

Traceability matrix

Functional Requirements

ID(Unique identifier)	Priority(Priority of this requirement)	Description(A description of each requirement)	Rationale (Why is this requirement needed?)	Implementation (Specific implementation detail)	Testable requirement ? (Is this requirement testable?)
FUS-1	High	AI-Generated Problems: Use AI to generate/regenerate Parsons problems based on selected topics and contexts.	As a student, I want to instantly get the Parsons Problems by select the topic.	1. AI Model: Utilize an AI model (e.g., Llama AI or Gemini API) to generate code snippets for Parsons problems. 2.API Integration: Implement an API to interact with the AI model for generating problems.	Yes
FUS-2	High	Topic Selection: Users can choose topics and contexts relevant to their learning needs.	As a student, I want to easily select the topic and content of the Parsons Problems.	1. Frontend: Create a user interface for selecting topics and contexts.	Yes
FUS-3	High	Drag-and-Drop Interface: Allow users to reorder code blocks using drag-and-drop functionality.	As a student, I want to solve the problem by dragging and dropping code blocks into the correct order.	1. Front-end: Use JavaScript libraries (e.g., React DnD) to implement drag-and-drop functionality.	Yes
FUS-4	High	Solution Evaluation: Provide immediate feedback like common interpreter/IDE .	As a student, I want to receive immediate feedback after rearranging the blocks of code.	1. Evaluation Logic: Implement backend logic to evaluate the correctness of reordered code.	Yes

				2. Front-end: Display feedback	
FUS-5	High	Time Tracking: Record the time spent on each problem.	As a student, I want to the system to record how long I spend answering each Parsons Problem.	1. Database: Store timestamps for problem start and end times. 2. Cookies: Temporarily store timestamps to track progress even if the session is interrupted.	Yes
FUS-6	High	Admin Login: Secure access to the admin dashboard.	As an admin, I want to securely log in to the system to access the admin dashboard.	1. Implement a login page/pop-up windows specifically for admins. 2. Include authentication mechanisms such as username and password validation. 3. Ensure secure handling and storage of admin credentials (e.g., hashed passwords). 4. Implement session management to keep the admin logged in for a specified duration or until they log out.	Yes
FUS-7	High	Admin Data Analytics: Display student	As an admin, I want to view a dashboard that provides an	1. Database: Store and aggregate data on	Yes

		progress and performance.	overview of student performance, including questions completed, accuracy, and time spent on each topic.	<p>student performance.</p> <p>2. Frontend: Develop a dashboard that displays the aggregated data in a user-friendly format.</p> <p>3. Analytics: Implement visualizations such as charts and graphs to present the data effectively.</p>	
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Non-Functional Requirements

ID (Unique identifier)	Priority (Priority of this requirement)	Description (A description of each requirement)	Rationale (Why is this requirement needed?)	Implementation (Specific implementation detail)	Testable requirement? (Is this requirement testable?)
NFUS-1	High	Intuitive Navigation: Ensure the interface is clean and easy to navigate.	As a user, I want to the Interface easy to use.	<p>1. Frontend Framework: Use a modern frontend framework (e.g., React, Vue.js) to build the UI.</p> <p>2. Usability Testing: Conduct usability tests to ensure the interface meets user needs.</p>	Yes
NFUS-2	Mid	Responsive Design(optional): Optimize the UI for various devices (desktops,	As a user, I want the app to display correctly on any device screen.	1. CSS Framework: Implement responsive design using CSS	Yes

		tablets, and mobile).		frameworks (e.g., Bootstrap, Tailwind CSS).	
NFUS-3	High	Privacy	As a user, I want my test correctness to be secure to ensure my privacy and safety while using the web.	1. All data transmission will be over HTTPS, never display test score.	Yes

Traceability Matrix [↗](#)

TC	Test Case
ITC	Integration test Case
FUS	Funtional Requirement
NFUS	Non-Funtional Requirement

Test Case ID	Req ID	Page	Test Description	Expected Result	Status
TC-1	FUS-2	Generator	Click the Topic/Context Button.	The sliding selection box is expanded/retracted.	Pass
TC-2	FUS-2	Generator	Scroll the mouse in the pop-up Topic/Context selection box.	Support browsing different topic/context	Pass
TC-3	FUS-2	Generator	Click on any topic/tontext from the selection box.	The topic/context is selected and displayed on the button.	Pass
TC-4	FUS-1FUS-2	Generator	Click the send button.	Button can be clicked, topic/content data sent to backend.	Pass
TC-5	NFUS-1	All page	Load the page.	Pages should load quickly.	Pass

TC-6	NFUS-2	All page	Check for inconsistencies in colors, fonts, buttons, and page layout.	The elements are harmonious both within the same page and across different pages.	Pass
TC-7	FUS-6	Admin Login	Enter characters in the username and password fields.	The username field will display the characters you enter, while the password field hides the input with substitute characters. Both fields allow modification of the entered characters.	Pass
TC-8	NFUS-1	Admin Login	Click the eye button.	The password entered is shown/hidden	Pass
TC-9	FUS-6NFUS-3	Admin Login	Enter the wrong username or password. Click the login button.	The host prompt that the account or password is wrong	Pass
TC-10	FUS-6NFUS-3	Admin Login	Enter the right username and password. Click the login button.	Redirect to Admin Profile	Pass
TC-11	NFUS-1	Admin Login	Click the go back button	Redirect to Context Selection Page	Pass
TC-12	NFUS-3NFUS-1	Admin Login	Go to Generator page then click Admin again.	The admin still remain logged in.	Pass
TC-13	FUS-7	Admin Login	Check that each topic shows the correct total practice and accuracy percentage.	Each topic is listed with its correct practice and accuracy values.	Pass

TC-14	FUS-7	Admin Login	Click on each topic	The summary of student performance on each topic is shown.	Pass
TC-15	FUS-7NFUS-1	Admin Login	Under the topic, click the button next to Student, Total Questions, and Accuracy multiple times in sequence.	For each button, multiple clicks toggle the sorting of the list under Topic between ascending and descending order. The other two buttons are reset to their default state (when not triggering any sorting).	Pass
TC-16	FUS-7NFUS-1	Admin Login	Click on student	Can be clicked and student id sent to backend.	Pass
TC-17	NFUS-1	Admin Login	Click on home button	Direct to home page	Pass
TC-18	NFUS-1NFUS-3	Admin Login	Click on logout button	Direct to Admin Login Page	Pass
ITC-1	NFUS-3	Generator	Open the website to prompt the cookie consent popup.	The website stores cookies and enables activity tracking.	Pass
ITC-2	NFUS-3	Generator	Click the "Accept" button.	Consent popup disappears.	Pass
ITC-3	NFUS-3	Generator	Open the website to prompt the cookie consent popup.	The website does not store cookies, and no tracking is enabled.	Pass
ITC-4	NFUS-3	Generator	Click the "Reject" button.	Consent popup disappears.	Pass
ITC-5	NFUS-3	Any Page	Observe the cookie consent popup. Refresh page	The consent popup appears once per session and does not	Pass

				reappear after user action.	
ITC-6	FUS-2	Generator and Problem-solving	Select a topic from the "Topic" dropdown. Select a context from the "Context" dropdown. Click the send button.	The website redirects to the Problem-solving Page.	Pass
ITC-7	NFUS-1	Generator and Problem-solving	On the Problem-solving Page, click the "Home" button in the top right corner.	The website redirects back to the Generator Page.	Pass
ITC-8	NFUS-1	Generator and History	On the Generator Page, click on the "History" button in the top right corner.	The website redirects to the History Page.	Pass
ITC-9	NFUS-1	Generator and History	On the History Page, click the "Home" button in the top right corner.	The website redirects back to the Generator Page.	Pass
ITC-10	NFUS-1	Problem-solving and Admin Profile	On the Problem-solving Page, click the "Admin" button located in the navigation bar.	The website redirects to the Admin Profile Page after successful login	Pass
ITC-11	FUS-6NFUS-3	Problem-solving and Admin Login	On the Problem-solving Page, click the "Admin" button located in the navigation bar.	When the user is not logged in, the website redirects to the Admin Login Page	Pass
ITC-12	FUS-7NFUS-1	Admin profile and Student's History	On the Admin Profile page, click the Topic button. Click the student's ID	The website redirects to the selected student's History Page.	Pass

