EduMetric Pro: The Academic Assessment Analyzer

Documentation & User Guide

Release Date: December 2025

Platform: Universal (HTML5/JavaScript) - Client-Side Only

1. Introduction

The Academic Assessment Analyzer is a browser-based tool designed for educators and program coordinators to generate instant, detailed statistical reports from exam data. It runs entirely on the client-side (in your browser), ensuring data privacy as no student records are uploaded to an external server.

Key Features:

- **Multi-Course Analysis:** Upload multiple CSV files to generate individual reports and a comparative ranking table.
- **Intelligent Detection:** Automatically identifies assessment components, total scores, letter grades, and course coordinators.
- **Risk Analysis:** Identifies students at risk (borderline), statistical outliers, and disengaged students (missing/zero marks).
- **Psychometrics:** Calculates skewness, kurtosis, and inter-component correlations to evaluate assessment quality.
- **Print-Ready:** Optimized layout for generating professional PDF reports.

2. Preparing Your Data (CSV Format)

For the best results, your CSV file should follow a structure similar to the template below. The tool is flexible, but adhering to these guidelines ensures 100% accuracy.

Recommended Columns

Header Name	Description	Required?
Coordinator	Name of the course instructor/coordinator. (Ideally the 1st column).	Optional
Course Code	E.g., "CS101", "DP 215".	Recommended
Course Name	E.g., "Intro to Computer Science".	Recommended
Student ID	Unique identifier (e.g., "2024ph01").	Yes
Student Name	Full name of the student.	Yes
[Components]	Any number of numeric columns (e.g., "Midterm", "Quiz 1", "Assignment").	Yes

Total	The final numeric score. Must be named "Total", "Final Mark", or similar.	Yes
Grade	Letter grade (e.g., A, B+, F).	Optional

Example CSV Structure

```
Coordinator,CourseCode,CourseName,StudentID,StudentName,Quiz1,Midterm,Final,Total,Grade
Dr. Aly,CS101,Biology,1001,Amira Amir,8,35,40,83,B
Dr. Aly,CS101,Biology,1002,Mai Hassan,9,40,45,94,A+
```

3. How to Use the Tool

Step 1: Configuration

Before generating reports, adjust the analysis parameters in the control panel:

- **Pass Mark (%):** The threshold for passing (default is 50). This affects the Pass Rate calculation and the histogram color coding.
- **Borderline Range (+/-):** The range around the pass mark to identify "at-risk" students. *Example: If Pass Mark is 50 and Range is 2, students scoring 48 to 52 are flagged.*

Step 2: Upload Data

1. Click "Choose Files" under "Upload Exam Data".
2. Select one or multiple .csv files from your computer.
3. Click "Generate Report".

Step 3: View & Print

- Scroll down to view individual reports for each course.
- Scroll to the very bottom for the Comparative Analysis table.
- Click the "Print Full Report" button (top right of the report area) to save as a PDF. *Note: The layout is optimized to start each course on a new page.*

4. Understanding the Report

A. Course Header

Displays the Course Code, Name, and Coordinator. It also summarizes the total number of students processed and the Pass Mark used for analysis.

B. Key Performance Indicators (KPIs)

- **Pass Rate:** Percentage of students scoring ≥ Pass Mark. Color-coded (Red < 60%, Green ≥ 60%).
- **Mean Score**: The arithmetic average of the class.
- **Median:** The middle score; useful for checking if the Mean is skewed by outliers.
- **Std Dev (σ):** Measures the spread of marks. A high σ indicates a wide gap between high and low achievers.
- **90th %ile:** The score required to be in the top 10% of the class.

C. Visual Analysis

- **Score Distribution (Histogram):** Shows how marks are distributed.
  - *Red bars:* Fail range. *Blue bars:* Pass range.
  - *Skewness:* Negative (tail left) = Easy exam; Positive (tail right) = Hard exam.
  - *Kurtosis:* Leptokurtic (positive) = Heavy tails/outliers; Platykurtic (negative) = Flat distribution.
- **Grade Frequency:** Bar chart showing the count of each letter grade (A+, B, etc.).

D. Component Analysis

A table breaking down every assessment element found in the CSV.

- **Mean:** Average score for that specific component.
- **Missing:** Count of students who have an empty cell for this component.
- **Corr (r):** Correlation with the Total Score. High correlation (>0.7) means this component is a good predictor of overall performance. Low correlation may indicate the component measures a different skill or was inconsistent.

E. Engagement Proxies

Identifies students who may have disengaged from the course.

- Missing Marks: Students who have at least one empty cell in an assessment component.
- Zero Scores: Students who have a score of 0 in *any* component or the Total.
- *Note: A list of specific Student IDs and Names is provided for easy follow-up.*

F. Inter-Component Correlation Matrix

A heatmap showing how every component correlates with every other component.

- Green (>0.8): Strong correlation.
- Red (<0.0): Negative correlation (investigate immediately).

G. Risk Analysis

- **Statistical Outliers:** Students with a Z-Score > 2 (more than 2 standard deviations from the mean). These are exceptional performers (high or low).
- **Borderline Cases:** Students scoring within the defined margin of the pass mark. These are critical for exam board reviews.

H. Comparative Analysis (Multi-Course Only)

A table at the end of the report ranking all uploaded courses by Pass Rate (Low to High).

- **Red Cells:** Pass rate < 60% (Critical).
- **Orange Cells**: Pass rate 60-80% (Monitor).
- **Green Cells:** Pass rate > 80% (Good).

5. Troubleshooting

Issue	Possible Cause	Solution
"Mid Semester" or other columns missing	The column might contain too much text or look like metadata.	Ensure the column contains numbers. Remove text like "Absent" (leave empty) if possible, though the tool handles some text.
Coordinator Name not showing	The column is not named "Coordinator" or isn't the first column.	Rename the header to "Coordinator" or move it to the first column position.
Zero Scores count is wrong	The tool distinguishes between 0 (zero) and null (empty).	Ensure students who received a zero have the digit 0 entered, not a blank cell.
Student Name is incorrect (e.g., shows Course Name)	The tool guesses the name column based on headers.	Ensure your header is explicitly named "Student Name" or "Name". Avoid using "Name" in the Course column header (use "Course Title" instead).

Report prints with weird breaks	Browser print settings.	In the print preview window, ensure "Margins" is set to "Default" or "None" and "Background Graphics" is checked.
Pass Rate seems wrong	The "Total" column contains non-numeric data.	Check your "Total" column for text values like "W" (Withdrawn) or "I" (Incomplete). These are ignored in calculation but may affect the total student count.

6. Glossary of Statistical Terms

- **Z-Score:** Describes a value's relationship to the mean of a group of values. Z=0 is the mean. Z=+2 is very high, Z=-2 is very low.
- **Skewness:** A measure of the asymmetry of the probability distribution.
- **Kurtosis:** A measure of the "tailedness" of the probability distribution.
- **Pearson Correlation (r):** A number between -1 and 1 that indicates the extent to which two variables are linearly

7. Technical Specifications

- **Architecture:** Single-Page Application (SPA).
- **Language:** HTML5, CSS3, Vanilla JavaScript (ES6).
- **Dependencies:** Chart.js (via CDN) for visualization.
- **Privacy:** No server-side processing. No cookies. Local Storage is not used (data persists only in RAM or via manual JSON save).
- **Browser Compatibility:** Chrome, Edge, Firefox, Safari (Desktop & Mobile).
- **Concept & Logic:** Dr. Muhammad AlShorbagy, Dean, College of Pharmacy, GMU.
- **Technical Implementation:** AI-Assisted Development (Code generation).
- **Methodology:** "This single-file HTML application demonstrates a 'No-Code/Low-Code' development approach. The domain expertise, algorithm logic, and user experience design were provided by Dr. Muhammad AlShorbagy, while the source code was generated via prompt engineering using Large Language Models (LLMs)."