EnlightenDS: Advanced Technologies for Skill Enhancement and Talent Recognition in Children

Project Proposal Report

Project ID : 24-25J-228

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Sri Lanka Institute of Information Technology
Sri Lanka

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DECLARATION

We declare that this is our own work, and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Name	Student ID	Signature
Methsahani K.K.S.P.	IT21292972	

The supervisor/s should certify the proposal report with the following declaration. The above candidate is carrying out research for the undergraduate dissertation under my supervision.

Signature of the supervisor
Prof.Samantha Thelijjagoda

2024/08/22
Date

Signature of the co supervisor
Dr. Junius Anjana

22/Aug/2024
Date

ABSTRACT

This component introduces a multimedia-based system designed to assess and identify the dominant talents of children with Down syndrome by recognizing their distinct interaction patterns and cognitive abilities. From this component, evaluates three key areas: recital skills, learning skills, and painting skills, using tailored digital tools for each. Recital skills are assessed through a digital piano interface that monitors interaction time and finger movement sequences, providing insight into the child's musical abilities. Learning skills are evaluated using an AI-driven quiz module, which generates quizzes customized to each child's cognitive level, analyzing both interaction time and quiz scores. Painting skills are gauged by measuring engagement time on a digital painting platform, allowing the system to capture the child's creativity and focus. The system records and analyzes the number of attempts and interaction time across these activities to determine the child's most prominent talent. By focusing on the area with the highest selection count, the system identifies where the child talented the most. It then generates a notification for parents, offering valuable insights into the child's dominant talent. This comprehensive and adaptive assessment approach is designed to support parents and educators in recognizing and nurturing the unique strengths of children with Down syndrome. By accurately identifying the talents of these children, the system helps guide further development and support in the areas where they show the greatest aptitude. Ultimately, the system aims to provide a deeper understanding of each child's abilities, ensuring that their talents are recognized and encouraged in a way that aligns with their individual needs and potential.

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1. INTRODUCTION

Down syndrome is a genetic condition caused by the presence of an extra copy of chromosome 21, also known as trisomy 21. It is the most common genetic cause of intellectual disability, occurring in approximately 1 in every 700 live births [1]. Individuals with Down syndrome often face a range of challenges, including cognitive delays, difficulties with memory and executive functioning, and an increased risk of certain medical conditions [2]. However, the severity of these challenges varies, with some individuals experiencing mild symptoms while others face more significant difficulties [3].

Despite these challenges, many individuals with Down syndrome possess various strengths and talents. Advances in healthcare, education, and social support have significantly improved their quality of life. As a result, individuals with Down syndrome are living longer, more fulfilling lives and are increasingly included in mainstream schools, workplaces, and community activities, where they make valuable contributions [4].

Education plays a critical role in helping children with Down syndrome develop their abilities. However, traditional teaching methods often fail to address their unique learning needs [5]. This has highlighted the importance of developing specialized educational materials tailored specifically for them. Multimedia technology offers an innovative approach to creating engaging and effective learning tools, particularly for teaching fundamental concepts such as numbers and basic mathematics [6].

The goal is to develop customized multimedia resources that support their learning process and contribute to improved educational outcomes [7].

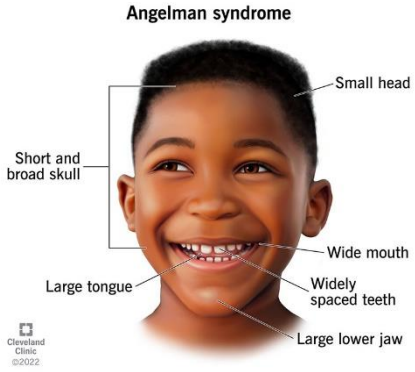
This research report on identifying the talents of children with Down syndrome focuses on the importance of supporting their creativity and tailoring educational methods to their needs. Proposed system is designed to analyze how these children interact with various activities to find their strongest talent. This approach aligns with the idea that children with Down syndrome can have unique creative abilities.

Children with Down syndrome often struggle in traditional classrooms because of cognitive and motor challenges. However, research shows that they can excel in creative arts, like music and painting, when given the right tools and opportunities [8]. Proposed system, which uses AI-generated quizzes, a digital painting platform, and a piano-based recital assessment, provides these children with accessible and engaging ways to express themselves [9].

Proposed system focuses on tracking interaction time, movement sequences, and performance is supported by research showing that children with Down syndrome often communicate better

through non-verbal and creative channels. By capturing this data, proposed system offers a more complete evaluation of their abilities compared to traditional methods [8].

This approach also matches findings that continuous exposure to creative arts benefits children with Down syndrome, helping them develop cognitive and motor skills while boosting their emotional and social well-being [8]. Additionally, notifying parents about their child's talents can help guide further support tailored to the child's strengths.
Overall, proposed research builds on existing knowledge and offers a new tool that could lead to more personalized and effective development strategies for children with Down syndrome.



1.1 Background Literature

This study mainly focuses on down syndrome children's talent identification. There are three main areas will be considered. They are recital skill, learning skill and painting skills. Down syndrome children talented for one specific area. According to the previous research works there's no proper system to identify that talent.[12][13][14] Most research focuses on the challenges faced by children with Down syndrome [12].

J. Janier et al. [11] proposed their research by considering learning, matching and counting skills of down syndrome children. In this research learning model helps to identify numbers and matching modules helps to match numbers. When it comes to the count module it helps to identify the value or amount. These modules consist with couple of activities and provide platform to numbers related learning.

W. Needham et al. [12] consider writing with a pencil typing with a keyboard using a knife and fork to cut kind of activities through the connection between the size of muscle and muscle group involve to movements. This approach helps to identify the ability of motions related activities. Authors stated that according to the size of muscle and muscle group involve to movements

directly involve to the ability of motion related activities.

A.S.T. Sampath et al [13] proposed an e- learning education system. In this research authors have used voice recognizing and image recognizing technique to identify the drawing abilities of down syndrome children. This research work is to measure the drawing ability of down syndrome children.

J Svendsen and others [15] did an analysis based on vision for motor behavior patterns in snow boarding game. The authors have introduced a parabolic bounding box concept to capture local changes of a posture while downs syndrome child perform motion. Authors stated that the proposed system helps to capture body motions. They have considered normal an abnormal weight shifting patterns differences and a frequency of the patterns

J. Jadan-Guerrero et al. [16] stated an early literacy process based on ready of frequencytechnology for down syndrome students. During their research work, authors have used graphical user interface, tangible user interface and traditional interface. Authors have used teachers and sixdown syndrome children to their study for analyze the results. They have used cardboard cards, digital cards 3D letters and low-cost toys which have RFID tags. For this study, they did their analysis of the interaction of the provided input.

1.2 Research Gap

In this section will describe about the identified research gaps from existing research papers.

Research study which is done by J. Janier and others [11] focuses only learning related skills such as matching and counting. They can consider other areas of learning using things like quizzes.

According to the studies which is done by Nadeem and others [12] identified connection between the size of muscle and muscle group involve to movements. They consider writing with a pencil typing with a keyboard using a knife and fork to cut kind of activities. As an improvement they can use there finding to improve the skills of down syndrome children.

A. S. T. Sampath and others has done research about e- learning education system [13]. They have use handwritten images and voice sample of down syndrome children. They are checking the drawing ability of down syndrome children by using voice recognizing and image recognizing. They haven't use that to improve that identified skills. Based the findings authors only measuring the drawing ability. They can use that to improve the skills of down syndrome children, as their future works.

According to the research study of [14], they have studied about programming assessment technical. According to their finding randomization technique is better than question shuffling.

Most of the research studies which have done in previously focuses on challenges faced by children with Down syndrome [12]. There is no proper system available to identify the talented area of down syndrome children. Proposed component will help to identify the talented area of down syndrome children and provide a chance to sharp up their talents. Without knowing the exact talent of down syndrome children, they will not be able to fine tune that. This component will help to identify that.

1.3 Research Problem

The main aim of the proposed component is to address the challenge of accurately identifying the natural talents of children with Down syndrome in specific areas (recital, learning, and painting) using an interactive system. Currently, there is a lack of tools that can evaluate these talents in a way that is tailored to the unique needs and abilities of Down syndrome children. By analyzing their interaction patterns, such as the time spent and performance in each activity, this component seeks to identify their strongest skill area. This information can then be shared with parents to better support the child's development.

Proposed system helps to finding an effective way to recognize the strengths which means the talent of children with Down syndrome in music, learning, and art using a technology-based system that can provide personalized feedback. Below research problems considered during the implementation of this component.

- **Data Interpretation**: Accurately interpreting interaction data (e.g., time spent, sequence patterns) to identify strengths.
- **Engagement Measurement**: Understanding how engagement levels can reliably indicate talent areas.
- **Notify to Parents**: Effectively communicating findings to parents to support their child's development.

2. OBJECTIVES

2.1 Main objective

To develop a system that identifies the talents of children with Down syndrome by analyzing their recital, learning, and painting skills, and informs parents about the child's strongest area of talent.

2.2 Sub objectives

1. **Identify Recital Skill:**

    - Implement a piano interface to measure interaction time and finger movement sequences.
    - Track the number of attempts and analyze the sequence to determine the child's skill in music or recital.

2. **Assess Learning Skill:**

    - Develop AI-generated quizzes to the cognitive level of children with Down syndrome.
    - Measure the time spent on quizzes and analyze scores to evaluate the child's learning capabilities.

3. **Evaluate Painting Skill:**

    - Create a digital painting platform where children can paint freely.
    - Track interaction time and analyze the paintings to assess artistic talent.

4. **Talent Identification and Notification:**

    - Analyze the data from all three skill areas to determine the highest selection count and score.
    - Generate a notification for parents highlighting the child’s area of strongest talent.

3. METHODOLOGY

3.1 System architecture diagram

3.1.1 Overall system architecture diagram

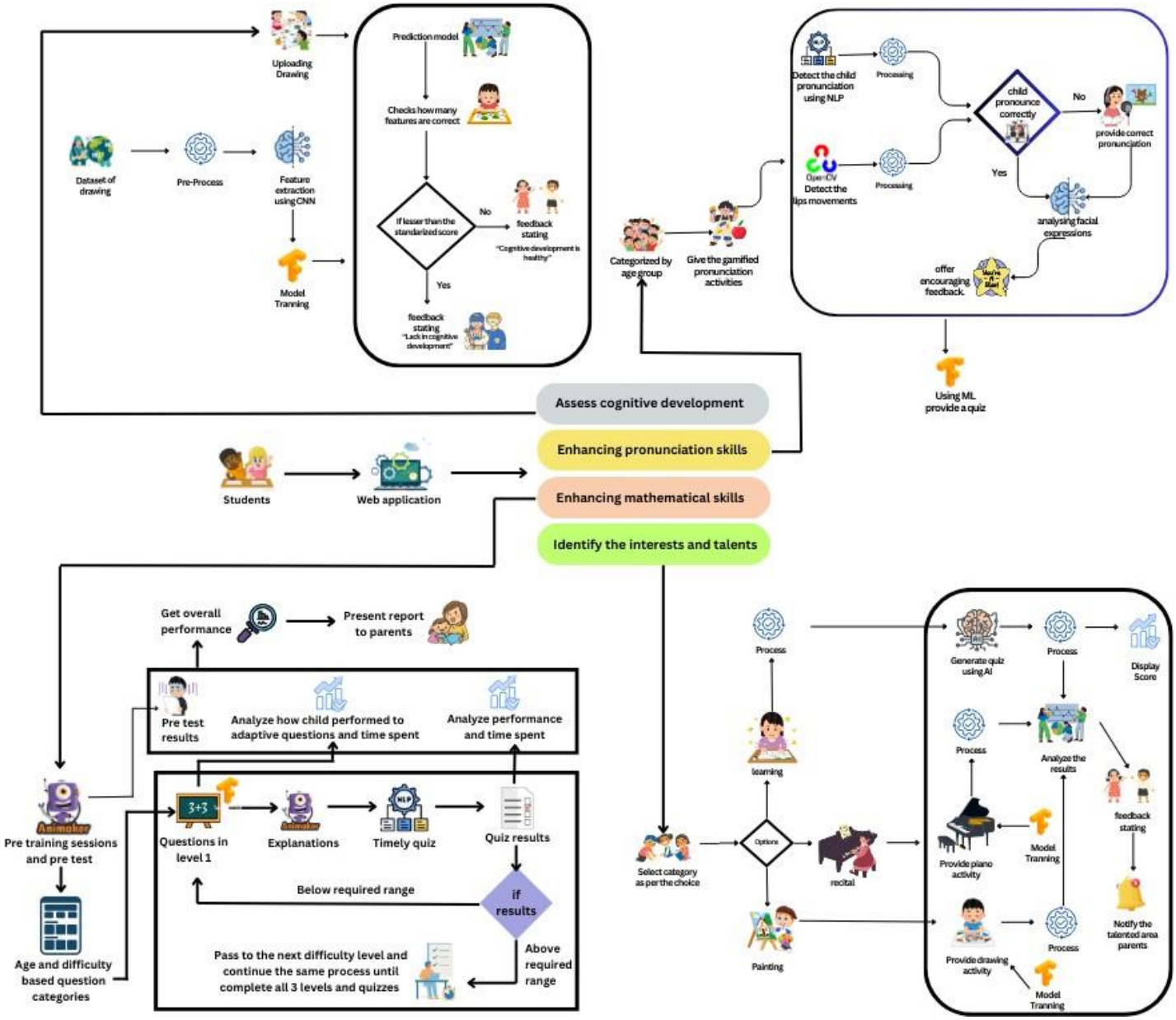


Figure 1:Overall System Diagram

Assessing Cognitive Development: We employ the Draw-a-Person test as a primary tool for assessing cognitive development. This test requires children to draw a person, and we examine the level of detail in their drawings. For example, a typically developing 3-year-old girl should be able to illustrate at least six distinct features. To enhance the accuracy of our evaluations, we leverage advanced technologies such as convolutional neural networks (CNNs). These tools are highly effective in processing images of the drawings, allowing us to compare them against standard developmental benchmarks.

Enhancing Mathematical Skills Using Personalized Mathematical Quizzes: We apply reinforcement learning algorithms to design personalized quizzes that adapt to each individual's learning pace and style. This process is supported by Python libraries like TensorFlow and Keras,which are essential for developing and training the models. The data needed includes performance metrics on various math tasks and a broad set of math problems.

Enhancing Mathematical Skills Using Personalized Mathematical Quizzes: To support speech and language development, we utilize Natural Language Processing (NLP) combined with machine learning and image processing. Specifically, we focus on improving pronunciation through motion detection and action analysis. Technologies such as OpenCV, an open-source computer vision library, play a key role in real-time image processing for speech recognition and language comprehension. The necessary data includes speech recordings and language usage patterns of individuals with Down syndrome.

Identify and enhance the talents of children with Down Syndrome: The system is designed to identify the talents of children with Down syndrome by evaluating their skills in three areas: recital, learning, and painting. It measures recital skills by monitoring the duration of interaction and the finger movement sequence on a piano keyboard. Learning skills are assessed through AI-generated quizzes, which adapt to the child's cognitive level, analyzing both interaction time and quiz performance. Painting skills are evaluated based on the time spent using a digital painting platform. The system calculates the highest score across these activities to determine the child's strongest skill area and notifies the parents about their child’s talent.

3.1.2 Component specific system architecture diagram

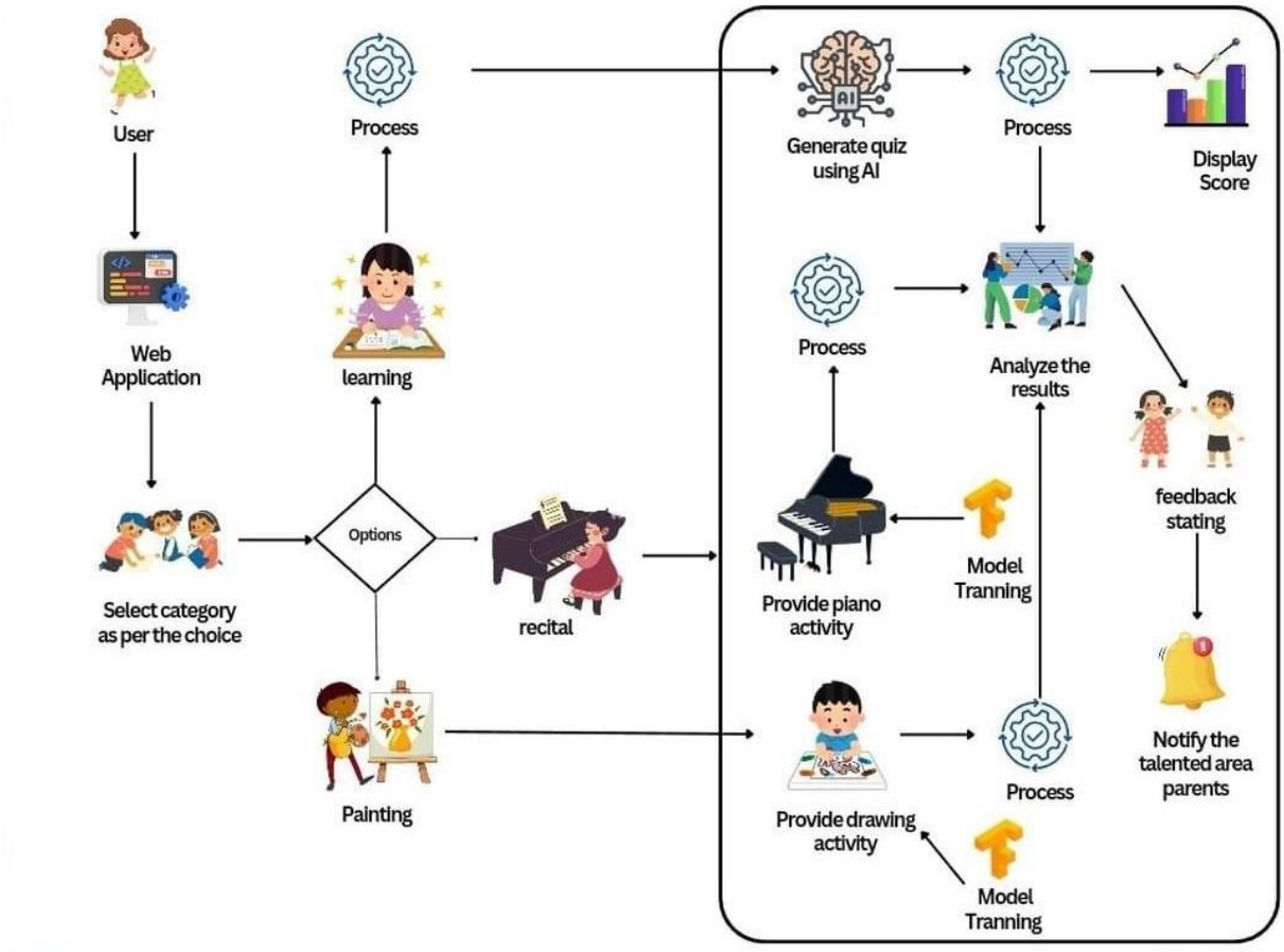


Figure 2:Component Diagram

This component will provide an interface to identify talent of down syndrome children. Once user navigate to this component user will be able to select a category according to their choice. There are three main categories are there. They are learning category, recital category and painting category.

Learning category includes quizzes which will be generate using AI. At the movement the plan is to use lang chain to generate questions. User will get 10 questions for a one attempt. After user completed the quiz user will receive the score. Multiple times user can attempt to quizzes by navigate to learning category section. This section includes measuring score as well. If the user scored lower range of marks multiple times, that will not take as there talented area.

As basic parameters of this category will take the attempt count, scored marks, and couple of other

parameters.

Once user selected recital category system will provide a piano. It means keyboard. This keyboard will implement using Java script. As basic parameters of this category the Sequens and the user interacted time period will be considered.

If user selected the painting category they will receive a painting platform. Once user entered to this category, they can draw pictures and painting. This category will implement using java script and image processing. As parameters to the analyzation the user interacted time period will be considered.

After a one week of time period, final analyzation will happen to identify the talented area. From that analyzation system will identify the most interacted category of that down syndrome child. Once it identifies the system will implement to notify that talented area to their parents.

3.2 Software solution

3.2.1 Agile

Agile is a flexible and iterative way of software development that emphasizes customer collaboration and feedback and small, rapid releases. This is so, in opposition to conventional development approaches, Agile methodology decomposes all projects into sprints in a way that allows a team to deliver functional parts of the project quickly and improve it in view of feedback. This way helps to address change and lead toward changing for the better.
Agile Methodology Project Phases of the Talent Identification Component

1. Planning
Scope of the project and its main features are defined at this stage, and a development roadmap is drawn. These step-to-step involved acquiring requirement to build a system where the user will be able to choose between three categories, namely: Learning, Recital, and Painting. The intention of this component is to assess the children's talents by watching their relative interactions to these categories. Main activities include the definition of user stories – activities where one defines what is needed, for example, how AI-generated quizzes could be implemented with the use of LangChain or developing a virtual piano using JavaScript and developing a drawing platform that incorporates image processing. Determining priorities for these features and setting milestones are key in this phase.

2. Design
Design is made of the system architecture and the user interface. At this stage, a design with the possibility of future scalability has been called for with the AI-based quizzes, the JavaScript piano, and the drawing platform. Design is given to a user interface that is serene and free from any clutter, with all the differentiation between sections clear and understandable probably for the most naive child. Attention should be focused on the design of data-collecting and data-analyzing mechanisms that would trace such parameters as the scores that a schoolchild gained during quizzes, a sequence of his or her playing N-Notes on the piano, and the time of playing for determining his or her talents.

3. Development
The realization happens in a development stage, which, through iterative sprints, translates the design into working code. The work done commences by the first implementation of the Learning category that chains LangChain on questions for the availability of the scoring system. The development of the Recital and Painting categories continues with each category after JavaScript was used to write the piano and drawing platform. The structure in each sprint includes coding, integration, and small chunk testing so that the component grows progressively with every consequent iteration.

4. Testing

Stage of Testing Required This is the phase of testing that ensures the component works just right. For the talent identification component, this is testing the AI-generated quizzes for correct assertion, the responsiveness of the piano and its ease of use, and image processing capabilities of the drawing platform. User Acceptance Testing is particularly crucial as this component is meant for kids with Down syndrome and hence, they have got to be factored for their respective needs and capabilities.

5. Release

Release is made after the testing phase has been completed. It is then made accessible to the exact operating environment, and the children are given a chance to use it. This includes setting up infrastructure and securing the system. The system is then scaled, and the component is made reachable by the children and parents. This is done in phases, and a small user base often accesses it to provide feedback before it is widely opened.

6. Maintenance

This ensures that once deployed, the component runs smoothly through the maintenance phase. In the case of the talent identification component, this would be the tracking of system performance, user support, and updating and improvement according to the prognosis of user needs. Regular data interaction analysis makes further improvements to the process of talent identification, and growing up of the component in accordance with user needs is held constant by due updates.

3.2.2 Flow Chart

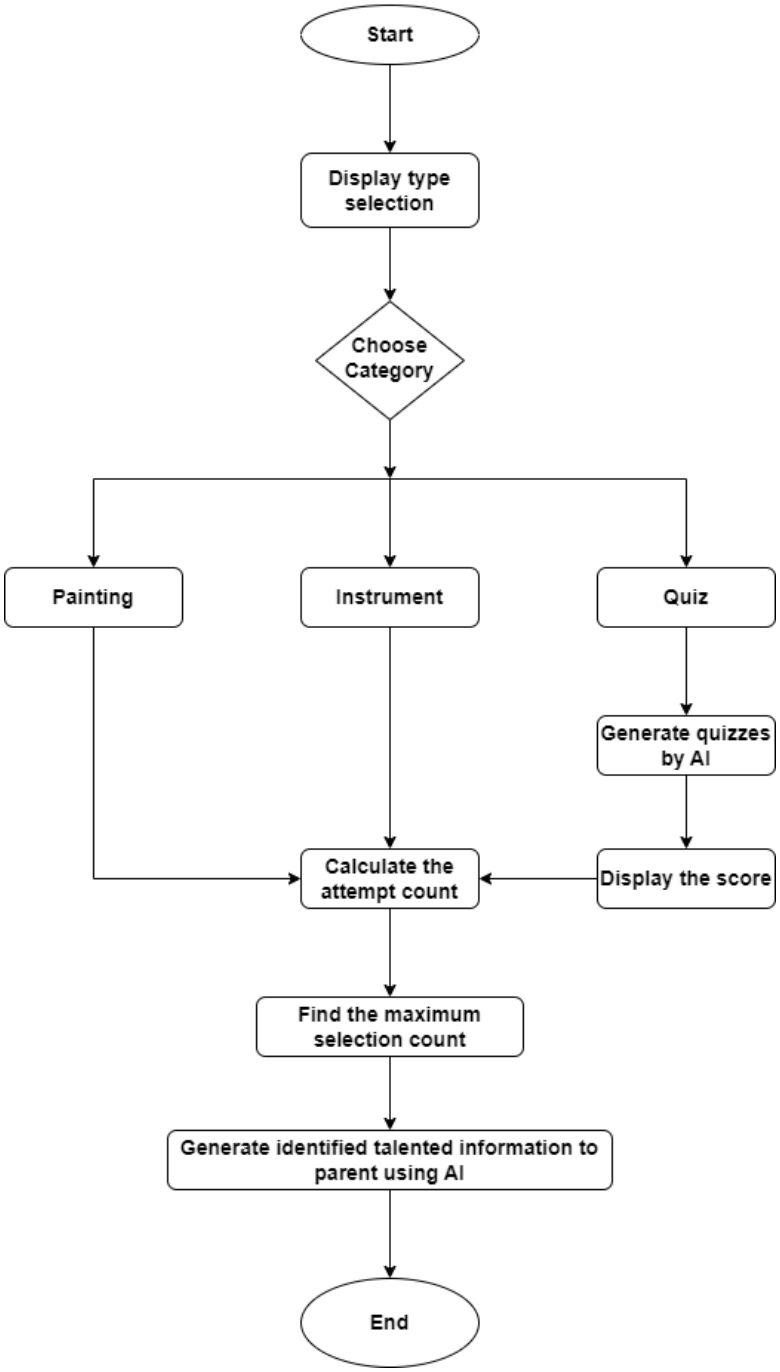


Figure 4: Flow Char

3.2.3 Requirement gathering

In the initial stage we started the research work with requirements gathering phrase. This project is based on down syndrome children. In that case we found out a school which provide education to down syndrome children. “Senehasa Research Center” is the school which we selected to do our research work. We are gathering information through those students.

Also, in the initial stage, we selected a doctor who is working with down syndrome children. We gathered information through that doctor and identified the research components correctly which we need to implement. From those discussions, we identified that, those down syndrome children talent for one specific area. In that case we confirmed that the features which we need to include in our research work. Also, did background studies through research papers and identified the existing research works which are done by other research.

Not only that, but also, we had couple of meetings with our supervisor who is Prof.Samantha Thelijjagoda and the co-supervisor, who is Dr. Junius Anjana. They also provided huge support to finalize the research components. In that way we gathered information to start our research work.

During this stage we did a survey to identify the persons feel about the research and how much they aware about down syndrome. The outcome of the gathered survey results as below. Here I have only attached the talent identification related survey results.

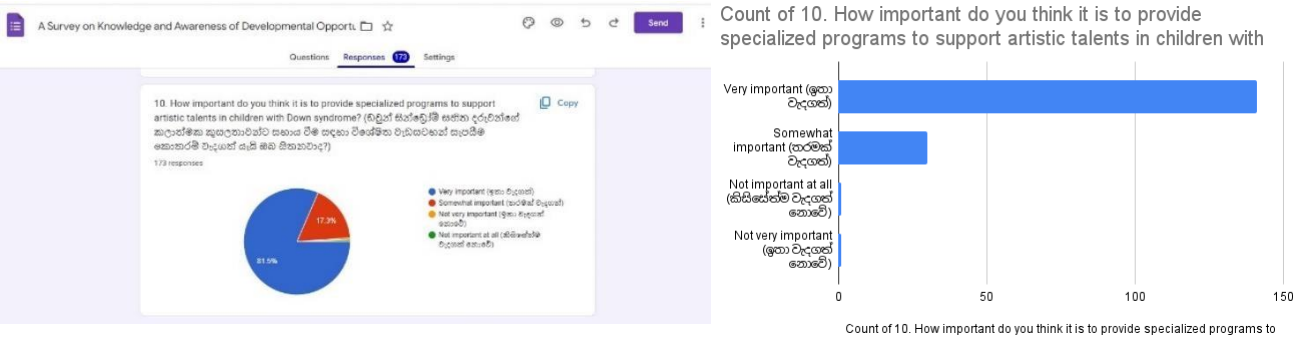
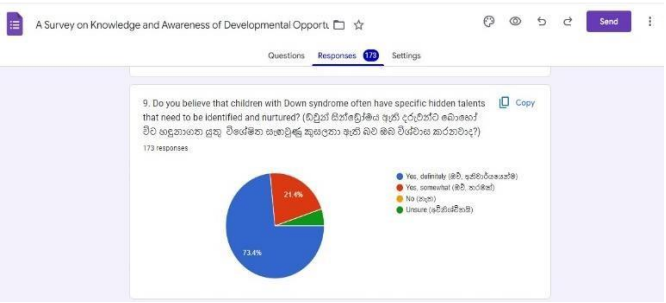


Figure 5: Survey Results – 1



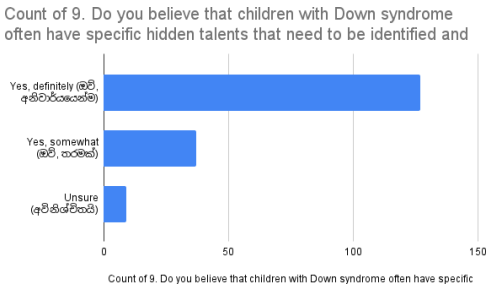
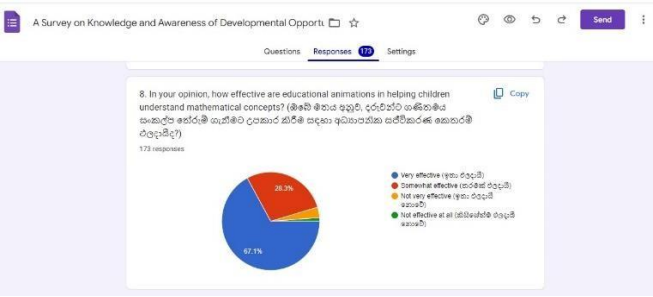


Figure 6: Survey Results - 2



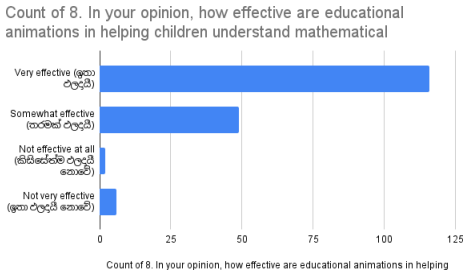
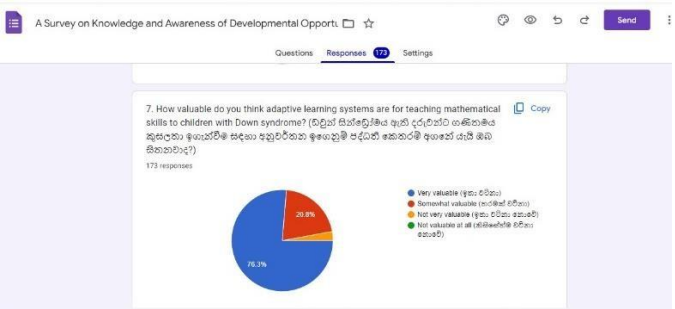


Figure 7: Survey Results – 3



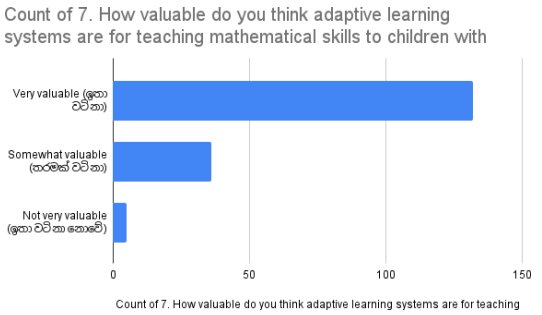


Figure 8: Survey Results - 4

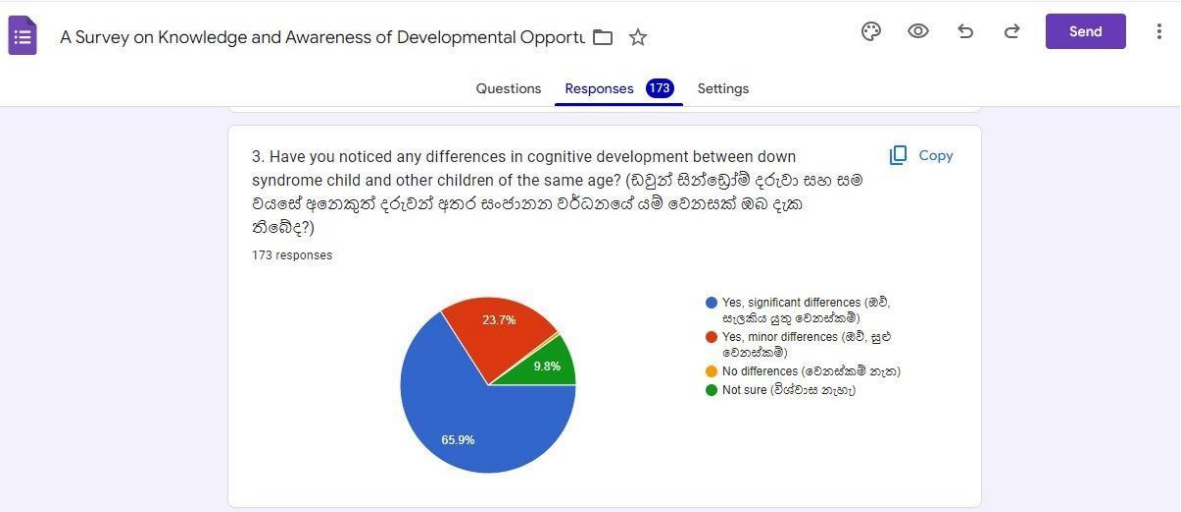


Figure 9: Survey Results - 5

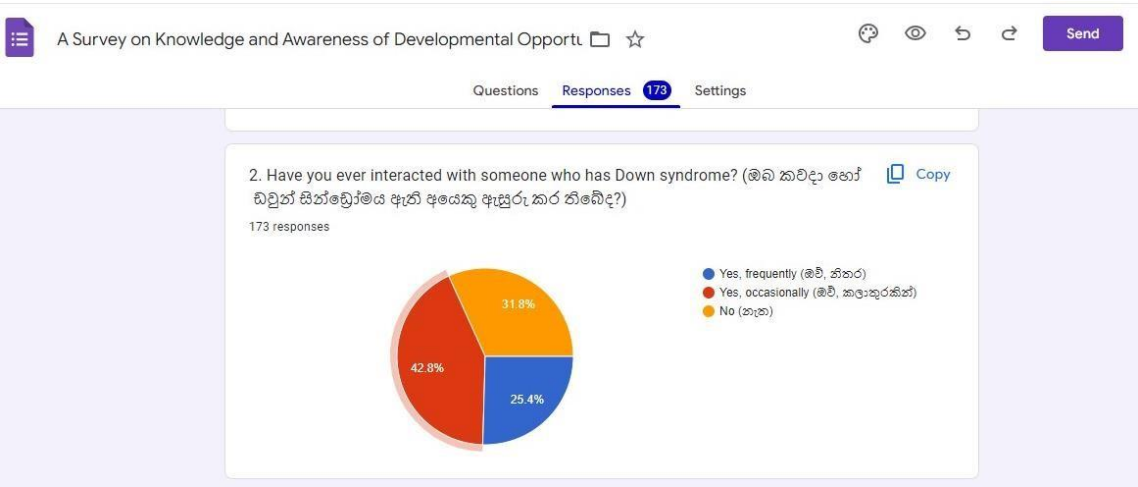


Figure 10: Survey Results - 6

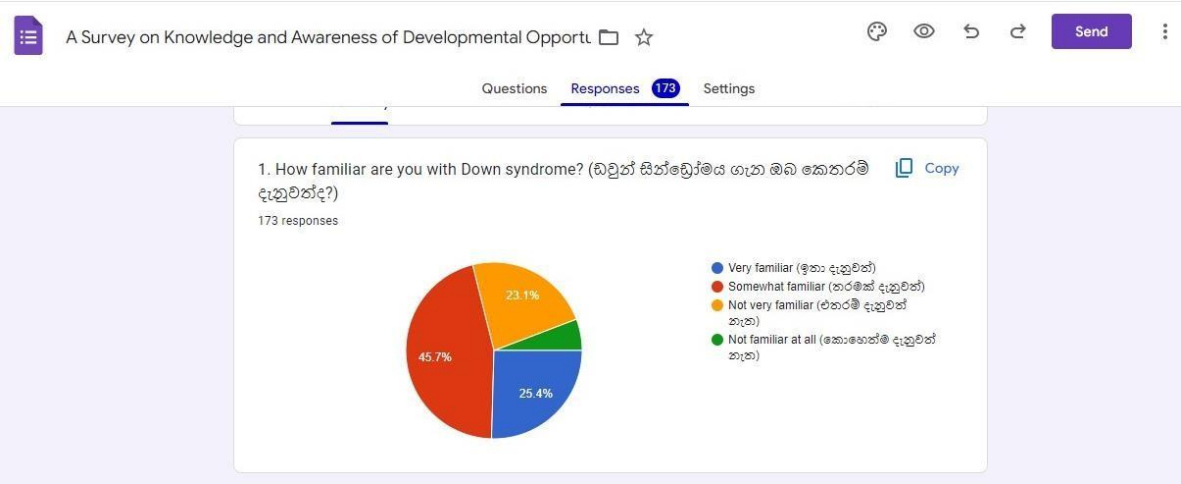


Figure 11: Survey Results – 7

4. METHODOLOGY

4.1 Functional requirements

Recital Skill Assessment

- The system should display a digital piano interface
- The system should record time spent interacting with the piano
- System should track and analyze the sequences of finger movements on the keyboard
- System should calculate and maintain scores based on interaction and sequence accuracy

Learning Skill Assessment

- The system should generate AI-generated quizzes based on the cognitive level of the child
- The system should ensure that no quiz shall be the same on every try.
- The system should keep track of the time spent with every quiz attempted.
- The system should provide a score for each quiz taken and subsequently save it for future reference.

Painting Skill Test

- The system must provide an online painting interface where children could create their picture.
- The system keeps track of how much time the painting process took.
- The system saves and calculates the level of complexity, colors, and patterns involved in making such a painting, if applicable.

Talent Analysis and Reports

- It should compare the scores obtained in all three activities to find out which one has the highest score.
- After that, it needs to generate the summary report identifying the major talent area of the child.
- Finally, this program should inform the parents about the child's identified talent through a user-friendly notification.

4.2 Non-functional requirements

Usability:

- The system should have an intuitive and child-friendly interface.
- The system must be easily navigable by children with Down syndrome, with minimalassistance.

Performance:

- The system should generate quizzes in real-time with minimal delay.
- Interaction tracking should be real-time and accurate, with no noticeable lag.

Scalability:

- The system should be able to handle multiple children using it simultaneously, in case it isused in a classroom setting.

Security and Privacy:

- All user data must be securely stored and protected; especially sensitive information relatedto children.
- Data transmission should be encrypted to protect against unauthorized access.

Accessibility:

- The system should be designed with accessibility in mind, ensuring it is usable by childrenwith different levels of Down syndrome.
- The platform should support assistive technologies if needed.

Maintainability:

- The system should be easy to update with new quizzes, piano exercises, and paintingfeatures.
- The system should be modular to facilitate future enhancements or changes.

4.3 Technology requirements

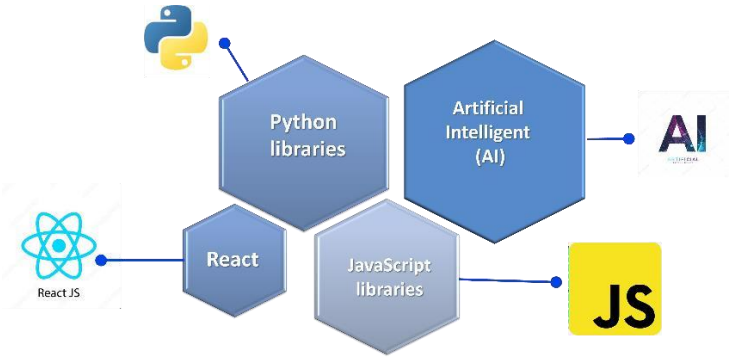


Figure 3: Technologies

When it's come to the software requirements, below tool and technology stack required toimplement the proposed component.

- **Artificial Intelligence(AI)**

The AI features at the heart of the generation and analysis of the data. AI would be helpful in creating quizzes at runtime using tools such as LangChain, making sure that the questions are tailored to the level of the child and his interests to stimulate his learning. Other than quiz generation, AI will also track and analyze the interaction patterns across the categories of learning, recital, and painting to form some estimation of factors such as quiz scores, piano sequences, and time spent in the activities. Analysis of such data helps greatly in determining the strongest area of the engagement of the child, which leads to precious assessment of the talents of the child with appropriate communication with his or her parents.

- **Python**

Python forms the base of AI capabilities in this component, giving a robust platform for data processing, quiz generation, and interaction analysis. The integration of LangChain with Python empowers seamless creation of quiz questions and provides a back-end process for the learning category. Furthermore, there are comprehensive libraries available within Python itself, such as Pandas and NumPy, to handle and process efficiently the interaction data collected from the activities of the children. This is rather essential for the AI to make an accurate assessment and spotting of the child's most engaged area in view of ensuring both reliability and effectiveness in the talent identification process.

- **React JS**

The user interface of this component is based on the key technology React.js, which would provide dynamism and responsiveness to the system. In React.js, a user-friendly interface can easily be created to be used by children and their parents to navigate between learning, recital, and painting categories. Such intuitive design is more important in maintaining user interest and smoothness in experiencing different activities. Besides, React can trace in real time user interactions from quiz attempts to piano key presses and convey such information to the Python-written backend for further analysis. In this way, the integration with React.js shall render both a seamless user experience and accuracy in data collection, embedded into AI-driven talent identification.

4.4 Design

4.4.1 Use case diagram

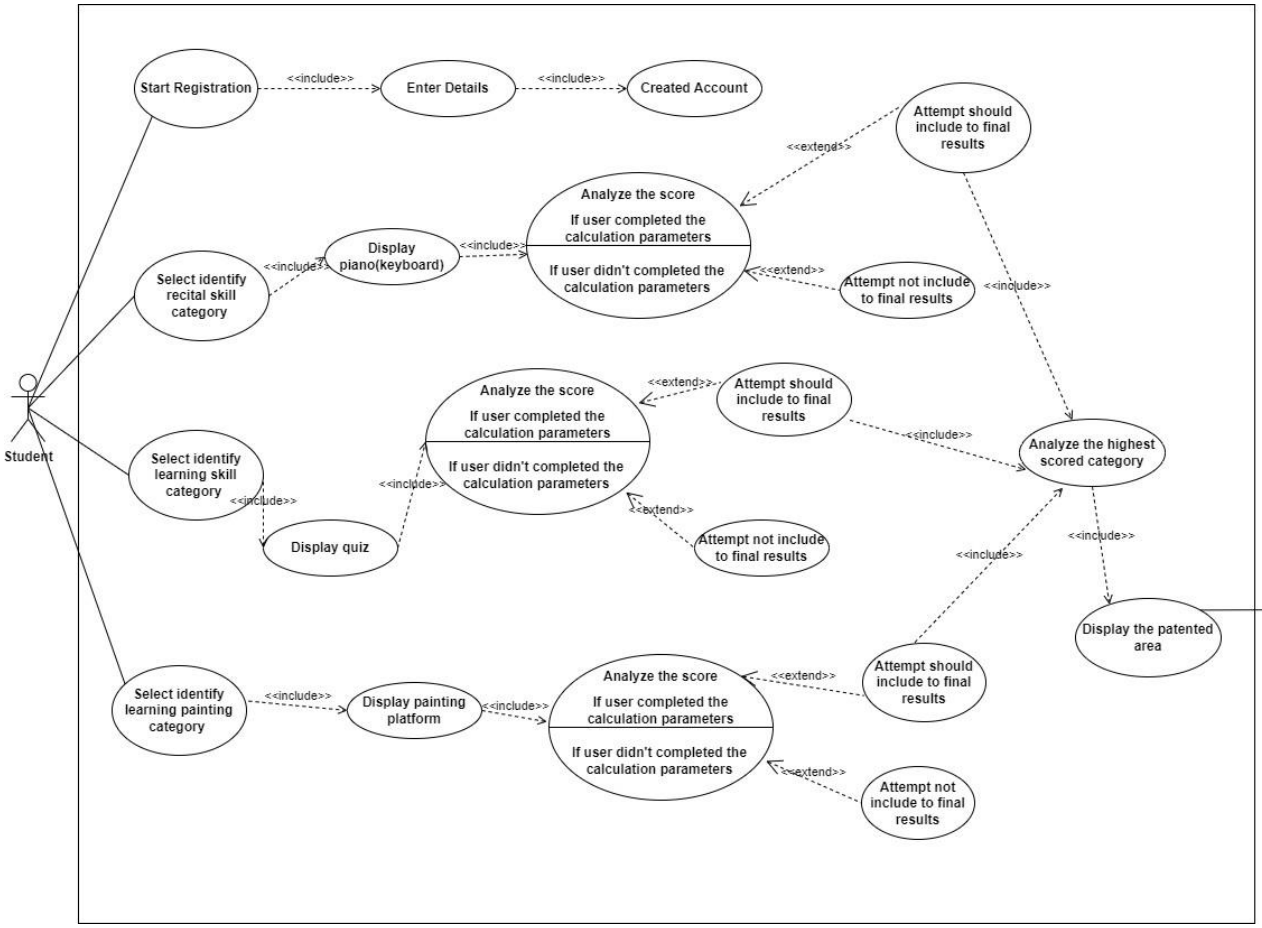


Figure 12:Use Case Diagram

4.4.2 Wireframe.

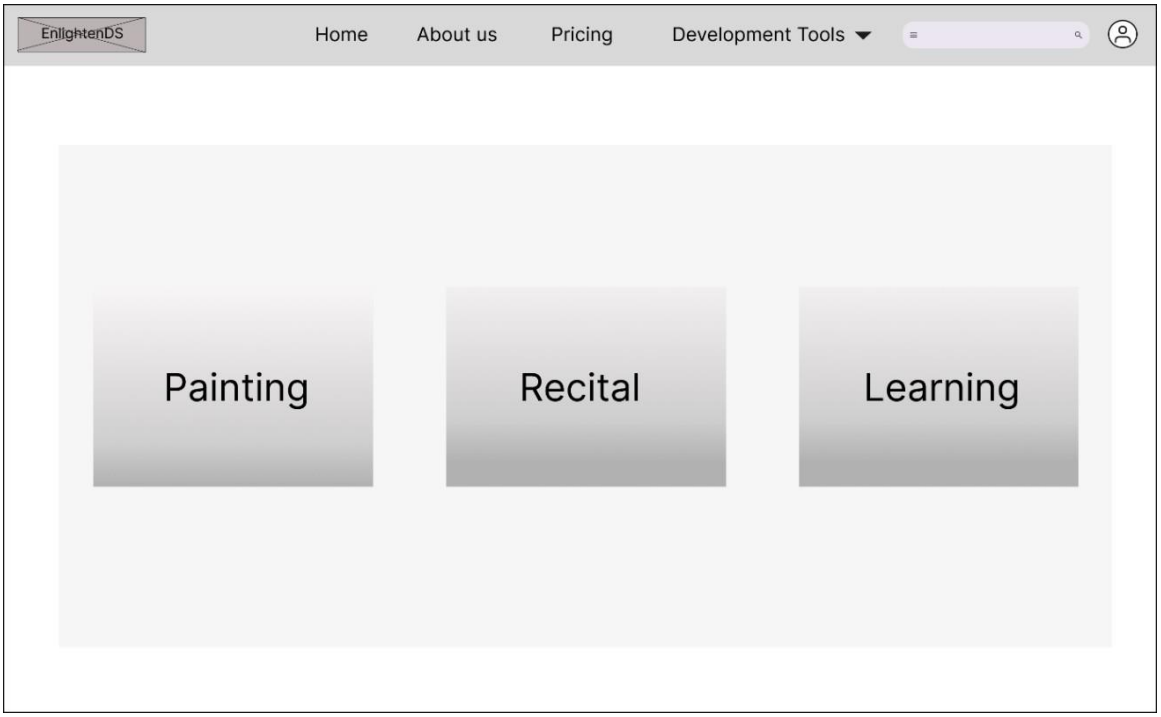


Figure 13: Selection Page

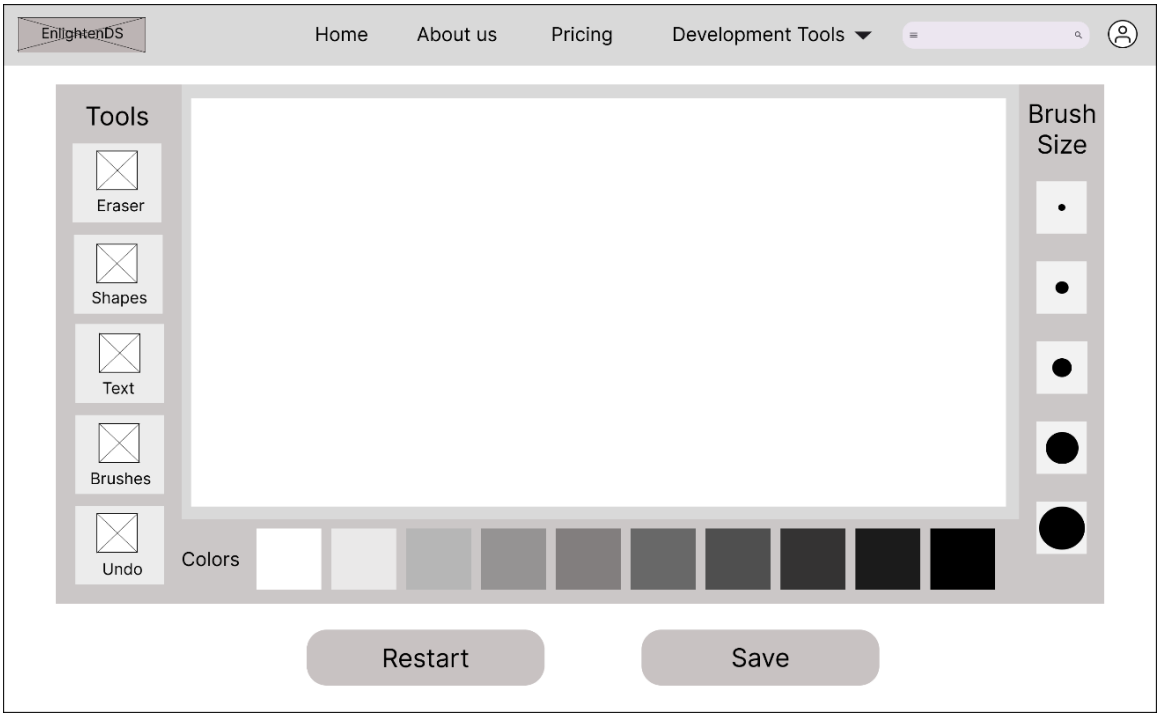


Figure 14: Painting Page

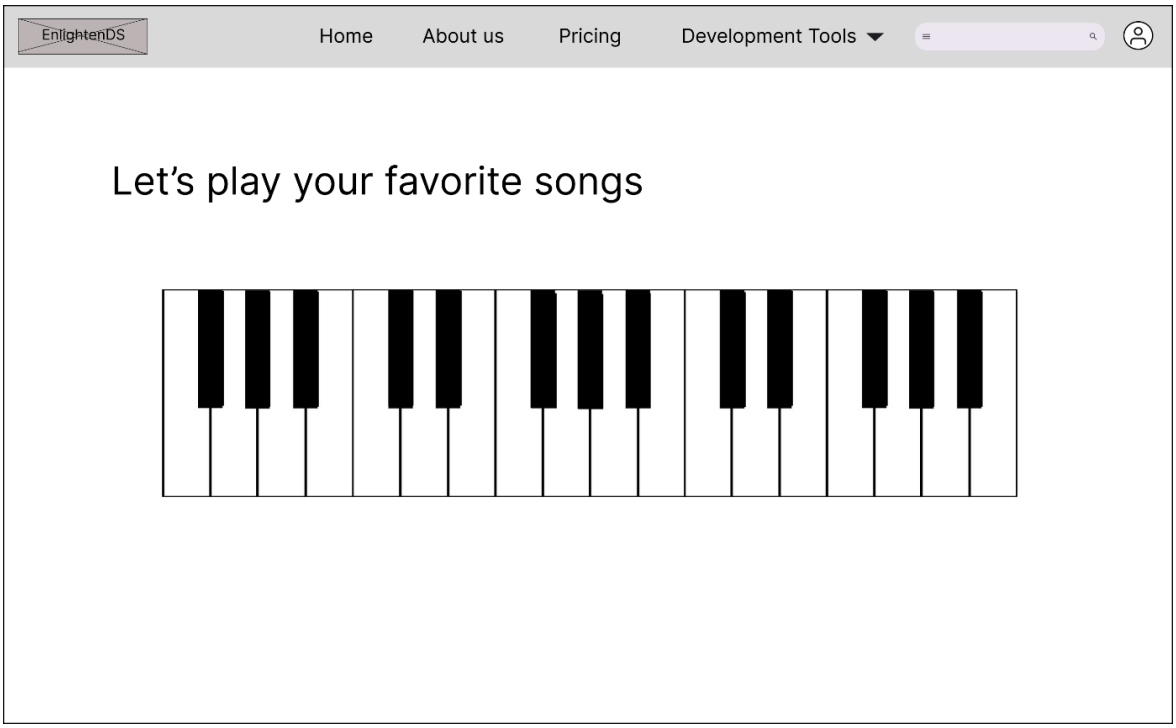


Figure 15:Piano Page

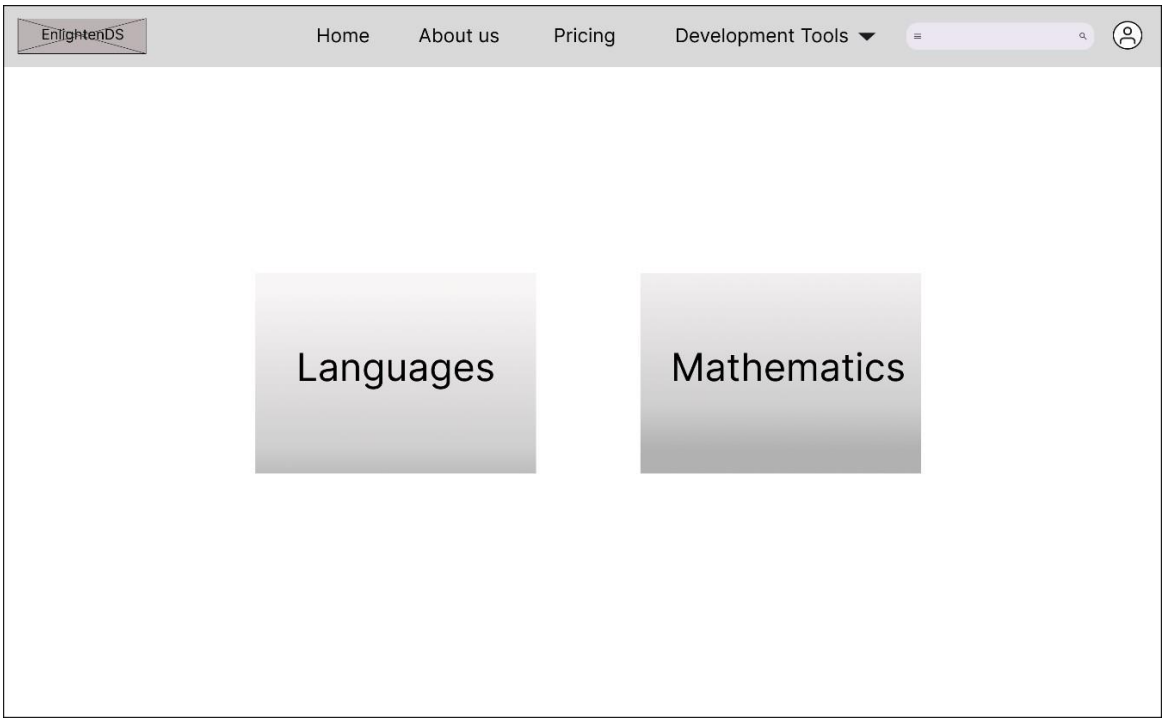


Figure 16: Subcategory Selection Page

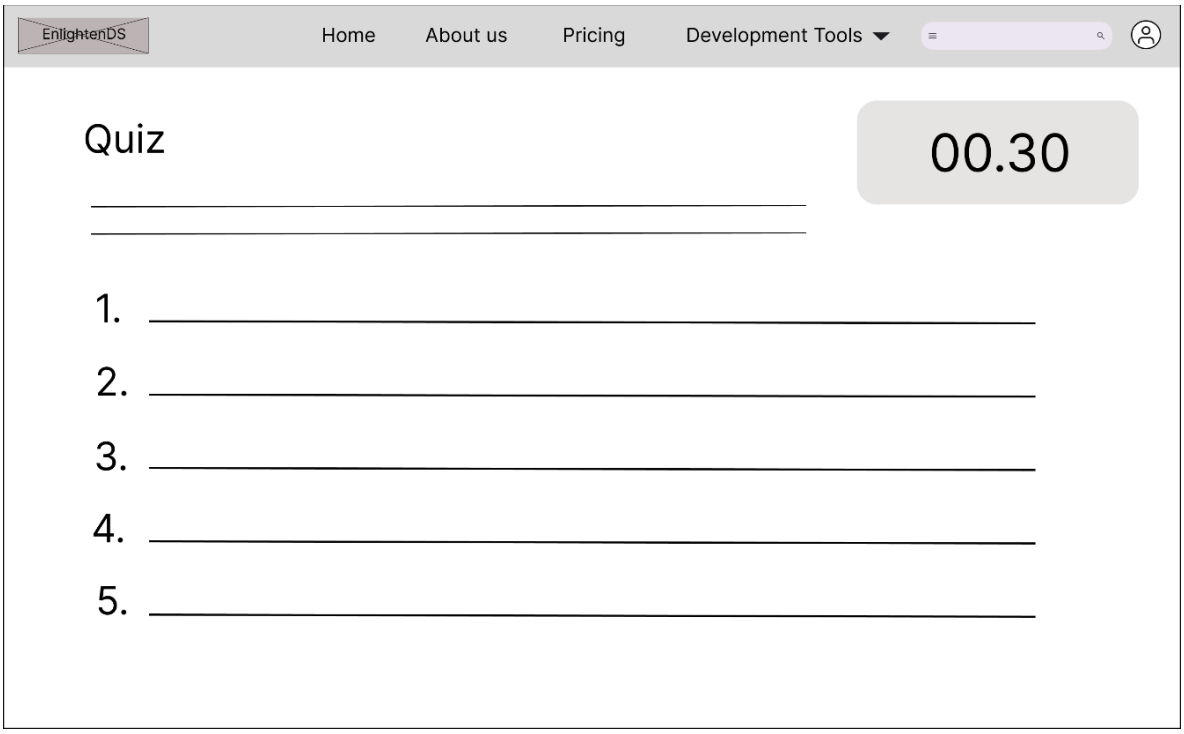


Figure 17: Quiz Page

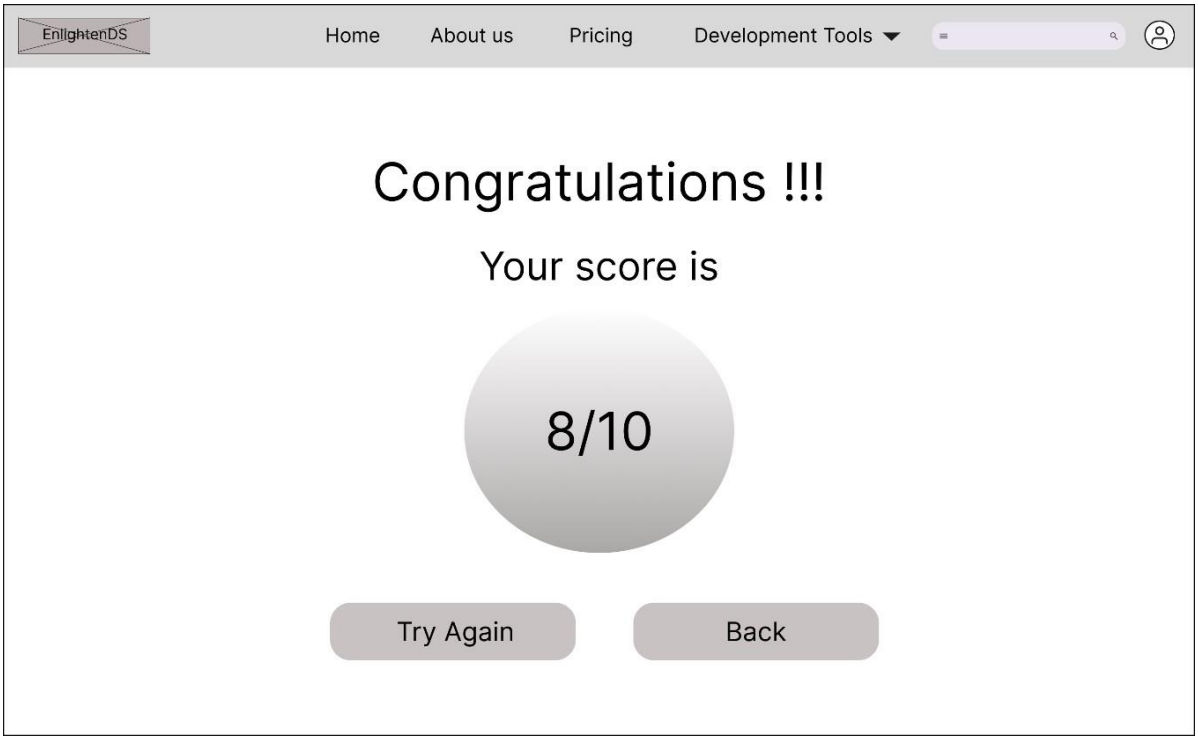


Figure 18: Score Page

4.4.3 Test Cases.

Test case ID: Test_01				
Test title: Validate successful navigation.				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: User Should be able to navigate to talent identification page.				
Pre-conditions: User should have valid credentials to login to the system.				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_01	1. User login to the system with valid credential. 2. User should be able to navigate to the talent identification page.	• Successfully user login to the system and once user selected the talent identification page through navigation panel and navigate to that page.	• Successfully user login to the system and once user selected the talent identification page through navigation panel and navigate to that page.	Pass

Table 1 - Test Case 01

Test case ID: Test_02				
Test title: Validate the learning category selection.				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: Once user selected the quiz category, quiz should display to user.				
Pre-conditions: User should be a valid user.				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_02	1. Login to the system with valid credential. 2. Then navigate to talent identification page. 3. Select learning category.	• Login should be successful. • User successfully navigated to the talent identification page. • Once user selected the learning category, user should receive a quiz.	• Login should be successful. • User successfully navigated to the talent identification page. • Once user selected the learning category, user should receive a quiz.	Pass

Table 2 - Test Case 02

Test case ID: Test_03				
Test title: Validate score calculation.				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: Score calculation				
Pre-conditions: User should successfully login to the system, navigate to talent identification page and selected learning category. .				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_03	1. Once user selected the learning category, user should receive the quiz. 2. Then user completed the quiz.	• Once user receive the quiz, user should be able to select answers. • Once it completed score should display.	• Once user receive the quiz, user should be able to select answers. • Once it completed score should display.	Pass

Table 3 - Test Case 03

Test case ID: Test_04				
Test title: Validate recital category selection.				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: Validate user navigation to recital category and validate recital functionality.				
Pre-conditions: User should successfully login to the system and navigate to talent identification page.				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_04	1. User should be in the talent identification page. 2. User select the recital category.	• Once user selected the recital category, user should navigate to recital page, • Then user should view a piano. • And user should be able to recital the piano.	• Once user selected the recital category, user should navigate to recital page, • Then user should view a piano. • And user should be able to recital the piano.	Pass

Table 4 - Test Case 04

Test case ID: Test_05				
Test title: Validate painting category related functionality.				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: Validate user navigation to paining category and perform painting functionality.				
Pre-conditions: User should successfully login to the system and navigate to talent identification page.				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_05	1. User should be in the talent identification page. 2. User select the painting category	• Once user selected the painting category, user should receive a painting platform. • User should be able perform painting actions.	• Once user selected the painting category, user should receive a painting platform. • User should be able perform painting actions.	Pass

Table 5 - Test Case 05

Test case ID: Test_06				
Test title: Validate results calculation				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: Validate the result calculation.				
Pre-conditions: User should interact with the system multiple times.				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_06	1. User perform learning, painting and recitalactivities in multiple attempts.	• After twice a week user should receive the talented area according to the number of attempts.	• After twice a week user should receive the talented area according to the number of attempts.	Pass

Table 6 - Test Case 06

Test case ID: Test_07				
Test title: Sending notification functionality validation.				
Test priority (High/Medium/Low): High				
Module name: Talent identification				
Description: Validate the notification sending to their parents.				
Pre-conditions: User should provide valid credentials to login to the system.				
Test ID	**Test Steps**	**Expected Output**	**Actual Output**	**Result (Pass/Fail)**
Test_07	1. User perform learning, painting and recital activities in multiple attempts. 2. After a twice a week, parents should receive a notification about their child's talented area.	• Once final results analyzed, the child's talented area should notify to their parents.	• Once final results analyzed, the child's talented area should notify to their parents.	Pass

Table 7 - Test case 07

5. COMMERCIALIZATION PLAN

1. Market Analysis

Target Audience:

- Children with down syndrome age 5-15
- Parents, caregivers and schoolteachers
- Health care professionals working with children with special needs

Market Size and Trends:

- Increasing awareness and demand for individualized educational help for children with special needs and increasing adoption of technology in the learning process, especially in special education

2. Revenue Model

1. Freemium Model:
    - Offer a free, basic version of the system, with reduced features.
2. Subscription-Based Model:
    - Users could have a subscription service on a monthly or annual basis for parents and institutions and have tiered pricing based on features/levels of access (basic, premium)
3. Institutional Sales:
    - Partner with schools and educational institutions by offering bulk subscriptions.

3. Packages and features

1. Basic Plan
    - Features:
        - ✓ Access to cognitive level assessment tools
        - ✓ Basic communication skill improvement activities
        - ✓ Limited personalized quizzes for math skills
        - ✓ Access to painting and piano platforms to develop creativity
        - ✓ Basic summary reports for parents with scores and spent time
    - Price: Free
2. Premium Plan
    - Features:
        - ✓ All features from the Basic Plan
        - ✓ Advanced cognitive assessment with detailed symptom analysis
        - ✓ Full access to personalized quizzes with adaptive difficulty
        - ✓ Emotion-based engagement activities and mood detection

- ✓ Advanced summary reports with performance improvement statistics.
- ✓ Priority customer support.

- Price: $10 per month

3.School/Institution Plan

- Features:
  - ✓ Bulk subscriptions with discounts for schools and educational institutions.
  - ✓ Access up to 40 students.
  - ✓ Full access to all features for multiple users [Students].
  - ✓ Training and support for educators to include it in the curriculum.
  - ✓ Detailed analytics and reports for educators on student progress
- Price: $30 per month

6. BUDGET

Component	Amount
Travelling cost	10000
Server & Hosting charges	25000
Internet Charges	15000
Total	50000

Table 8 - Budget

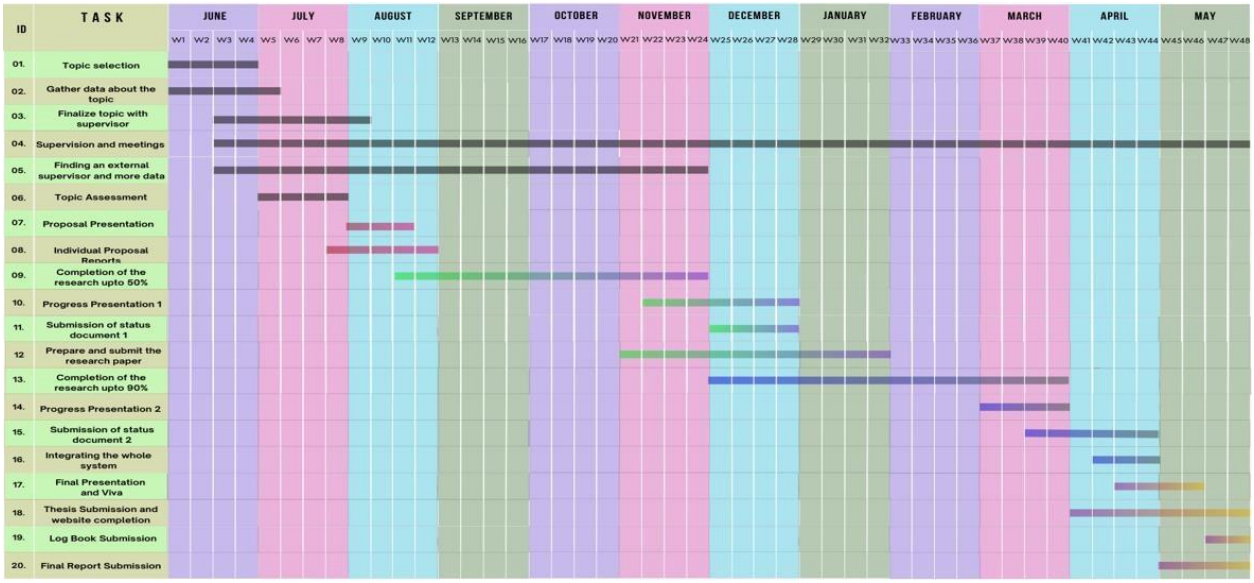
The budget for "EnlightenDS" has been carefully planned to cover all the important costs needed to develop and launch our cognitive assessment tool. It involves an amount of LKR 50,000, carefully planned to cover all the essential costs associated with the development and deployment of our cognitive assessment tool, EnlightenDS. The total budget is broken down into three key components.

First, we allocated LKR 10,000 for Traveling Costs. This amount is for traveling related to team meetings, collaboration with educational institutes, and any fieldwork that might be required for collecting user feedback or on-site demonstrations of our tool. This will ensure that we get to meet and interact face-to-face with our stakeholders. This is very important in the refinement of our solution to meet real-world needs.

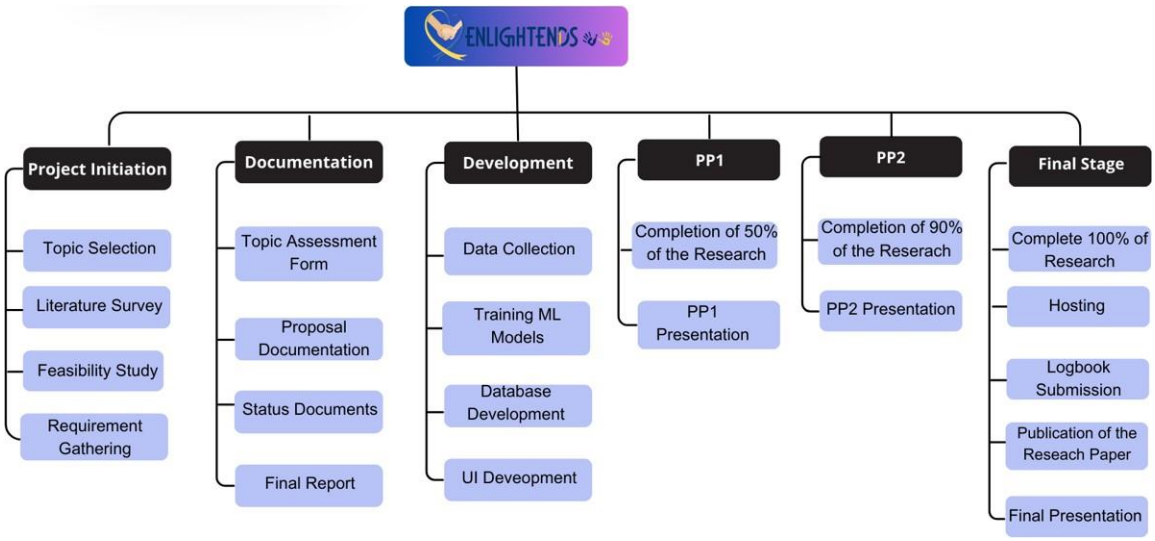
This comes with the largest portion of the budget, LKR 25,000, for Server and Hosting Charges. This will be very instrumental in maintaining the infrastructure required to support our app. Reliable server hosting ensures that our platform remains open to users always, ensuring seamless operation and data security.

Finally, LKR 15,000 has been allocated for Internet Charges. Since we are going to use cloud-based services and collaborate remotely, stable internet with high speed is one of the essential requirements for the day-to-day running of the project from research to development, testing, and communication.

7. GANTT CHART



8. WORK BREAKDOWN CHART



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10. APPENDICIES

Survey Link = https://forms.gle/QAtP4zw7gkEtuYQ47

Plagiarism Report =

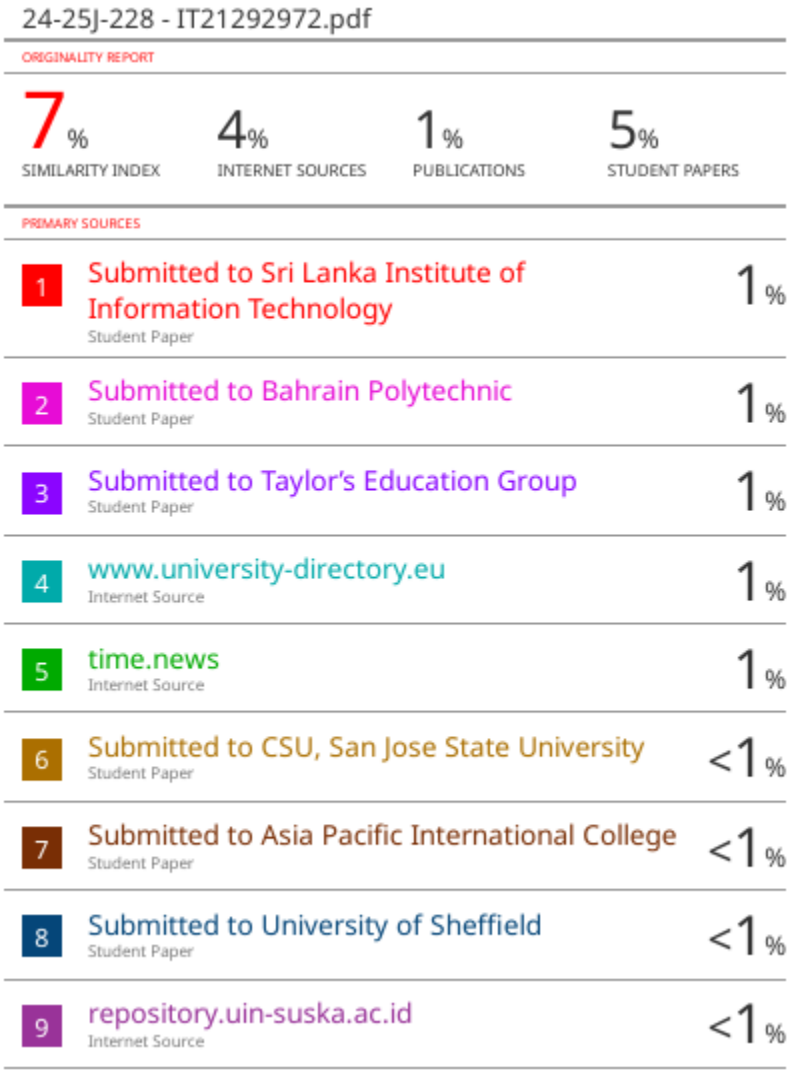

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Figure 19 - Plagiarism Report