EDICULA

Educational Digital Innovative Cultural heritage related Learning Activities

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INTELECTUAL OUTPUT: **O1 EDICULA EDUCATIONAL TOOLKIT**
DELIVERABLE: **D1.4 AI module for classification of different data and metadata**
LEAD ORGANIZATION: NTUA
DATE: 31 October 2021

EDICULA

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Table of Contents

EDICULA

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heritage related Learning Activities

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1. Introduction

EDICULA "Educational Digital Innovative CUltural heritage related Learning Alliance" is a **Strategic Partnership for Higher Education** in **Erasmus+**. Strategic Partnerships aim to support the development, transfer and/or implementation of innovative practices at organizational, local, regional, national or European levels. Institutions of Higher Education work with others (other sector fields, enterprises, social partners etc.) to help to improve higher education across Europe and to deliver high quality education which is relevant to national and European labor market needs.

A major challenge for Europe and the world is to promote cultural heritage protection as a lever for the enhancement of the society's identity and the integration of 'culture as an enabler for sustainable development'.

New knowledge must break the boundaries of science and engineering and be integrated in education. In the field of CH protection, this will be achieved through the development of new learning mechanisms and educational material, taking into consideration the experience from existing interdisciplinary postgraduate study programs and actively promoting in situ education. The added value of this approach is the education of the youth towards this new vision.

2. The Edicula Educational Platform

The following screenshot depicts the homepage of the Edicula Educational Platform, which is available for everyone to check it out, as a guest, at the following URL : http://161.35.19.89/moodle/

It shows a calendar with all the available dates, upcoming events that will take place and all the latest announcements , as also a small summary of the Edicula project. Moreover, all the course names are available to be seen from guests, as also their respective categories and subcategories where they belong. Final a search box, for easily checking any summarized info for any of the courses is also added at the top.

Figure 1: Edicula Educational Platform Main Page

At the following screenshot we can see the logon splash page of the Edicula Educational Platform, where a registered user can log in or else, as mentioned, only as guest to view summarized information.
The URL of the logon splash page is :   http://161.35.19.89/moodle/login/index.php

Figure 2: Edicula Educational Platform splash logon page

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3. The Edicula AI toolkit

3.1 Overview

This particular tool integrates into each one of the courses offering various helpful statistics for all participants, depending to their activities.
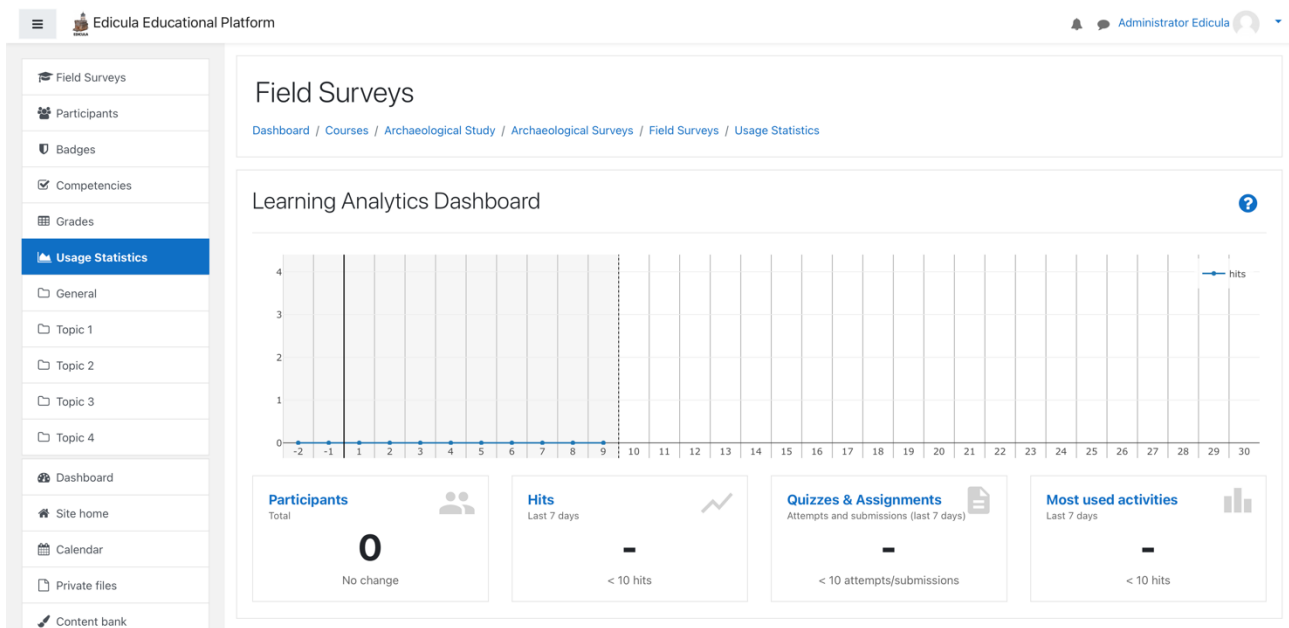
Screenshot from Edicula moodle

Figure 3: Learning Analytics Dashboard

This screenshot depicts the Learning Analytics Dashboard from the AI toolkit, which shows statistical analytics regarding the particular course "Field Surveys", which is in the "Archaelogical Study" category and "Archaelogical Surveys" subcategory. Moreover it will show data like how many "hits" had from the students this particular course at a specific time period. Also it will show the number of participants, the participation percent in various quizzes and assignments as also the most used activities.

The following screenshot depicts a sample of how all this data will be represented at the User Interface

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heritage related Learning Activities

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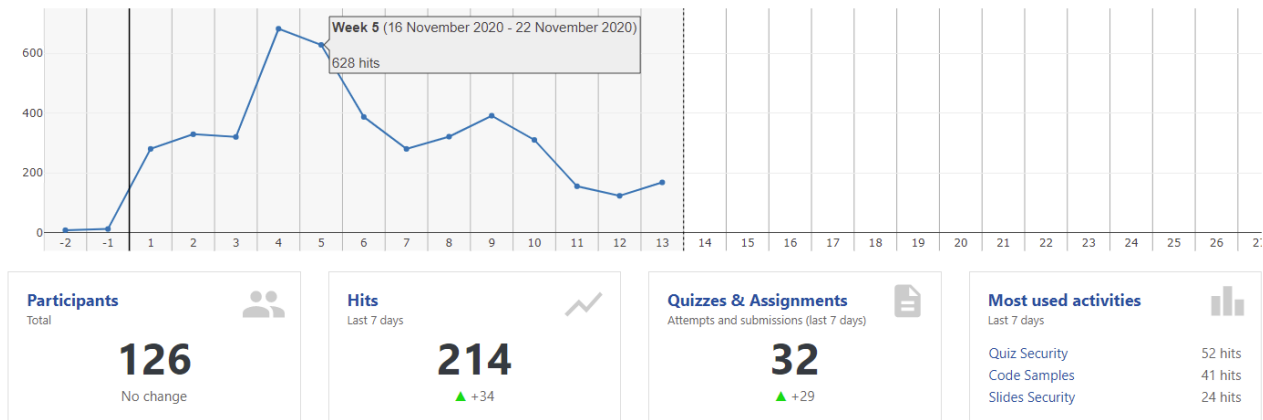
Learning Analytics Dashboard

Figure 4: Illustrated sample of the Learning Analytics Dashboard

The "Participants Box" shows us statistical analytics of each course regarding the parallel enrollments of the participants to other related courses and also, showing data, if they have chosen similar / related courses before their enrollment to this particular course.
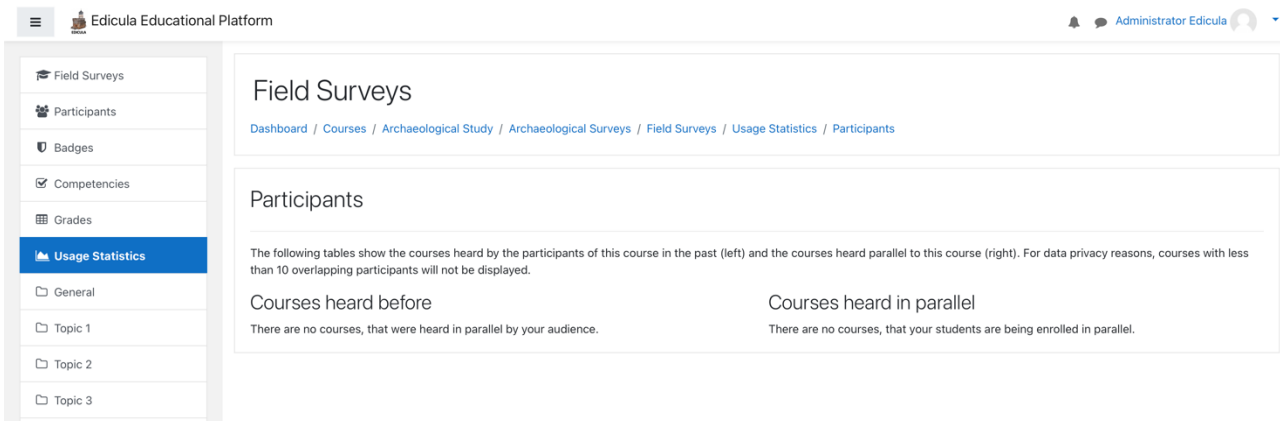

Figure 5: Participants course analytics

Participants

The following tables show the courses heard by the participants of this course in the past (left) and the courses heard parallel to this course (right). For data privacy reasons, courses with less than 1 overlapping participants will not be displayed.

Courses heard before

Course	Percentage
Programmmierung	95%
Einführung in die Technische Informatik	94%
Einführung in die Softwaretechnik	83%
Lineare Algebra	60%
Datenbanken	29%

Courses heard in parallel

Course	Percentage
Analysis I	41%
Mathematische Logik	27%
Praktikum Systemprogrammierung	12%
Datenkommunikation und Sicherheit	8%

Figure 6: Illustrated Sample of the Participants course analytics

6

Another statistical analysis provided by the Edicula AI Toolkit is the Heatmap Hits, which visualizes in a beautiful heatmap chart all the hits of the particular course at a weekly scale and per hour. Each hit is mapped to its corresponding time on the X-axis and to the corresponding weekday on the Y-axis.
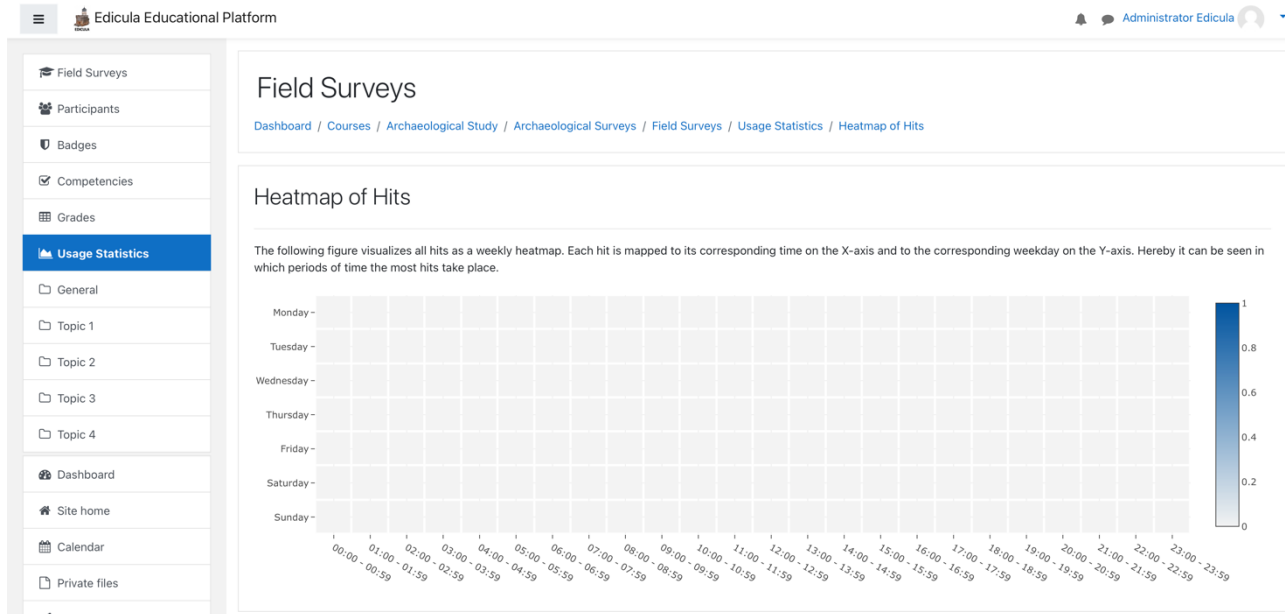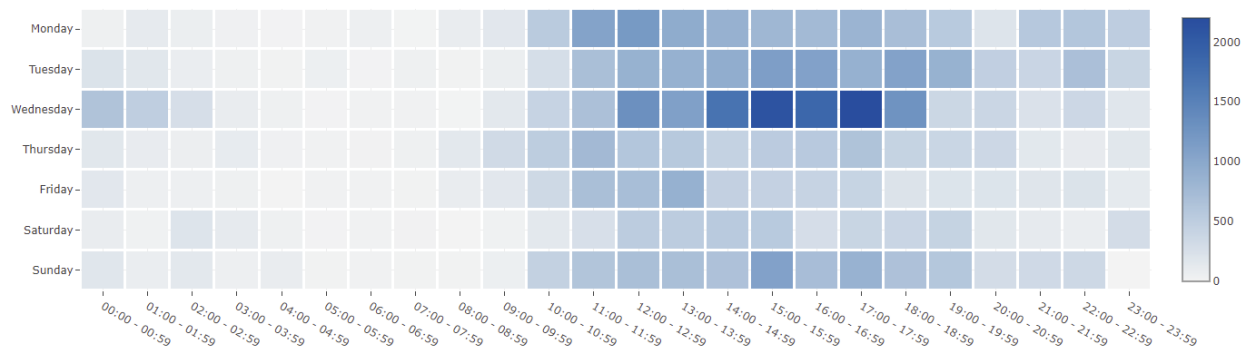

Figure 7: Heatmap of Hits

Figure 8: Illustrated Sample of the Heatmap of Hits chart

Each course will have quizzes and assignments for the participants to take part, that will help him learn significant more information regarding the course, but also evaluate his knowledge. This data will be represented at a beautiful user interface, illustrating important statistical analytics regarding the number of the participants, the attempts that they have done for each quiz and assignment, as also the overall average of all the attempts and their first attempt.

The following screenshot depicts the "place" where all the data will be presented at the Edicula Educational Platform.
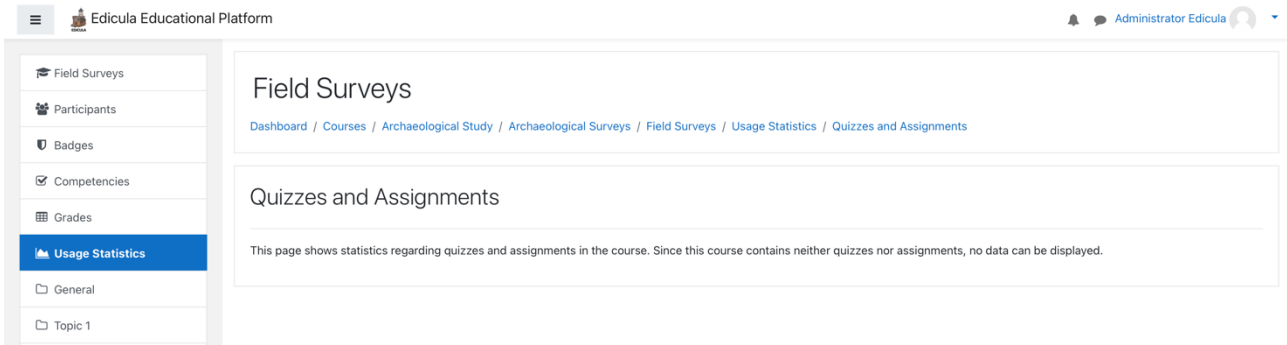
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≡ Edicula Educational Platform   🔔 💬 Administrator Edicula ▾

🎓 Field Surveys	**Field Surveys**
👥 Participants	
🛡 Badges	Dashboard / Courses / Archaeological Study / Archaeological Surveys / Field Surveys / Usage Statistics / Quizzes and Assignments
☑ Competencies	
▦ Grades	**Quizzes and Assignments**
📊 **Usage Statistics**	
🗀 General	This page shows statistics regarding quizzes and assignments in the course. Since this course contains neither quizzes nor assignments, no data can be displayed.
🗀 Topic 1	

Figure 9: Quizzes and Assignments usage statistics

Quizzes and Assignments

This page shows statistics regarding quizzes and assignments in the course.

Quizzes

Quiz	Participants	Attempts	Overall average of all attempts	Overall average of first attempts
Quiz Introduction	104	423	89.5%	79.7%
Quiz Server	95	339	84.4%	76.6%
Quiz PHP	101	384	87.3%	83.6%
Quiz Databases	92	301	82.9%	74.0%
Quiz JavaScript	87	287	76.2%	63.9%
Quiz Security	80	273	87.9%	79.0%

Assignments

Assignment	Graded submissions	Overall average of all attempts
Exercise Introduction	62	76.5%
Exercise Server	60	73.4%
Exercise PHP	57	68.6%
Exercise Databases	55	82.2%
Exercise JavaScript	48	78.8%
Exercise Misc.	< 10	*
Project hand in	< 10	*

* For privacy reasons, results from less than 10 participants are not shown.

Figure 10: Illustrated Sample of the Quizzes and Assignments usage statistics

The final statistical analysis from the Edicula AI toolkit is the Activities and Resources section, where the user will see data information regarding the hits per activity.
The order of the illustration will be based upon the order of the activities in each course. A second table will illustrate the hits by activity type, as also the most frequently used activities in each course.
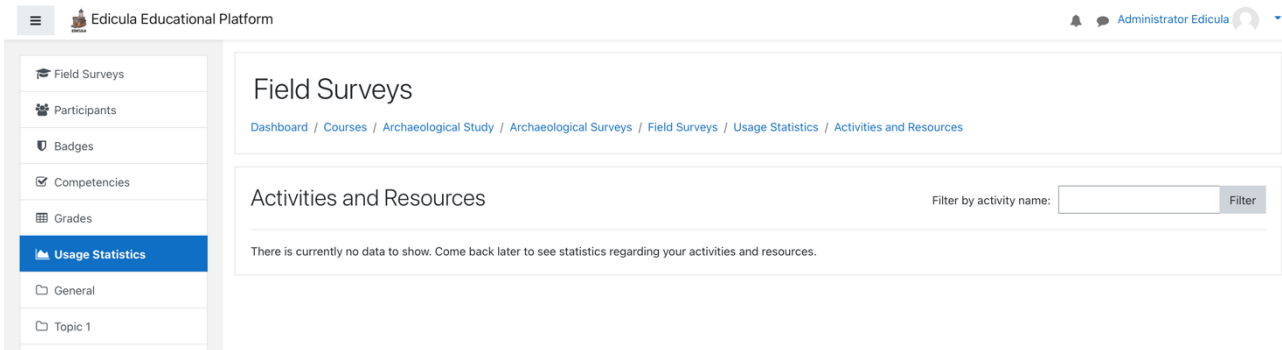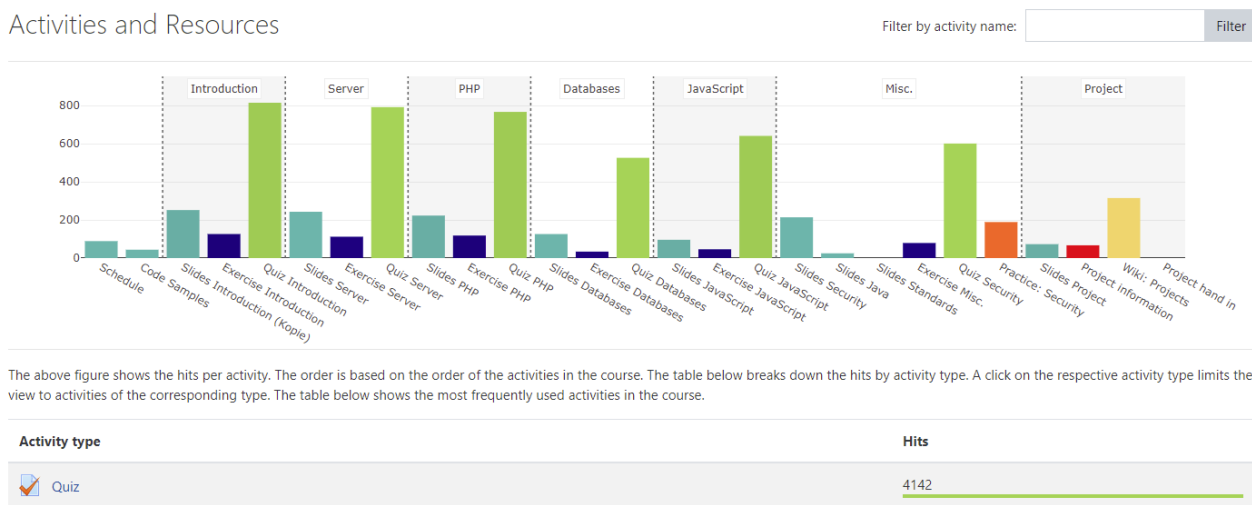
Figure 11: Activities and Resourses

Figure 12: Illustrated Sample of the Activities and Resources usage analytics

3.2 Technologies Used

Some of the third-party libraries and resourses that have been used in the creation of this AI toolkit are

- Plotly.js: https://plotly.com/javascript/

Plotly.js is a free and open source javascript charting library, built on top of d3.js and stack.gl ,with over 30 chart types, including 3D charts, statictical graphs, SVG maps, etc.

- Material.io icons: https://material.io/resources/icons/

Material icons are based on the core material design principles and metrics of Google fonts, which is a font embedding service library. It includes free and open source font families and an interactive web directory for browsing the library.

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IKY

3.3 Back-end software algorithms for creating learning analytics

The Edicula Educational Platform, with the help of some back-end machine learning algorithms that are used to predict or detect various aspects of the learning process of each course, utilizes learning analytics and insights reports depending the "behaviour" of each created analytics model.

The following screenshot depicts some created analytics models, which trach the behaviour of the participants in each course.

Figure 13: Created Analytics models

Some models that have been created are a) courses at risk of not starting, b) students at risk of dropping out, c) students who have not accessed the course recently d) students who have not accessed the course ye, e) upcoming activities due, etc.

Moreover, analysing the "students who have not accessed the course recently" model, analyses the student's participation in each course, based on a time interval that can easily be edited from the user.

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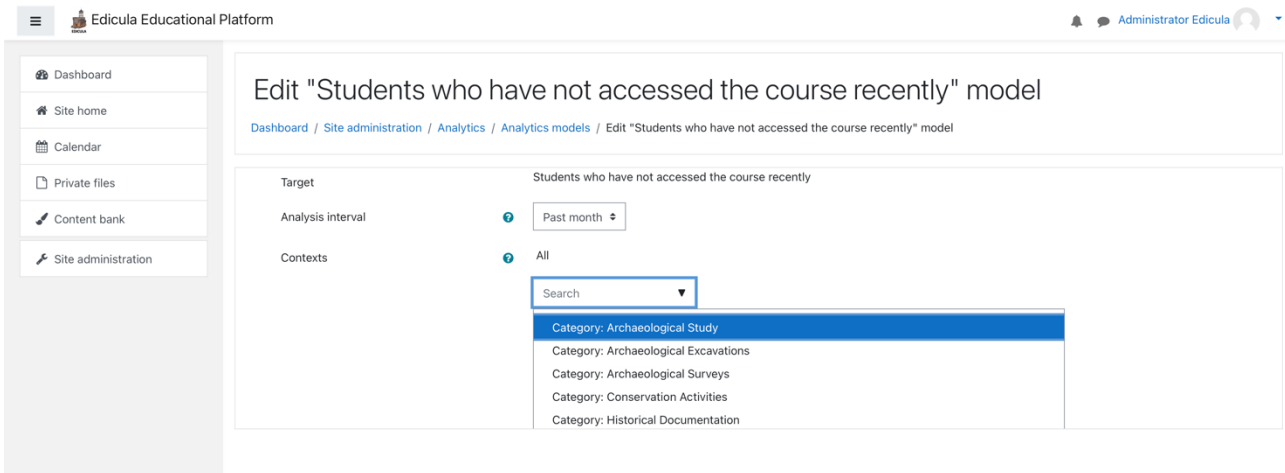Erasmus+ Programme
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Figure 14: edit settings section of a model

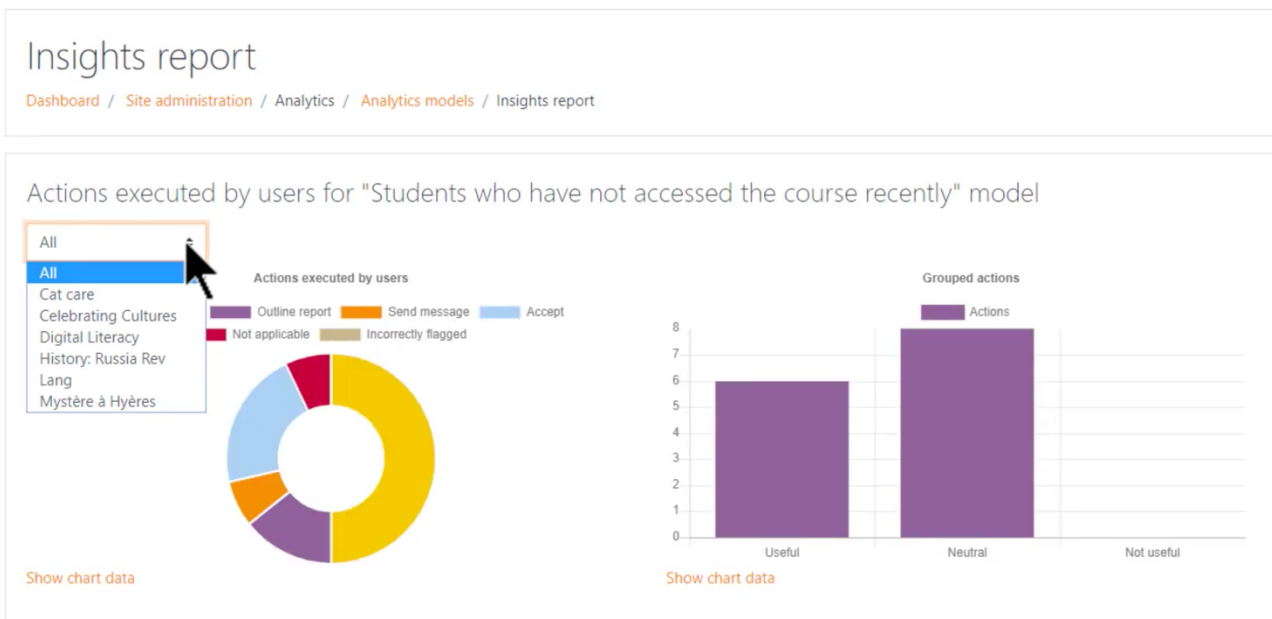Finally, the following screenshot depicts an illustrated sample from the insights report of the particular model

Figure 15: Insights Statistical Report of the model