Intelligent intervention for enhancing learning outcome

Abstract

A "Virtual Mentor" AI application to support blended learning pedagogy. This application will be used by the staff (Learning Facilitators, Instructors and Mentors) of the education institution in supporting students during their learning journey. The support is to be automated via this application thus giving institution staff more opportunities to do valued added services to students. In addition to the above, the application is able to discover and provide insights on course content, consumption and assessment performance leading to further fine-tuning of the course & its delivery.

Objectives

The "OmniMentor (OM)" increases productivity & provides insights through discovery of information through meaningful analytics and automated machine learning to:

- Enrich the student experience by guiding the student on completion of the course and attaining required skills for the next job
- Make the instructor and/or LF role more effective by providing timely intervention during student journey to analyse and provide remedial actions either online or face to face.
- Enhance blended learning delivery support by personalizing to each student.
- Enhance curriculum and assessment design

Key Components

The envisaged **OmniMentor** solution covers 3 key aspects of an efficient and targeted Learning Journey:

1. **Student Performance** - Individual student's journey tracking, progress reporting and taking remedial actions (predominantly Learner analytics).
2. **Class or Intake performance** - consists of a group of students' journey tracking and progress reporting (predominantly Learning analytics).
3. **Course Management** which includes enhancements to curriculum design, assessment and student profiling (intelligent recommendations informed by appropriate combinations of Learner and Learning analytics).

Expected Outcomes / Impact

The OmniMentor application's key deliverables are:

- Comprehensive student progress facilitation to provide personalized automated support on both administrative and basic subject matter expertise
- Learning Management Integration to gather student progress data for analysis

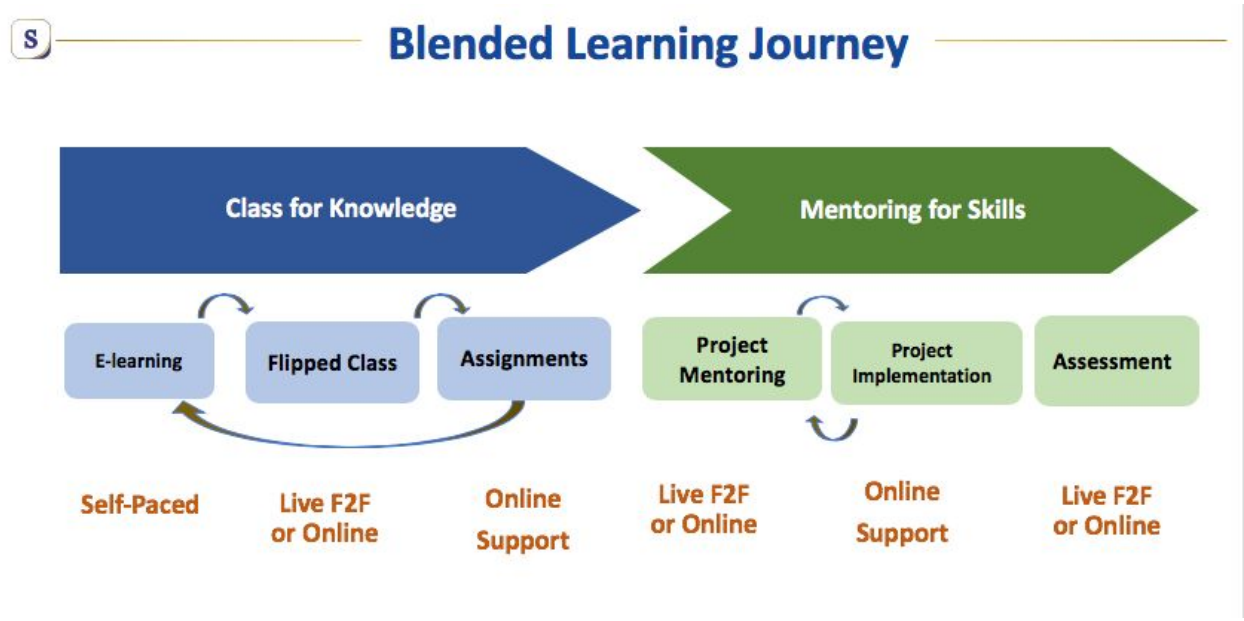
- Comprehensive class progress dashboard for faculty to provide the valued added support to the entire class.
- Provide information on course content and assessment for future enhancement

It focuses on Student and Class Facilitation features which will help both the student and the faculty to prepare themselves so that the student's journey is on track.

Industry Challenge / Opportunity

Current situation

TAE Framework is the way that the Gov of Singapore wants to address the needs of learning for the professionals. One of the key strategies of the Training and Adult Education (TAE) ITM is Pedagogical & Technology Innovation where focus is to increase the adoption of blended learning. Blended learning optimises learning delivery through a good mix of self-learning and guided in-classroom learning / flip-class. At the same time, blended learning brings its own challenges to the forefront - the need to personalise the learner's journey by helping the mentor.



Most LMS provides learning analytics and progress of the student based on quantitative assessment without having a feel of qualitative information. The qualitative feel is based on the capabilities of the mentor and is not uniform across the different courses and students. As the number of students increases, such qualitative help from mentors cannot scale in a blending learning environment which requires on-demand mentoring. Each course would have Knowledge and Project Mentoring sessions which are delivered with a combination of e-learning, Flip Class, Assignments, Project Mentoring, and Support activities. These activities are conducted face to face and/or online.

In order to measure the success of a student's learning journey, the training organisation measures the student's progress through:

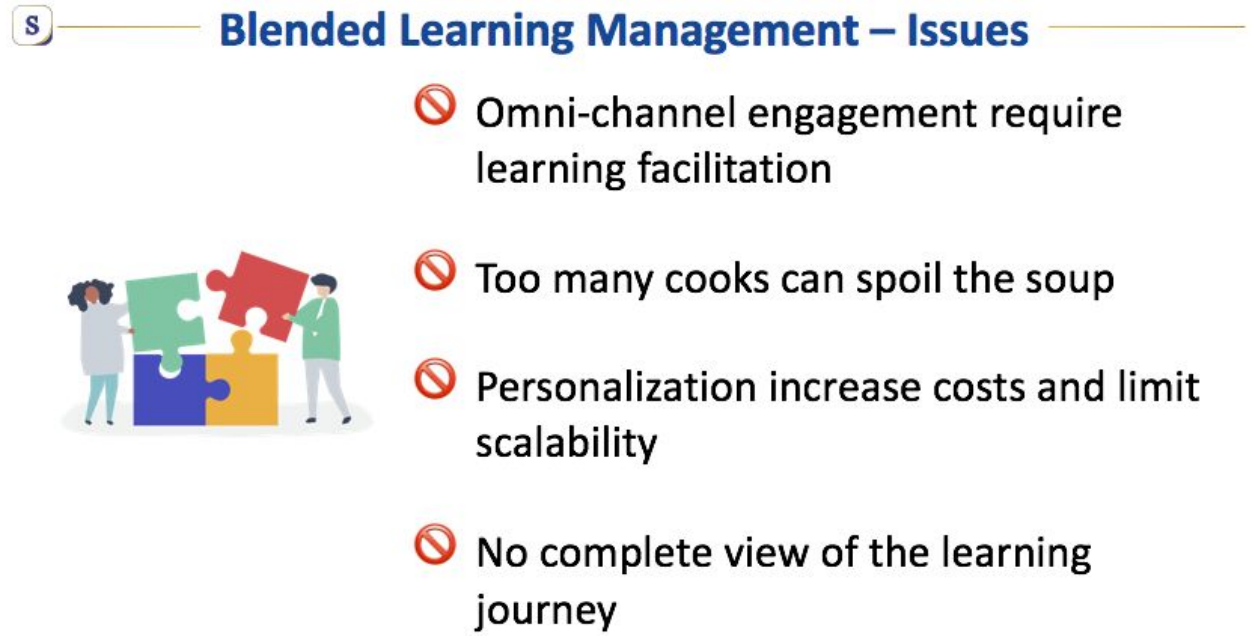
1. Attendance, both classroom and online
2. Formative Grading which include content consumption (elearning resources such as slides, video, audio etc), MCQ and Assignments progress
3. Summative Grading which includes project work and presentation progress
4. Survey which includes post session feedback (during the course) and end of course feedback where information is solicited in the areas of understanding, content, delivery, faculty and support.

The above parameters collectively provides valuable insights into:

1. **Student's progress** during his/her learning journey. Through the measurement of the progress one can identify "Students at Risk" and render personalised support.
2. **Overall class progress** which gives the faculty an indication on the topics / lessons / concepts where the class is having difficulty and addresses them timely and adequately.

Challenges & Gaps

In any education institution's blended learning environment, the learning management team (consisting of mentors, instructors and administrative staff) monitor the progress of the students via a report generated from the LMS (Learning Management System) and then follow up with the students personally to help them progress through the course. When institutions have more than a few hundred students at hand, this approach is manual in nature and requires a lot of human intervention. This approach is not scalable due to the magnitude of the follow ups and the anticipated student growth. Such administrative activities take away valuable time from a staff who would otherwise utilise it for more subject matter expertise support to the student.



The gap can be addressed by leveraging AI and machine learning technologies with an optimal mix of human and machine models. With AI and machine learning solutions, we can use “intelligent” & “timely” inputs and insights to help the students to take relevant actions in order to stay on track. Such automation will free the faculty time to provide value added support and guidance on students’ course work.

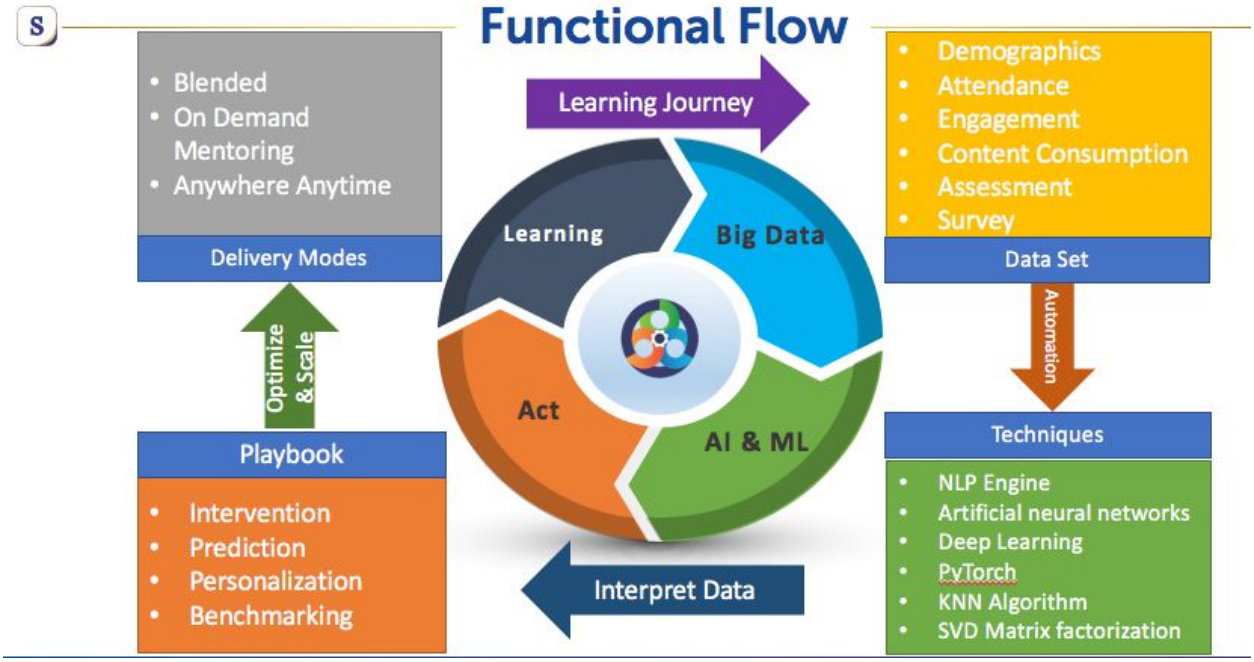
Furthermore, the insights discovered by the AI application can feedback into the fine-tuning of the course design and assessment. This value add benefits the Company as well as the new students for the subsequent re-runs of the course.

Intelligent intervention for enhancing learning outcome

The next wave of innovation in pedagogy is *personalising* the blended learning methodology to deliver a better learning experience (1:1) and outcome. Blended learning is the core of the pedagogy not just for adult learners who wish to transform and adapt to the digital world of business but also for the entire education industry in the current context of the COVID-19 situation.

In this context, *personalising* the learning experience leads naturally to a better or enhanced outcome. To achieve this goal, an innovative *OmniMentor,* provides intervention (remedial actions) & support based on timely insights of the learner's journey.

Since the *OmniMentor* is designed to utilise data points - both **quantitative** and **qualitative** - of the learner's journey (using AI & ML), it allows for learning, adaptation and scaling of the **personalised mentoring** for larger number of students, without compromising the learner's outcome or the mentor's time.



OmniMentor is designed to address issues and provide support in the following areas:

1. **Student Performance** - Individual student's journey tracking, progress reporting and taking remedial actions (predominantly Learner analytics).
2. **Class or Intake performance** - consists of a group of students' journey tracking and progress reporting (predominantly Learning analytics).
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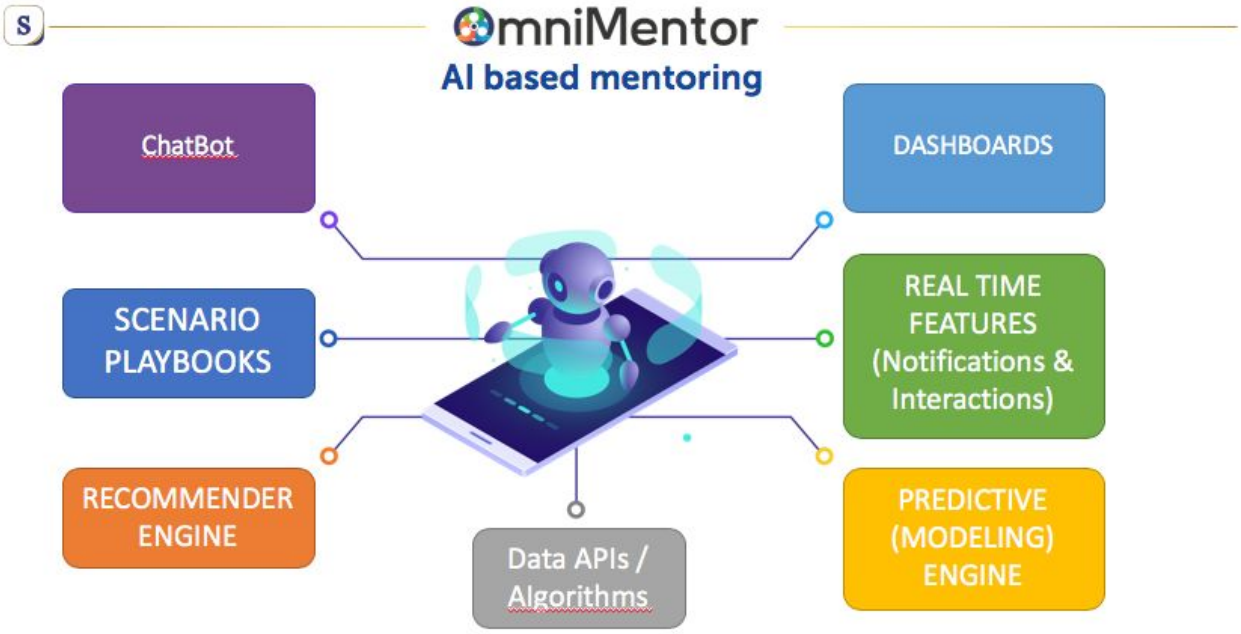

At the Individual Student level, OM gathers information on the attendance, content consumption, assessment performance and survey to ascertain a student's performance level. If the student is lacking behind the required level of performance during the learning journey, OM provide the following:

- Send notifications to the student and suggest the required course of action for the student to take. For example, inform students that he/she should have completed the elearning content and the MCQ before attending the flip class. If the student ignores it repeatedly beyond a threshold, OM alerts the Learning Facilitator (LF) / Instructor to contact the student in person to address the performance.
- Provide assessment of the performance to identify the student's weak areas and suggests additional support via online or make appointments for one to one personalised guidance with the Learning Facilitator (LF) / Instructor.
- Provide insights into the demographics of the student vis-à-vis his/her learning performance. This helps the LF to continuously review and improve the support level needed to be given for such a student persona. It will also provide more predictive analytics on the entry level of a student for the course.

- Link the survey feedback to student progress to cross-validate the comments. In other words, to check the "credentials" of the student before taking the survey seriously.

At the Class/Intake level, OM is able to provide insights & statistics (which is an aggregate of students) on the class performance in the areas of :

- Readying the Instructor vis-a-vis the cohort / class, so that the instructor can assess the overall class performance and provide additional support via face to face and/or online to address weak areas. For example, address a complex topic in class since most students have difficulty in such topics.
- Personalising the delivery of the Knowledge and Projects Sessions' to enhance the learning of this class.

At Course Management level, OM is be able to provide insights & statistics (which is an aggregate of students) on the class performance based on patterns/trends observed in the areas of :

- Content consumption in order to improve curriculum design for future intakes. For example, identify the "heavy" content and make it simpler or break into bite sized for better understanding
- Assessments to ascertain the level of difficulty and the passing grade of the class. This will provide enhancements to assessment design and methods.
- Student profiling to include entry criteria, pre-requisites and pathways to promote skills upgrade and career progress.

In summary, the "OmniMentor (OM)" increases productivity & provides insights through discovery of information through meaningful analytics and automated machine learning to:

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- Enhance curriculum and assessment design
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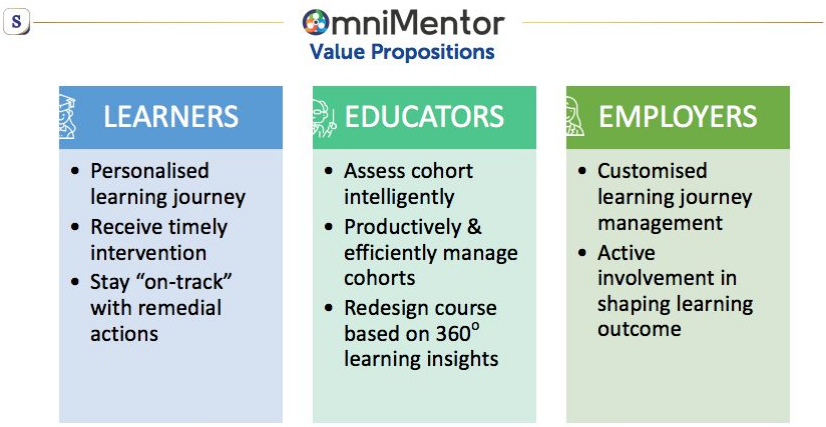
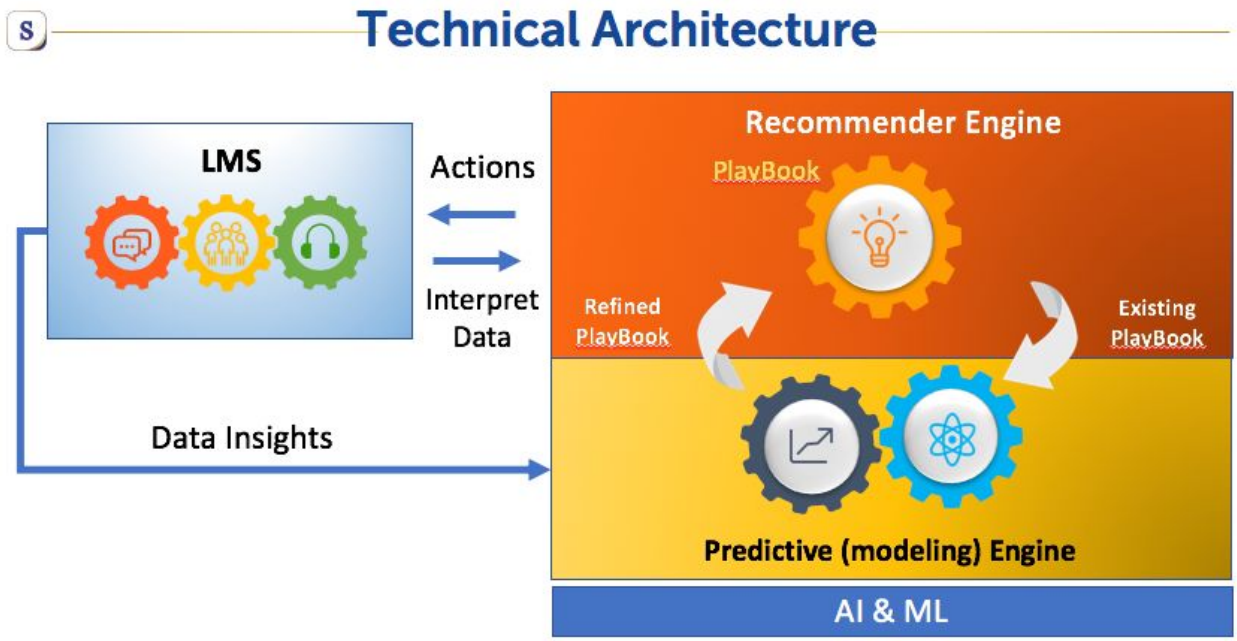


Gradually, this is expected to enhance the learner's outcome leading to quicker and faster adaptation of the skills for the digital world that we live in.

The underlying high level Architecture of *OmniMentor* is shown below.



Data (both engagement and performance) from the LMS is fed into the Recommendation Engine which "picks" the appropriate PlayBook and starts the learner engagement with remedial actions. As the learner follows the action via the playbook, the progress data is updated in the LMS.

The Predictive Engine "learns" from the updated data from the LMS and assesses the PlayBook's effectiveness for improvement areas. Using Machine Learning techniques, the Playbook is continuously enhanced.