

Development of a General Performance Scoring Interface for student groups based on academic KPIs using programmable codes through conditional logic process

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Abstract. Managing learner skills is a challenging area with limited research. While statistics often present only numerical data, few educational institutions have systems dedicated to monitoring student performance through indicators aligned with quality standards and managed by an information system. This work demonstrates the value of implementing such a system and provides detailed guidance on how to develop it without requiring advanced programming skills. It introduces the General Performance Scoring Interface (GPSI), an interface designed for managing student group performance using carefully selected indicators. The importance of this system is underscored when identifying the root causes of student regression, where interpreting quality indicators is crucial. This work operates on the principle that the choice and calculation method of an indicator should go beyond simple statistical percentages.

Keywords: Scoring, academic KPIs, academic performance, academic information system, LMD system

1 Introduction

The ability to effectively monitor and manage student performance is crucial for educational institutions striving to maintain and improve academic standards. Traditionally, performance monitoring in education has relied heavily on numerical data and statistical analysis. While these methods provide valuable insights, they often fail to capture the multifaceted nature of student performance. In many educational institutions, especially within the context of the LMD (Licence, Master, Doctorate) system, there is a lack of comprehensive systems that

can monitor and manage student performance through quality indicators (Rahhou & Talbi, 2019b).

Quality indicators, when carefully selected and managed, can offer a more nuanced understanding of student performance and highlight areas needing improvement. Despite their potential, the adoption of such indicators in educational information systems remains limited. This limitation is often due to the perceived complexity of developing and implementing such systems, which can require specialized programming skills and substantial resources.

This paper introduces the General Performance Scoring Interface (GPSI), a user-friendly tool designed to facilitate the monitoring of student group performance using a set of academic key performance indicators (KPIs). GPSI is developed with the aim of being accessible to educators and administrators without advanced technical skills, making it a practical solution for a wide range of educational settings.

The primary objective of this research is to demonstrate the feasibility and effectiveness of using the GPSI to enhance the monitoring and management of student performance. By using indicators aligned with quality standards, this system can provide deeper insights into student progression and regression, allowing educators to identify and address the root causes of academic challenges more effectively.

In this work, section 2 reviews related work in the area of academic performance monitoring and information systems, section 3 describes the design and functionality of the GPSI, section 4 presents the results of implementing the GPSI in a real-world educational setting, and section 5 discusses the implications of these findings and future directions for research.

2 Literature review

The use of performance indicators in educational settings has gained significant attention with the integration of information technology. This interest is rooted in early efforts to define performance indicators that align closely with the strategic objectives of educational institutions (Ball, 1987). A critical challenge in defining KPIs lies in determining *what to measure?* that is, identifying success factors and failure points that significantly impact overall performance (Osman, 2014).

Despite the recognized importance of performance monitoring, its application remains limited, particularly in higher education settings. A study conducted at the National Tsing Hua University in Taiwan across 48 schools underscores the importance of performance monitoring through educational indicators, but remains limited (Chen, 2022). However, the adoption of such methods is often hindered by their perceived complexity and the technical expertise required for implementation.

Performance management in educational institutions has evolved with the advancement of information systems. For example, the Baldrige Education Criteria offers a framework for evaluating performance based on specific criteria

(Evans, 2016). However, these systems are typically not designed for direct use by educators, who are the primary stakeholders in student performance. Simplistic methods, such as test scores based on raw or scaled measures (Mohan, 2016), fail to provide a comprehensive analysis of performance.

Current approaches to performance measurement often rely on basic statistical calculations, such as retention rates, credit momentum, course completion, and graduation rates (Wayne College, 2023). While these indicators are relevant, they are limited in scope, often reducing performance to simple percentages. Moreover, some studies, such as those focusing on post-graduation career success, provide valuable insights but do not offer timely interventions during the academic process (Prakhov, 2023).

These limitations highlight the need for a more nuanced approach to performance monitoring, one that enables educators to receive detailed analyses of student performance through user-friendly interfaces. Our research addresses this need by introducing the General Performance Scoring Interface (GPSI), which allows educators to monitor and manage student group performance using customizable KPIs, facilitating a deeper understanding of academic progress and areas for improvement.

3 Aim of research

The objective of the GPSI is to understand the performance situation of a specific group of students and to identify the causes and main causes of non-performance. Indeed, the use of scoring *is the ability to provide the possibility of knowing, at each point of its implementation, whether the formulated strategy actually works, if not why* (Kaplan and Norton, 1996). In simpler terms, we seek to find *what to check?, why to check it?, how to check it?* and finally how to correct in case of unexpected result? Indeed, professors should not be limited to the question *what are the results obtained by the students?* to define their performance, but rather *why did they achieve these results?*, then *what would be the root causes?* and *how to find them in order to treat them?*

Thus, the study of performance is based on the possibility of generating a report revealing the strengths and weaknesses of a group without complex analysis of the data in numbers to be carried out, which represents all the innovation of this work.

4 Problem Statement and hypothesis

This research hypothesizes that the GPSI will facilitate improved monitoring and enhancement of student group performance by providing insights into KPIs. It is uncommon, or at least challenging, to find an educational institution that employs an information system capable of presenting learner results to teachers not merely in tabular form, but as performance cards displaying predefined indicators. Existing literature on performance management in education predominantly addresses information systems within the realm of computer science and

programming, rather than focusing on educational technologies, and seldom incorporates customizable approaches to performance management through KPIs.

While some universities use student tracking systems, these systems primarily function to alert students about their progress (University of Aberdeen, 2023). Furthermore, strategic solutions firms offer support to educational institutions in performance management, including the establishment of performance management systems with relevant indicators. Despite the proliferation of such service companies, the associated costs are often prohibitive for many educational institutions. For example, ClearPoint Strategy in the USA and SAS Institute in the UK, both renowned for their expertise in monitoring, particularly in education, offer performance management solutions. Additionally, Ed ITK provides performance monitoring solutions. However, these solutions are typically constrained to statistics on grades, success rates, and failures, focusing primarily on primary and secondary education.

Moreover, performance measurement methods are not always adaptable to the group context, often involving equations with multiple and complex parameters. Consequently, this work is motivated by the need to explore whether:

- The performance of teaching and learning at the university level is influenced by group dynamics.
- The KPIs relevant to this context can be identified and utilized.
- These KPIs can be effectively processed and displayed using a group performance interface.

5 Methodology

5.1 Initial Point of Research

Utilizing a database of student results and curriculum information, which have been pre-consolidated and integrated into the Information System, the GPSI was designed as a dynamic and interactive tool. This interface is driven by the Information System of Performance Management and Reporting (Rahhou and Talbi, 2019a), which is readily comprehensible to educators through its use of spreadsheet functions and programmable macros. The GPSI provides both summary and detailed views of the performance of selected student groups, thereby elucidating the underlying causes and principal factors of non-performance.

5.2 Choice of Editing Program and data base sample

Although this research may fall within the domain of computer science, it is primarily focused on academic management within educational science. Consequently, it does not necessitate the use of Business Intelligence or advanced statistical analysis programs, as it is intended for educators. Despite the availability of various database management software programs, spreadsheets were selected due to their detailed functions and the capability to design macros for automating specific information system processes. Spreadsheets also offer

remarkable flexibility for developing complex algorithms and a wide range of functions. They are accessible across various platforms, including all operating systems, the web, and mobile devices.

Concerning the data base, since it is not permitted to use the real lists of university students, a pseudo data base has been injected. Thus, the student names have been substituted by the denomination "Student 1, Student 2, and so one. In total, the data base sample carry 1000 students.

In this system, spreadsheets function as the operational environment. In information system terminology, different entities are represented by the columns of the tables, while entity types correspond to the various tabs within a sheet. The relationships between these entities are defined through the KPIs discussed in the subsequent section.

5.3 Principle of Operation

5.4 Spreadsheet functions

Table 1 provides a list of spreadsheet functions used for editing the KPIs of the GPSI, along with their corresponding descriptions.

Table 1. Spreadsheet Functions Used for Editing KPIs of the GPSI

Function	Description
CONCATENATE	Joins two or more values into one string
RIGHT	Extracts characters from the right side of a cell
MATCH	Returns the position of a value within a range
LEFT	Extracts characters from the left side of a cell
INDEX	Returns the value at a specified position within a range
COUNTIF	Counts the number of cells that meet a single criterion
COUNTIFS	Counts the number of cells that meet multiple criteria
LEN	Returns the number of characters in a cell
COUNT	Counts the number of numeric entries in a range
RANK	Determines the rank of a value within a list
VLOOKUP	Retrieves a value from a range based on a specified criterion
IFERROR	Returns a blank cell if a calculation results in an error
SUM	Calculates the sum of a range of values
SUMIF	Calculates the sum based on a single criterion
SUMIFS	Calculates the sum based on multiple criteria
MID	Extracts a specific segment of characters from a cell
LOGICAL TEST	Performs logical tests and returns results based on conditions

Like any information system, it is crucial to define entities (data lists), attributes (titles of lists), and relationships (links between entities), which are illustrated by the spreadsheet functions. After evaluating various criteria, and in order to be as precise as possible in evaluating the group's performance, it has

been decided to consider the most relevant parameters in the academic field for this study: students, program, year, semester, subject, marks, and coefficients.

6 Findings and research outcomes

6.1 Overview and descriptions of the GPSI

The GPSI, presented in Figure 1, is similar to the student scorecard that presents individual performance (Rahhou & Talbi, 2019a), providing an overview of all the KPIs that show the performance of a selected group. In the example shown in Figure 1, the selected program is SMC ³ within the license cycle (bachelor). This view allows for an appreciation of the ergonomics of the displayed information, which is organized into views, with the most relevant and summarized information at the top and more detailed information further down.

³ Chemical Sciences Program (Sciences de la Matière Chimie)

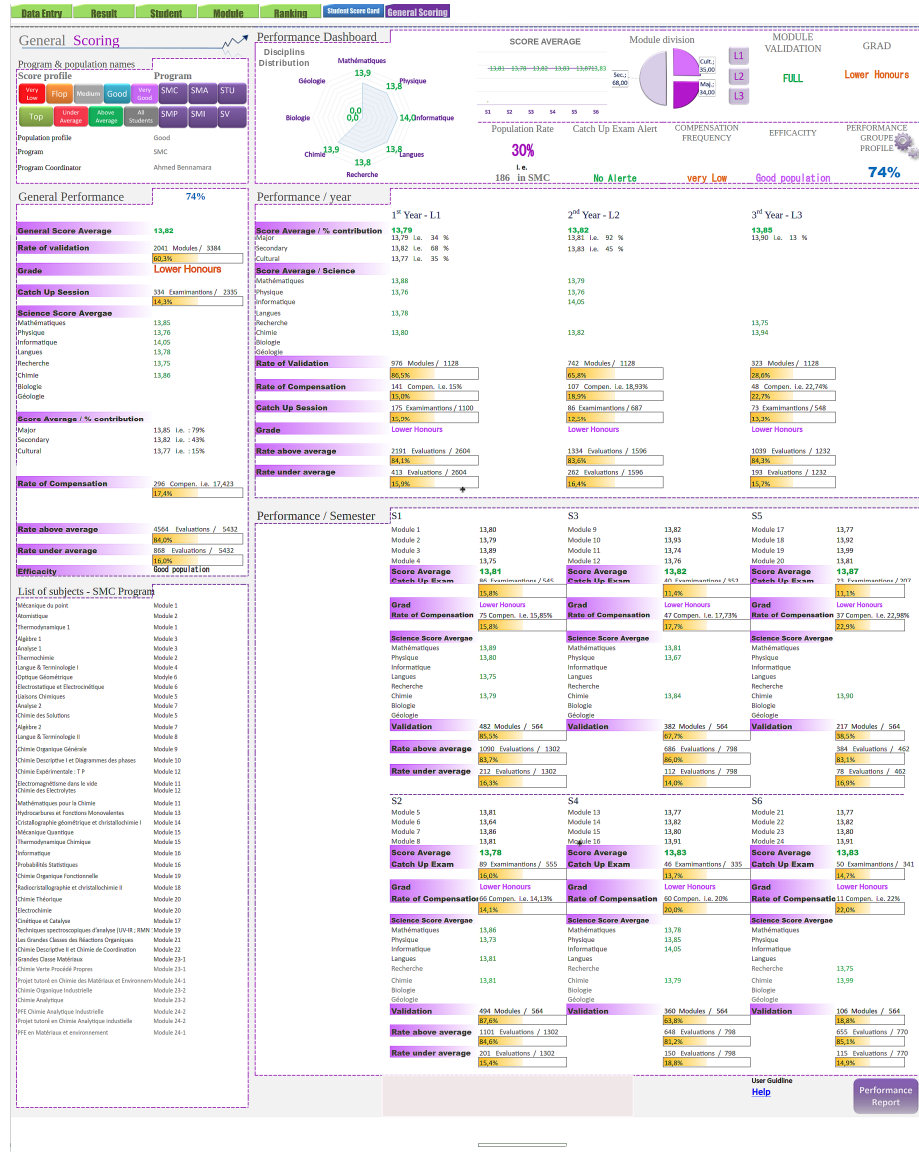


Fig. 1. General Performance Scoring Interface

This overview of the GPSI also highlights seven ergonomically organized views, which bring together the different KPIs: Program and population names, Performance Dashboard, Performance per year, Performance per semester, General performance, and List of subjects.

6.1.1 The Performance Dashboard view

The dashboard, located at the top of Figure 1, is the most relevant, attractive, and obvious element, driving all the KPIs included. Each KPI is presented in a specific form deemed relevant for its nature. Eight KPIs are grouped in this view, as detailed in Figure 2, where they are numbered⁴ from 1 to 8. The ninth and tenth KPIs are also represented as indicators but are calculated based on a combination of others: indicators numbered 5, 7, and 8 for the efficiency indicator (indicator 9), and indicators 2, 4, 7, and 8 for the performance group profile indicator (indicator 10).

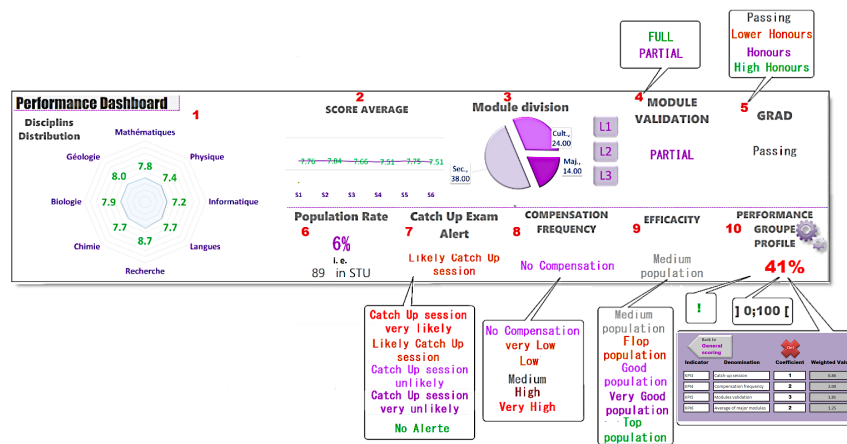


Fig. 2. Performance dashboard in GPSI

- **Disciplines distribution (1):**

To the left of the dashboard in Figure 2, a radar graphic displays all the primary majors included. It shows, for the selected program, the related disciplines and their relative performance. This graphic indicates where a group excels and where it may lack skills. Moreover, it also shows if the results of a specific group are diverging from their majors.

- **Score average (2):**

⁴ The numbering of indicators in the settings window of the Performance Group Profile, which appears at the bottom right of the dashboard, carries different numbers (KPI3, KPI4, KPI5 and KPI6) since they refer to their designation within the ISPMR (Rahhou & Talbi 2019b)

Next is the score average curve, which indicates the evolution over the six semesters of the licence cycle. If the curve is stationary, it reflects that student scores within the selected group are homogeneous, which will be considered a performance factor. In contrast, a variable curve will indicate the opposite.

- **Module division (3):**

The macro-buttons L1, L2, and L3 (with L1 for the first year, and so on) allow the display, on the pie chart beside these buttons, of the distribution of module types. This provides an idea of the major's preponderance compared to other modules. The relevance of this indicator becomes apparent when verifying whether the group's score covers a majority of majors or not. In the given case, Figure 2, the pie chart shows that half of the chart represents majors, which leads to the conclusion that the accuracy of these group scores, concerning their major skills, is relative and moderately significant.

- **Module validation & Grade (4) and (5):**

Module validation indicates whether the validation of modules is complete or partial. This indicator is particularly relevant when selecting students for the master's program at the end of the bachelor's cycle. Additionally, the grade indicator, which is displayed in four levels described in the LMD system, serves the same purpose.

- **Population rate (6):**

This rate provides information about the relative size of the group compared to the overall student population. Statistically, the size of the group is an important factor in the accuracy of all calculated indicators. Therefore, a larger population generally leads to more reliable results. In the given example, shown in Figure 2, the population rate is 30%, indicating that the selected group, the STU⁵ program (as shown under the percentage), represents nearly one-third of the overall student population in the Faculty of Sciences where this study was conducted.

- **Catch-up exam alert & Compensation frequency (7) and (8):**

In the middle of the dashboard, below the pie chart, two mutually linked indicators are displayed: the catch-up session alert, expressed in seven levels, and the compensation frequency, expressed in six levels. The catch-up session alert indicates the potential urgency for catch-up sessions for most students in the selected group. The compensation frequency, which is proportional to the first indicator, reflects the likely frequency of module compensations (adjustments between scores). These two indicators are crucial as they specifically reflect the

⁵ Earth and Universe Sciences (Sciences de la Terre et de l'Univers)

relevance of the diploma. Indeed, the higher these values, the lower the relevance of the graduation. The principles of calculation behind these indicators will be described later.

- **Efficacy (9):**

Efficacy is presented, right before the performance group profile, and expressed in five levels. This indicator provides information about the efficiency of the selected group based on three other indicators: 5, 7, and 8. This combination was chosen based on the premise that an effective group should have a high average grade level, a low catch-up exam alert, and a low compensation frequency. The principles of calculation involving these three indicators will be detailed in the following section.

- **Performance Group profile (10):**

The purpose of developing such an indicator is to provide readers, professors, or academic administrators with a comprehensive view of a selected group, taking into account the most relevant indicators that could potentially lower scores. In other words, this approach seeks to create a performance profile that approximates the real performance situation as closely as possible. Thus, this tenth indicator is based on four KPIs, all embedded in a settings window, accessible via the gear icon at the bottom left of the dashboard, which serves as a macro button. Within this window, indicators 2, 4, 7, and 8, previously mentioned, are configured, which are responsible for calculating the performance profile of the group. The description of these window settings is as follows:

- **Indicator column:** Allows the entry of the KPIs relevant to indicator 10.
- **Denomination column:** Enables the input of indicator names. These cells remain editable for modifications, should any name need to be changed.
- **Coefficient column:** Allows the entry of coefficients estimated to accurately reflect the relevance of the KPIs.
- **Weighted value column:** Contains programmed spreadsheet functions that calculate the KPIs based on the provided coefficients.

It is important to note that these four indicators are not fixed; they can be changed, adjusted, or substituted according to the needs of the organization implementing the GPSI to manage group performance. For this reason, some cells have been left editable to allow for adaptation, while others are grayed out as they contain the calculation functions. However, even the grayed-out cells remain subject to change if significant modifications are necessary.

As a final point, since the GPSI processes the performance of relatively large groups, summary data in the other views are primarily presented as percentages, with additional numerical details provided for more granularity.

6.1.2 Performance per year and Performance per semester views

The *Performance per year* view displays, for each type of module (major, secondary, and cultural), the averages alongside the percentage of their contribution (or predominance), followed by the averages for each discipline—information particularly relevant in the first year, when students encounter a variety of subjects. Visually, all these averages are represented using three color codes: *Green* for high scores, *Orange* for medium scores, and *Red* for averages below 10/20.

Following that, for each year, information on module validation, module compensation, catch-up sessions, grades, population, and the rates of students above and below average is provided. These rates represent the number of modules compared to the total number for all students in the selected group (pre-selected in the *program & population names* view), all accompanied by progress bars that provide a clear and quick understanding of the progression without needing to read the numerical data.

Concerning the *Performance per semester* view, it follows the same principle by displaying more detailed information for each academic year. These details pertain to the modules for both semesters in a given year, along with the averages for the included modules. This view is particularly useful when focusing on a specific semester for a specific group.

6.1.3 General performance view

The *General performance* view can be considered a summary of both the *Performance per year* and *Performance per semester* views. It also contains information from the Dashboard but in less detail. Its utility is especially evident when the focus is on formal scores (such as for curriculum selection) rather than on an ergonomic view, which is more useful for analyzing academic situations (e.g., unexpected results, high number of compensations, frequent catch-up sessions, etc.).

6.1.4 List of subjects view

The final view, *List of subjects*, displays all modules and their respective units (sub-modules) based on the selected program. This view is closely tied to the *Module division* indicator from the Dashboard, as it provides detailed information on the distribution of each type of module from the first to the last semester. Its relevance is particularly highlighted when conducting an in-depth analysis of a curriculum, such as when adding, adjusting, or removing a module or unit.

6.2 Functioning of the GPSI

6.2.1 Operating mode

This research was conducted under the LMD system (Licence, Master, Doctorate), where the Licence (bachelor's degree) is obtained upon the successful completion of 24 modules: 8 modules per year, with 4 modules per semester, including 2 major modules, 1 secondary module, and 1 cultural module (soft skills).

Two combined criteria determine the functions that generate performance values for each student group: the profile of the selected population, referred to as the score profile, and the specific major or program, as illustrated in Figure 3.

General Scoring

Program & population names

Score profile

Very Low Flop Medium Good Very Good

Top Under Average Above Average All Students

Program

SMC SMA STU

SMP SMI SV

Population profile Good

Program SMC

Program Coordinator

Fig. 3. Selection of profile and program in GPSI

In this view, the selection of the group profile to display, along with its associated program, is managed through pre-programmed macros named after the score profiles and the programs. There are eight possible score profile combinations, each of which can be paired with one of six program selections. In practice, each button linked to a score profile functions as a macro that populates a cell with the name of the corresponding population profile (e.g., Very Low to All Students). Similarly, the macros for the programs fill the cell immediately below the first one. Once the double profile-program selection has been made, all the GPSI views are populated with the corresponding data.

The example shown in Figure 3 represents a combination of the score profile with the SMC program. This means that the dashboard and other views display KPI values relative to a population rated at the level *Good* within the SMC major.

Since the GPSI is integrated within the ISPMR, an intricate system typically constructed with extensive and complex spreadsheet functions, it is challenging to elucidate its entire operational mechanism, which encompasses a broad array of functions (as shown in Table 1) and corresponding macros. To enable a comprehensive exploration of its functionality, the complete information system is provided⁶. Its operational mode is distilled into a simplified pattern, as illustrated in Figure 4.

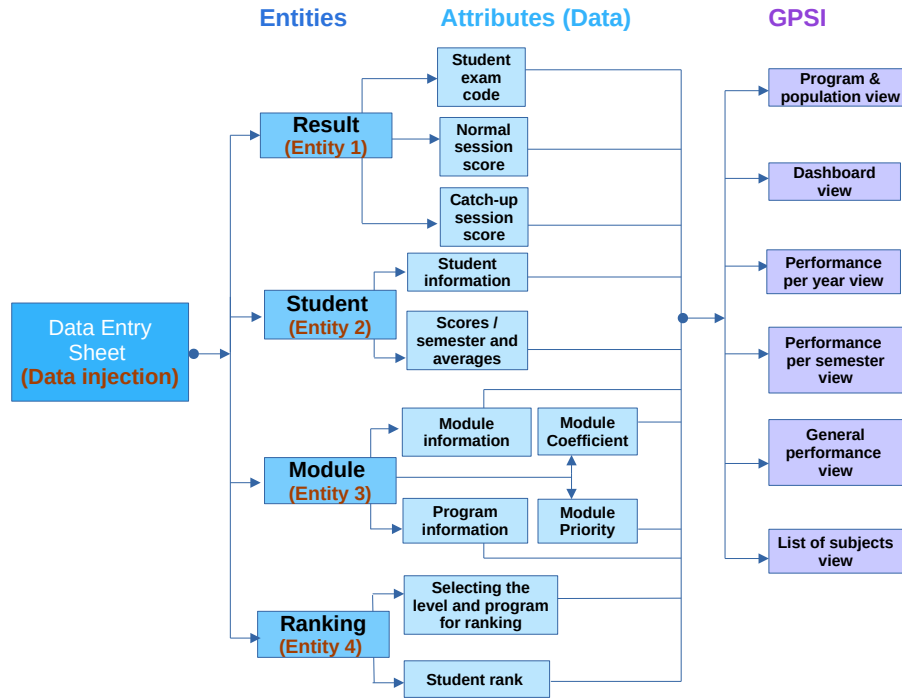


Fig. 4. Operational mode of the GPSI

The ISPMR, along with the GPSI it includes, functions as an information system with entities, attributes, and the relationships between them, which feed into the interface where all KPIs are displayed. The attached spreadsheet file is explained in detail as follows:

– *Explanation of operating mode of the spreadsheet file:*

⁶ The ISPMR, developed in a spreadsheet, is included as supplementary material with this article

The pattern in Figure 4 highlights four entities (on the left) that receive data from the Data Entry. In the ISPMR, which is implemented as a spreadsheet, the Data Entry is a sheet populated via a simple online form that collects data in a table (e.g., student results, student information, module details, etc.). Once collected, the data is injected into this sheet, specifically pasted into cell L5. This cell is programmed to transpose the table vertically (using *Actualize Board* macro) for more convenient use.

The remaining functionality of the ISPMR, particularly the GPSI, which is the focus of this work, is straightforward. By examining the four entities, it becomes clear that most of the columns are grayed out to prevent alteration, as they contain programmed functions, while the others remain white to allow modifications, such as for exam codes, scores, student information, etc.

6.2.2 Calculation methods of KPIs

In this section, although it is primarily intended for programmers and developers in educational technology due to the listings, codes, and algorithms it contains, it is also designed for professors and academic administrators interested in the KPIs calculation methods. This is because the logical processes underlying these calculations initially stem from an academic study of their relevance before reaching the technical aspects.

• Indicator 1 : Discipline distribution

The students' skills are illustrated through a radar graph, with disciplines distributed across the axes. The limits of the graph are defined by the averages, representing overall performance from a general perspective.

• Indicator 2 : Score average

The average score, illustrated in the GPSI through a graphical display, reflects the averages of a selected group. The resulting curve represents the progression of the overall semi-annual averages, drawn from the performance per-semester perspective (Figure 1). To understand the calculation method of this indicator, the equation that calculate the score average of a single a student is given in Equation 1 (Rahhou & Talbi, 2019b).

$$\text{KPI 1} = \frac{1}{2} \left[1 + \sum_{n=2}^6 \frac{\text{Ent}(S_n - S_{n-1})}{5} \right] \quad (1)$$

Equation 1: Student score average equation

KPI 1 calculates the sum (Σ) of the differences between the averages of two semesters (S_n and S_{n-1}) over six semesters, expressed as integers (Ent). This

sum is then divided by 5, which represents the five intervals between the six semesters. Since this indicator can result in a negative value, the calculation is adjusted by multiplying by $\frac{1}{2}$ to ensure that the final value remains between 0 and 1.

• Indicator 3 : Modules division

This graphic, displayed as sectors, represents the distribution of three types of modules, major, secondary, and cultural, according to their prevalence each year for a group of students selected based on a dual criterion (profile-program). The graphic is shown by selecting one of the three pre-programmed macros, L1, L2, or L3 (Figure 3), which correspond to the first, second, and third years, respectively.

• Indicator 4 : Module validation

This indicator determines the validation status of modules using the LOGICAL TEST function in a spreadsheet. It evaluates the total number of modules for a selected group of students within a specific program whose scores are below 10/20. The indicator displays "Full" or "Partial," depending on whether the number of modules with scores below 10/20 (after the catch-up session) is zero, indicating full validation, or if there are any remaining, indicating partial validation.

In conditional logic process, this logic KPI is given by listing 1.1, where P represents the profile of the of the student group, F (Field) denotes the program of the group, and S stands for the semester.

In the conditional logic process, these four grades, conditioned by the profile and program, are provided in the GPSI by Listing 1.2, where S_i (with i representing the semester number) denotes the semester, P represents the group's profile, and F refers to its program.

Listing 1.1. Module validation in GPSI

```

1 IF SUM of NB_modules_Si >= 10 THEN
2   profile P, program F = 24
3     OUTPUT "Full"
4 ELSE
5     OUTPUT "Partial"
6 END IF
7
8 FOR i = 1 TO 6
9   END FOR

```

• Indicator 5 : Grade (Distinction)

This grade is displayed based on the following thresholds: 12/20 and below, 14/20, then 16/20 and above, corresponding to *Passing*, *Low Honors*, *Honors*, and *High Honors*, respectively. These classifications are generated in a spreadsheet using the LOGICAL TEST function.

In the conditional logic process, the four grades, conditioned by the profile and program, are provided in the GPSI as shown in Listing 1.2, where Si (i represents the semester number) refers to the semester, P to the group's profile, and F (Field) to its program.

Listing 1.2. Grade of results in GPSI

```

1
2 IF SUM (AVERAGE Si >= 10), Profile P, program F
3 AND SUM AVERAGE Si < 12
4     OUTPUT "passing"
5
6 IF SUM AVERAGE Si >= 12), Profile P, program F
7 AND SUM AVERAGE Si < 14
8     OUTPUT "low honours"
9
10 IF SUM (AVERAGE Si >= 14), Profile P, program F
11 AND SUM AVERAGE Si < 16
12     OUTPUT "honours"
13
14 IF SUM (AVERAGE Si >= 16), Profile P, program F
15     OUTPUT "high honours"

```

• Indicator 6 : Population rate

The population in question refers to the profile of the selected group of students and their program. In a spreadsheet, the percentage displayed by this indicator is calculated using the ratio of the COUNTIFS function combined with the LOGICAL TEST function. This percentage reflects the number of students with the chosen profile and program relative to the total number of students in the program. The data includes grades such as *Very Low*, *Low*, *Medium*, *Good*, *Very Good*, and *Top*, along with categories like *Below Average*⁷, and *Above Average*, based on the program criterion for the same group. This report is displayed in the dashboard, concatenated with the program name below it, using the CONCATENATE function.

In the conditional logic process, these functions, conditioned by the profile and program, are detailed in Listing 1.3, where P represents the group's profile and F (Field) denotes its program.

Listing 1.3. Percentage of population in GPSI

1

⁷ In the ISPMR and GPSI, the term "Below Average" is referred to as "Under Average."


```

2 IF (P = "very low" OR "low" OR "medium" OR "good" OR "very
   good" OR "top")
3     OUTPUT NB_students_profile_P_and_program_F /
       NB_students_in_F
4
5 IF (P = "Under average" OR "above average")
6     OUTPUT NB_students_profile_P_and_program_F /
       NB_students_in_F
7
8 IF (P = "all students" AND program_F)
9     OUTPUT 100

```

• Indicator 7 : Catch-up exams alert

In the GPSI, the alert indicator for catch-up sessions is represented across five levels of criticality. It is based on the LOGICAL TEST function, combined with the COUNTIFS function, which calculates the number of module units (subjects) in catch-up sessions relative to the total number of module units. Due to the complexity and depth of its code interpretation, this indicator will be the focus of independent research and is introduced here for informational purposes.

• Indicator 8 : Compensation frequency

The compensation frequency indicator is based on the 24 modules within a bachelor's program and the six grades, as determined by the LOGICAL TEST function in a spreadsheet. This function, applied and conditioned by profile and program criteria, utilizes the COUNTIFS function.

In the conditional logic process, these grades, conditioned by the profile and program, are detailed in Listing 1.4, where P represents the group's profile and F (Field) denotes its program.

Listing 1.4. Frequency of compensation in GPSI

```

1
2 IF SUM of NB compensated modules, profile P, program F = 0
3     OUTPUT "no compensation"
4 ELSE IF SUM of NB compensated modules, profile P, program F <
   3
5     OUTPUT "very low"
6 ELSE IF SUM of NB compensated modules, profile P, program F <
   6
7     OUTPUT "low"
8 ELSE IF SUM of NB compensated modules, profile P, program F <
   9
9     OUTPUT "medium"
10 ELSE IF SUM of NB compensated modules, profile P, program F <
   12
11     OUTPUT "high"

```

```

12 ELSE IF SUM of NB compensated modules , profile P, program F <
    24
13     OUTPUT "very high"

```

• Indicator 9 : Efficacy

The effectiveness of the student group and the selected program is assessed using three indicators, numbered 5, 7, and 8, each of which provides discrete variables. These discrete variables are subsequently converted into continuous variables to make them measurable.

In the conditional logic process, these indicators are detailed in Listing 1.5, Listing 1.6, and Listing 1.7, respectively, where P represents the profile of the group and F (Field) denotes the corresponding program.

– Catch-up indicator:

Listing 1.5. Catch-up indicator in efficiency – GPSI

```

1
2 IF (P = "very low" OR P = "low" OR P = "medium" OR P = "
    good" OR P = "very good" OR P = "top")
3     OUTPUT (SUM of NB of catch-up subjects , profile P,
        field F / SUM of NB of first session subjects
        , profile P, field F)
4
5 ELSE IF (P = "below average" OR P = "above average")
6     OUTPUT (SUM of NB of catch-up subjects , profile P,
        program F / SUM of NB of first session
        subjects , profile P, program F)
7 ELSE IF (P = "all students")
8     OUTPUT (SUM of NB of catch-up subjects , program F
        / SUM of NB of first session subjects , program
        F)

```

– Grade result indicator:

Listing 1.6. Result level indicator in efficiency - GPSI

```

1
2 IF student grade = " passing "
3     Output 25
4 IF student grade = " lower honours "
5     Output50
6 IF student grade = " honours " use
7     Output 75
8 IF student grade = " high honours "
9     Output 100

```

– **Compensation indicator:**

Listing 1.7. Compensation indicator in efficiency - GPSI

```
1
2 IF compensation frequency, profile P, program F = " very
   high "
3     Output 0
4 IF compensation frequency , profile P = " high "
5     Output 25
6 IF compensation frequency , profile P, program F = "
   medium "
7     Output 50
8 IF compensation frequency , profile P, program F = " low "
9     Output 75
10 IF compensation frequency , profile P, program F = " very
    low "
11     Output 85
12 IF compensation frequency , profile P, program F = " no
    compensation "
13 Output 100
```

7 Discussion

As demonstrated at the beginning of this paper, it is challenging to find an example of a student performance interface that provides a comprehensive an ergonomic view of achievement through KPIs in representations other than tables, histograms, or numerical statistics. Currently, no example of such an interface, or any performance management tool, has been identified in academic databases. Therefore, the relevance of the GPSI presents a practical solution in various higher education contexts. These include:

- Analyzing low-performing student profiles
- Assessing the negative impact of module compensation
- Anticipating students requiring catch-up sessions
- Comparing scores across multiple disciplines
- Evaluating students for pre-selection into advanced curricula (master's, doctoral, or specialized programs)

Furthermore, to advance the GPSI interface, it is feasible to implement computer programming by a specialized team. This enhancement would not demand overly complex programming, as the algorithm, code, and logic have already been described. More importantly, the KPIs have been thoroughly examined within the framework of educational sciences. Additionally, using this GPSI should encourage professors to improve the interface by proposing performance indicators better suited to their specific teaching and learning contexts. Academic administrators could also monitor institutional road maps, ensuring that goals set by

the institution are being met and that expectations are aligned with actual outcomes.

8 Conclusion

While organizations that offer performance management services are often qualified, they may not be as effective in addressing the specific needs of educational sciences, and their services are frequently priced beyond reach. Therefore, educational institutions must place greater emphasis on performance analysis and ensure the continuous evolution of the indicators they monitor. This begins with defining KPIs and their calculation methods. The aim of this work is to ultimately encourage educators to cultivate a culture of analysis, performance evaluation, and reporting.

This paper is divided into two parts. The first part presents the GPSI, explaining its functionality, the various KPIs it encompasses, and how to calculate them, along with an overview of the ISPMR. The second part demonstrates how these tools were developed and written to facilitate ease of use, either in their existing form or with modifications to adapt to different educational contexts. The ultimate goal is to provide a comprehensive view of what a performance management tool for student achievement and monitoring could look like within the realm of educational technologies, designed to be user-friendly for educators and academic administrators without requiring specialized IT skills.

Finally, while the GPSI is specifically designed for the License Master Doctorate (LMD) system, it remains a flexible and adaptable solution for other educational systems, provided that data input parameters, calculation methods, information system entities, and their relationships are adjusted accordingly. This flexibility ensures that the interface, powered by the ISPMR, remains capable of continuous improvement.

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