



## **Act 2.3. Creation of a Multimodal Dashboard for Teachers**

**“Improving the quality and sustainability of learning using early intervention methods based on learning analytics”**

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<b>Abstract</b>	This document focuses on creating a multimodal dashboard for teachers integrated with an online learning platform. This dashboard collects and analyzes learning analytics data, providing insights to enhance pedagogical interventions, improve student engagement, and reduce dropout rates.
<b>Keywords</b>	learning analytics, dashboard, data collection, multimodal learning analytics

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# 1 INTRODUCTION

Activity 2.3 is defined in the context of the ISILA projects’ WP 2. It consists of Creation of a multimodal dashboard for teachers that will be integrated with an online learning platform and will be used by teachers during the teacher training and pilot courses in later WPs.

The learning analytics data collected and analyzed through the dashboard components will provide valuable insights into student performance, engagement, and progress. These insights can inform the development and implementation of targeted pedagogical intervention methods to support student success and reduce dropout rates.

📌 Objective: Proactively identify struggling students and provide timely interventions to help them get back on track.

📌 Key Metrics: Low quiz/assignment grades, declining engagement (time spent, absenteeism, activity levels), and slow progress through course modules.

## 2 DASHBOARD COMPONENTS

### 3 Performance components

The Assessment Performance Component identifies areas where students struggle, allowing timely and targeted interventions to address knowledge gaps. Regular assessments enable students to track their progress and receive personalized feedback. This component also helps educators refine their teaching strategies based on performance data, enhancing overall course effectiveness. Detecting consistent poor performance early triggers support mechanisms to prevent students from feeling overwhelmed and dropping out. Overall, it ensures a more tailored and effective learning experience.

#### 3.1 Total Number of Users (GENERAL)

**Description:** This component displays the total count of unique users (students) engaged in the learning environment.

**Importance:** This metric offers an overview of the number of students enrolled in the course, allowing educators to gauge overall student involvement and track participation trends over time.

#### 3.2 Unique Number of Students who attempted each quiz (GENERAL)

**Description:** This component tracks the distinct number of students who have attempted each quiz at least once.

**Importance:** Understanding the unique student participation in quizzes helps educators monitor student involvement, ensuring all learners engage with key assessments. Additionally, this data allows instructors to recognize potential gaps in participation and take proactive steps to encourage broader student involvement.

### 3.3 Total Number of Quiz Attempts (INDIVIDUAL)

**Description:** Shows the cumulative number of quiz attempts made by students.

**Importance:** Monitoring quiz attempts is essential for evaluating student engagement and the frequency of knowledge assessments. It enables educators to determine the effectiveness of quizzes as learning tools.

### 3.4 Total Number of Submission Attempts (INDIVIDUAL)

**Description:** Indicates the total number of assignment submissions by students.

**Importance:** This metric reflects student engagement with assignments, which are vital for practical learning and skill assessment. High submission rates typically signify active participation and commitment to coursework.

### 3.5 Total Number of Statements (BOTH)

**Description:** Displays the total number of logged actions within the system, including resource views, assignment submissions, and quiz attempts.

**Importance:** Tracking the total number of statements provides insights into overall student activity and engagement, offering a comprehensive view of interaction levels within the learning platform.

### 3.6 Average Quiz Grade per Quiz (GENERAL)

**Description:** Presents the average grade achieved by students in each quiz.

**Importance:** This metric is crucial for assessing overall student performance and identifying areas of difficulty. It aids educators in evaluating the effectiveness of quizzes and the students' understanding of the material.

### 3.7 Average Assignment Grade per Assignment (GENERAL)

**Description:** Shows the average grade obtained by students on assignments.

**Importance:** Similar to the average quiz grade, this metric helps assess student performance on assignments, revealing trends and determining if assignments align with learning objectives.

## 4 Engagement Metrics Component

The Engagement Metrics Component is essential for identifying how and when students interact with course activities, enabling educators to design more engaging content. By highlighting participation patterns, it helps create strategies to boost student involvement and motivation. This component also allows for early detection of low engagement, prompting timely interventions to re-engage students at risk of dropping out.

### 4.1 Time spent (BOTH)

**Description:** The time a user spends interacting with a learning resource.

**Importance:** By analysing this data, we can gain insights into user engagement and identify opportunities to improve the learner experience.

### 4.2 Total active days per student (INDIVIDUAL)

**Description:** Total number of days with at least one statement

### 4.3 Total number of activities per week (BOTH)

### 4.4 Absenteeism (INDIVIDUAL)

**Description:** Total number of days absent

**Importance:** It helps identify trends in student attendance over time and enables teachers to intervene early, preventing students from low academic performance and even potential dropouts.

### 4.5 Hourly Activity Distribution (GENERAL)

**Description:** A bar chart representing student activity across different day hours.

**Importance:** Understanding peak activity times enables educators to optimize communication, deadlines, and live session scheduling, aligning with students' availability.

### 4.6 Weekly Activity Patterns by activity (GENERAL)

**Description:** A bar chart displaying student activity levels across different days of the week. Divided by activity type.

**Importance:** Identifying days with varying activity levels allows educators to tailor engagement strategies, such as providing additional resources on weekends when activity may be lower.

## 5 Content Interaction Component

The Interaction Component is important because it tracks student participation in different types of content, such as videos, readings, discussions etc.

It helps in overall enhancing of the learning experience by ensuring students are actively involved and supported during their education.

### 5.1 View Completion Rate (GENERAL)

**Description:** Percentage of students who watch the entire video.

**Importance:** Understanding video viewing patterns allows educators to assess the effectiveness of their instructional content and identify areas that may require improvements to engage students more effectively.

### 5.2 Average Proportion of Video Viewing (GENERAL)

**Description:** Average time spent watching each video.

**Importance:** Analyzing the average viewing duration provides insights into student engagement with the video content, helping educators optimize the length and delivery of their instructional materials.

### 5.3 Re-watch Rate (GENERAL)

**Description:** Frequency with which students re-watch videos.

**Importance:** Tracking the re-watch rate can indicate areas of difficulty or high interest, enabling educators to refine their content and provide additional support where needed.

## 6 Progress Tracking Component

By analyzing completion rates, teachers may identify students at risk of dropping out due to lack of progress.

## 7 VISUALIZATIONS

### 7.1 Statements vs. Grades (GENERAL)

**Description:** A scatter plot illustrating the relationship between the number of statements (activity) and quiz/assignment grades.

**Importance:** Analyzing this correlation helps educators understand if increased activity correlates with better performance, guiding strategies to enhance student engagement.

## 7.2 Grades vs. Time Spent (GENERAL)

**Description:** A scatter plot depicting the relationship between time spent on the platform and average grades.

**Importance:** This metric aids in determining whether time investment translates to improved performance, guiding students on effective time management strategies.

## 7.3 Distribution of Time Spent on Quiz Attempts (GENERAL)

**Description:** A bar chart displaying the average time each student spends on quiz attempts.

**Importance:** Monitoring quiz duration helps educators evaluate quiz difficulty and student engagement levels, indicating whether students are adequately challenged.

# 8 Overall

- 1 graph per week with distribution of responses per variable
- Scatter plot survey items of each week vs. grade of weekly assignment/quiz
- Heatmap of activity level by week for each student

## Individual Level

- Line chart of each variable and how it evolves weekly for each student
- Line chart of the number of statements (that match certain conditions) per week.
- Bar chart of Discord metrics - Individual - team/group (activity name) - course
- Timeline ChatGPT conversations with other activities
- Number of ChatGPT prompts
- Length of ChatGPT messages

## Group level

- Timeline of conversation (messages) with LMS activity (scatter plot?), colored by group member



## **9 CONCLUSION**

By developing comprehensive learning metrics and analysis for multimodal dashboards, education providers can equip teachers with the tools they need to monitor student progress effectively and implement timely interventions. This proactive approach can significantly contribute to reducing student dropout rates and promoting overall student success.