STUDENT PERFORMANCE PREDICTION AND ACTION (SPPA)

USER GUIDE

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Student Performance Prediction and Action (SPPA)

I. INTRODUCTION:

The Student Performance Prediction and Action (SPPA) is an innovative educational tool designed to enhance teaching and learning through predictive analytics and personalised interventions. It utilises advanced predictive models to predict student performance and provide risk levels, allowing for early, tailored interventions. SPPA's unique blend of technology and pedagogical principles facilitates a proactive teaching approach and fosters an engaged learning environment.

SPPA enables instructors to map Course Learning Outcomes (CLOs), Assessment Tasks (ATs), and Teaching and Learning Activities (TLAs) while providing a platform for direct communication with at-risk students. SPPA provides Learning Analytics (LA) dashboards for instructors, which illustrates students overall performance in their courses, and LA dashboards for students, which allows students to track their performance progress and have personalised feedback and suggested revision plan. A distinguishing feature of SPPA is its iterative nature, allowing for continuous improvement through its course evaluation phase that uses data visualisations and reports to provide insightful comparisons between current and past course iterations.

SPPA encompasses six key technological artefacts (see Figure 1), which are Student Performance Prediction Module, Learning Analytics Dashboards (LADs) for instructors and students (Academic Dashboard, Student Dashboard and Course Evaluation Dashboard), an LA tool for providing personalised feedback and communication by instructors for at-risk. These elements collectively aim to enhance both course delivery and student learning outcomes. These technological artefacts and features collectively aim to enhance both course delivery and student learning outcomes.

This user manual serves as a comprehensive guide for users of SPPA, detailing each of these technological components and their associated features. It provides a step-by-step walkthrough on how to effectively utilize the system, ensuring users are able to make the most of SPPA's transformative potential in enhancing the teaching and learning experience.

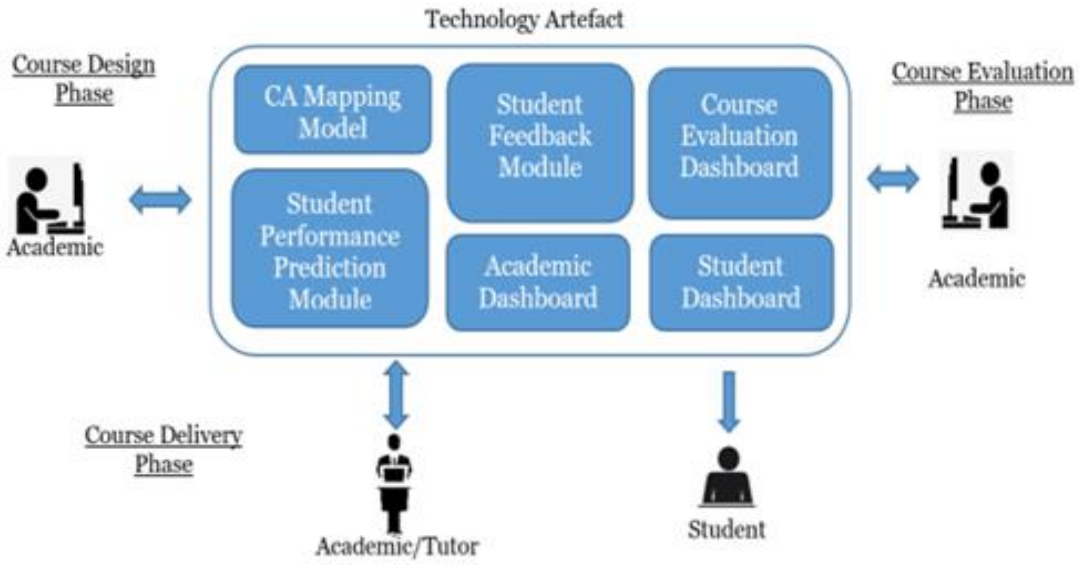

Figure. 1. Technology artefacts of the proposed framework

The use case diagram depicted in Figure 2 delineates the primary functions of the SPPA framework. There are two primary user types in SPPA: Instructors and Students. SPPA's primary objective is to empower instructors with the tools necessary to design, develop, and deliver learning analytics interventions in their courses, resulting in a majority of its functionality being oriented towards instructors.

Students interact with SPPA mainly through the Student Dashboard, which is enabled by instructors. This dashboard serves as an informative platform for students, providing vital information about their progress, potential risk levels, and offering personalized revision plans to improve performance on assessment tasks. The underlying aim of this feature is to foster self-regulated learning among students, encouraging them to take charge of their own educational journey.

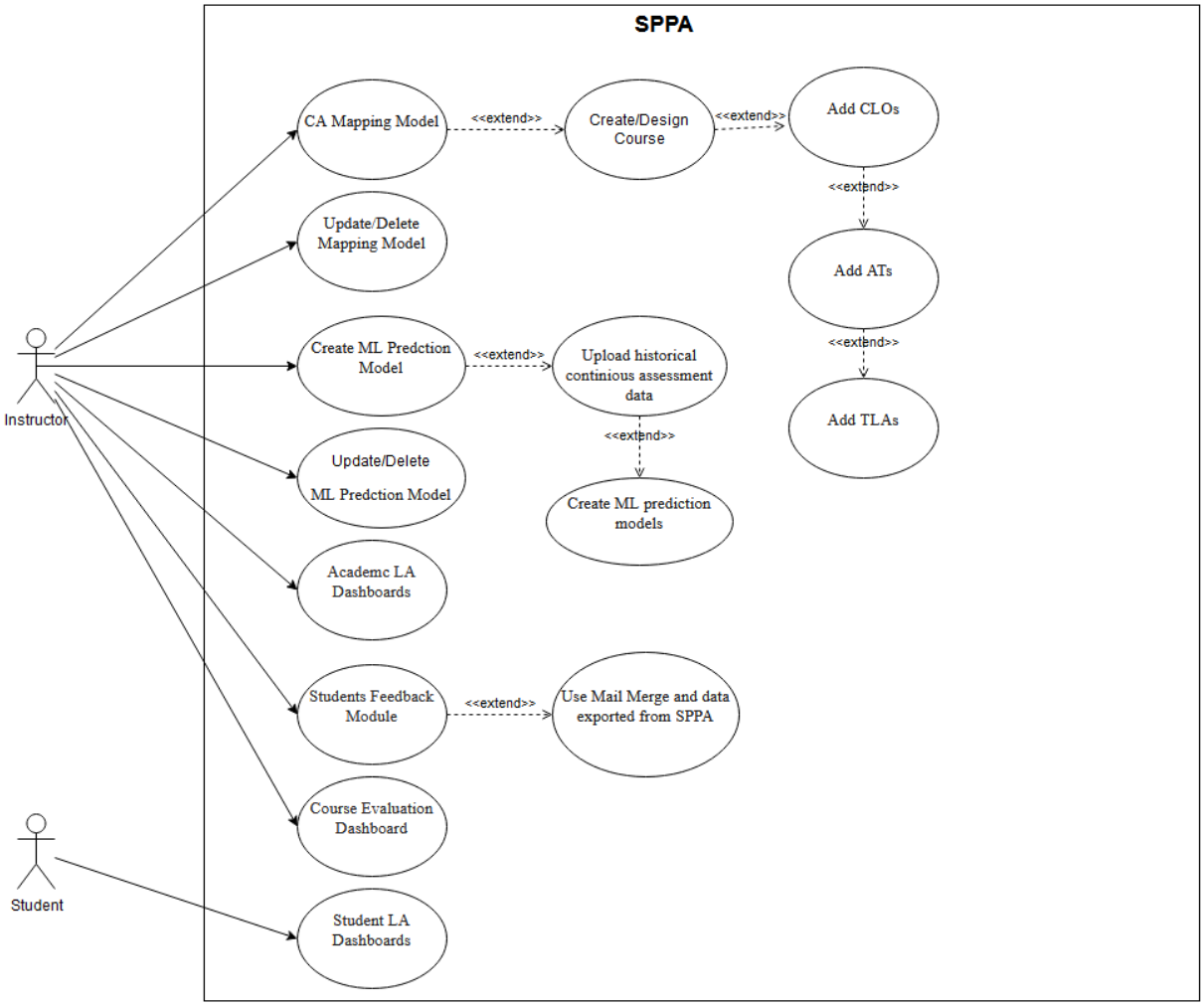

Figure 2: A Use case diagram illustrating the technological artefacts.

The instructor has many features, which includes:

- The *CA Mapping Model* which is used in the Course Design phase to map Course Learning Outcomes (CLOs) with Assessment Tasks (ATs) and Teaching and Learning Activities (TLAs). The CA Mapping Model follows the principles of Constructive Alignment, a well-known and accepted principle in designing courses. As discussed in Chapter 3, the CA Mapping Model is used to obtained study plans for ATs and in Course Evaluation phase.
- The *Student Performance Prediction Module* in SPPA utilises well-known Machine Learning algorithms to generate prediction models of student performance - both binary and multiclass classification models after each continuous assessments. Instructors upload historical continuous assessment data for the course, which then enable instructors to create ML predictive models.

- The *Academic Dashboard Module* provides a visual representation of the student's performance data. Instructors can access real-time information and derive meaningful insights from the various descriptive charts based on continuous assessments and prediction results. This facilitates informed decision-making for targeted LA interventions.
- The *Students Feedback Module* allows instructors to send personalised communication to groups of students via email for instructor-led interventions. Also, this module produces the revision plans for ATs that instructor can enable to be shown for students in the Student Dashboards or attach to personalised communication.
- The *Student Dashboard Module* is designed to help students track their own progress. With various descriptive charts showing students' performance on continuous assessments, it provides real-time, personalised feedback and a customised revision plan.
- The *Course Evaluation Dashboard* offers an analytical view of the overall course performance. It provides crucial reports and visualisations on the course and students' performance on assessment performance and intervention effectiveness, which can be used for course refinement in subsequent iterations.

II. SPPA'S TECHNOLOGICAL ARTEFACTS AND FEATURES

The SPPA has been designed as a web-based application to offer convenient access for both instructors and students via any standard web browser. You can access SPPA by visiting the following link: https://studentprediction.pythonanywhere.com/login. Users of SPPA can sign in using their login credentials (username and password), as shown in Figure 3.

Upon logging in, several features become available, as displayed in the left-side menu (Figure 4). These features are divided into three main sections: Course Design, Prediction Model, and Dashboards.

In the Course Design section, instructors have the ability to create courses, add Course Learning Outcomes (CLOs), Assessment Tasks (ATs), and Teaching and Learning Activities (TLAs) for their courses, update the revision plan and the courses' CLOs, ATs, and TLAs, and visualize the mapping model.

The Prediction Model section enables instructors to upload historical assessment data for generating Machine Learning (ML) prediction models, create and manage prediction models, and run predictions throughout the term.

The Dashboards section facilitates access to the instructors' and students' dashboards, and allows the uploading of intervention data to the system. It also provides access to the Mail Merge data, which includes prediction results, student, and assessment data that are needed for LA interventions, and the Final Course Reports.

Please note that the main menu for students only contains one feature, the Student Dashboard, where students can monitor their performance progress in their respective courses.

The next section will offer further detail on each of these features.

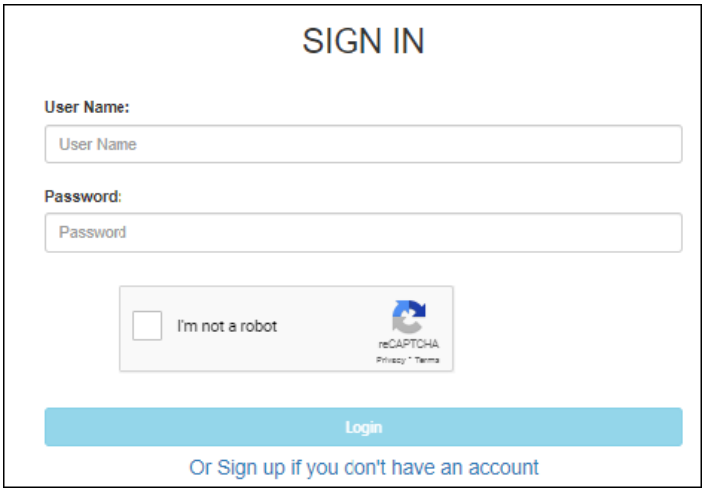

Figure 3 SPPA's login page

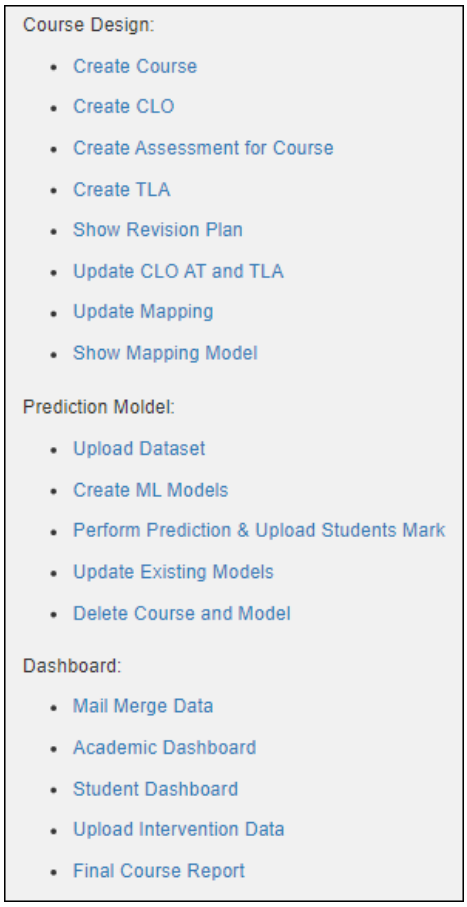

Figure 4 SPPA's features available for instructors

A. Course Design (CA Mapping Model)

The course design feature allows instructors to create and achieve *CA Mapping Model. T*he *CA Mapping Model* equips instructors with the capability to design their courses according to Biggs's Constructive Alignment (Biggs, 1999), generating a detailed and personalised revision plan uniquely customised for each student based on their continuous assessment performance. The workflow of this module within the SPPA framework, which enables instructors to establish a CA mapping model, is depicted in Figure 5. The *CA Mapping Model* encompasses several functionalities, including creating/designing courses, adding CLOs, ATs, and TLAs to a courses, generating revision plan, updating CLOs, ATs, and TLAs, updating the CA Mapping Model, and displaying the CA Mapping Model.

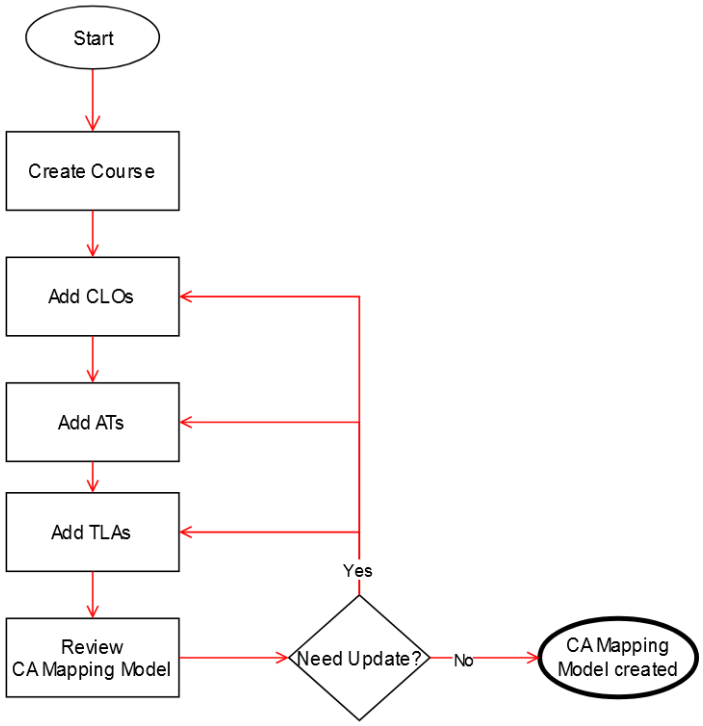

Figure 5: CA Mapping Model workflow

Instructors initiate the process by adding their courses to the system, inputting crucial course details, such as the course name, course ID, and course description (refer to Figure 6). Following this, instructors utilize a template designed with Biggs's Constructive Alignment to fill in the CLOs, TLAs, and ATs for their courses to facilitate the creation of the CA Mapping Model (an example is provided in Table 1).

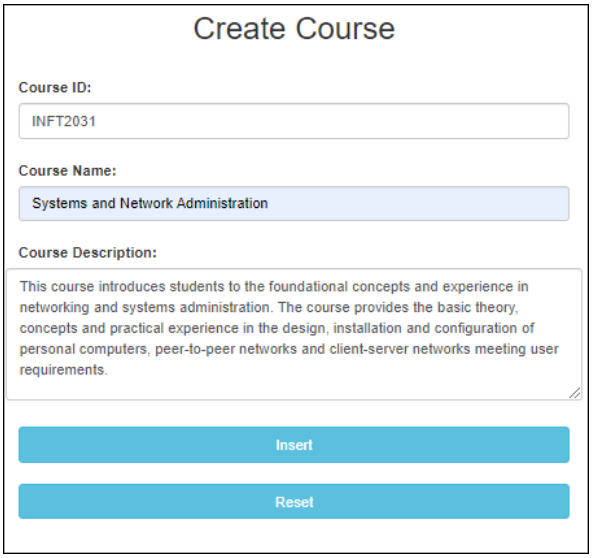

Figure 6: create/design a course

Table 6.1 CA template for a course

Course: Course A		
Course Learning Outcomes	**Assessment Tasks**	**Teaching and Learning Activities**
CLO1: Design and configure peer-to-peer networks to share resources		
CLO1a: Design a peer-to-peer networks to share resources	• Practical Test 1 – Design Task • Final Exam	• Lectures 1 – 4 • Network design exercise in class (Absolute Cleaning)
CLO1b:Configure a peer-to-peer networks to share resources	• Practical Test 1 – Practical Task	• Labs 1 – 3 • Practice Practical Test 1
…		

The system allows instructors to add the CLOs first (see Figure 7), followed by ATs, and then the TLAs. While adding assessments to a course, instructors add assessment details (for instance, assessment name, assessment marked out of, etc.) and align each assessment to specific CLOs by choosing the relevant CLOs. Thus, each assessment is mapped to one or more CLOs (see Figure 8).

Similarly, when incorporating a TLA, instructors insert TLA details and select the associated CLOs and ATs that align with the TLA (see example in Figure 9). This procedure results in a CA Mapping Model for a course, correlating each CLO with relevant TLAs and ATs and vice versa.

Furthermore, the CA Mapping Model activity gives instructors the ability to view the results of the CA mapping model (an example is provided in Figure 10), as well as update the mapping, CLOs, ATs, or TLAs as necessary (see example in Figure 11).

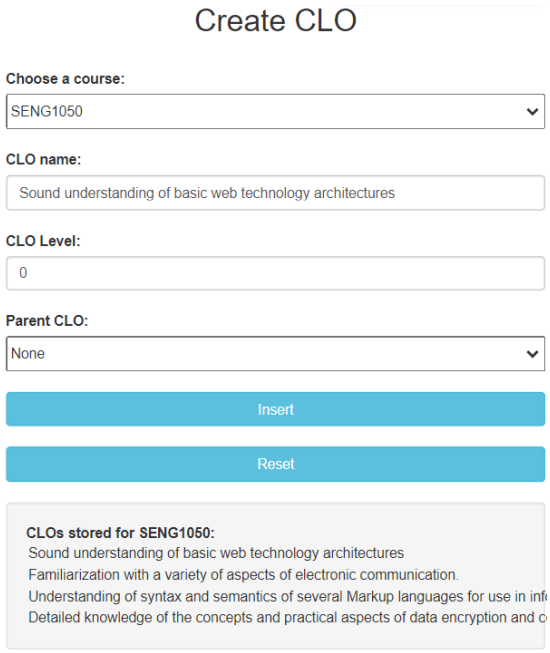

Figure 7 Adding CLOs to a course

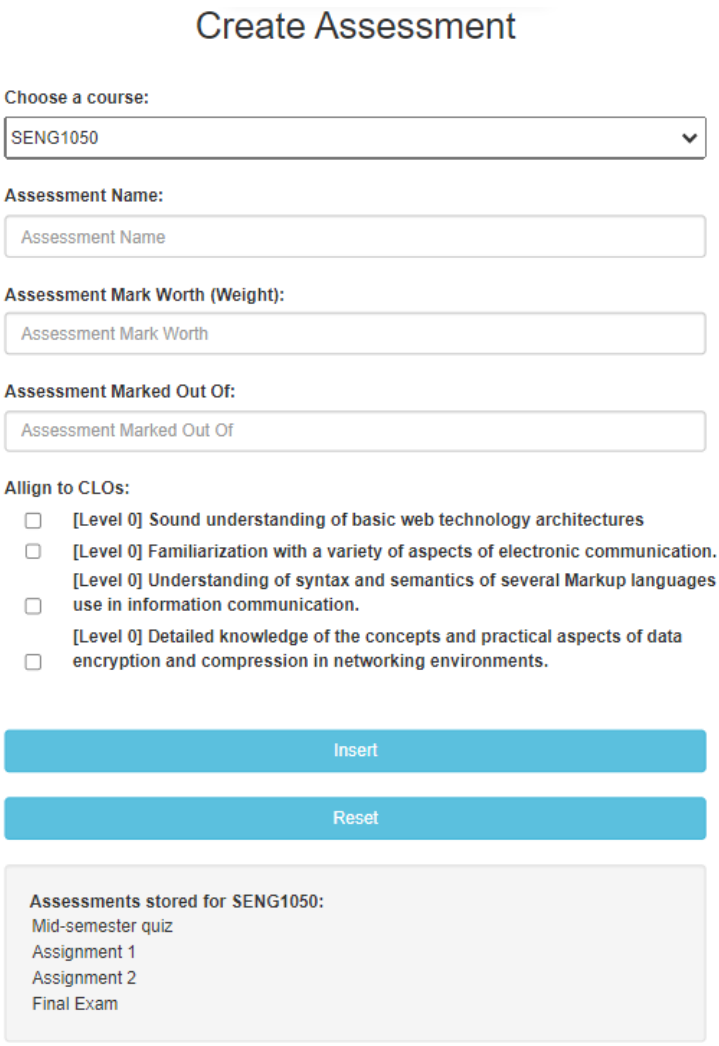

Figure 8 Adding ATs to a course

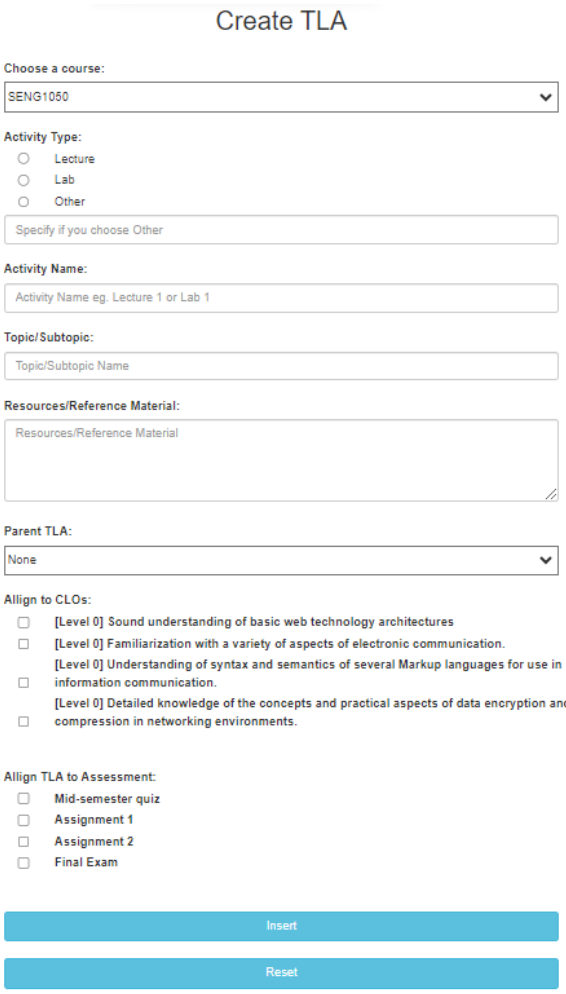

Figure 9 Adding TLAs to a course

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Assessment Name	Activities Type	Activities Topic	Activities Name	Activities Resources
Practical Test 1 - Design Task	Hands-on Activity	Configuring P2P networks	Getting the Job Done 3	- Activity 1.9: Configuring P2P in Windows -
Practical Test 1 - Design Task	Quiz	P2P and Client-Server Networks	Charity Quiz Night 1	Module 1 Resource Document - Section 3.1 Peer
Practical Test 1 - Design Task	Hands-on Activity	Installing and Configuring VMs	Getting the Job Done 1	- Activity 1.3: Familiarising lab environment
Practical Test 1 - Design Task	Activities	Network Addresses	Client Support 2 - Absolute Cleaning	Module 1 Resource Document - Section 2.2.2 Ad
Practical Test 1 - Practical Task	Quiz	P2P and Client-Server Networks	Charity Quiz Night 1	Module 1 Resource Document - Section 3.1 Peer
Practical Test 1 - Practical Task	Hands-on Activity	Configuring P2P networks	Getting the Job Done 3	- Activity 1.9: Configuring P2P in Windows -
Practical Test 1 - Practical Task	Hands-on Activity	Installing and Configuring VMs	Getting the Job Done 1	- Activity 1.3: Familiarising lab environment
Practical Test 1 - Practical Task	Activities	Network Addresses	Client Support 2 - Absolute Cleaning	Module 1 Resource Document - Section 2.2.2 Ad
Module 1 - Weekly Tasks	Crossword Puzzle	Networking Fundamentals	Taking a Break 1	Module 1's Resource Document - Section 1.3 Ne
Module 1 - Weekly Tasks	Quiz	P2P and Client-Server Networks	Charity Quiz Night 1	Module 1 Resource Document - Section 3.1 Peer
Module 1 - Weekly Tasks	Hands-on Activity	Configuring P2P networks	Getting the Job Done 3	- Activity 1.9: Configuring P2P in Windows -
Module 1 - Weekly Tasks	Response	OSI Model and TCP/IP Protocol Stack	How do they compare?	Module 1 Resource Document - Section 2.2 TCP/

Figure 10 CA Mapping Model

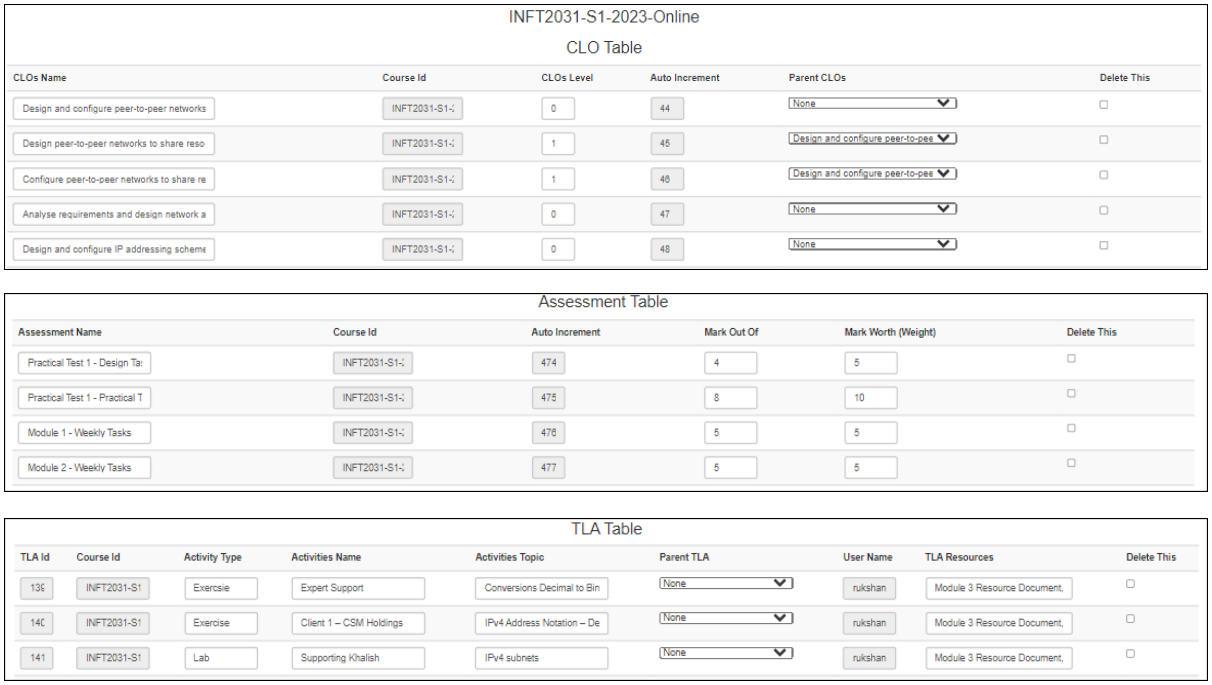


Figure 11 updating CLOs, ATs, and TLAs of a course

B. Prediction Model (Student Performance Prediction Module)

This feature allows instructors to (i.) create ML prediction models using historical assessments data of their courses and (ii.) perform predictions during the term.

1) Creating Prediction Models

The workflow for creating prediction models is shown in Figure 12. The first process in creating a prediction model is to upload the historic continuous assessment data sets. The format of the data to be uploaded is depicted in Figure 13. The first three rows specify the meta-data: the first row contains the names of the assessment, final exam, total mark (out of 100) and the grade. The second row contains marks out of for each continuous assessment while the weight for each continuous assessment is specified in the third row. Next, each row specifies marks a student has obtained for each continuous assessment including the final mark and the grade. The file needs to be in comma-separated values (CSV) format. The format of the data is kept as simplistic as possible for instructors to upload historical cohort data.

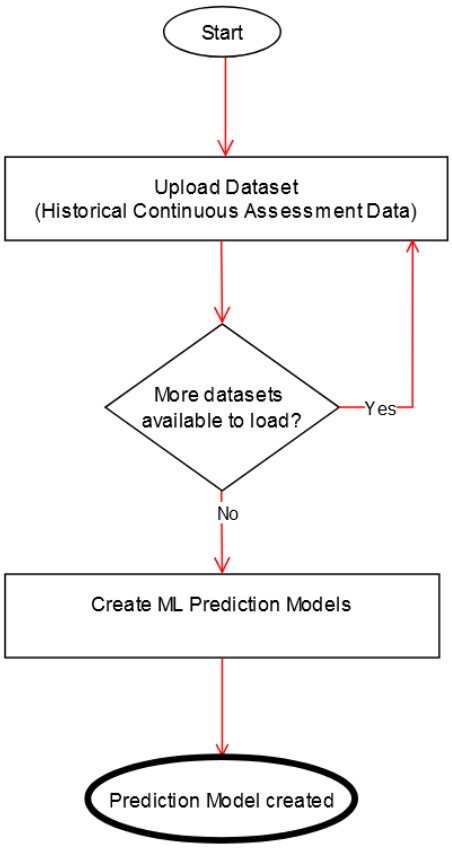


Figure 12 Create Prediction Models workflow

	A	B	C	D	E	F	G
1	PracticalTest 1	Assignment 1	Assignment 2	PracticalTest 2	Final Exam	Total (out of 100)	Grade
2	50	20	25	50	80		
3	20	10	10	20	40		
4	47.5	14	25	48.75	69.6	90	HD
5	42.5	19	17.5	16.25	46	63	P
6	37.5	18	15	43.75	43.6	69	C
7	40	12	12.5	43.75	42.4	66	C
8	43.75	18	22.5	48.125	56.4	83	D

Assessment's Title

Assessment's Marked out of

Assessment's Weight (% out of 100)

Figure 13 Format to load dataset

Figure 14 presents the steps process of uploading dataset. First, the course is selected, along with the historical cohort information. The format required is displayed along with the existing number of records already uploaded. Once the data is uploaded and the prediction model is ready to be created.

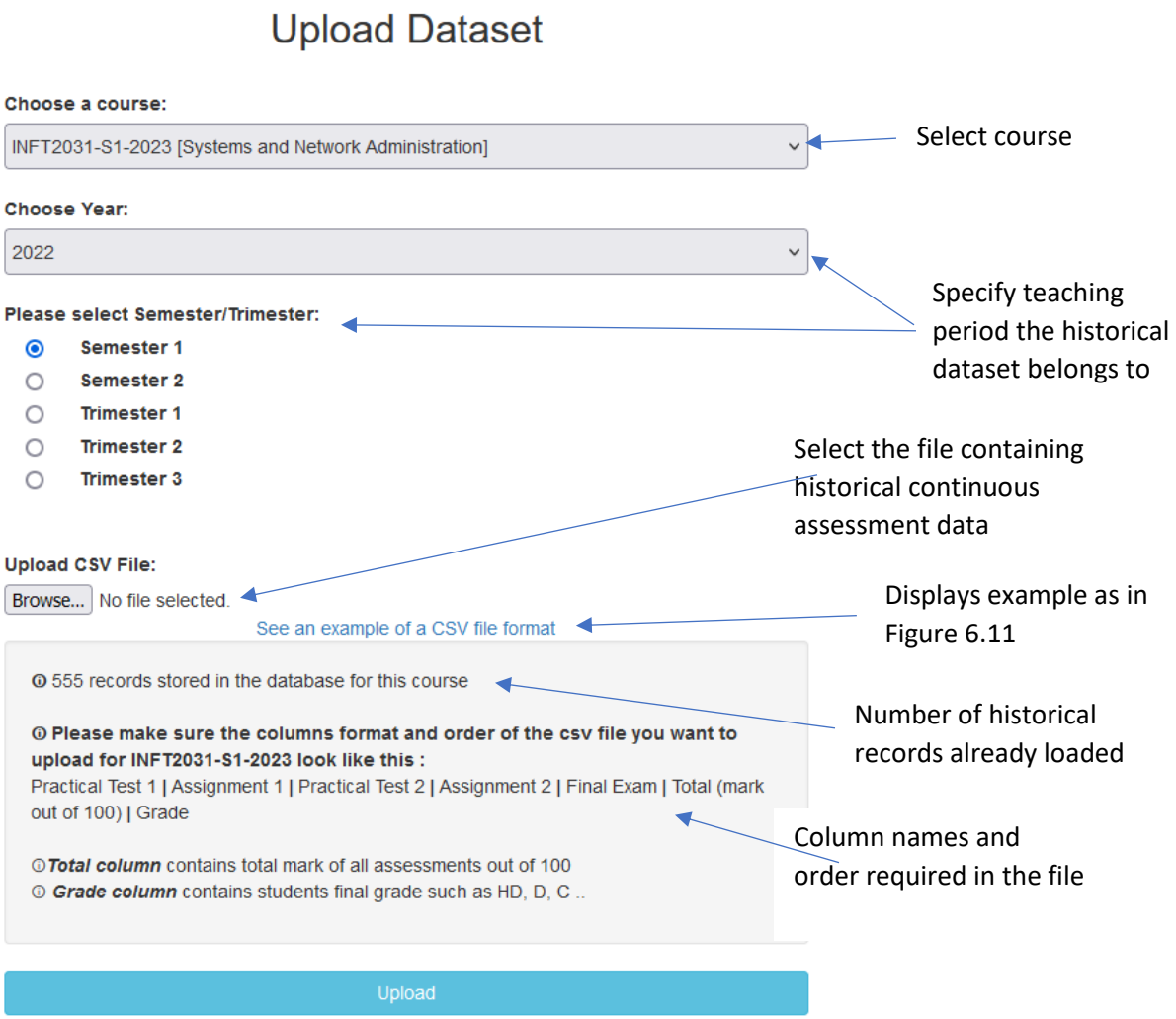


Figure 14 Uploading dataset design in SPPA

After uploading the dataset to SPPA, instructors can readily develop the ML prediction models with a straightforward click of a button (see Figure 15). This process, spanning a few minutes, results in the creation of five binary classification models and five multiclass classification models (see Figure 16).

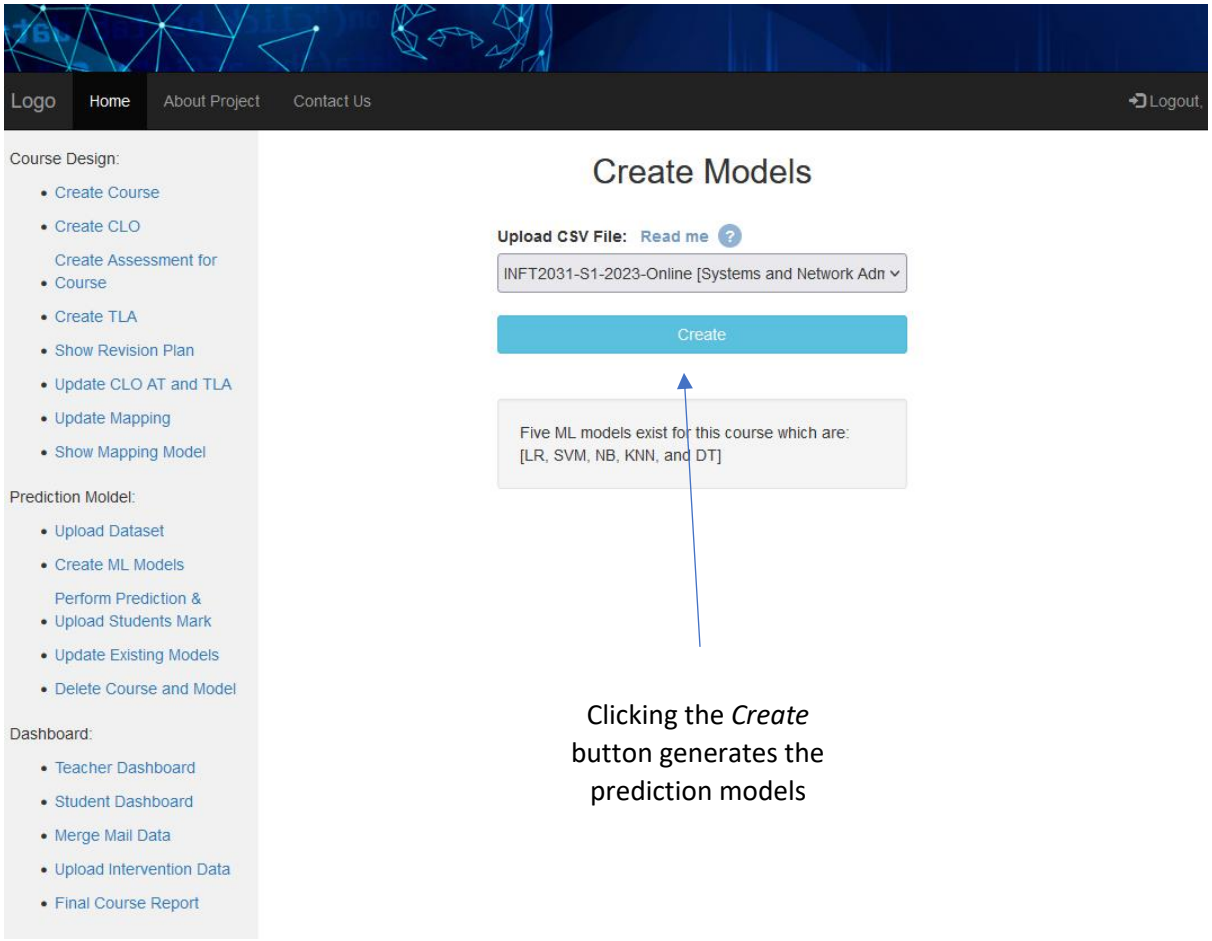


Figure 15 Create ML prediction models

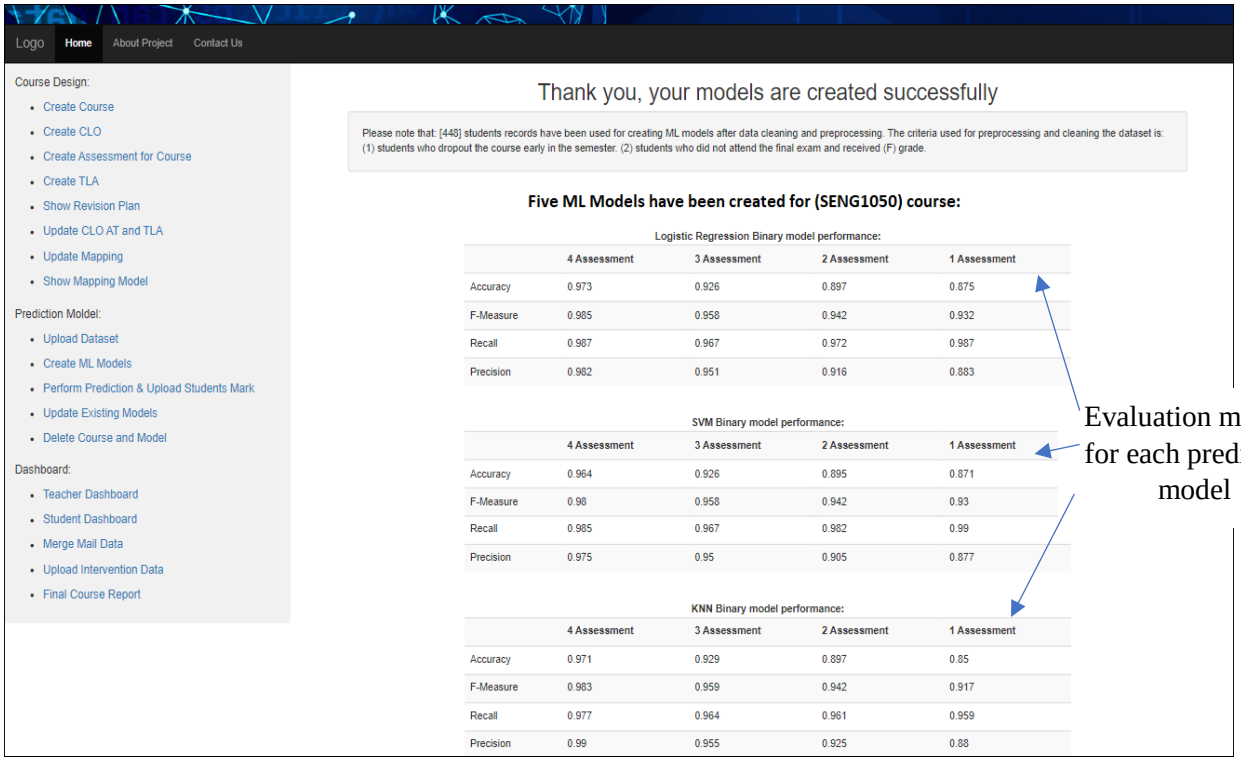


Figure 16 ML prediction models created

The prediction model creation process creates predictive models after each continuous assessment using five well-known ML algorithms: Logistic Regression, Support Vector Machine, Decision Trees, K-Nearest Neighbor, and Naïve Bayes.

The evaluation metrics for each predictive model are displayed after generating them (see Figure 16). However, instructors can ignore this information as SPPA framework, by default, selects the best prediction model based on the highest accuracy results first, then F-measure, recall and precision lastly for each continuous assessment durnig prediction. Thus, instructors do not need to have any knowledge on ML predictive models or their evaluation metrics to use them. Of course, if there are instructors with expert ML knowledge and would like to manually select a predictive model to use, they are able to do so.

Other workflows include updating existing ML prediction models for a course by introducing additional datasets, such as in subsequent offerings of a course (see Figure 17). Updating an existing prediction model for a course requires uploading new data sets for the course resulting in generating new prediction models for the course.

SPPA also enables instructors with the option to delete their courses and Machine Learning (ML) models, should they choose to do so. This can be accomplished via the 'Delete Course and Model'

feature, which can be located in the left-side menu as illustrated in Figure 18. Instructors merely need to select the course they wish to delete and then click on the 'Delete' button.

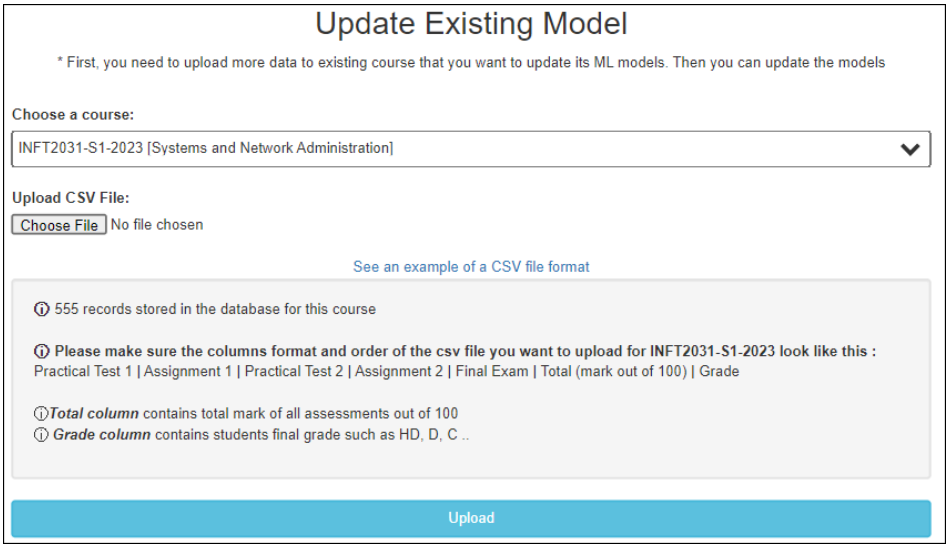


Figure 17 Updating existing ML predictive models

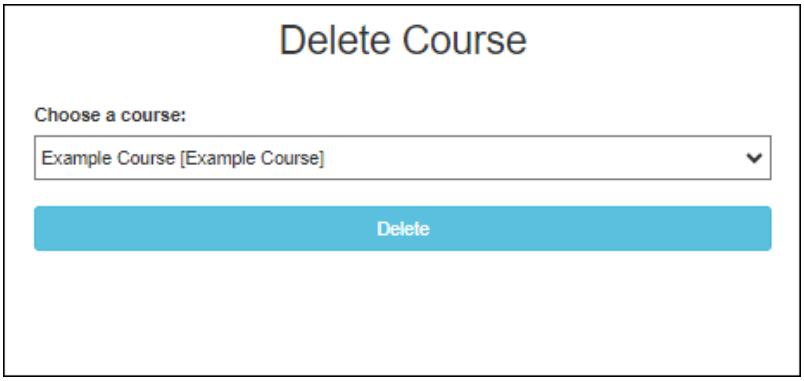


Figure 18 Deleting course and predictive models in SPPA

2) Performing Predictions

During the Course Delivery phase, the 'Perform Prediction' feature allows instructors to carry out performance predictions after each continuous assessment or as required. The workflow of perform predictions feature is shown in Figure 19. The instructor loads continuous assessment data of the current cohort with the assessment data to perform the predictions. The format of the data to be uploaded is depicted in Figure 20. The first three rows specify the meta-data: the first row contains the names of student, student id and names of any continuous assessments which have been graded so far. The second row contains marks out of for the continuous assessments while the weight for the continuous assessments is specified in the third row. The file needs to be in CSV format.

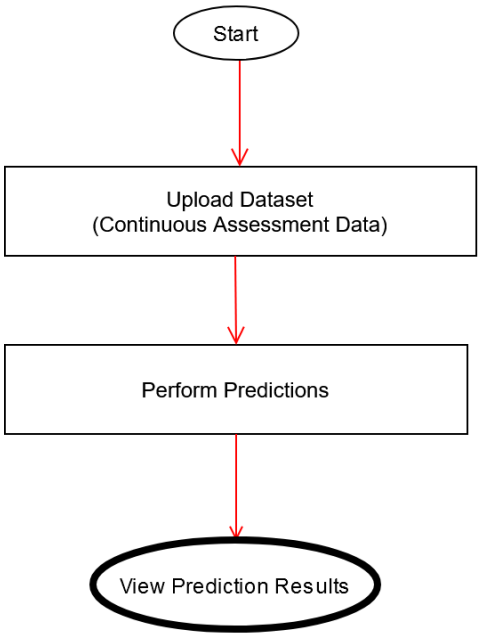
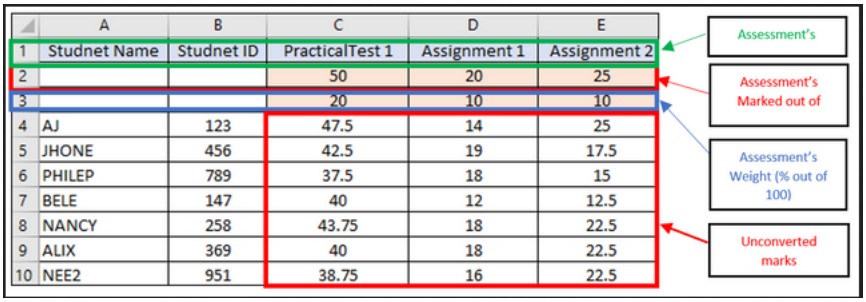


Figure 19 Performing prediction Workflow



	A	B	C	D	E
1	Studnet Name	Studnet ID	PracticalTest 1	Assignment 1	Assignment 2
2			50	20	25
3			20	10	10
4	AJ	123	47.5	14	25
5	JHONE	456	42.5	19	17.5
6	PHILEP	789	37.5	18	15
7	BELE	147	40	12	12.5
8	NANCY	258	43.75	18	22.5
9	ALIX	369	40	18	22.5
10	NEE2	951	38.75	16	22.5

Figure 20 Format of data to be uploaded to perform prediction

The user interfaces to perform predictions and show results are shown in Figure 21 (a.). The current cohort's continuous assessment data needs to be uploaded in a CSV format shown in Figure 20. Once the file is selected and "Submit" button is pressed, the prediction models are run and the results displayed (see Figure 21 (b.) and (c.)). These results can be exported either is CSV or PDF formats. Exported prediction results in CSV formats are used in the *Student Feedback Module* during LA interventions.

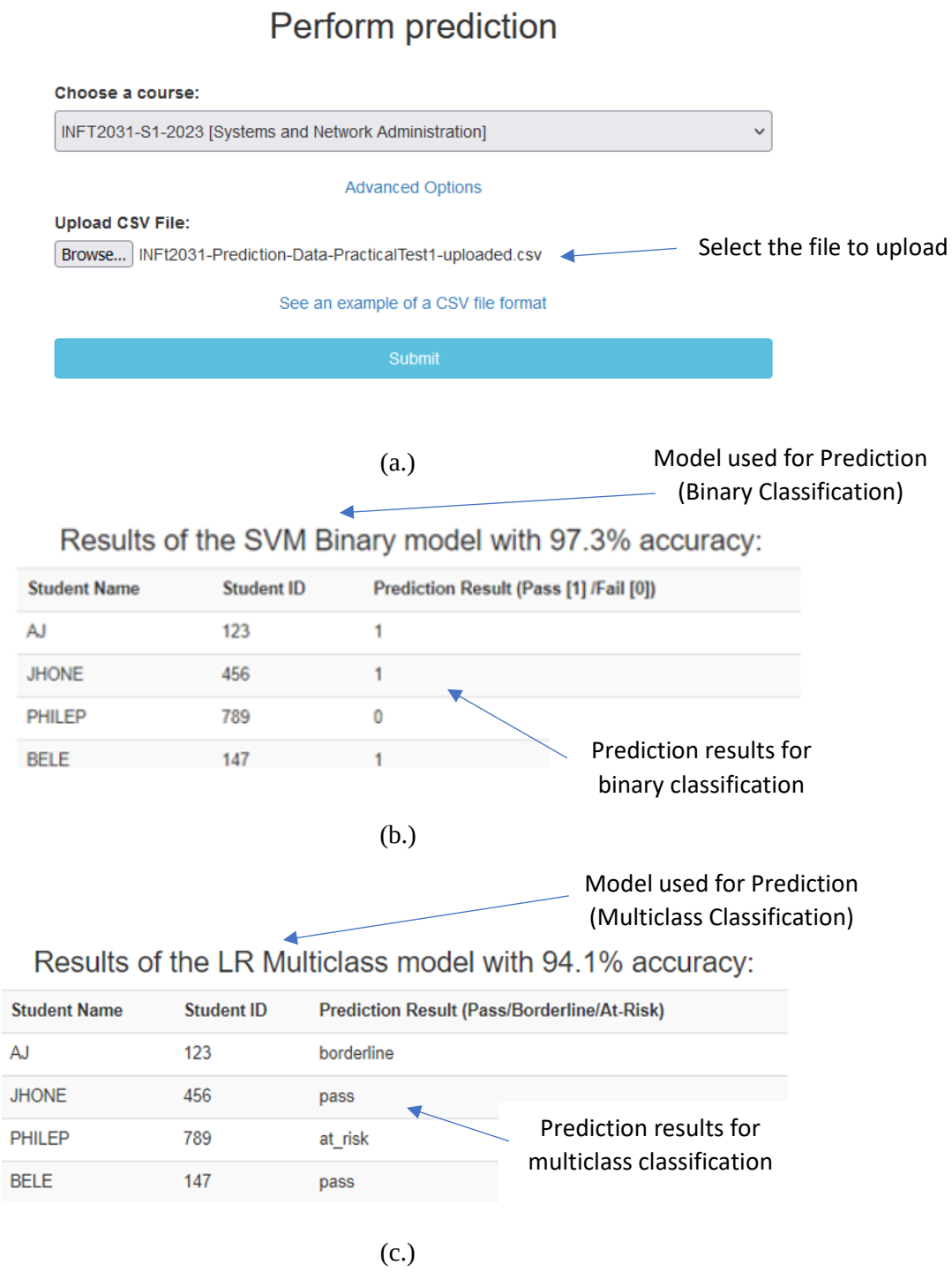


Figure 21 (a.) Interface used for performing predictions; (b.) Results for binary classification prediction models; (c.) Results for multiclass classification prediction models

This feature facilitates the identification of students at risk of failing a course, facilitating instructors to provide timely interventions (see Figure 19 for the process). Performance prediction can be enacted anytime during the course, even following the release of the first continuous assessment

results. Figure 21 (b.) and (c.) presents an example of the metrics yielded by the predictive models. Instructors can export prediction results along with student and assessment details into MS Excel sheets for subsequent use in the *Student Feedback Module* for LA interventions.

C. Dashboards

This section contains five features: 1) Merge Mail Data 2) Academic Dashboard, 3) Student Dashboard, 4) Upload Intervention Data, and 5) Final Course Report.

1) Merge Mail Data (Student Feedback Module)

SPPA allows instructors to provide personalised feedback. Pardo et al. (2018)'s OnTask provides an architecture where data from multiple sources are integrated to create a single large student information table. Next, rules are used by the instructors to select groups of students for personalised email interventions. SPPA incorporates this idea to enable personalised email interventions. Data is collected from the class list, assessment data and prediction results. These data sets are integrated to a single Student Table. In SPPA, the student table is exported as an Excel file. Next, filters can be used to select student groups by instructors for personalised interventions and emails are generated using Mail Merge in Microsoft Word. Instructors are encouraged to follow the model for effective feedback Hattie and Timperley (2007) in generating personalised emails and can attach reports from Student Dashboard (see next section). The Student Feedback Module's personalised messaging workflow is shown in Figure 22.

Instructors can access the mail merge data by selecting the "Mail Merge Data" feature and choosing their respective course as depicted in Figure 23. Figure 24 provides an example of what the Mail Merge data typically looks like. Generally, the data encompasses various student details such as their names, IDs, emails, assessment marks, and prediction results.

An example of an exported file, Mail Merge filtering process and template email are shown in Figure 25.

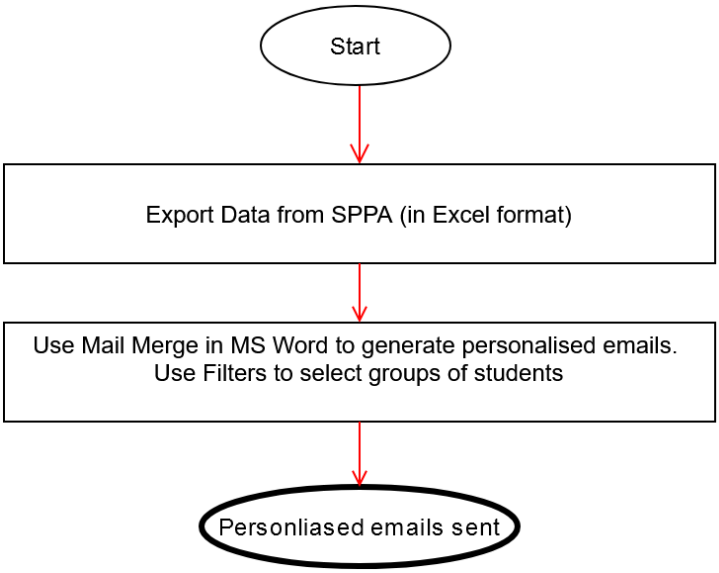


Figure 22 Students Feedback Module workflow

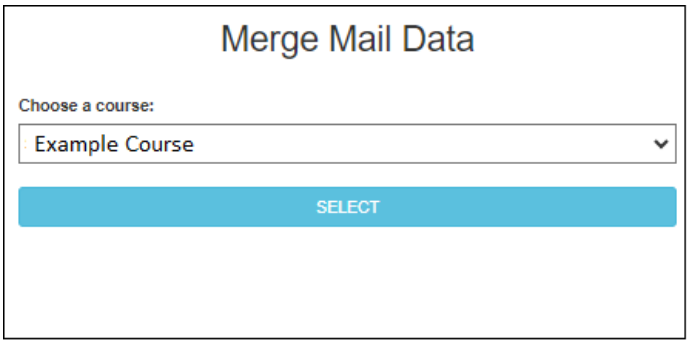


Figure 23 Mail Merge Data feature

Example Course

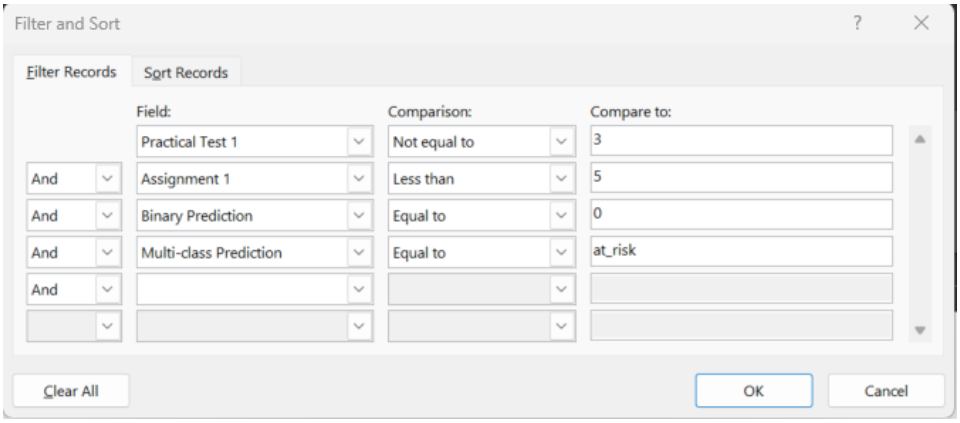
Export Excel

#	Student Name	Student ID	Student Email	Mid-semester quiz Mark	Binary Prediction Results (Mid-semester quiz)	Multiclass Prediction Results (Mid-semester quiz)	Assignment 1 Mark	Binary Prediction Results (Assignment 1)	Multiclass Prediction Results (Assignment 1)
1	Students 1	ID3366951	ID3366951@uon.edu.au	13.4	1	pass	10.1	1	pass
2	Students 2	ID3366952	ID3366952@uon.edu.au	10.9	1	pass	5.9	1	borderline
3	Students 3	ID3366953	ID3366953@uon.edu.au	15.7	1	pass	14.8	1	pass
4	Students 4	ID3366954	ID3366954@uon.edu.au	10.2	1	pass	10.8	1	pass
5	Students 5	ID3366955	ID3366955@uon.edu.au	8.3	1	pass	2.8	0	at_risk
6	Students 6	ID3366956	ID3366956@uon.edu.au	8.2	1	pass	8.0	1	borderline
7	Students 7	ID3366957	ID3366957@uon.edu.au	0.0	0	at_risk	13.9	1	at_risk

Figure 24 example of data in Mail Merge Data

	A	B	C	D	E	F
1	Student Name	StudentID	Practical Test 1	Assignment 1	Binary Prediction	Multi-class Prediction
2	Doe, John	1234	5	8.25	1	pass
3	Mary, Anne	3456	2.5	4	1	borderline
4	Jane, Bob	3464	0	0	0	at_risk
5	Pan, Peter	6948	4	8	1	pass

(a.)



(b.)

Dear «Student_Name»,

We haven concern with your progress in the ABC course. Your continuous assessments scores (shown below) are not encouraging.

Assessment	Score
Practical Test 1	«Practical_Test_1_»
Assignment 1	«Assignment_1»

I would strongly encourage to contact me to discuss your Practical Test 1 and Assignment 1 scores as well as discuss ways to improve your performance by taking the practice test and class exercise before the next Assignment. Note that if you have valid reasons as discussed in class, you may be eligible to submit an alternate assessment task to improve your continuous assessment scores

Kind regards

Instructor/Tutor

(c.)

Figure 25. (a.) SPPA exported Student file integrating student data, assessment results and prediction results; (b.) Filters used in Mail Merge to select groups of students; (c.) A sample Mail Merge with personalisation using inserted fields (such as student name, assessment scores etc.)

2) Instructor Dashboard (Academic Dashboard Module)

The *Academic Dashboard Module* equips instructors with real-time, detailed insights regarding student performance through various types of descriptive visualizations. All charts/visualizations are informed by student performance in continuous assessments and the results from the ML performance prediction.

Instructors can access their dashboards by selecting the "Academic Dashboard" feature in the left-side menu, followed by their course of interest, as demonstrated in Figure 25.

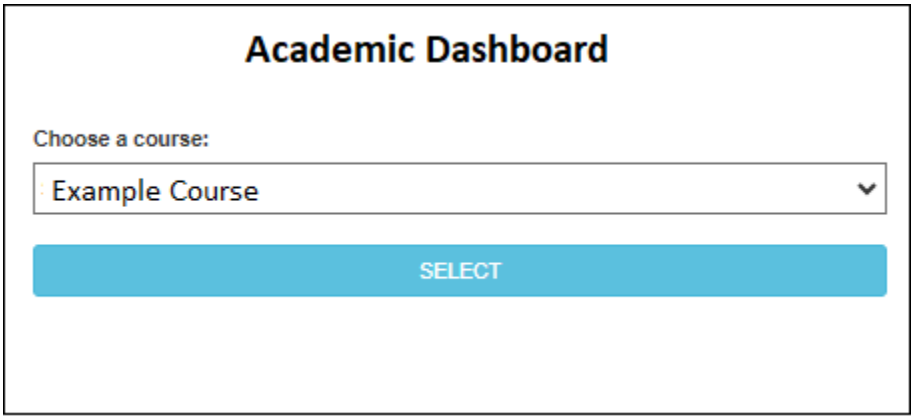


Figure 25 Academic Dashboard in SPPA

Several types of charts/visualizations, tables, and information at differing granular levels have incorporated into the academic dashboards. For the first dashboard, instructors are provided an overview of the course including all continuous assessments, which includes:

- CLOs pertaining to the current continuous assessment,
- a list of students who are at risk of failure or are borderline,
- a box-plot chart displaying student percentiles for the current assessment,
- a bar graph illustrating average class marks on each assessment, and
- a pie chart showcasing the number of students who achieved 50% or less on each assessment

Figure 26 shows an example.

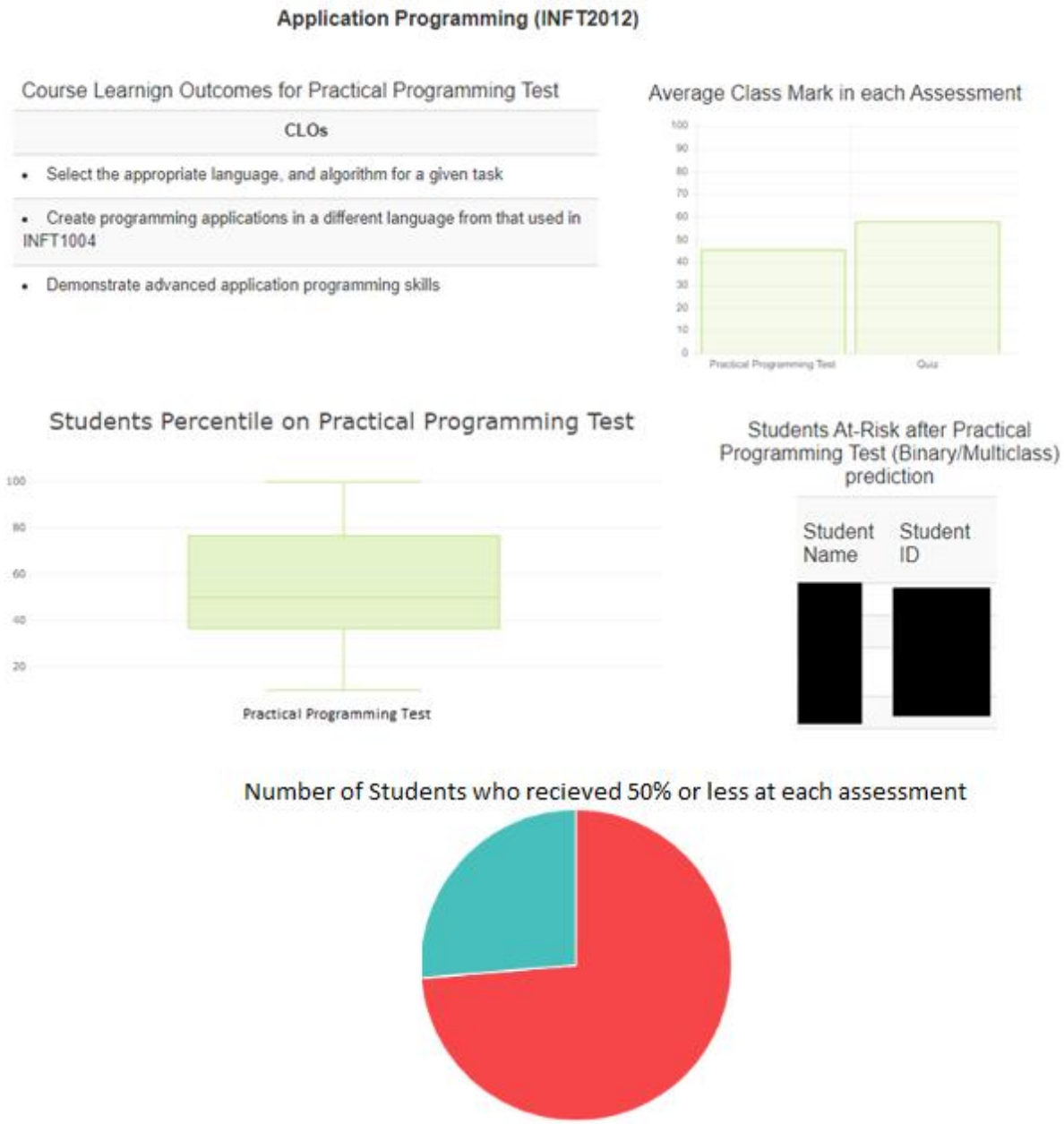


Figure 26. Academic dashboard example.

The next dashboard, which is activated when instructors select a specific continuous assessment, the *Academic Dashboard Module* provides more granular details on student performance for the selected assessment. This dashboard is designed to present the following

- CLOs for each assessment in a table format,
- a list of students at risk,
- a box-plot chart illustrating student percentiles for the selected assessment, and

- a list of students who scored 50% or less on the selected assessment

Figure 27 illustrates an example of this dashboard. It is noteworthy that SPPA's available data is limited to continuous assessment results of students. Therefore, the charts/visualizations and information presented on the LA dashboards are constrained by this dataset.

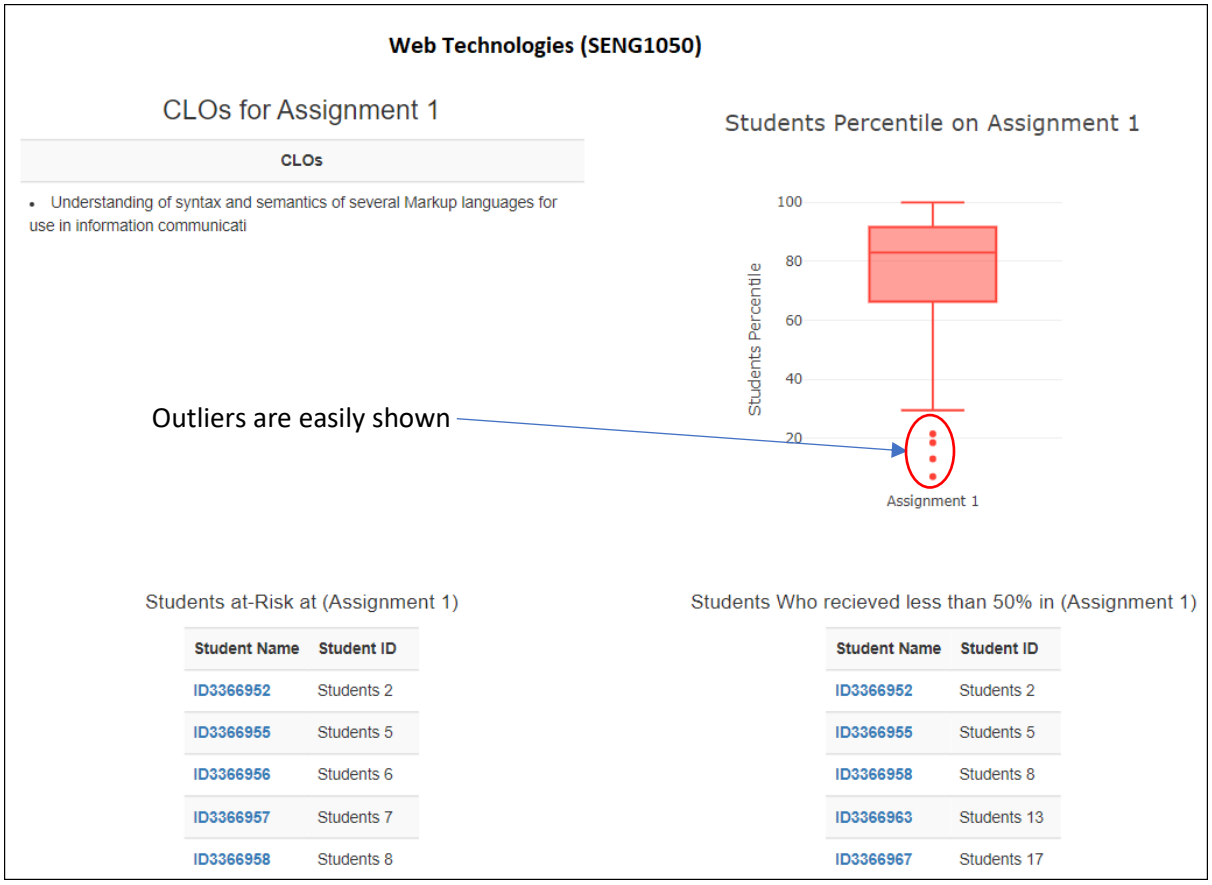


Figure 27. Example of Academic Dashboard for a selected assessment.

3) Student Dashboard (Students Dashboard Module)

In SPPA, the *Student Dashboards* are designed to provide effective feedback based on Hattie & Timperley's (2007) model for effective feedback. The CLOs for the AT are outlined (answering "*what are the goals*?"). Overall comments and marks for the assessment and detailed comments on the submission aims to answers – "*What progress is being made toward the goal*?") and finally a revision plan outlining the TLAs mapped to the assessment task aims to answer - "*What activities need to be undertaken to make better progress*?". Note that if the *CA Mapping Model* maps to specific fine granular questions/areas in the assessment task, the instructor can specify to show TLAs for only those areas that the student has performed poorly (e.g. scored < 50% for the question)

providing customised revision plans for students based on their performance in the assessment task. In SPPA, instructors have the discretion to enable the student dashboard for an assessment task.

The *Student Dashboard Module* offers students real-time information through various descriptive visualizations, aiding them in receiving personalised feedback based on their individual performance. All charts are derived from student performance on continuous assessments. A collection of charts, tables, and information are included in the student dashboards including:

- the CLOs for the current continuous assessment,
- a bar chart illustrating the student's average performance in each assessment,
- a pie chart that represents the student's marks (i.e., marks obtained, unattained, and remaining for their continuous assessments out of 100%),
- personalised messages/feedback from instructors/tutors, and
- a customised revision plan for each student, generated based on their performance on the assessment from the *CA Mapping Model*

An example is shown in Figure 28.

In the SPPA framework, instructors are given the flexibility to activate the student dashboard in their courses. This feature empowers educators to control what performance metrics and feedback are displayed, tailoring the information to the specific learning objectives of each assignment. Moreover, SPPA offers the convenient functionality for instructors to export individual student dashboards as PDF files. These files, encapsulating a snapshot of the student's performance, can then be conveniently attached to personalized emails in the *Student Feedback Module*. This provides a tangible and detailed record of student progress and individualized feedback, enhancing the communication and understanding between instructors and students.

It is important to highlight that the "Student Dashboard" feature caters to both instructors and students, albeit for different objectives and perspectives. For instructors, the dashboard serves as a useful tool for generating individual student performance reports downloadable as PDFs. These reports can then be incorporated as supportive evidence in personalized email interventions, as illustrated in Figure 29. From the students' standpoint, the dashboard provides an intuitive interface to monitor their academic progress in their respective courses, as demonstrated in Figure 28.

Systems and Network Administration (INFT2031-S1-2022)

Student: [redacted]

Assignment 2

What are the goals?

Course Learning Outcomes (CLOs) for the Assignment 2 are:

- a. Design a client-server network and required network services for a given scenario

Your Assessments Grades

Your Achieved/Unachieved (Lost)/Remaining Marks out of 100%

Achieved	Unachieved (Lost)	Remaining
47.9	12.1	40.0

How am I going?

Your mark in Assignment 2: 7.5/10.0 (75.0%)

Tutor Comments:

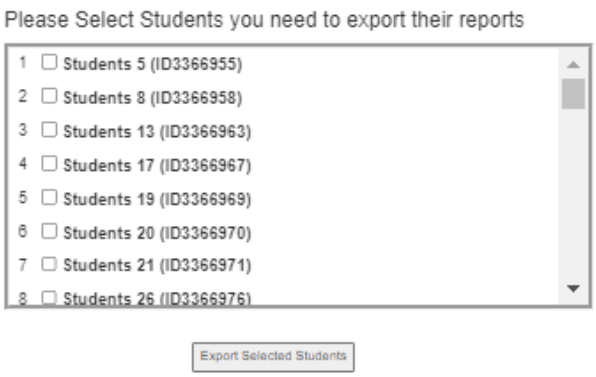
Please see further comments on Canvas. You don't demonstrates an understanding of IPv4 addressing. Review IPv4 addressing and address allocation schemes.

How to improve?

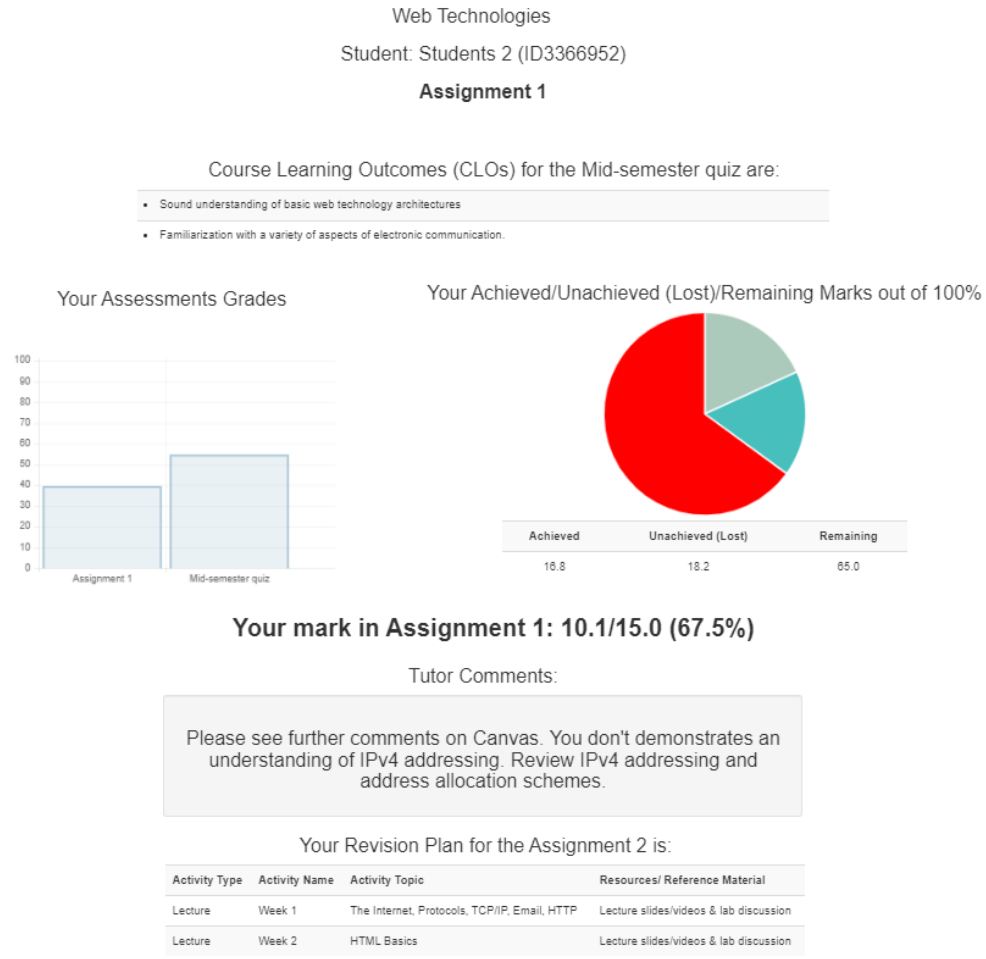
Your Revision Plan for the Assignment 2 is:

Activity Type	Activity Name	Activity Topic
Lecture	Lecture 6	Network Operating System, DNS
Lecture	Lecture 8	Active Directory
Review Exercises	Lab 5 Review Exercises	NOS, DNS
Lab	Lab 6	Installing Windows Server 2019, Unix commands and Windows Powershell

Figure 28 A sample student dashboard in SPPA



(a.)



(b.)

Figure 29 Students Dashboards in instructor side (a.) SPPA allows instructors export students' reports as PDF. (b.) Exported example of a student's report.

4) Upload Intervention Data

This feature enables instructors to upload intervention data into the system, which is subsequently utilized in the Final Course Report (*Course Evaluation Dashboard Module*). This intervention data provides valuable insights into the impact of the implemented interventions on students throughout the term and their eventual outcomes at the course's end.

Instructors can access this feature by navigating to "Upload Intervention Data" from the menu on the left side and selecting the relevant course, as depicted in Figure 30. The process of uploading the intervention data to the system is illustrated in Figure 31. Essentially, instructors select a course and the assessments on which interventions were implemented. The intervention data, a CSV file comprising the names and IDs of students who were intervened, is then uploaded.

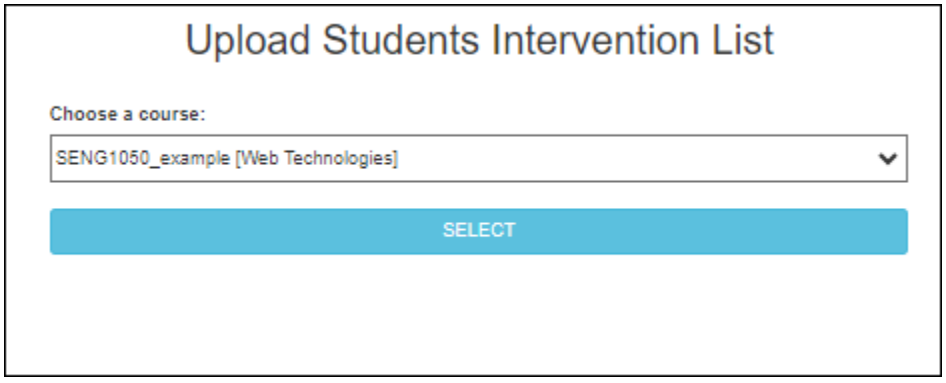


Figure 30

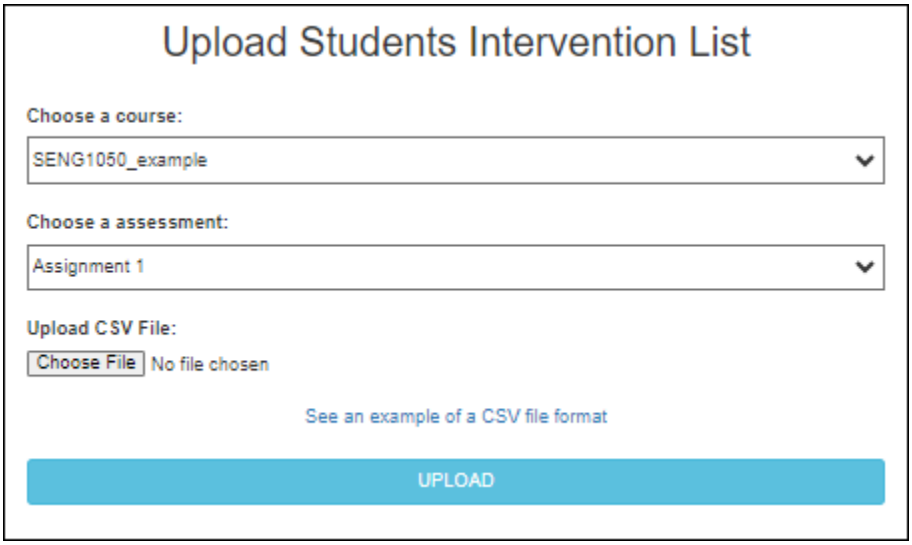


Figure 31

5) Final Course Report (Course Evaluation Dashboard Module)

The objective of the *Course Evaluation Dashboard* is to assess the effectiveness of a course iteration and offer insights that could potentially enhance course design (i.e., restructure/redesign CLOs, ATs, or TLAs) based on the lessons learned from previous iterations. Instructors can access this feature by navigating to "Final Course Report" from the menu on the left side and selecting the relevant course.

A list of visualizations and reports are included in the *Course Evaluation Dashboard*. These include:

- The *Overall Course Performance* report allows comparison of key metrics such as pass rates, fail rates, withdrawal rates, and average final grades with those of previous course iterations (see Figure 32).
- The *Course Assessment Performance* report depicts the average grade for each assessment, facilitating a comparative analysis with current and prior course offerings (see Figure 33). A low average grade on a particular assessment may signal a potential area for improvement. In such a case, a detailed investigation and review of the assessment tasks (ATs) and teaching and learning activities (TLAs) mapped to the lower performing assessment may uncover opportunities for refinement in the subsequent course iteration.
- The *Intervention Performance* report (see Figure 34) assesses the effectiveness of implemented interventions by presenting the final grades and predicted grades of students who received these interventions. Descriptive analytics offer valuable data such as the percentages of students passing, failing, or withdrawing within the intervened at-risk group.

These reports and visualisations along with other sources of course evaluations (such as student feedback on course) can aid instructors to reflect and identify issues and areas for improvement for future iterations of the course.

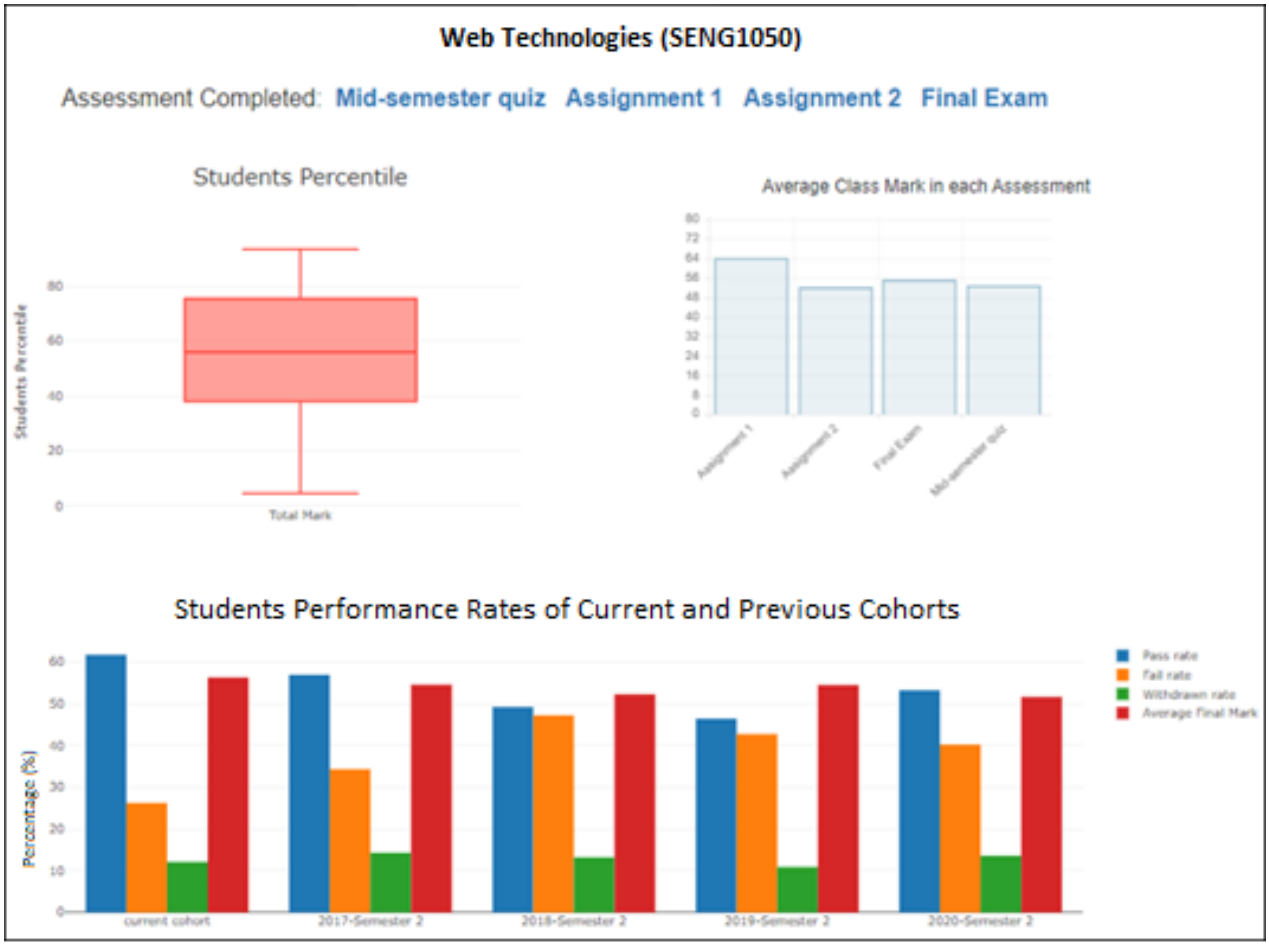


Figure 32 Overall Course Performance Report

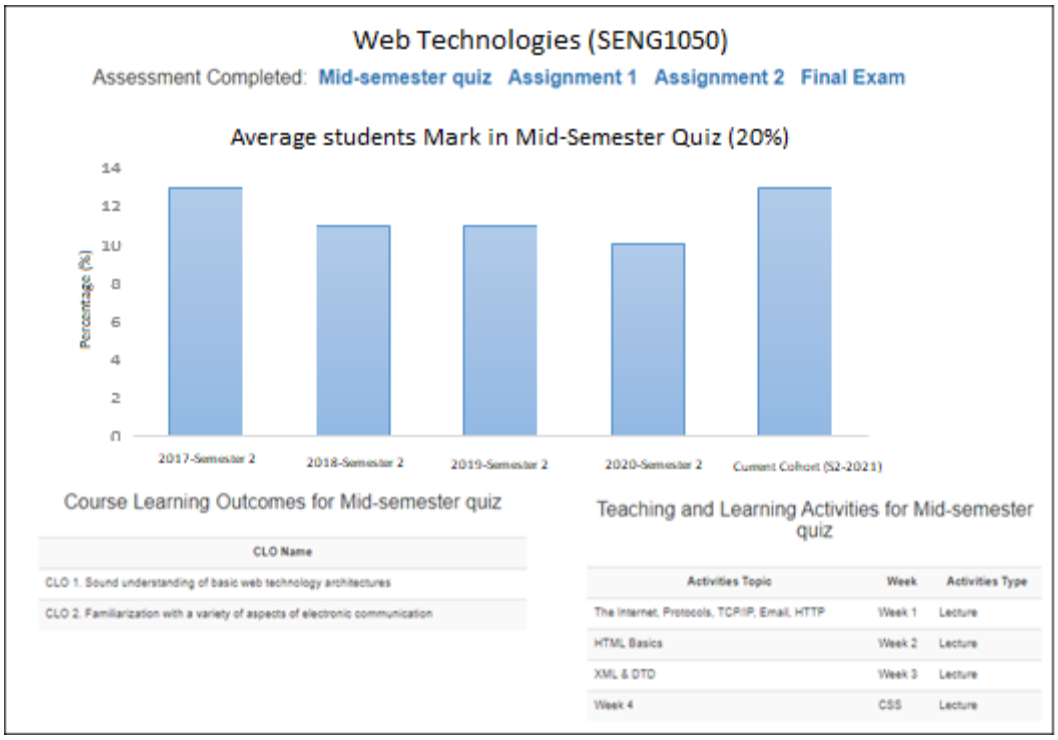


Figure 33 Course Assessment Performance Report

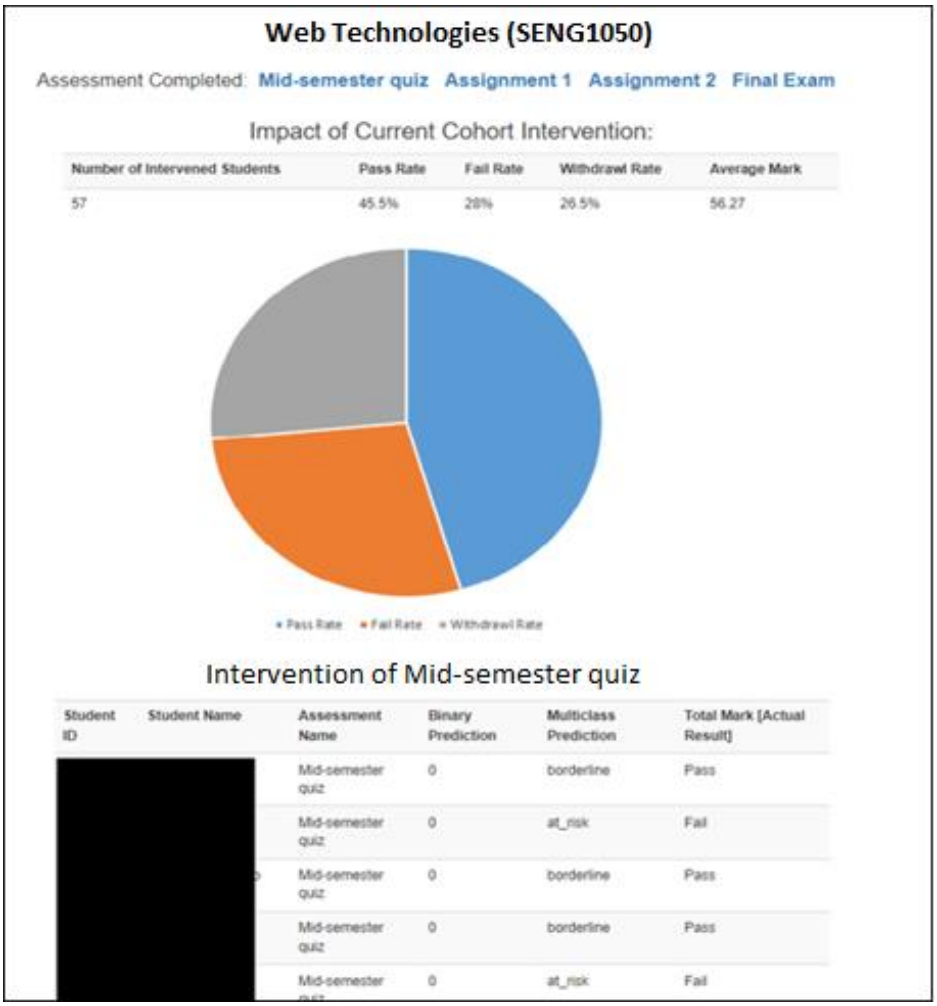


Figure 34 Intervention Performance Report

III. CONCLUSION

This comprehensive user manual details the core functionalities of the SPPA system, aimed at equipping instructors to maximize student learning and achievement. The key features encompass:

- **Course Design (*CA Mapping Model*):** This facilitates instructors in creating a course, adhering to the principles of Constructive Alignment, and generating a customized *CA Mapping Model*. It tailors unique revision plans for each student, optimizing their learning outcomes.
- **Prediction Model (*Student Performance Prediction Module*):** It enables the creation of predictive models, offering performance prediction throughout the term, helping instructors to predict and address potential learning obstacles.
- **Mail Data Merge (*Student Feedback Module*)**: A feature for personalizing student interventions, it offers an easy approach to provide customised email intervention.

- **Academic Dashboard:** This LA dashboard provides detailed performance insights of students, allowing instructors to evaluate student progress and adjust teaching strategies if needed.
- **Student Dashboard:** This LA dashboard provides each student with tailored feedback and progress tracking, fostering a sense of ownership over their learning journey.
- **Upload Intervention Data:** A key functionality that allows data input for rigorous analysis, evaluating the effectiveness of interventions.
- **Final Course Report:** Comprehensive LA dashboards for assessing course effectiveness, it provides critical feedback to improve future course design and LA interventions.

Collectively, these features significantly augment an instructor's ability to supervise, intervene, and refine their course offerings. They enable a highly personalized and supportive learning environment, fostering student engagement and success.

Thank you for reading this user manual. If you have any comment or question, you are welcome to contact me via email or phone and am happy to be of any assistance.

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