Swiss International Institute Lausanne

SIIL LMS-BASED MONTORING PRINCIPLES

Swiss International Institute Lausanne - SIIL

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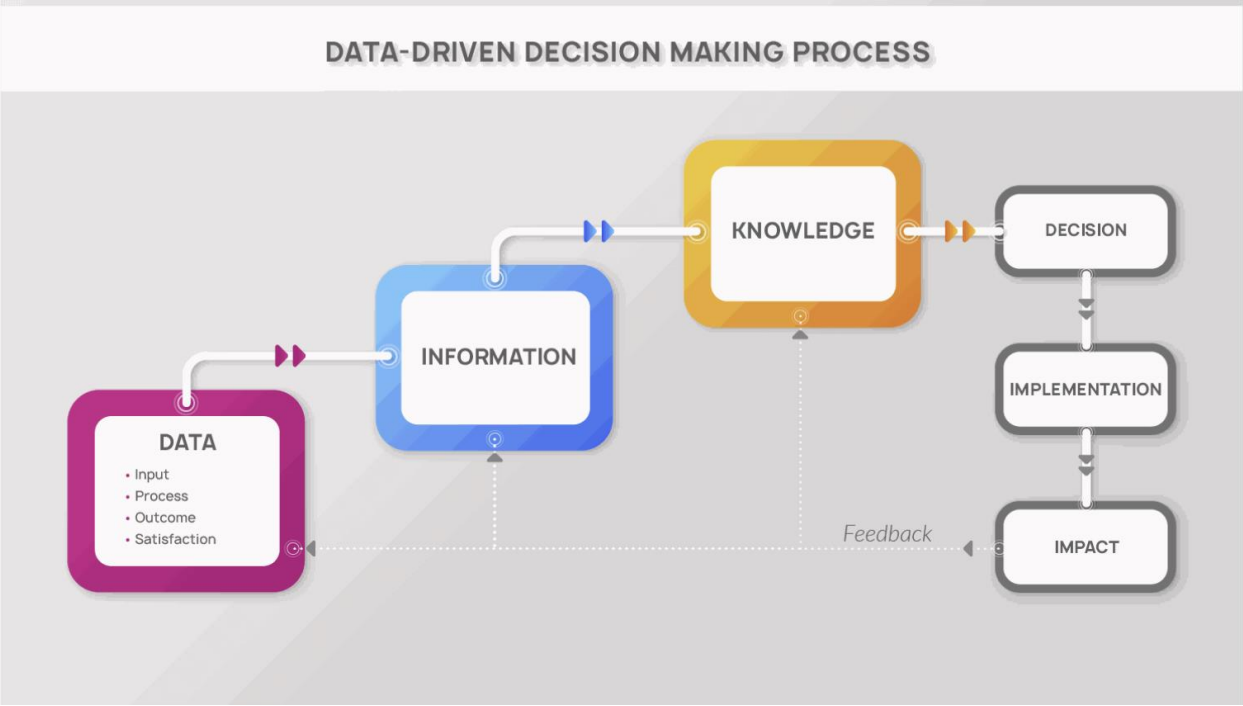
I INTRODUCTION: WHAT IS DATA-DRIVEN DECISION-MAKING IN ONLINE LEARNING?

Data-driven decision-making in learning refers to a continuous cycle of identifying, collecting, combining, analyzing, interpreting and acting upon educational data from different sources to report, evaluate and improve resources, processes and outcomes of organizations.

To describe the DDDM process RAND Education recommends to use the following framework:



The framework suggests that multiple forms of data are first turned into information via analysis and then combined with stakeholder understanding and expertise to create actionable knowledge.

This framework can be interpreted through 4 steps:

1. Data Collection

We talk about collection and organization of "raw" educational data about students' activity and their performance. Educational or student-level data refers to any information that teaching staff, administrative staff, the Institute, and state agencies collect on individual students, including data such as personal information, enrollment information, academic information, and various other forms of data collected and used by educators and educational institutions".
There are several types of data that teaching staff should use in their data analysis process:

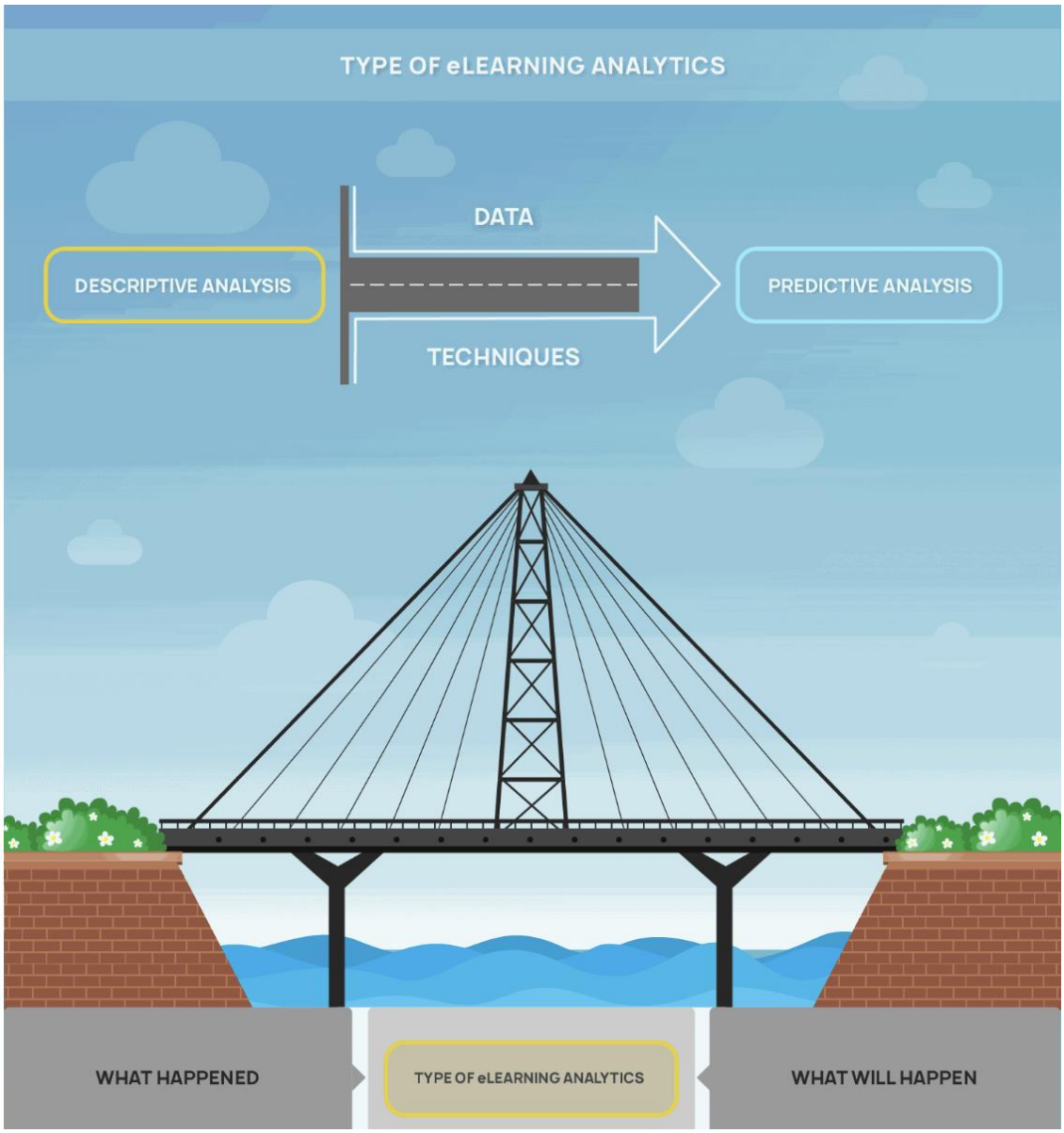
- Input data – student's background characteristics.

- Process data – quality/quantity of teaching materials,
- Outcome data – student's retention and completion rates,
- Satisfaction data – student's satisfaction rates.

2. Data Analysis

It is an analysis of learner's data and information to get meaningful knowledge about e-learning courses or programs.

The type of analysis depends on the type of the obtained data, therefore e-learning specialists identify such types of data analysis



a). Cluster Analysis

Cluster analysis is a number of statistical methods of partitioning data into homogeneous parts for classifying the data. It divides these data into meaningful or useful groups known as clusters. Clustering analysis in e-learning deals with the task of how to group students into different clusters. For example, teaching staff can effortlessly identify student groups with high and low activity using classification and clustering techniques. SIIL LMS aims to include cluster analysis in its reporting tool kit.

b). Descriptive Analysis

Descriptive Analysis is the simplest and the most common form of data analysis. Descriptive analysis answers the "what happened" by summarizing past data basically in the form of dashboards. The biggest use of descriptive analysis in e-learning is to track Time and Engagement Metrics:

- The average number of actions of the students
- Progression of users through the experience (for example, 32% of our students started just one semester or elective course, 44% finished and obtained certificates etc.)
- Learner's Retention Metrics

c). Diagnostic Analysis

Diagnostic Analysis is a form of advanced analytics which examines data or content to answer the question "Why did it happen?", and is characterized by techniques such as drill-down, data discovery, data mining and correlations. For example, diagnostic analysis in an LMS or analytics tool can be presented by heat maps – visualised engagement elements using colours with popular areas in learning content.

d). Predictive Analysis

Predictive analytics is another way of using e-learning data to create predictions about future student progress, using techniques such as data mining, machine learning and predictive modelling. For example, using past engagement and participation indicators, the LMS system or analytics tool may predict how our students will perform in our present or future e-learning course or program.

3. Data Identification

Data identification defines new instructional design approach to apply meaningful knowledge. When we speak about the instructional design approach it refers to a framework or process that helps to develop instructional materials in e-learning course.

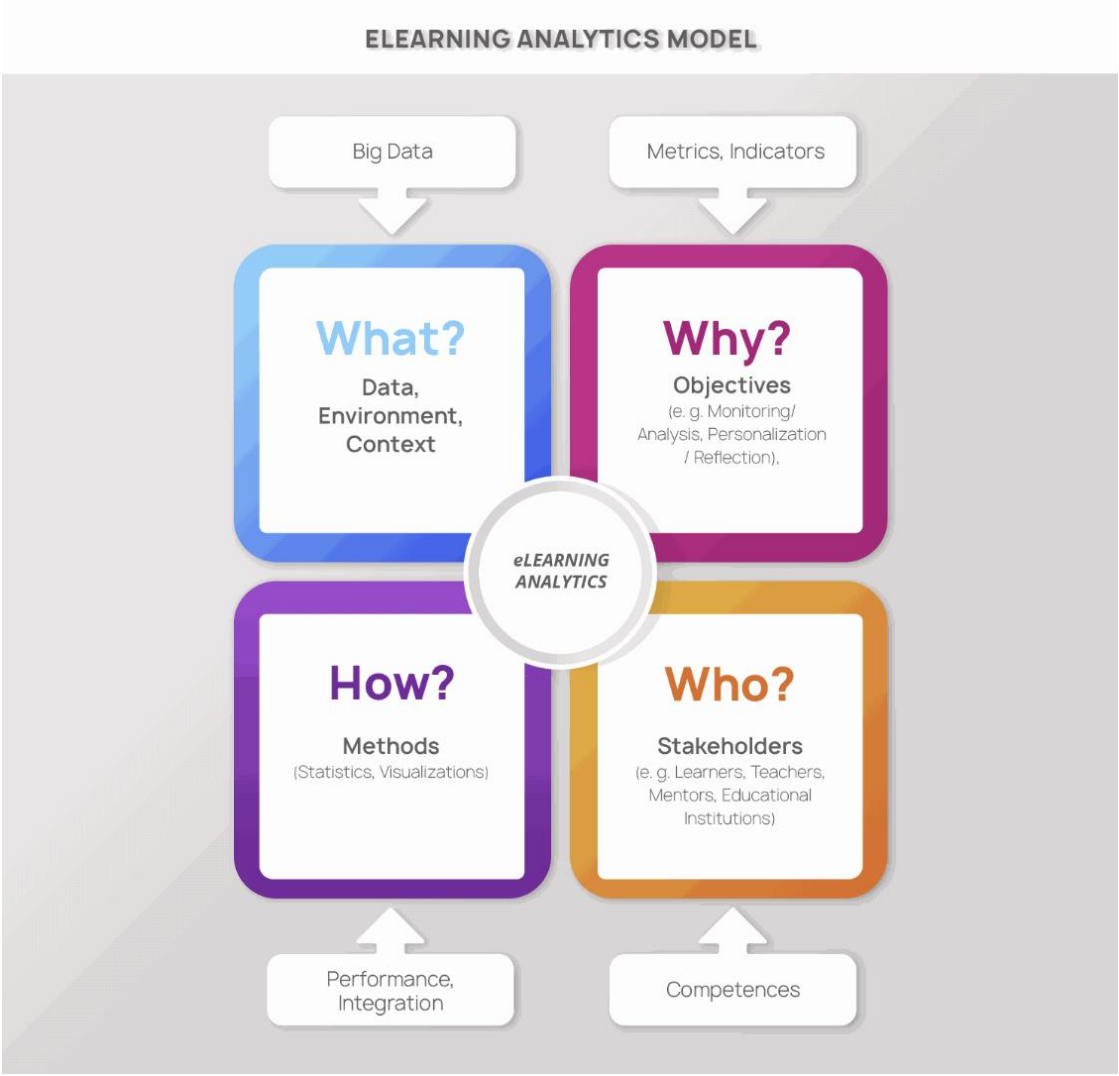
4. Data Improvement

Data improvement defines questions on how to improve student experience using the collected knowledge.

For SIIL development and success the LMS is a key tool for analytics and monitoring procedures. The constant LMS improvement is the permanent process. The use of LMS in monitoring as a tool of e-learning analytics is very helpful in DDDM framework steps.

II SIIL E-LEARNING ANALYTICS

E-learning analytics tracks, measures, analyses and reports on the data that students produce when they engage with SIIL e-learning service. e-learning analytics can also show which methods are more effective for different student groups. For SIIL it is important via its LMS to unify and set up all the data to be able to personalize our service and significantly improve the learning journey of SIIL students.



1. What?

What kind of data will SIIL e-learning analytics system gather and manage?

As we know, e-learning analytics is a data-driven process, and by definition needs data to provide teaching staff and content developers with meaningful and actionable metrics. We defined various types of data that could be gathered by the system in the first chapter.

2. Who?

Who is the analysis targeted at? What kind of stakeholders are there?

In SIIL organizational context, a stakeholder is a constituency of an organization. In the same way, the stakeholders of SIIL e-learning analytics are those who are affected by it and those who will benefit the most from using it.

3. Why?

What are SIIL objectives? What do we want to see in our reports?

There are 2 categories of e-learning analytics objectives: educational and business. The Educational objective is targeting at improving online learning impact and student's performance, such as:

- Reducing students' dropouts
- Improving students' understanding and learning
- Deciding which content is relevant for a certain user
- Improving training materials

The Business one is targeting at improving the return on investment (ROI) of educational initiatives.
At this stage, the analysis outcome is interpreted in order to achieve the objectives of e-learning analytics.

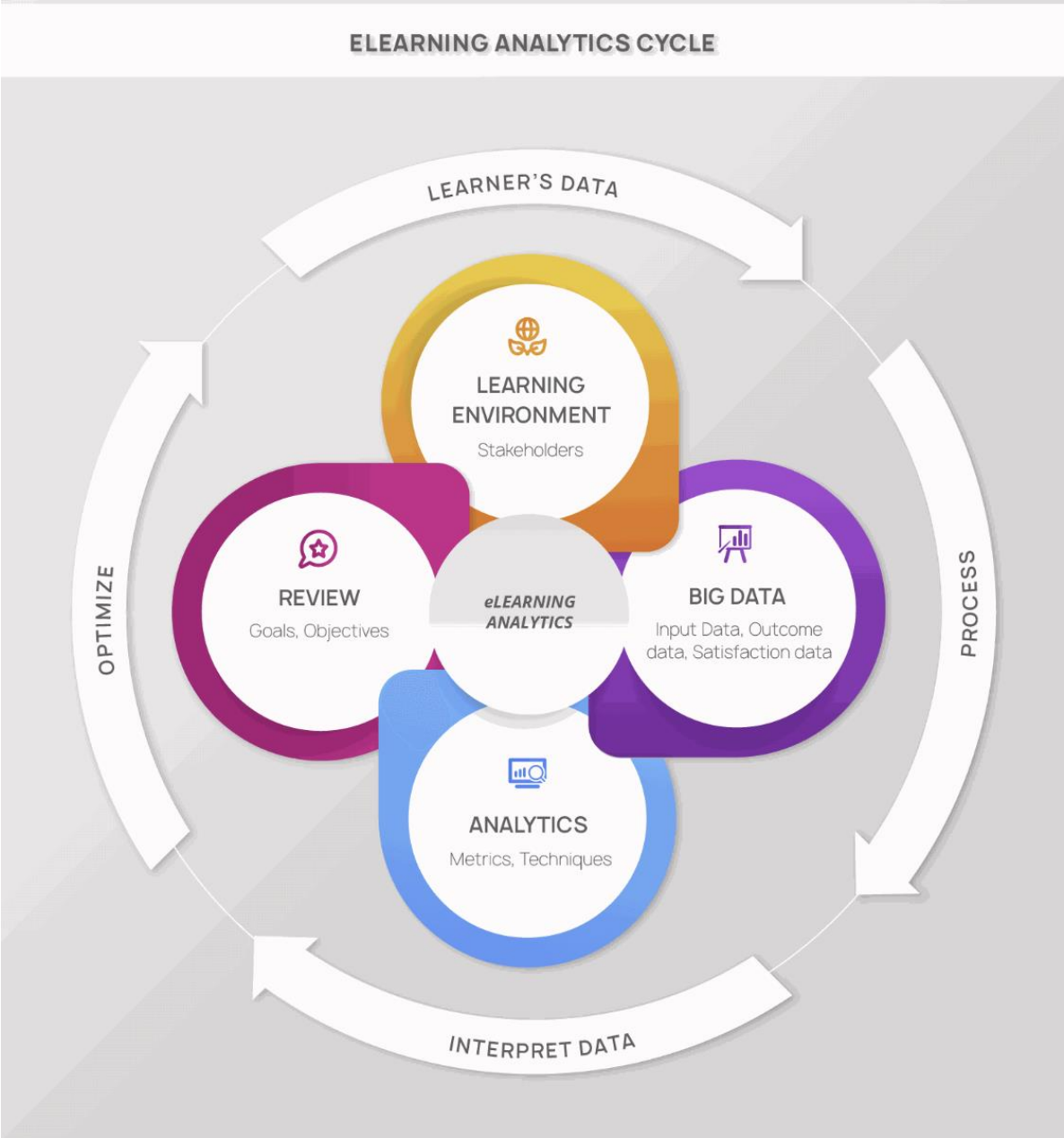
4. How?

How will the system analyse the collected data? To get a full picture of the impact of your e-learning course or program, SIIL shall create and use built-in analytics models such as real time dashboards, surveys, user feedback and other reporting tools.

SIIL never forgets that e-learning analytics is an ongoing process. It doesn't end once corrective/remedial action is taken. To ensure the effectiveness of the model, SIIL makes sure the analytics cycle is closed through continuous review and benchmarking.

SIIL e-learning Analytics Cycle considers four parts:

1. Learning environment where stakeholders produce data;
2. Big data which consist of massive amounts of datasets;
3. Analytics which comprises different analytical techniques and metrics;
4. Review where objectives are achieved to optimize the learning environment.



III SIIL LMS REPORTING REQUIREMENTS

SIIL Learning Management System shall provide a comprehensive toolkit of analytics and reporting tools that the Institute can use to visualize and retrieve valuable data about different areas of online courses.

SIIL administrative staff have access to different analytics and reporting functionalities that offer meaningful information about student activities.
SIIL is permanently adding functions to its LMS system analytics tool set. In 3 year perspective the SIIL LMS will include the following set of metrics and reports to boost our working process:

1. “Course/program progress and completions”
2. “Course Status” – the current situation of students’ enrollments (the dynamics of students’ enrollment and unenrollment metrics)
3. “Number of students who enrolled in a course/SP”
4. “Number of students who unenrolled from a course/SP”
5. “Total number of students who are currently passing a course/SP”
6. “Last access by user” – the last time a user logged into our LMS to take course content. If it has been a long time then the SIIL admin team can follow-up accordingly.
7. “Total time spent on course/SP”
8. “Performance grade” – student’s test/assessments score in an online course or SP
9. “Current students location” – this metric tells us exactly where in our online course/SP the student is currently on
10. “Learning plan reports”
11. “User activity tracking” (# of video views, discussion activities, etc.)
12. “Most viewed course/SP parts”
13. “Attempts and answers breakdown” – information on the average score and student’s response distribution for each question/problem
14. “Gamification reporting stats” (e.g., badges and contests)
15. “Time spent in separate course/SP part”
16. “Quiz/assessments performance”
17. “Individual quiz/assessments answers”
18. “Identification of low-performing and high-performing students”
19. “Clustering students’ activity and characteristics”

1. Types of LMS Reports

SIIL LMS analytic tool must be able to generate several types of reports depending on request and objective of the department requiring data.

a). Enrollment Stats Report

(using data analysis) shows the dynamics of enrollment metrics
The set of analytics metrics to be reflected in the report:
a. “Course Status”
b. Number of students who enrolled in a course/SP
c. Number of students who unenrolled from a course/SP
d. Total number of students who are currently passing a course/SP

b). Student’s Activity Report

(using data analysis) indicates which parts of the course/SP are the most difficult or interesting for our students:
The set of analytics metrics to be reflected in the report:
a. “User activity tracking” (# of video views, discussion activities, etc.)
b. “Most viewed course parts”

c). Student’s Progress Report

The set of analytics metrics to be reflected in the report:
a. “Performance grade”
b. “User activity tracking” (# of video views, discussion activities, etc.)

d). Problem Report

(using diagnostic analysis) shows which parts of a course/SP require improvement, and calculates the ratio of right and wrong answers of students in assessments.
The set of analytics metrics to be reflected in the report:
a. Attempts and answers breakdown
b. “Quiz/assessments performance”
c. “Individual quiz/assessments answers”

e). Progress Funnel Report

(using descriptive analysis) shows a “road map” of student’s participation in an online course or SP
The set of analytics metrics to be reflected in the report:
a. “Learning Path”
b. “Current students location”

f). Cluster Report

(using cluster analysis) clusters our students into groups based on their current progress (from low-performers to high-performers)
The set of analytics metrics to be reflected in the report:
a. “Identification of low-performing and high-performing learners”
b. “Clustering students’ activity and characteristics”

Simple Types of Analytics Reports

Type of Report	Key Features	Data Included	Tech Needed	Use Cases	Results
Performance Reports	Tracks learner progress	Completion rates, test scores, retention	Basic LMS tools	See how well learners are doing	Spot areas where learners need help
Custom Reports	Tailored to your needs	Custom data (e.g., by department or team)	Advanced reporting tools	Find trends in specific groups	Make targeted improvements
Engagement Reports	Measures how involved learners are	Time spent on content, participation in activities	Engagement tracking tools	Check how learners are interacting with the content	Keep learners more engaged
Compliance Reports	Verifies that mandatory training is completed	Certification progress, course completions	Compliance tracking tools	Ensure required training is completed	Avoid compliance issues
ROI Reports	Shows the value of your training	Cost of training vs. benefits, productivity	LMS financial tracking features	Measure the impact of your training on business	Understand the value of your training

IV ROADMAP DEVELOPMENT FOR SIIL LMS ANALYTICS

A clear roadmap for LMS analytics ensures that our Study programmes are effective and measurable. Our roadmap guides through the essential steps of the process. From setting up the system to using LMS reports and analytics, to have the opportunity to make better decisions.

1. Initial Setup

The first step is to set up SIIL LMS analytics system. This involves identifying the key metrics we need to measure, aligning them with SIIL training goals (Learning outcomes), and configuring SIIL LMS to track them.

Features to Set Up:

- **Basic features**: Course completion rates, test scores, and engagement tracking.
- **Crucial features**: Custom reporting tailored to SIIL goals.
- **Advanced features**: Automated data collection and real-time reporting for up-to-the-minute insights.

2. Generating Reports and Dashboards

Once LMS system is set up, generating reports and dashboards is the next step. Reports allow to monitor LMS training effectiveness, while dashboards provide a visual snapshot of key metrics.

Steps to Generate Reports:

- **To define report parameters**. To choose the specific data pointing what SIIL wants to track.
- **To customize the dashboard**. To tailor the layout to display the most important metrics front and center.
- **To automate reporting**. To set reports to generate automatically on a schedule that suits SIIL needs.

3. Tracking Key Metrics

Tracking key metrics is essential to evaluate training effectiveness with LMS data and progress. These metrics give a clear picture of studen performance.

Key Metrics to Track:

- **Completion rates**. Measure the percentage of students who finish the course/SP.
- **Assessment scores**. Track how well students perform on tests and quizzes.
- **Engagement levels**. Monitor how actively students participate and engage with the content.

4. Identifying Knowledge Gaps

With LMS reports and analytics, identifying knowledge gaps becomes straightforward. These gaps show where students struggle and where SIIL content may need improvement.

Techniques to Identify Knowledge Gaps:

- **To analyze assessment results**. To look for patterns where students consistently underperform.
- **To track engagement data**. To see where students disengage or spend more time, which could indicate confusing content.
- **To feedback integration**. To combine learner feedback with analytics to gain a deeper understanding of problem areas.

5. Evaluating Training Effectiveness

Evaluating SIIL Study programmes goes beyond tracking individual metrics. It involves looking at the bigger picture and combining data for a more complete understanding of our training's impact.

Evaluation Methods:

- **Completion rates**. How many students finished the course?
- **Assessment scores**. What is the overall score average, and how does it reflect learning outcomes?
- **Feedback + Analytics**. To use feedback and analytics together to create a comprehensive view of training success.

6. Data-Driven Decision-Making

Finally, SIIL uses the insights gained from LMS analytics for employee training/teaching staff further training and development effectiveness to make informed decisions about future training. Regular analysis ensures that SIIL Study programmes are continually improving.

Steps to Ensure Data-Driven Decisions:

- **Regular review of analytics**. Look at the data on a consistent basis to identify trends.
- **Adjust content and strategies**. Use the insights to make necessary tweaks to content or delivery methods.
- **Continuous improvement**. Schedule regular assessments to ensure ongoing success.

By following this roadmap, is able to use data analytics to evaluate its LMS settings effectively, ensuring that SIIL Study programmes remain impactful and data-driven.

V TECH NUANCES TO PAY ATTENTION TO

When using data analytics for LMS, there are several important technical nuances to consider. These details help SIIL gain deeper insights, customize its system to fit SIIL organization, and ensure everything runs smoothly as we scale.

1. Machine Learning and Data Mining for Deeper Insights

To get the most out of LMS learning analytics, SIIL shall consider incorporating machine learning algorithms and data mining techniques. These tools can help predict trends, personalize learning paths, and provide more accurate insights into learner behavior. By analyzing large data sets, machine learning can identify patterns that might not be obvious at first glance.

2. Customizing Reports and Dashboards

Customization is key to making sure SIIL reports and dashboards meet Institute specific needs. As SIIL grows, the Institute wants to ensure that our reports and dashboards can be easily scaled and adapted to new demands.

- **LMS Tools**. To support plugins, which allow for more granular control over reports and real-time insights.
- **Scaling Solutions**. To look for tools that can automatically update and grow with SIIL needs, avoiding manual updates as the data increases.

3. Maximizing SIIL LMS Effectiveness with Integrations

Integrating SIIL LMS with ERP systems or with HR tools can boost effectiveness. These integrations enable seamless data flow between systems, reducing duplication and ensuring accurate, real-time updates.

- **ERP Integration**. To sync training data with financial and resource planning systems for improved budget management.
- **HR Integration**. To ensure that employee training data is aligned with performance metrics and compliance tracking.

4. Ensuring Compatibility and API Use

For a smooth data flow between systems, ensuring compatibility is critical. SIIL need to monitor and use APIs to integrate our LMS with other platforms, enabling real-time data sharing and more accurate reporting. Many modern LMS platforms come with built-in API support, making it easy to connect with other tools.

5. Pro Tips on Security and Privacy

Data security is a SIIL top priority when handling sensitive training information. To safeguard our LMS learning analytics, SIIL assures to implement these best practices:

- **Encryption**. Use end-to-end encryption to protect data at rest and in transit.
- **Access Controls**. Limit access to sensitive data by setting up role-based permissions and multi-factor authentication.
- **Regular Audits**. Conduct regular audits to identify vulnerabilities and ensure compliance with data protection regulations.

By addressing these tech nuances, SIIL ensures that its data analytics for LMS remains effective, secure, and scalable as the Institute grows.

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