered users.
Data Visualisation - 17 SDG Spider Web Diagram - Social, Economic and Environment Triangle Diagram - SDG Correlation Matrix	- Has 17 SDG Spider Web Visualisation. - Has Triangle Visualisation. - No equivalent feature.	- Has 17 SDG Spider Web Visualisation. - Has Triangle Visualisation. - Has a correlation matrix visual showcasing the relationship between two SDGs.
Plugin Dependencies/ Custom Code	N/A Custom open source code.	early versions used third party plugins before moving to custom code.
Statistics and Analytics	No publicly available metrics, statistics or analytics.	Statistics page included within the platform for many different metrics. Ensuring transparency of the inputs to date.
Public Course Statistics	Statistics not available.	Statistics of each course's coverage of the SDGs publicly available.

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University Sustainability Questionnaire	No general university sustainability questionnaire. Only concerning teaching modules.	University sustainability questionnaire included for the university administrator role.
CSV Export Option	Tool configurations can be downloaded as an excel spreadsheet. But not the output of the online version.	Course/module data can be exported in CSV format for offline analysis.
Gamification System (Badges)	No gamification system.	Badge system implemented to encourage users to map more courses to the SDGs.

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7. Gamification

7.1 What is Gamification?

Gamification is the application of elements of play (e.g. rewards for milestones, levels, point scoring) to another area of activity, such as education or a software platform. There is an extensive literature on the merits of enhancing 'engagement' of software end-users by using gamification (Looyestyn, 2017; da Rocha Seixas et al., 2016; Suh et al., 2016). One meta-analysis found that gamification in education has a positive although small effect on learning outcomes (Sailer and Homner, 2019). Sailer and Homner (2019) also found that gamified approaches outperformed passive instruction methods (like lectures) more significantly than active learning, indicating that gamification may be optimal when utilised as an enhancement to the existing pedagogy rather than a standalone method.

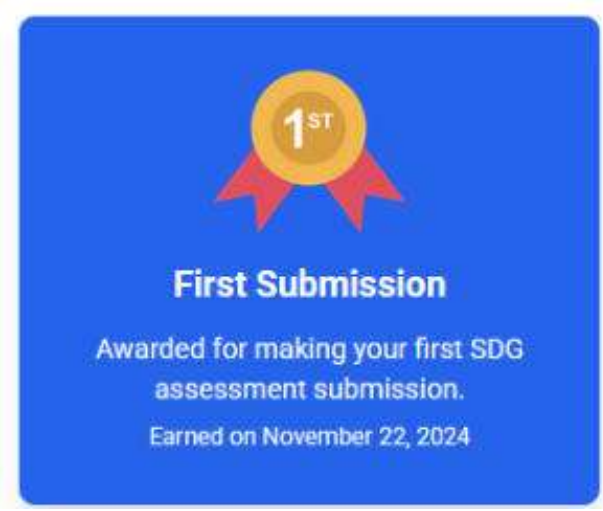

Image 7.2.1 - Example of Mapping Tool Badge

7.2 Gamification in SDG4U Mapping Tool

Gamification was added to the SDG4U Mapping Tool in v1.1. Professor and Student users receive badges when they meet the criteria of a badge. For example, a user receives their first badge upon submitting their first assessment of a course's links to the SDGs (Image 7.2.1). Criteria for achieving a badge range from submitting a certain number of course assessments in a week, total number of submissions from a user, early adoption of the tool

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(i.e. one of first 100 to do an action) and more. An exhaustive list of the badges and their award criteria are shown in Image 7.2.2.

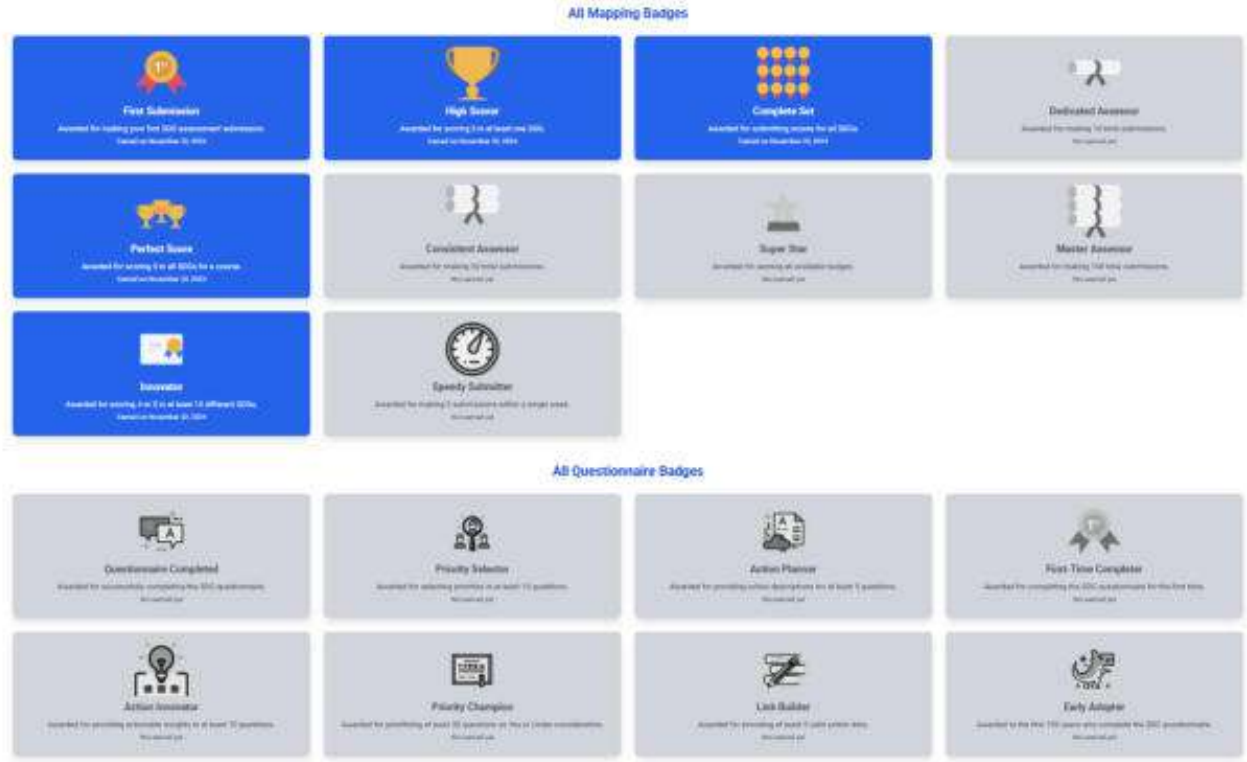

Image 7.2.2 - All SDG4U Badge Awards

7.3 Outcomes of Gamification

Gamification elements helped the programmers streamline the user interface, to ensure simple navigation by users. Which in turn enhanced user's engagement and time spent on the platform. Following the implementation of gamification, the number of users increased significantly. Although this coincided with more dissemination of the tool amongst partner universities' staff and students.

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Image 7.3 - No. Site Users by 31/12/2025 after Gamification Implementation

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8. KPIs.

Key Performance Indicators, measure the success of project activities. They help track progress, ensure objectives are met, and identify areas for improvement. Essentially, they provide a clear snapshot of a project's health.

8.1 Results from the Mapping tool

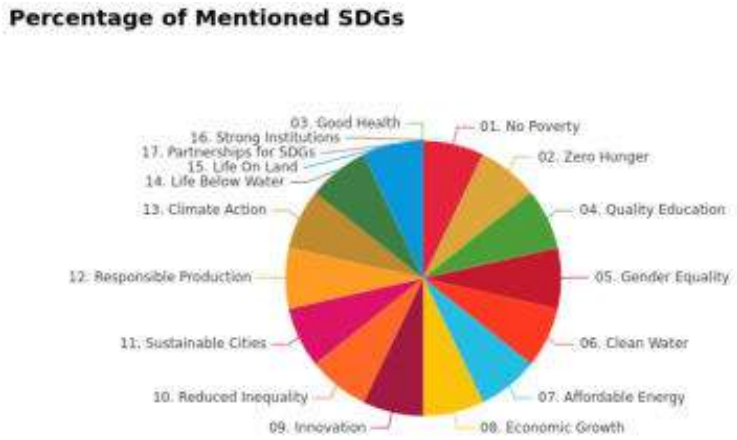
By pressing the green "View stats" button, a page displaying four KPIs will appear, with the option to download anonymized results. Stakeholders can then reflect on how courses align with SDGs.

Below there are direct links that point to the KPIs.

https://sdg4u.uoa.gr/mapping_tool/statistics/

https://sdg4u.uoa.gr/mapping_tool/course-stats

8.1.1 KPI: Percentage of the Most Mentioned SDGs in Education Modules per course.



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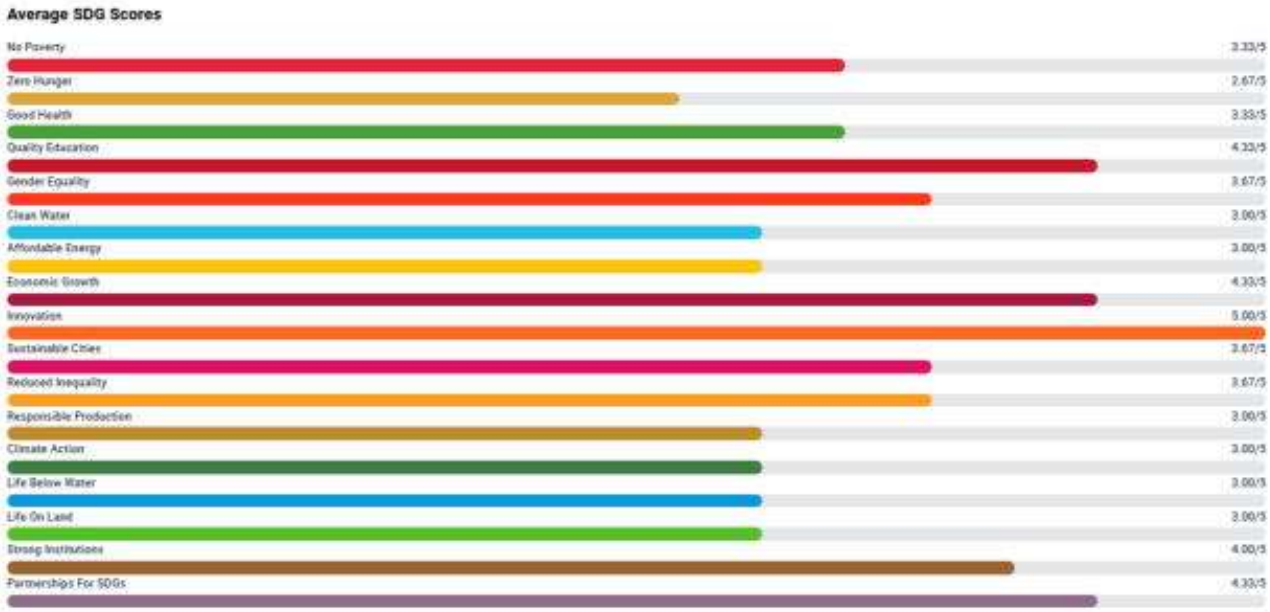
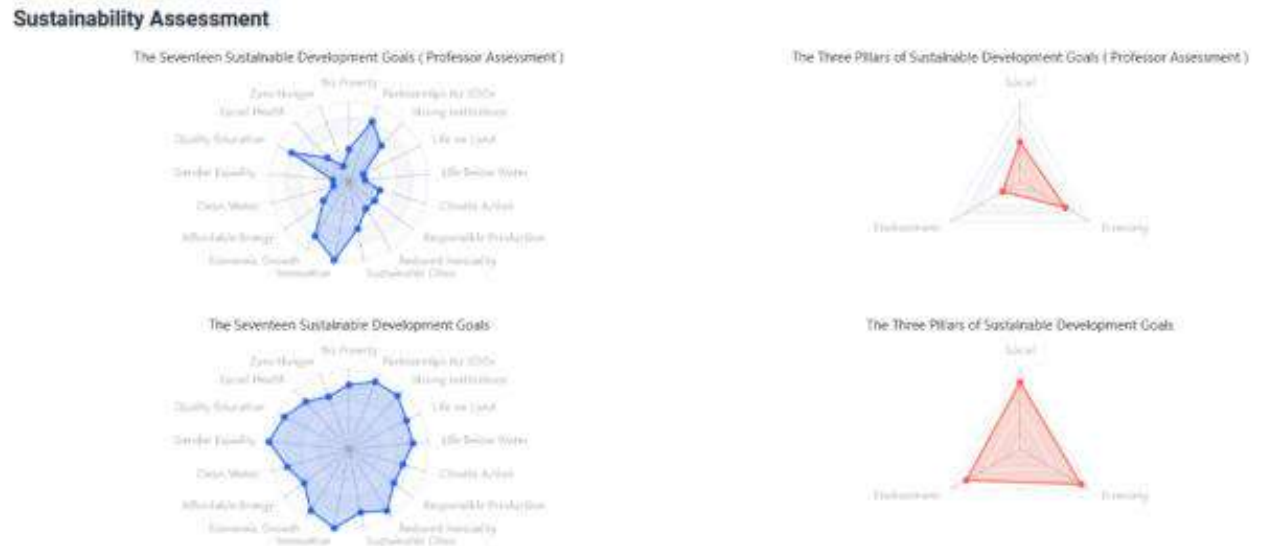
8.1.2 KPI: Average SDG Scores



8.1.3 KPI: Sustainability Assessment on SDGs mapping between professor and students



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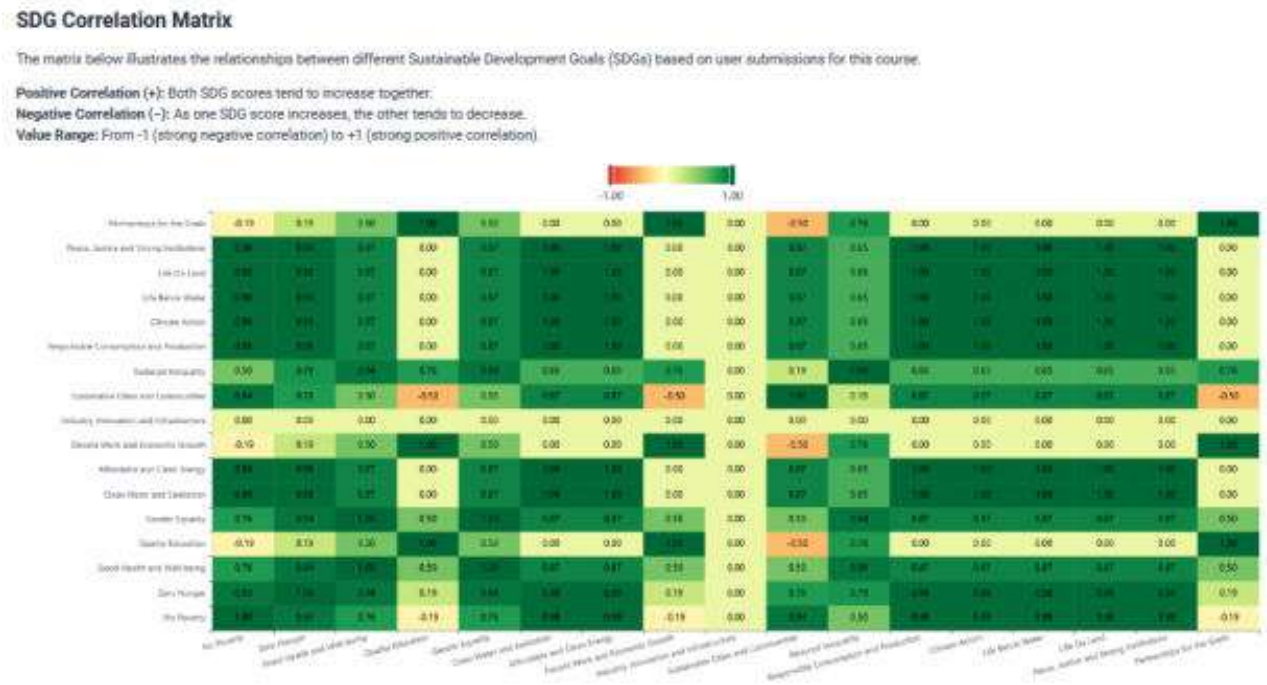
8.1.4 KPI: SDG Correlation Matrix



There is also the feature to download all submissions (anonymized) to csv file

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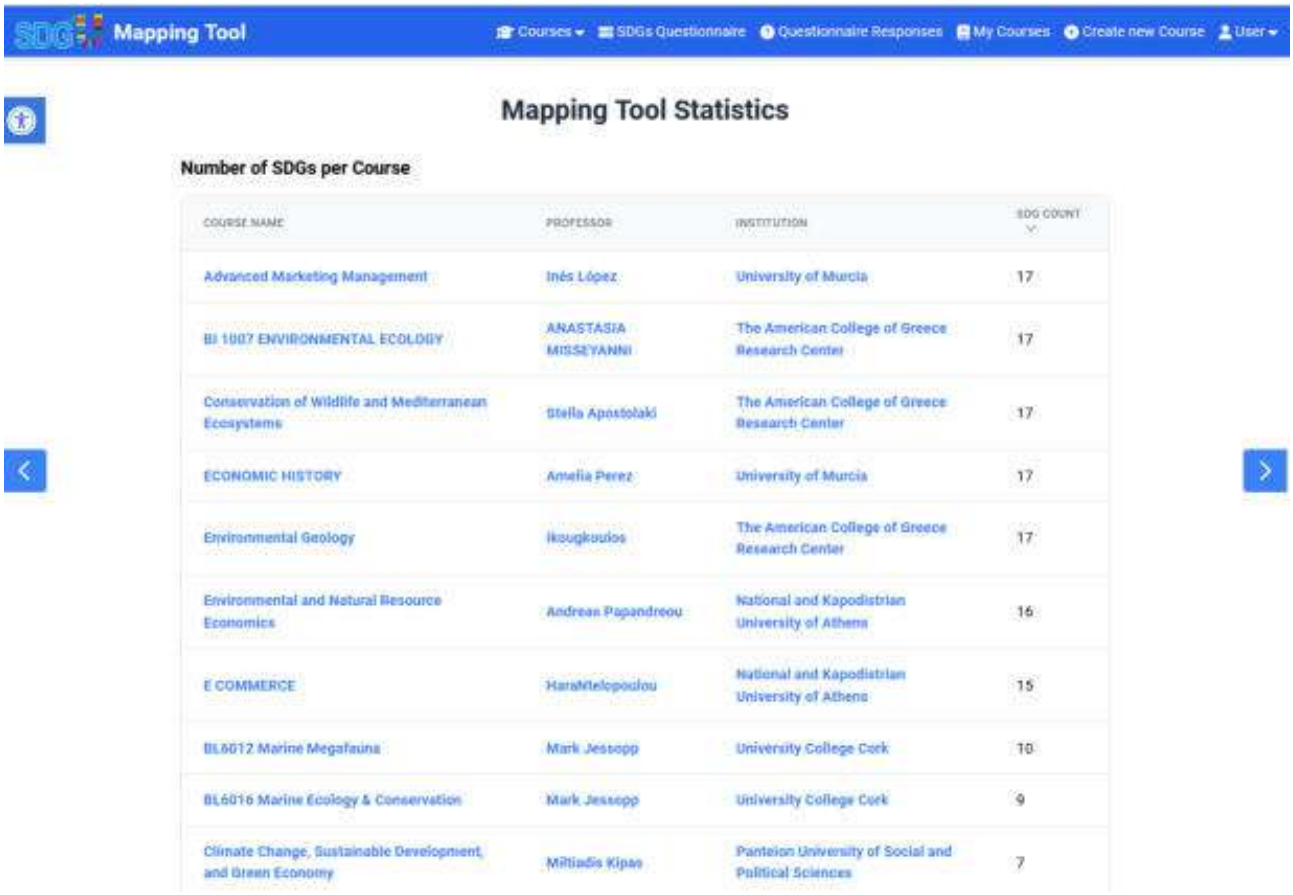
8.1.5 KPI: Number of Different SDGs Addressed per Course/Module.



COURSE NAME	PROFESSOR	INSTITUTION	SDG COUNT
Advanced Marketing Management	Inés López	University of Murcia	17
BI 1007 ENVIRONMENTAL ECOLOGY	ANASTASIA MISSEYANNI	The American College of Greece Research Center	17
Conservation of Wildlife and Mediterranean Ecosystems	Stella Apostolaki	The American College of Greece Research Center	17
ECONOMIC HISTORY	Amelia Perez	University of Murcia	17
Environmental Geology	Ikougkoulos	The American College of Greece Research Center	17
Environmental and Natural Resource Economics	Andreas Papandreou	National and Kapodistrian University of Athens	16
E COMMERCE	Haralitelopoulou	National and Kapodistrian University of Athens	15
BL6012 Marine Megafauna	Mark Jessopp	University College Cork	10
BL6016 Marine Ecology & Conservation	Mark Jessopp	University College Cork	9
Climate Change, Sustainable Development, and Green Economy	Miltiadis Kipas	Panteion University of Social and Political Sciences	7

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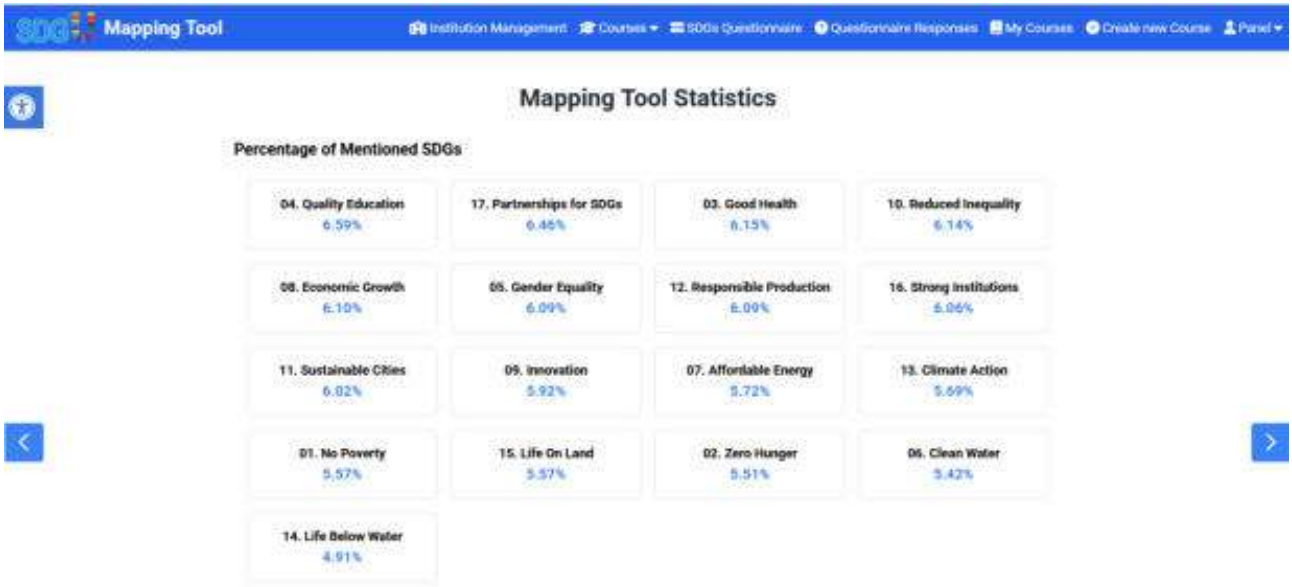
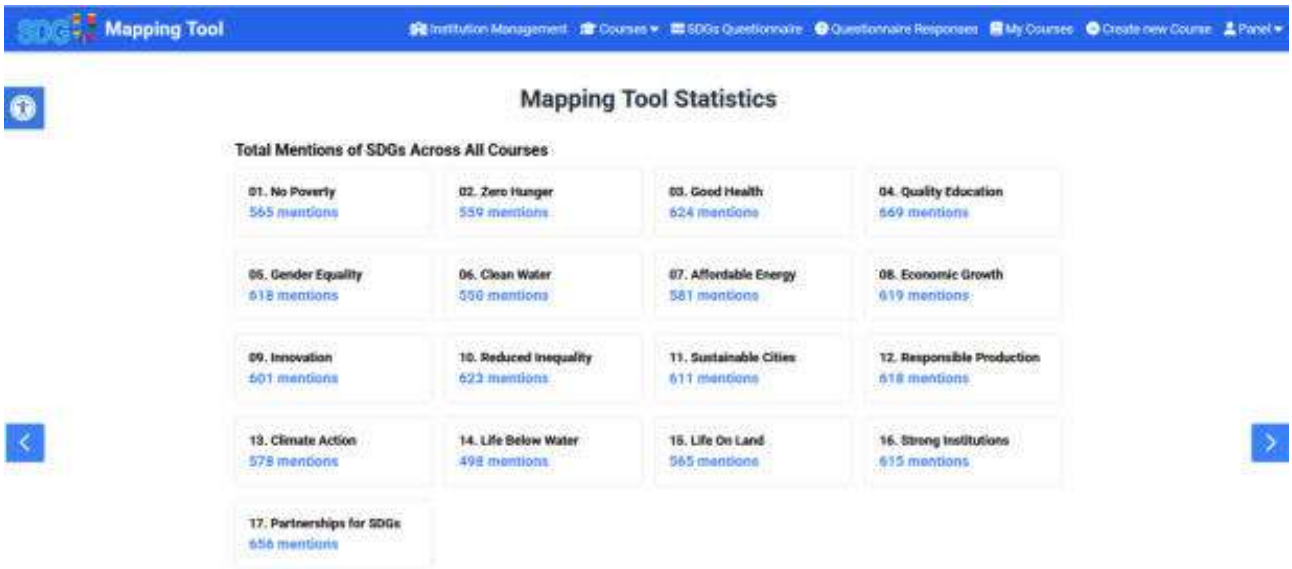
8.1.6 KPI: The percentage of the most mentioned SDGs in education Course/Module.



8.1.7 KPI: Total Mentions of SDGs Across All Courses/Modules.



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8.1.8 KPI: Number of Different Scientific Areas Linked with SDGs.

Number of Scientific Areas Linked to SDGs

Total courses: 84

Number of Courses per Institution

National And Kapodistrian University Of Athens	30 courses
Panteion University Of Social And Political Sciences	22 courses
The American College Of Greece Research Center	17 courses
University Of Murcia	17 courses
University College Cork	7 courses

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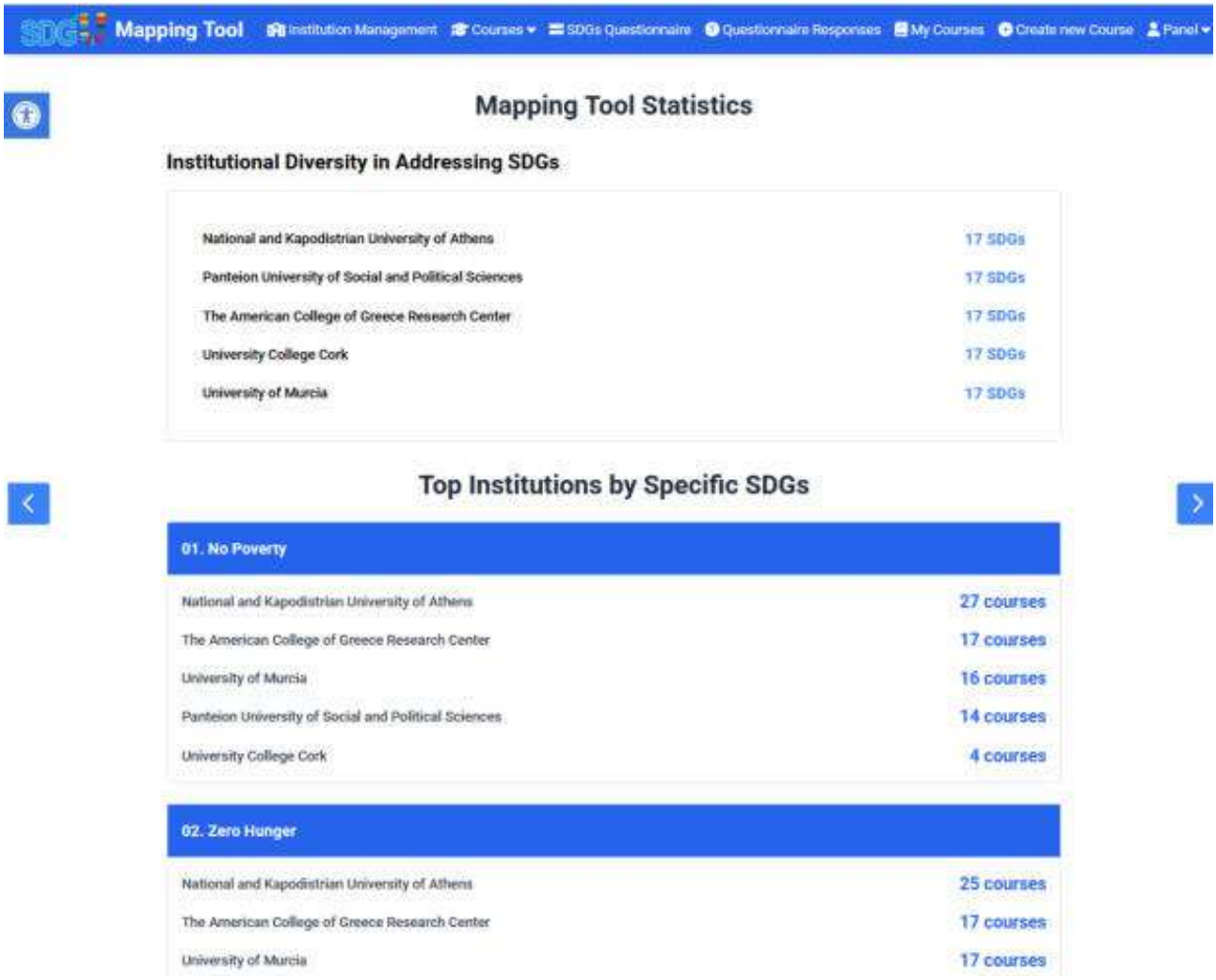
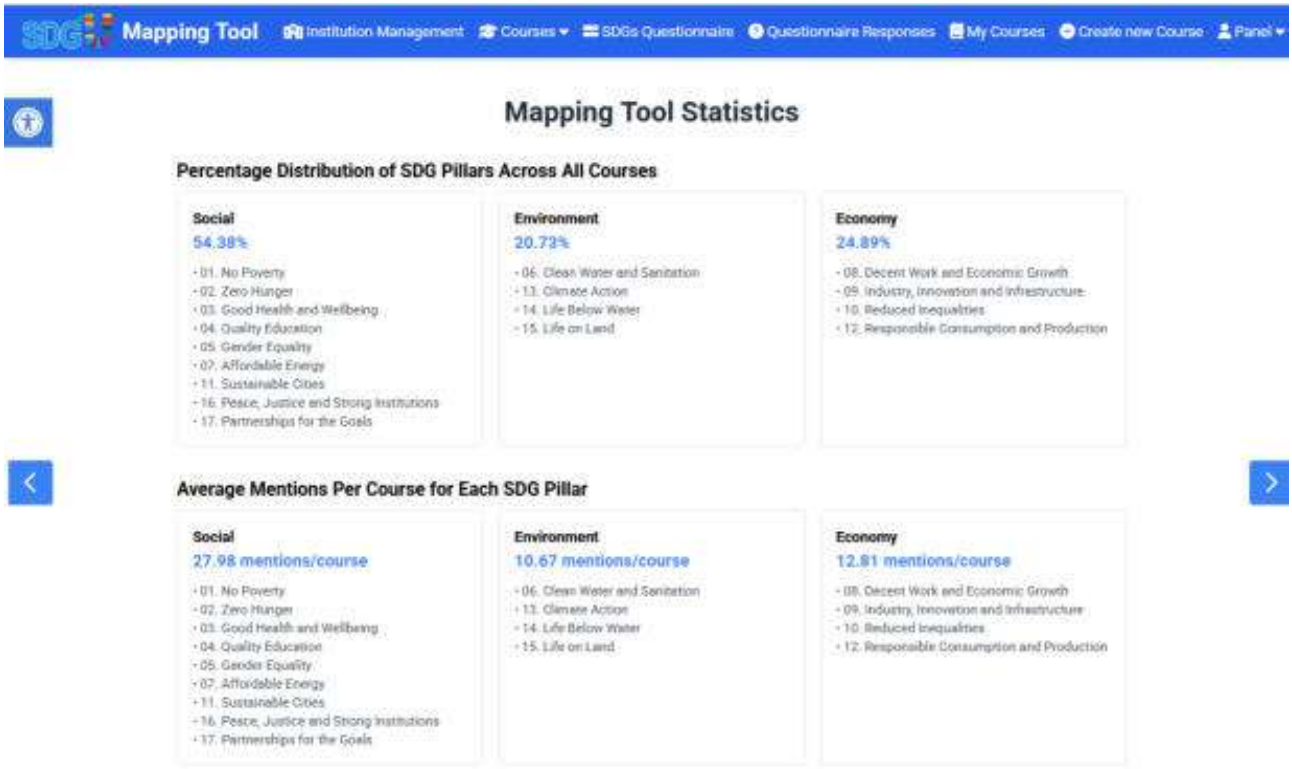
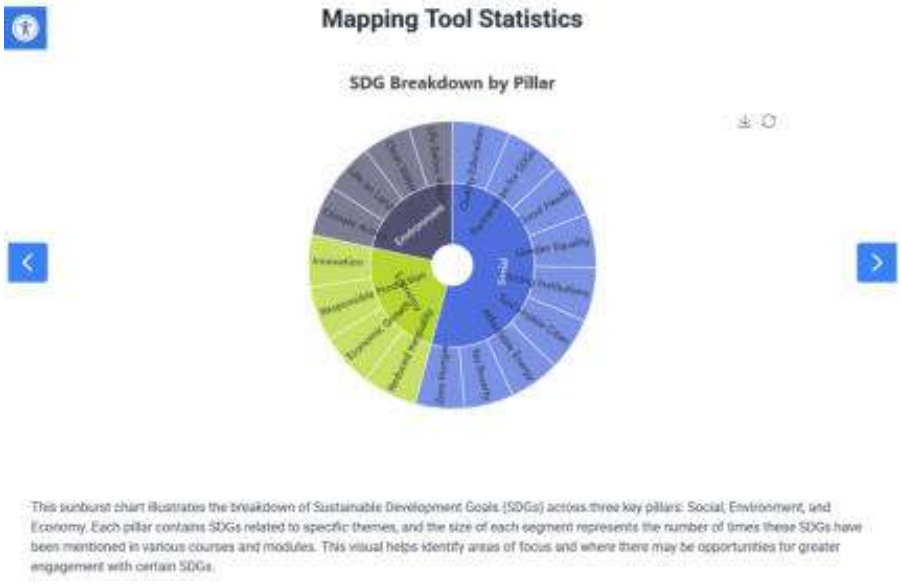
8.1.9 KPI: Courses/modules addressing specific SDGs per Institution.



8.1.10 KPI: Interdisciplinarity of the Course/Module.



8.1.11 KPI: SDGs breakdown by Pilar.



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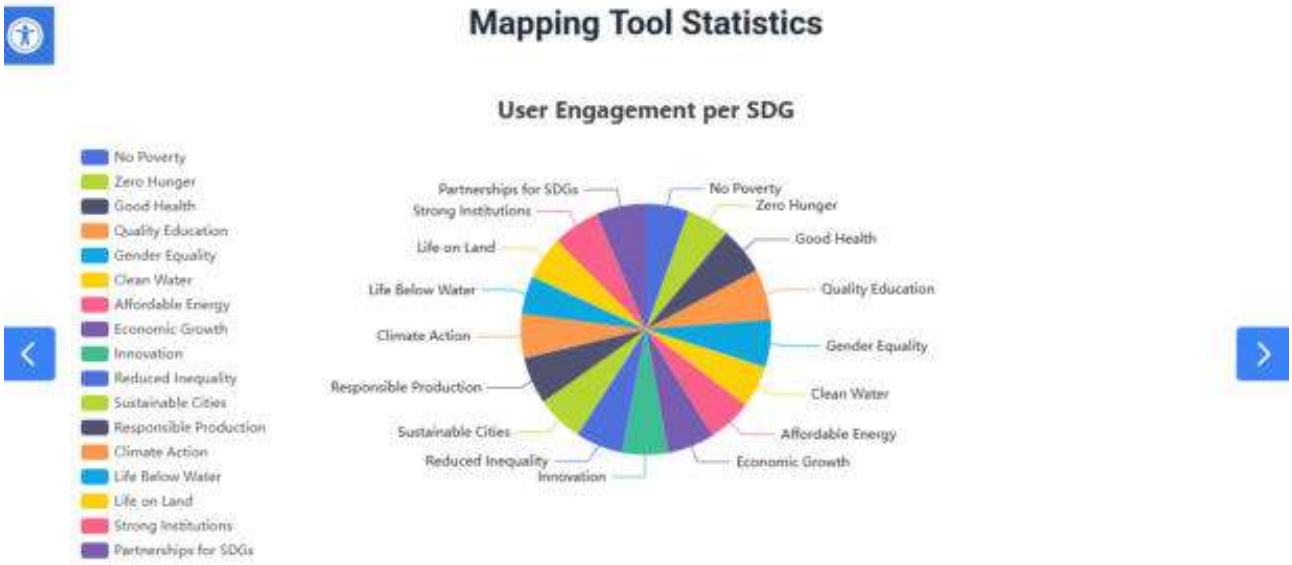
8.1.12 KPI: Extent of Sustainable Practices in University Engagement and Operations



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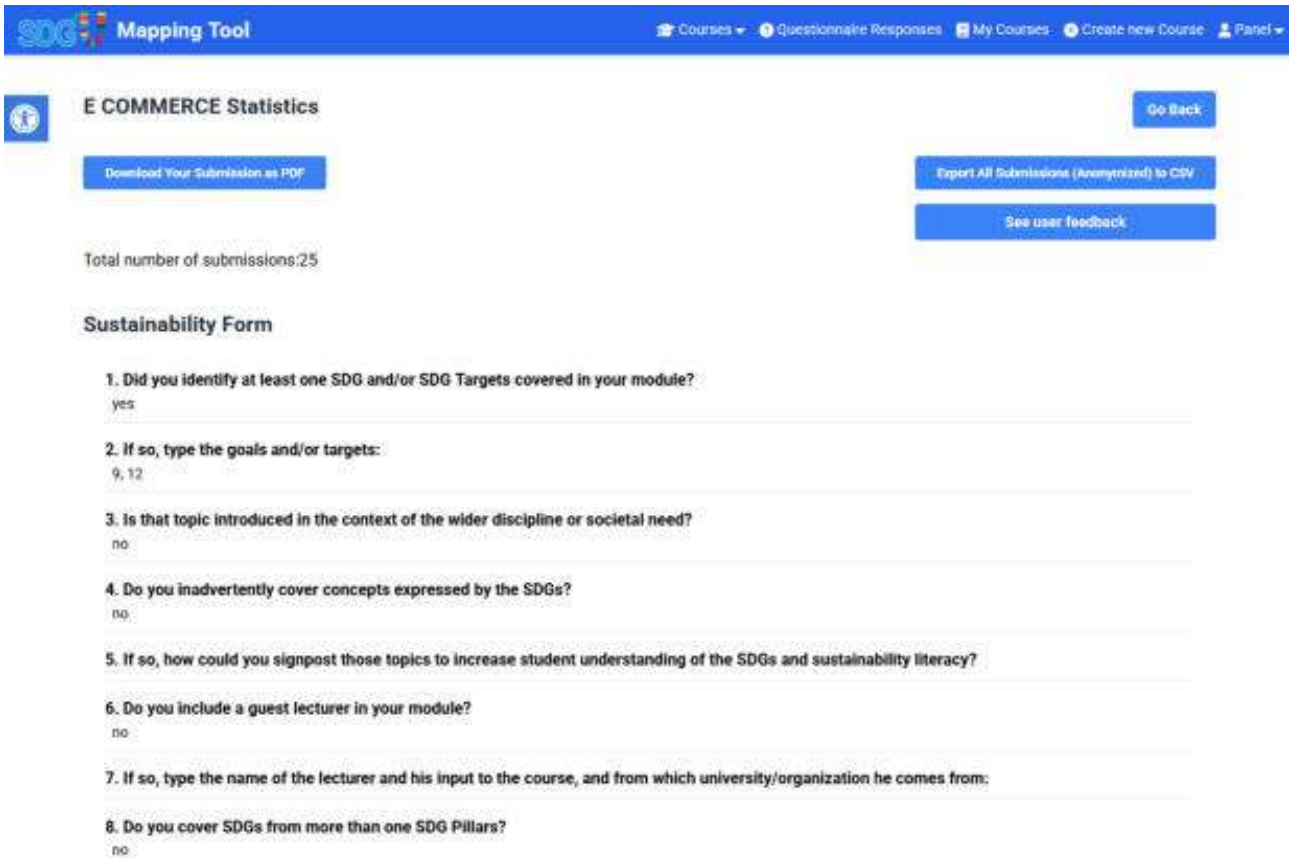
8.2 KPIs related to student feedback coming from the Mapping tool

The following KPIs are derived from student feedback provided through the Mapping tool.

8.2.1 KPI: The quality of SDGs content included at each module by looking at the depth and the extent of information provided.



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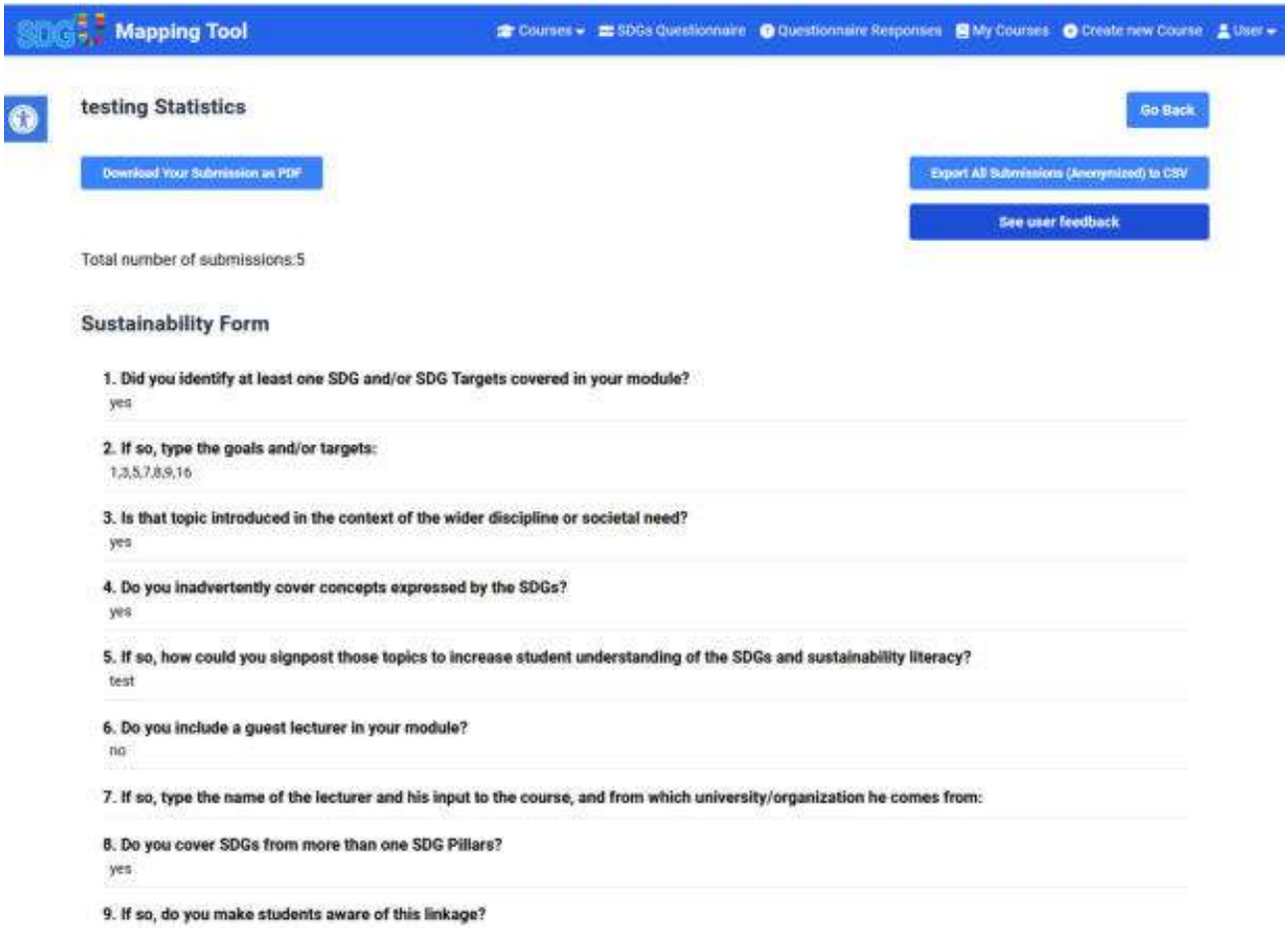
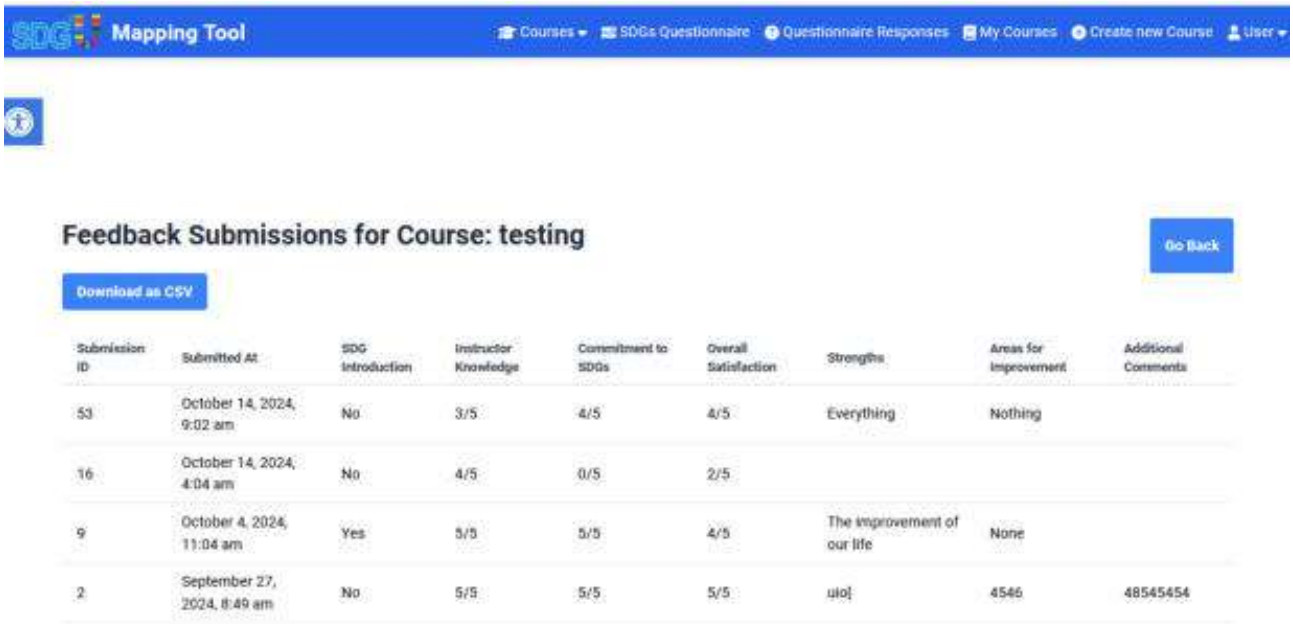
8.2.2 KPI: Assess the educational value of the tool as a process





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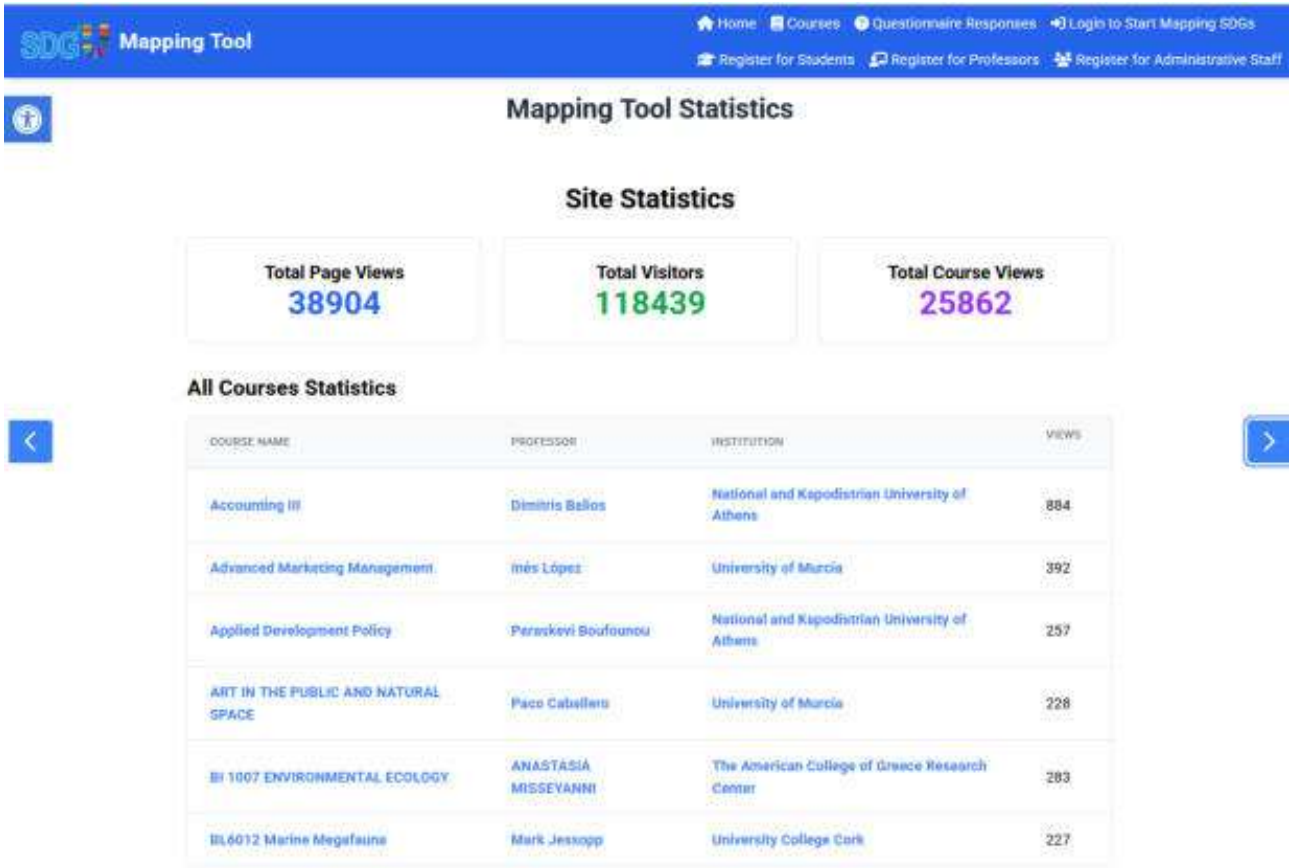
8.3 Statistics on Mapping tool usage

8.3.1 Site Statistics (All Courses Statistics)



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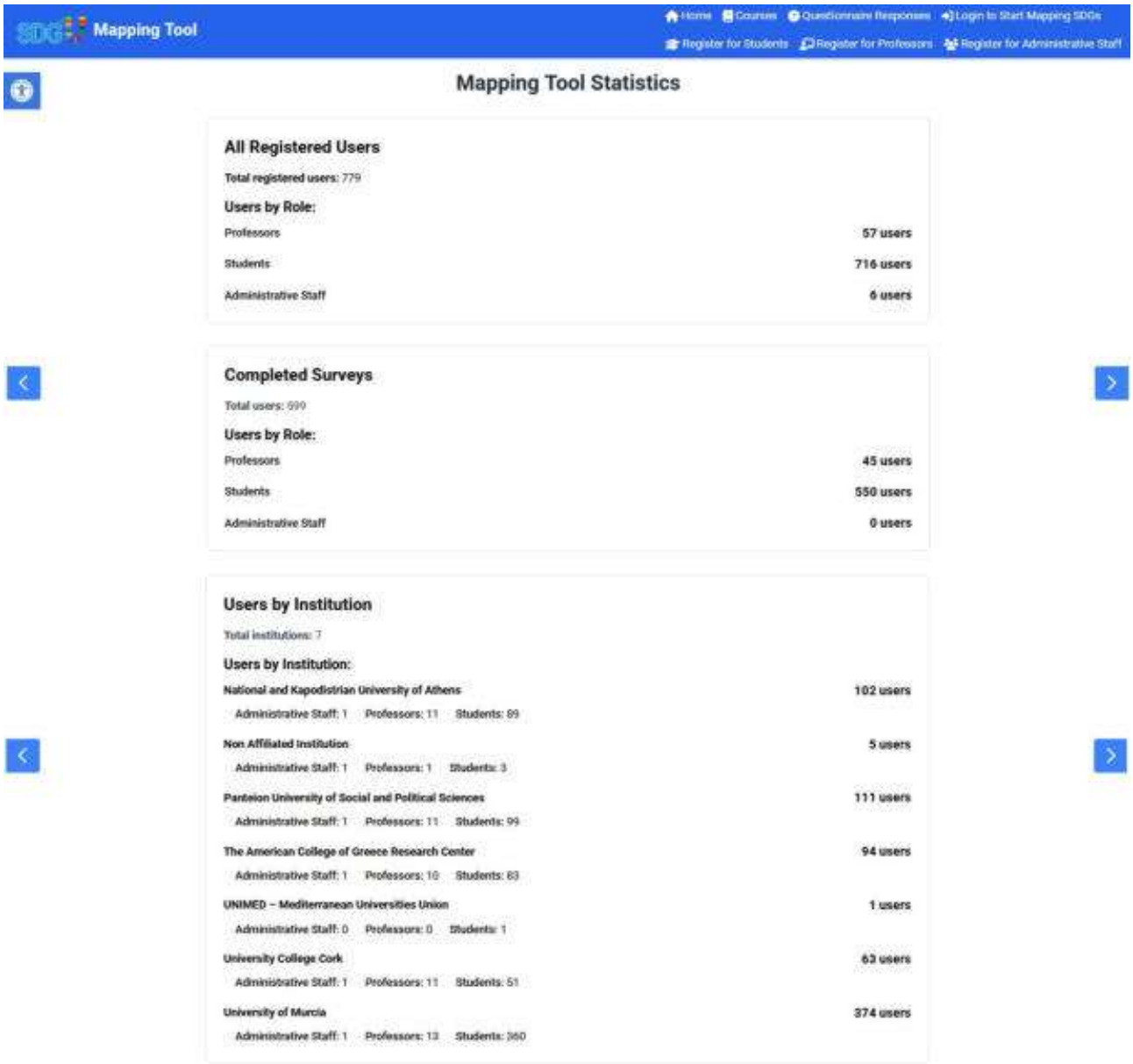
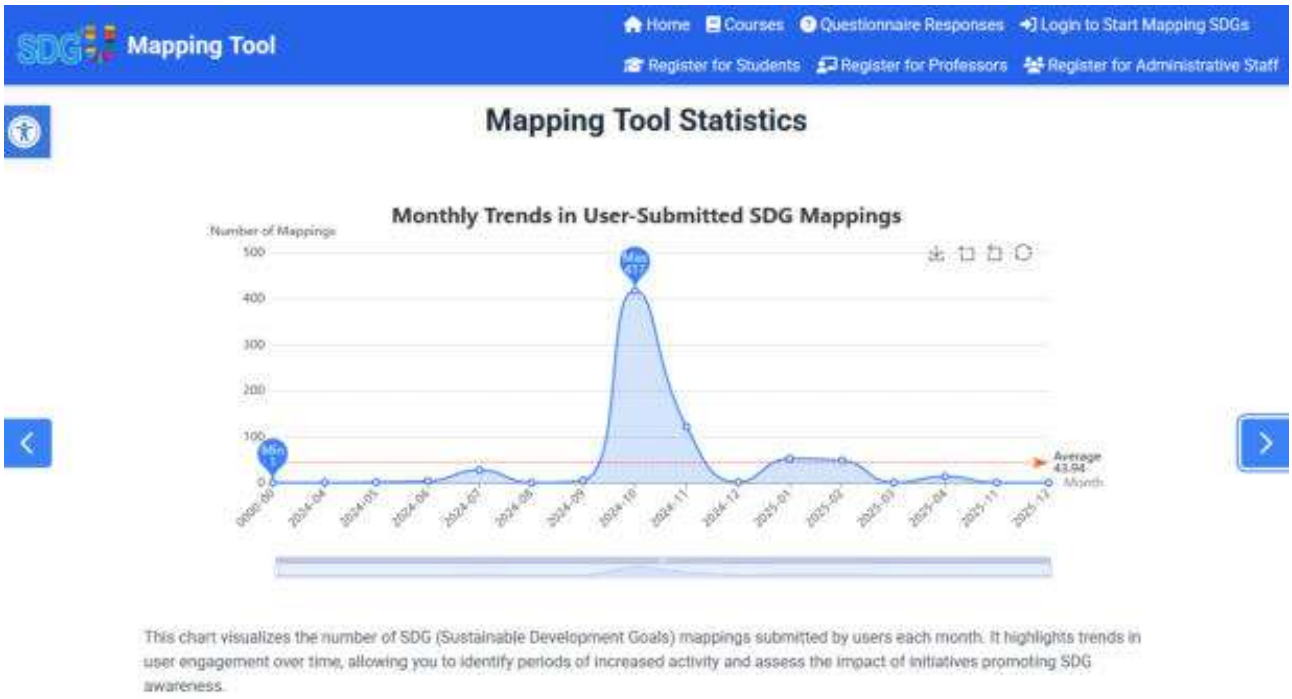
8.3.2 All Registered Users - Completed Surveys - Users by Role - Users by Institution



8.3.3 Monthly trends in user-submitted SDGs Mapping



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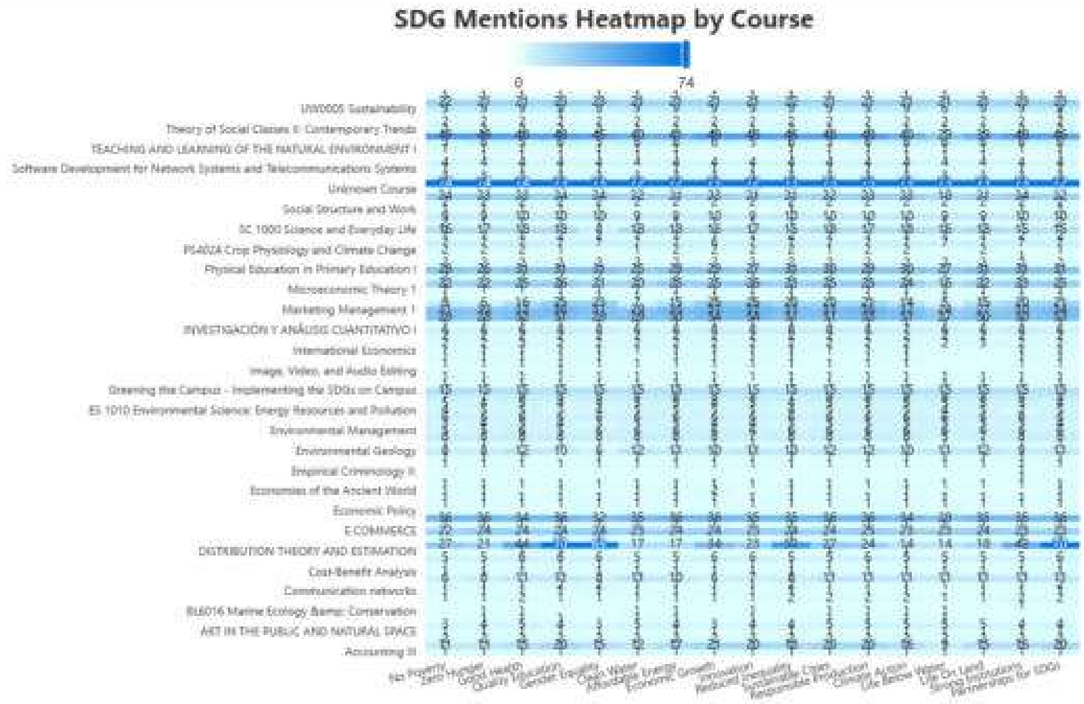
8.3.4 SDG mentions heatmap by course/module



This heatmap illustrates the frequency of Sustainable Development Goals (SDGs) mentions across various courses. Each cell represents how often a specific SDG has been associated with a course. The intensity of the color indicates the number of mentions, helping to identify which SDGs are most prominently featured in each course.

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9. Evaluation of the Mapping tool

9.1 Experts' evaluation

The Partners were asked to evaluate the SDGs mapping tool. The dataset contains multiple questions about the SDG4U tool's educational value, ease of use, impact on sustainability reporting, and correlation with university programs. Respondents generally rated the tool positively, noting its effectiveness in connecting university courses with the SDGs. While the tool was found intuitive, some respondents emphasised the need for faculty training to maximise its potential, and others suggested enhancements, such as making sustainability data more accessible for reporting and refining the mapping of course content to specific SDGs. There was also feedback on improving the balance between general SDG information and course-specific applications, indicating the need for more detailed SDG links in courses. Overall, the respondents highlighted that the tool could become a robust resource for aligning university operations with sustainability principles if further developed. Questionnaire is in annex 11.5.

In summary:

Ratings: Predominantly rated between 4 and 5

Overall Positive Perception: Respondents generally rated the SDG4U tool positively for its educational value and ease of use for faculty and students alike.

Effectiveness in Linking Courses: The tool is effective in connecting university courses with the Sustainable Development Goals (SDGs).

Need for Faculty Training: Some experts emphasised the necessity of training for faculty members to maximise the tool's potential.

Suggestions for Enhancements: Improve accessibility of data of the courses for analysis and reporting purposes. This aim would be met as information from a higher number of courses is available.

Refine the mapping of course content to specific SDGs: This should be a continuous process.

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Balance of Information: Feedback indicated a need for a better balance between general SDG information and course-specific applications. This would facilitate shareability both within the university and across universities.

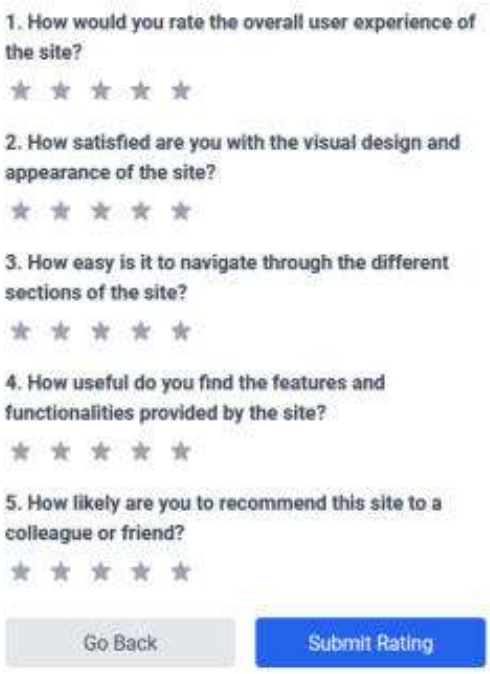
Potential for Robust Resource: The tool could serve as a strong resource for aligning university operations with sustainability principles if further developed.

Shareability: if information collected through the mapping tool is shared between universities, a good pool of best practices as well as inspiration for future implementation could smooth the institutions path towards sustainability in teaching

Insights for administrators: if applied to all courses within a university, the tool might provide a complete overview of the institution's commitment towards sustainability in teaching as well as identify gaps or weaknesses that should be attended.

9.2 User ranking evaluation

After submitting their entries, all users are requested to rate the Mapping tool using a 1 to 5 star ranking method, based on 5 major questions. This evaluation helps assess the services provided by the Mapping tool and records user experiences. The image below contains the questions users are asked to answer.



Access the mapping tool ratings by going to the “SDG Panel” menu and clicking “Site Ratings.”

The following table summarizes the performance ratings of the Mapping Tool. It allows for a direct comparison across key metrics, highlighting top performers and areas for potential improvement. To enable further analysis, rankings table are exportable in CSV format.

Mapping Tool | Institution Management | Courses | SDGs Questionnaire | Questionnaire Responses | My Courses | Create new Course | Panel

Admin Panel | SDGs Manager | Questions Manager | Institution Management | Site Ratings

Export All Site Ratings to CSV

Submitted At	How would you rate the overall user experience of the site?	How satisfied are you with the visual design and appearance of the site?	How easy is it to navigate through the different sections of the site?	How useful do you find the features and functionalities provided by the site?	How likely are you to recommend this site to a colleague or friend?
2025-12-30 11:02:23	5	5	4	5	5
2025-12-04 13:04:49	5	5	5	5	5
2024-12-10 17:06:52	5	5	5	4	5
2024-11-26 19:42:59	5	5	4	4	5
2024-10-30 19:44:03	5	5	5	5	5
2024-10-30 15:37:22	5	5	5	5	5
2024-10-30 14:01:18	5	4	3	3	1
2024-10-30 14:01:06	5	4	3	3	1
2024-10-30 10:31:58	5	4	3	2	1
2024-10-30 10:29:06	5	5	5	5	5

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In the bale below is the average satisfaction scores that were derived per question from all user ratings. This per-question analysis reveals key strengths and areas for improvement based on user feedback.

Table 9.1 Average Ranking of Mapping Tool

Question	Rank 1-5
How would you rate the overall user experience of the site?	4.8
How satisfied are you with the visual design and appearance of the site?	4.4
How easy is it to navigate through the different sections of the site?	3.9
How useful do you find the features and functionalities provided by the site?	3.8
How likely are you to recommend this site to a colleague or friend?	3.5

The results in Table 9.1 indicate that the Mapping Tool is generally well received by users, with an overall positive level of satisfaction. The highest score was given to the overall user experience (4.8), suggesting that users find the tool reliable, effective, and pleasant to use. The visual design and appearance (4.4) also scored highly, highlighting that the interface is aesthetically appealing and contributes positively to user engagement. These two areas represent clear strengths of the Mapping Tool and should be highlighted as key achievements.

Scores for ease of navigation (3.9) and usefulness of features and functionalities (3.8) are lower, indicating that users may experience some difficulty finding content or fully benefiting from the available features. The lowest score relates to likelihood of recommending the site (3.5), which suggests that while users are generally satisfied, there are shortcomings that prevent strong advocacy.

In conclusion, while the Mapping Tool excels in overall experience and visual design, improvements should focus on enhancing navigation clarity, optimizing features for usability, and increasing overall value to users.

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10. Mapping Tool Impact

10.1 Mapping Tools impact on identifying better educational practices/methodologies and propose new policies.

In order to identify the educational methodologies most commonly used in universities to introduce sustainability the team undertook a detailed analysis of the initiatives implemented by the universities that occupy the top positions in the THE impact ranking for each of the SDGs. Three educational methodologies were chosen for analysis based on the SDSN's categorisation the most prominent and appropriate formulae to address sustainable development in Higher Education Institutions; these are Interdisciplinarity, Action-based learning and Multi-actor involvement.

"Action-Based Learning" appeared to be the most commonly utilized educational methodology of the three dimensions established by SDSN (2020). Active learning engages students in the learning process through activities and discussions, encouraging them to take a central role in their education. Rather than passively receiving information, students actively analyse, synthesize, and apply concepts through learning techniques such as research-led work, project-based methods, labs, simulations, hands-on experiments industry partnerships and internships. This approach fosters critical thinking, enhances retention of knowledge, and develops skills such as collaboration and communication. Active learning may also create a more inclusive and dynamic classroom environment, catering to diverse learning styles and encouraging participation.

"Experiential Learning" was frequently used by all the identified universities across the SDGs. This educational methodology bridges academic knowledge with real world action, empowering students to address the SDGs through reflective and applied activities This educational methodology fosters deeper understanding of sustainability issues while equipping students with skills and experience to contribute to global challenges. All in all, these methodologies not only align academic efforts with global sustainability priorities but also prepare graduates to become proactive contributors to achieving the SDGs in their future careers.

The "Problem-based Learning" approach also seems widely used by universities to deal with sustainability. By engaging students in collaborative work, this methodology fosters the design and implementation of projects that tackle pressing issues such as renewable energy, waste management, biodiversity preservation, sustainable consumption and sustainable urban development, among others.

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10.2 Standardize good practices: Serve as a template for other higher education institutions to adopt and implement SDG-related activities.

As mentioned, for the majority of courses and initiatives reported by top institutions according to the Times Higher Education Impact Rankings 2024, Action-Based Learning emerged as the most commonly utilized educational methodology. This highlights the strong emphasis these universities place on tools that actively engage students, instilling in them the values and commitment necessary to contribute to sustainability efforts. Active learning positions students at the centre of the educational process, involving them in activities and discussions that promote critical engagement.

On the other hand, most courses offered by the partner institutions tend to rely heavily on lectures and curriculum-based approaches to promote the SDGs, while also incorporating the interdisciplinary dimension of educational methodologies. Interdisciplinarity in sustainability education has become a cornerstone methodology for universities, as it allows students to address the complexity of global challenges through an integrated approach. Issues such as climate change, resource depletion, and social inequality are inherently multifaceted and require solutions that extend beyond the scope of a single discipline. By combining knowledge and perspectives from diverse fields, such as environmental science, economics, sociology, and engineering, interdisciplinary teaching equips students with a holistic understanding of sustainable development.

- In all 17 SDGs, except “SDG 2: Zero Hunger” and “SDG3: Good Health and Wellbeing” and “SDG5: Gender Equality”, partner universities use the interdisciplinary dimension compared to Times Higher Education Impact Rankings 2024, that they use instead “Action Based Learning”.
- In “SDG 2: Zero Hunger” the Educational methodology used by top universities worldwide according to the THE Impact Ranking 2024 is Action based: and for partners’ universities professors the Educational methodology, both under the Dimension of “Action Based Learning”.
- In “SDG 3: Good Health and Wellbeing” the Educational methodology used by top universities worldwide according to the THE Impact Ranking 2024 and for partners’ universities professors is the same: Interprofessional Education (IPE) under the Dimension of Interdisciplinarity
- In “SDG5: Gender Equality”, the Educational methodology used by top universities worldwide according to the THE Impact Ranking 2024 is “Interdisciplinarity Inclusive Curriculum and Gender-Focused Learning” and for partners’ universities professors is

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"Interdisciplinarity Inter-and transdisciplinary approaches". Both under the same Dimension of "Interdisciplinarity".

The above conclusions highlight a potential 'room for growth' in the methodologies employed by partner institutions. This challenge reflects a broader trend seen in many institutions worldwide, which are striving to further integrate the promotion of SDGs into their curricula. In this context, the insights derived from the use of the SDG4U mapping tool can be especially valuable. The tool provides a snapshot of the current SDGs engagement of an institution, helping to identify strengths and gaps. This information can inform potential changes and improvements in an institution's approach, enabling it to adopt more dynamic and engaging educational methodologies that are under the Dimension of Action Based Learning.

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11. Annex

11.1 SDG4U Mapping Tool Questionnaires

11.1.1 Student Questionnaire

SDG Introduction & Integration

1. Were the Sustainable Development Goals (SDGs) introduced at the beginning of the course?

   Yes/No

2. How clearly were the SDGs integrated into the course content?

   0-5 scale (0 = 'Not Clear at All', 5 = 'Extremely Clear')

Instructor Effectiveness

3. How knowledgeable was the instructor about the SDGs and their application within the course?

   0-5 scale (0 = 'Not Knowledgeable', 5 = 'Extremely Knowledgeable')

4. How effectively did the instructor engage students with SDG-related topics?

   0-5 scale (0 = 'Not Effective at All', 5 = 'Highly Effective')

Course Materials & Assignments

5. To what extent did the course materials (e.g., readings, case studies, projects) relate to the SDGs?

   0-5 scale (0 = 'Not Relevant', 5 = 'Highly Relevant')

6. Has your participation in this course influenced your personal or professional behaviours towards sustainability?

   Yes/No

Commitment & Satisfaction

7. After completing this course, how committed are you to contributing to the achievement of the SDGs?

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0-5 scale (0 = 'Not Committed', 5 = 'Highly Committed')

8. How satisfied are you with the integration of SDGs into this course?

   0-5 scale (0 = 'Very Dissatisfied', 5 = 'Very Satisfied')

Open-Ended Feedback

9. What did you like most about how the SDGs were integrated into this course?
10. What aspects of SDG integration could be improved in this course?
11. Do you have any other comments or suggestions regarding the SDG-related content in this course?

Accessibility & Confidentiality

12. Did you encounter any issues accessing or using the feedback form? **Yes/No**

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11.1.2 Professor Questionnaire

Questions adapted from UCC SDG Toolkit:

1. Did you identify at least one SDG and/or SDG Targets covered in your module?
    - If so, type the goals and/or targets:
    - Is that topic introduced in the context of the wider discipline or societal need?

2. Do you inadvertently cover concepts expressed by the SDGs?
    - If so, how could you signpost those topics to increase student understanding of the SDGs and sustainability literacy?

3. Do you include a guest lecturer in your module?
    - If so, type the name of the lecturer and their input to the course, and from which university/organisation they come from:

4. Do you cover SDGs from more than one SDG Pillars?
    - If so, do you make students aware of this linkage?
    - Do you discuss in terms of "transdisciplinary"?
    - In what way and where in the context, e.g., During an exercise at the chapter:

5. Can you incorporate concepts of sustainability and the SDGs into your Learning Outcomes?

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11.1.3 Admin Survey

Questions adopted from THE Impact Rankings.

SDG 1 - No Poverty	
1.	Students who receive significant financial aid in order to attend the institution.
2.	Targets to admit students who fall in the bottom 20 percent of household income in the country (or a more tightly defined target)
3.	Graduation/completion targets for students who fall in the bottom 20 percent of household income in the country (or a more tightly defined target)
4.	Support for students from low income families to enable them to complete university – for example, in relation to food, housing, transportation, legal services.
5.	Programmes or initiatives to assist students who fall in the bottom 20 per cent of household income in the country (or a more tightly defined target) to successfully complete their studies.
6.	Schemes to support poor students from low or lower-middle income countries – for example, offering free education or grants.
7.	Education or resources to assist the start-up of sustainable businesses in the local community – for example, mentorship programmes, training workshops, access to university facilities.
8.	Financial assistance to aid the start-up of sustainable businesses in the local community.
9.	Training or programmes to improve access to basic services for all.
10.	Participating in policymaking at a local, regional, national and/or global level to implement programmes and policies to end poverty.
SDG 2 - Zero Hunger	
11.	Campus food waste tracking.

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12.	Campus food waste per person (7.7%)
13.	Programme on student food insecurity (4.8%)
14.	Interventions to target hunger among students and staff – for example, providing access to food banks (4.8%)
15.	Sustainable food choices for all on campus, including vegetarian and vegan food (4.8%)
16.	Healthy and affordable food choices for all on campus (4.8%)
17.	For this metric, we measure the proportion of graduates who receive a degree associated with any aspect of food sustainability within an agricultural or aquacultural course, out of the institution's total number of graduates. It aims to capture whether a university actively teaches food sustainability within undergraduate and postgraduate agriculture and aquaculture courses.
18.	Provide food security and sustainable agriculture and aquaculture knowledge, skills or technology to local farmers and food producers (4.8%)
19.	Events for local farmers and food producers to connect and transfer knowledge (4.8%)
20.	Access to university facilities for local farmers and food producers to improve sustainable farming practices (4.8%)
21.	Prioritise purchase of products from local, sustainable sources (4.8%)
SDG 3 - Good Health and Wellbeing	
22.	Proportion of research papers that are viewed or downloaded (10%)
23.	Proportion of research papers that are cited in clinical guidance (10%)
24.	Proportion of health graduates (34.6%)
25.	To understand how a university is supporting health professions, we measure

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	the proportion of graduates who receive a degree associated with a health-related profession out of the institution's total number of graduates. The data relate to the number of graduates in the 2020 academic year. The degree does not necessarily give them the ability to practise directly; additional qualifications may be required.
26.	Collaborations and health services (38.4%)
27.	Smoke-free policy (8%)
28.	Collaborations with local, national or global health institutions to improve health and well-being outcomes (7%)
29.	Outreach programmes in the local community to improve or promote health and well-being (7%)
30.	Access to sexual and reproductive healthcare services for students (7%)
31.	Access to mental health support for students and staff (7%)
32.	Community access to university sports facilities (2.4%)
SDG 4 - Quality Education	
33.	Access to educational resources for those not studying at the university (5%)
34.	Events that are open to the general public, such as lectures or specific educational courses (5%)
35.	Educational events that provide vocational training for those not studying at the university (5%)
36.	Educational outreach activities in the local community, including schools (5%)
37.	Policy to ensure that these activities are open to all, regardless of ethnicity, religion, disability, immigration status or gender (6.8%)
SDG 5 - Gender Equality	

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38.	Proportion of female authors across all indexed publications (10%)
39.	Proportion of papers on gender equality in the top 10 per cent of journals as defined by Citescore (10%)
40.	Number of publications on gender equality (7%)
41.	This is defined as the number of women starting a degree who identify as being the first person in their immediate family to attend university, divided by the total number of women starting a degree. All data are provided as full-time equivalents.
42.	Tracking application, acceptance and completion rates for female students (1.6%)
43.	Policy addressing application, acceptance, entry and participation rates for female students (4.6%)
44.	Provision of appropriate women's access schemes, such as mentoring (4.6%)
45.	Encouraging applications in areas where women are under-represented (4.6%)
46.	This is defined as the number of women in senior roles, divided by the total number of senior roles in the university. Senior roles can include professorships, deanships and senior university leaders. The category does not include honorary positions. All data are provided as full-time equivalents.
47.	This is defined as the number of women who are awarded a degree, divided by the total number of students who are awarded a degree. The data are provided as headcounts and subject-weighted against three broad areas: STEM; medicine; and arts, humanities and social sciences.
48.	Policy of non-discrimination against women (1.95%)
49.	Policy of non-discrimination against transgender people (1.95%)
50.	Maternity and paternity policies that support women's participation (1.9%)

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51.	Accessible childcare facilities for students (1.9%)
52.	Accessible childcare facilities for staff (1.9%)
53.	Women's mentoring schemes, in which at least 10 per cent of female students participate (1.9%)
54.	Track women's graduation rate compared with men's and scheme in place to close any gap (1.9%)
55.	Policy protecting those reporting discrimination (1.9%)
SDG 6 - Clean Water and Sanitation	
56.	Proportion of papers in the top 10 per cent of journals as defined by Citescore (10%)
57.	Field-weighted citation index of papers (10%)
58.	Number of publications (7%)
59.	Water consumption tracking (9.5%)
60.	Water consumption per person (9.5%)
61.	Process to treat wastewater (4.6%)
62.	Process to prevent polluted water entering water system (4.6%)
63.	Free drinking water for students, staff and visitors (4.6%)
64.	Building standards to minimise water use (4.6%)
65.	Landscape planting to minimise water usage (4.6%)

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66.	Policy to maximise water reuse across university (6%)
67.	Measure the reuse of water across university (6%)
68.	Educational opportunities for local communities to learn about good water management (3.8%)
69.	Promoting conscious water usage on campus and in wider community (3.8%)
70.	Supporting water conservation off campus (3.8%)
71.	Sustainable water extraction technologies on associated university grounds on and off campus (3.8%)
72.	Cooperating with local, regional, national or global governments on water security (3.8%)
SDG 7 - Affordable and Clean Energy	
73.	Proportion of papers in the top 10 per cent of journals as defined by Citescore.
74.	Field-weighted citation index of papers.
75.	Number of publications.
76.	Policy to ensure all renovations or new builds follow energy efficiency standards.
77.	Plans to upgrade existing buildings to higher energy efficiency rating.
78.	Process for carbon management and reducing carbon dioxide emissions.
79.	Plan to reduce overall energy consumption.
80.	Reviews to identify areas where energy waste is highest.

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81.	Policy on divesting from carbon-intensive energy industries, notably coal and oil.
82.	This is defined as the energy used per floor space (gigajoule/m2) of university buildings. It measures units of energy used by an individual, event, organisation or product at the university.
83.	Programmes for the local community to learn about the importance of energy efficiency and clean energy.
84.	Promoting public pledge on 100 per cent renewable energy beyond the university.
85.	Services aimed at improving energy efficiency and clean energy for local industry.
86.	Informing and support governments on policy development related to clean energy and energy-efficient technology.
87.	Assistance for start-ups that foster and support a low-carbon economy or technology.
SDG 8 - Decent Work and Economic Growth	
88.	Proportion of papers in the top 10 per cent of journals as defined by Citescore.
89.	Payment of a living wage to staff and faculty.
90.	Recognition of union and labour rights.
91.	Policy on ending discrimination in the workplace.
92.	Policy against modern slavery, forced labour, human trafficking and child labour.
93.	Guarantees of equal rights for outsourced labour workers.
94.	Policy on pay scale equity, including commitment to measure and eliminate gender pay gaps.

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95.	Measuring or tracing pay scale gender equity.
96.	Process for employees to appeal decisions on rights and/or pay.
97.	To understand if universities are preparing students for the world of work, we asked for the number of students with an employment placement of more than a month required as part of their studies, divided by the total number of students. All data are provided as full-time equivalents.
SDG 9 - Industry, Innovation and Infrastructure	
98.	"This focuses on research that is relevant to industry, innovation and infrastructure, measuring the volume of research produced. [The number of publications looks at the scale of research output from a university around industry, innovation and infrastructure]"
99.	This is defined as the number of patents from any source that cite research conducted by the university. [Patents are an indicator of the relevance of university research to society and industry. Rather than looking at patents directly associated with a university, we instead explore the number of patents from any source that cite research conducted by the university.]
100.	University spin-offs are defined as registered companies set up to exploit intellectual property that has originated from within the institution. This metric looks at spin-offs that were established on or after 1 January 2000. They must have been established at least three years ago and still be active.
SDG 10 - Reduced Inequalities	
101.	Non-discriminatory admissions policy.
102.	Planned action to recruit students and staff from under-represented groups.
103.	Anti-discrimination and anti-harassment policies.
104.	Existence of a diversity and equality committee, office or officer.

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105.	Mentoring, counselling or peer support programmes aimed at students and staff from under-represented groups.
106.	Accessible facilities for people with disabilities.
107.	Support services for people with disabilities.
108.	Access schemes for people with disabilities.
109.	Accommodation policy or strategy for people with disabilities, including adequate funding.
SDG 11 - Sustainable Cities and Communities.	
110.	Public access to buildings and/or natural heritage landscapes of cultural significance.
111.	Public access to university libraries.
112.	Public access to university museums, galleries or works of art.
113.	Public access to open and green spaces.
114.	Provide artistic events for members of the public, such as concerts.
115.	Record and preserve local heritage.
116.	Targets on sustainable commuting.
117.	Promote sustainable commuting.
118.	Encourage telecommuting, remote working or condensed working weeks.
119.	Affordable housing for students.

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120.	Affordable housing for staff.
121.	Prioritise pedestrian access on campus.
122.	Work with local authorities to address planning issues, including the provision of affordable housing for local residents.
123.	Build to sustainable standards.
124.	Build on brownfield sites.
SDG 12 - Responsible Consumption and Production	
125.	Policy on ethical sourcing of food and supplies.
126.	Policy on the appropriate disposal of hazardous waste.
127.	Policy to measure the amount of waste sent to landfill and amount recycled.
128.	Policy on minimising the use of plastic.
129.	Policy on minimising the use of disposable items.
130.	Evidence that these policies also apply to outsourced services.
131.	Evidence that these policies also apply to outsourced suppliers.
132.	Measure the amount of waste generated and recycled.
133.	Proportion of waste recycled.
134.	We asked whether the institution published a university sustainability report between 2018 and 2020 and whether this was a stand-alone document or part of a larger annual report. Publication of a sustainability report is a direct requirement of SDG 12 by the United Nations.

SDG 13 - Climate Action	
135.	Local education programmes or campaigns on climate change.
136.	Existence of university climate action plan shared with local government and community groups.
137.	Working with local or national government to plan for climate change disasters.
138.	Inform and support local or regional government on issues associated with climate change.
139.	Collaborate with NGOs on climate change adaptation.
140.	Commitment to carbon neutrality.
SDG 14 - Life below Water	
141.	Educational programmes on fresh-water ecosystems for local or national communities.
142.	Educational or outreach programmes on sustainable management of fisheries, aquaculture and tourism for local or national communities.
143.	Outreach activities to raise awareness about overfishing, unregulated fishing and destructive fishing practices.
144.	Support or organise events aimed to promote conservation and sustainable use of bodies of water.
145.	Policy to ensure that seafood on campus is sustainably harvested.
146.	Maintain and extend existing ecosystems and their biodiversity, either through research or engagement with industry.
147.	Work on technologies or practices to help marine industry prevent damage to aquatic ecosystems.
148.	Water quality standards and guidelines for water discharges.

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149.	Plan to reduce plastic waste on campus.
150.	Policy preventing and reducing marine pollution.
151.	Plan to minimise physical, chemical and biological alterations of aquatic ecosystems.
152.	Monitor health of aquatic ecosystems.
153.	Develop and support programmes and incentives that encourage good aquatic stewardship.
154.	Collaborate with local community to maintain shared aquatic ecosystems.
155.	Watershed management strategy based on diversity of aquatic species.
SDG 15 - Life on Land	
156.	Support or organise events aimed to promote conservation and sustainable use of land.
157.	Policy to ensure that food on campus is sustainably farmed.
158.	Maintain and extend existing ecosystems and their biodiversity.
159.	Educational programmes on ecosystems for local or national communities.
160.	Educational programmes or outreach on sustainable management of land for agriculture and tourism.
161.	Policy to ensure the conservation, restoration and sustainable use of land ecosystems associated with the university.
162.	Policy to identify, monitor and protect threatened species affected by the operation of the university.
163.	Include local biodiversity in any planning and development processes – for example, construction of new buildings.

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164.	Policy to reduce impact of non-native species on campus.
165.	Collaborate with local community to maintain shared land ecosystems.
166.	Water quality standards and guidelines for water discharges.
167.	Policy on reducing plastic waste on campus.
168.	Policy on waste disposal, covering hazardous materials.
SDG 16 - Peace, Justice and Strong Institutions	
169.	Policies to identify and engage local stakeholders.
170.	Participatory bodies to recognise and engage local stakeholders.
171.	Publishing university principles on organised crime, corruption and bribery.
172.	Policy supporting academic freedom.
173.	Publishing university financial data.
174.	Providing expert advice to government.
175.	Providing outreach to policy and lawmakers.
176.	Undertaking policy-focused research in collaboration with government departments.
177.	Providing a neutral platform for political stakeholders to discuss challenges.
178.	Universities can support justice through the provision of appropriately educated graduates, so we measured the number of graduates in law or civil policing subjects divided by the total number of graduates. All courses must include a positive ethical dimension and the data relate to the number of graduates in the

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	2020 academic year.
SDG 17 - Partnerships for the goals.	
179.	Relationships with regional NGOs and government for SDG policy.
180.	Cross-sectoral dialogue about SDGs with government or NGOs.
181.	Collaborating internationally to capture data relating to SDGs.
182.	Collaborating internationally to develop best practice on tackling SDGs.
183.	Collaborating with NGOs to tackle SDGs through student volunteering programmes, research programmes or educational resources.
184.	We asked institutions whether they published specific data on their performance against each of the 17 SDGs. We gave extra credit for documents that are in the public domain.
185.	Commitment to meaningful education around the SDGs across the university, relevant and applicable to all students.
186.	Dedicated courses (full degrees, or electives) that address sustainability and the SDGs.
187.	Dedicated outreach educational activities for the wider community, which could include alumni, local residents, displaced people.

11.2 List of Tables

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11.4 Links to SDG4U Mapping Tool Manuals

11.4.1 Manual for Professors

sdg4u_mapping_tool_professor.pdf

sdg4u_mapping_tool_professor_submissions.pdf

11.4.2 Manual for administration staff

sdg4u_mapping_tool_administrative_staff.pdf

11.4.3 Manual for administration staff

sdg4u_mapping_tool_student.pdf

11.5 Evaluation of the mapping tool questionnaire

The online evaluations form **https://forms.gle/WdbjaCMYP5bfPvzG8**

Evaluation Form for SDG4U Educational & SDG Correlation in University Programs activities and outcomes of Mapping tool usage
Evaluator:

---

1. Educational Usefulness of the SDG4U activities and Tool

- **Ease of Use for Faculty & Students:**
  - Does the tool streamline the process of linking university courses to SDGs?

Rating: (1-5)
Comments:

- **Educational Value of the Tool:**
  - Does the tool enhance the educational process by providing meaningful links on SDGs?

Rating: (1-5)
Comments:
Suggestions for improvement (optional):

---

2. Correlation of Statistics with SDGs

- **Measure the Number of Raw Data Analysed for Content Selection:**
  - How much data (e.g., statistics, course modules, students, university activities) is useful to analyse to match courses with SDGs?

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Rating: (1-5)
Comments:

- **Quality of SDG Content in Modules:**
  - Is there a sufficient balance between general SDG information and specific course-related SDG applications?

Rating: (1-5)
Comments:

- **SDG Objectives Achieved (Module by Module):**
  - Are there outcomes for the percentage of SDG-related objectives achieved for each course based on student feedback?

Rating: (1-5)
Comments:

---

3. KPI: Educational Objectives Achieved

- **Percentage of Objectives Achieved for Delivered Product:**
  - What percentage of the course-specific and university-wide objectives related to SDG compliance have been achieved?

Rating: (1-5)
Comments:

- **Assessment of Learning Outcomes:**
  - How effectively does the SDG4U support the university's overall goals to enhance sustainability education?

Rating: (1-5)
Comments:

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4. University Administration Actions & Sustainability Operations

- **University Engagement with Sustainability Principles:**
  - How well does the tool capture the university's commitment to sustainability based on the questionnaire's?

Rating: (1-5)
Comments:

- **Support for University Sustainability Reporting (Times Higher Education SDG Impact Ranking):**
  - Is the data comprehensive enough to be used for formal reporting and continuous improvement?

Rating: (1-5)
Comments:

- **Actionable Recommendations for Improvement:**
  - Does the SDG4U tool and activities enable recommendations for further aligning the university's programs, operations, and sustainability actions with SDG principles?

Rating: (1-5)
Comments:

---

5. Final Evaluation and Feedback

- **Overall Usefulness in Supporting Educational Programs and SDGs Correlation:**
  - Does the tool serve as an effective resource for embedding sustainability and SDGs into university programs and operations?

Final Rating: (1-5)
Comments:

- **Suggestions for Future Enhancements:**

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- Are there any key features that should be improved or added in future versions of the tool to enhance its educational and sustainability-related impact?

Comments:

11.6 Link to Mapping tool Source code

The following link leads to the source code of the mapping tool at GitHub. It is open source, and it is licensed under Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International - CC BY-NC-SA licence.

https://git.scanlab.gr/sdghub/2022-1-el01-ka220-hed-000088776

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