INDUSTRY GRADUATE DIPLOMA

INTEGRATED LEARNING PROJECT

ARTIFICIAL INTELLIGENCE (AI) IN THE DIGITAL ECONOMY

Final Project Report

EduKaki: AI-Enabled Personalised Education Pathway Planner for Singapore Students and Parents

Submitted by:

Benjamin Yuan

Ho Binjin (Misty)

Maria Donna Empic Marco

Tan Hsiao Ching

Group 1

5 May 2026

Live Application: https://edukaki.replit.app/

Abstract

Singapore's education system is consistently recognised among the best in the world, with various options catering to students of differing academic abilities. Students (and their parents) have to decide on different pathways along their educational journey, and often turn to multiple sources of information — such as the Ministry of Education (MOE) and school websites, advice from friends, family and forums — to decide which path best suits their academic strengths and personal interests. While there are existing digital tools aiming to help with information gathering, most do not offer end-to-end guidance based on a student's individual circumstances. Our team developed **EduKaki**, a web application powered by AI, to help bridge this guidance gap.

The methodology consisted of four phases — data collection and structuring; rule engine development; prototype construction and logic testing of version 1.0, and lastly usability testing of version 2.0. As part of the validation process under Phase One, our team surveyed 23 respondents (21 parents, 2 students). The results established that 100% of participants perceived value in an AI-powered tool able to provide personalised guidance within a single resource, with a mean adoption likelihood of 4.2 out of 5.

During Phases Two and Three, AI tools were utilised to build the data layer, backend logic and frontend interface, as well as integration with a Large Language Model (LLM) to deliver the customised guidance as text output. In the last phase, a short usability test was conducted with five respondents to evaluate their experience trying out EduKaki's three interaction modes, and to identify areas for improvement.

In all, this project addressed the challenge faced by students and parents in gathering information from fragmented and multiple sources lacking in personalisation, in order to navigate complex pathways and options in Singapore's education system.

Background

Problem Statement

Singapore has consistently done well in global education indicators, most notably the Programme for International Student Assessment (PISA), with regular stellar scores in Mathematics, Sciences and reading across PISA assessments. But behind all this, is an education system which can be challenging to navigate, characterised by multiple pathways culminating in high-stakes checkpoints — such as the Primary School Leaving Examination (PSLE) at the end of six years of primary education, and the O- and A-level pathways marking the transition from secondary and post-secondary education respectively, This is true for students taking what is now known as the Secondary Education Certification (SEC), previously known as the Express or Normal (Academic/Technical) streams. For students in the Integrated Programmes offered by selected schools, other options are also possible, such as the International Baccalaureate or IB Diploma. Besides the A-levels and the IB, the polytechnic and Institute of Technical Education (ITE) routes are also available.

At times, cohort-specific policies have also raised the level of complexity due to differing implementation timelines, and students and their families have had to figure out which specific policies apply to their own pathway. This has not been an easy feat. One example is the the shift from the T-score to the Achievement Level (AL) scoring system in 2021, with each subject scored on a scale of AL1 to AL8 and total PSLE scores ranging from 4 to 32. Students born in 2009 were the first to experience this new scoring framework at the national level.

Navigating what sometimes feels like a maze of fragmented information, students and parents have sought information from sources such as school websites, public forums on social media, friends and family, as well as tuition centres and other unofficial channels. The difficulty of obtaining coherent and accurate information may even be associated with an elevated level of stress and tension especially during the key transition years. Approximately one in three youth in Singapore have reported poor mental health symptoms, with academic stress identified as one of the leading triggers

(Institute of Mental Health, 2024). Singaporean children who are recipients of mental health services have experienced academic stress at about twice the level of their non-Singaporean counterparts (IMH, 2024). This may well be associated with the high-stakes nature of the key academic transition points for Singapore students, coupled with the difficulty of obtaining clear comparisons about the diverse options available. In the face of the dearth of available information, many eventually come to regret their educational choices (Tan, 2023).

While there are various digital tools available for students, they lack systematic identification of developmental gaps and end-to-end customised guidance. MOE SchoolFinder matches school options based on cut-off scores, but does not provide a more nuanced recommendation based on a personalised fit for the student as an individual. MySkillsFuture Student Portal helps those who are exploring career interests, but also does not take into account specific challenges or unique circumstances faced by each student. What is lacking is a single resource which can identify gaps in a student's academic and developmental trajectory, with the ability to surface a customised plan tailored to their specific circumstances, to help each student get from where they currently are to where they aspire to be. This would entail looking at each student's unique profile and then producing a roadmap to show the path forward.

Objectives

In this project, we aimed to:

- Identify a real-world challenge in Singapore's education landscape, conduct evidence-based research, and develop an AI-driven solution to address it.
- Examine how AI technologies, specifically natural language processing and generative AI, can be applied to education guidance in a compliant manner.
- Use AI to process a structured dataset and synthesise information from multiple sources, producing customised guidance that empowers students and parents to make informed decisions.

Scope

Edukaki is designed for use by Singapore students between the ages of 10 to 16 who are soon entering, or are within, the Secondary school system. This demographic is likely to be encountering, for the first time, the diversity of pathways available, and questions regarding future career options and the necessary subject combinations. They and their families would be concerned with getting into a school which would be a best fit for them, including considerations such as the breadth of school programmes, as well as academic and CCA offerings. EduKaki addresses these factors, while also taking into account the relevant education policies impacting each student based on their cohort, such as Full Subject-Based Banding (FSBB), and the Direct School Admission (DSA) exercise.

Project Limitations

Lack of data currency: EduKaki currently depends on a static and manually filled dataset drawn from multiple public sources, such as the websites of MOE, Singapore Examinations and Assessment Board (SEAB), SkillsFuture and individual schools. This was workable for the purposes of building a prototype, however EduKaki's generated recommendations are limited by how updated the dataset is. As students and their families may use EduKaki to make important decisions, any outdated information could lead to confusion and loss of trust.

Current design as Single-Session Architecture: EduKaki's current design treats every user visit as a one-off session. Since education pathway planning is usually not a one-time decision, EduKaki's design ideally should be aligned with how users are likely to use it over a period of time, rather than at a single sitting. EduKaki is currently limited by the lack of functionality in account or profile creation, which would allow for extended usage and user profile retention.

LLM Hallucination Risk: Even though the logic behind EduKaki is based on structured rules, the LLM that generates text output may still produce inaccurate or irrelevant advice at times. This is a known risk associated with using LLMs, which can be

mitigated with prominent UI disclaimers and mandatory "Consult your school" prompts in all outputs.

Exclusion of other factors when deciding on specific schools: Parents may also have other factors in mind such as social mix, or logistical considerations like the school's proximity from the student's residence. EduKaki's current design has omitted such considerations.

Tools and Technologies

The Edukaki app was built using Replit as a prototyping platform, Excel to contain the structured dataset, and coded with AI development support.

Frontend Interface — Replit

Replit served as the main environment for building and hosting the app. It also allowed the prototype to be shared through a public URL, which was useful for collecting feedback from testers without requiring a separate hosting site. This was suitable and fit the team's aim of developing and testing the concept quickly, rather than starting out with building a fully commercial application from the outset.

At the core of the prototype is a rules-based recommendation system which would constrain the AI from generating advice freely to users. Instead, EduKaki must first check each user's profile against a structured set of pathway requirements (or rules). These helped to keep the recommendations accurate and grounded firmly within the Singapore education context.

Data Layer — Structured Excel Dataset

The prototype used a Master Excel file as its main source of data. It contained all key information on school policies, cut-off scores, subject prerequisites, and pathway requirements. This data was collected from trusted sources like the MOE website, SEAB, SkillsFuture, and other relevant course and university websites. This information was then organised into a coherent and structured format for use by the application and allowed it to check a user's stated profile against the structure of pathways provided. Where relevant to user requests, the logic on Replit also directed users to official Junior

College, university or course webpages so that they could personally verify the details of the information and further explore the pathways.

LLM Integration — OpenAI GPT-4o-mini

OpenAI GPT-4o-mini was used mainly to improve the way recommendations were explained to users. First, the application generated results based on the user's profile and pathway rules. GPT-4o-mini then helped turn these results into clearer guidance for students and parents, including more conversational guidance upon request. In this way, the AI model was used to make the rule-based output easier to read and understand.

Development and Collaboration Tools

Replit served as the integrated development environment (IDE) and hosting platform. ChatGPT was utilised as an AI coding assistant during the development of the rule engine logic, as well as providing the LLM integration. Microsoft Excel and Google Forms were used for data structuring and survey administration, respectively. The project presentation was developed using Microsoft PowerPoint. Lastly, a separate AI tool Manus was used to evaluate various outputs for further coherency.

Technology	Purpose
Replit	Frontend: Responsive web UI with rapid prototyping Hosting for Deployment and public URL access
Custom Rule Engine	Backend: 6-Rule deterministic gap analysis (R1–R6)
Structured Excel Dataset	Data Source as Single source of truth for MOE policies
OpenAI GPT-4o-mini	Large Language Model with Natural language generation layer
Manus	AI tool to evaluate other AI-generated outputs
ChatGPT, Google Forms, MS Excel	Development assistance and data collection

Planning Phases

EduKaki was developed across four structured phases, designed to ensure that policy accuracy and logical correctness were established before the user experience layer was built.

Phase 1: Data Collection and Structuring

The team started by gathering all the necessary information from different sources to help create a logical pathway recommendation, including MOE policies on scoring systems, secondary school placements, and subject-based banding; requirements for direct school admissions and post-secondary pathways; as well as career guidance frameworks from SkillsFuture. Various online sources were consulted, including school websites, official press releases, and SEAB announcements. The consolidated data was organised into a single, structured Master Excel dataset. Concurrently, the team conducted a preliminary survey to better understand how parents and students gather information. (Refer to Methodology/Validation for more details.)

Phase 2: Rule Engine Development

The team took a close look at the education policies and broke them down into a simple framework. Six main rules, denoted as R1 to R6, were used to check how ready students are for their chosen path, in an objective and effective manner. These rules were turned into small, reusable pieces of code in Python and connected to a central system to make sure everything worked consistently. Before moving on to the next step, the team tested the rules thoroughly, including unusual situations like students coming back from schools in other countries. This careful testing helped make sure the system was reliable and worked as expected.

Phase 3: Prototype v1.0 — Logic Testing

The first functional prototype was built using Replit as the development and hosting platform, with AI coding assistance from ChatGPT. At this stage, the focus was on making sure the rule engine worked accurately, rather than making the user interface look good. The rule engine was checked for correct identification of gaps in all six areas for different types of student profiles. Outputs for the 18-month roadmap were also checked to match MOE policies. Any mistakes in the rule logic were fixed during this phase before the prototype was shown to external testers.

Phase 4: Prototype v2.0 — UX Refinement and Usability Testing

After making sure everything worked as it should, the team turned their attention to creating the final interface that users would see. This is where we introduced three different ways for people to interact with the system: Quick Planner, Guided Conversation, and Recovery Playbook. Integration with OpenAI GPT-4o-mini LLM, also helped turn complicated rules into simple, easy-to-understand guidance that was also empathetic. The homepage was redesigned to make it clear what EduKaki was all about and to help users find the right way to interact with the system. Lastly, usability testing was also conducted.

Step-by-Step Execution

Step 1: Define the Problem and Research Hypothesis

The team conducted a literature-informed problem scoping exercise, drawing on existing research linking Singapore's high-stakes education transitions to student and parental stress. The core research question was framed as: "How might we empower Singapore students and parents with personalised, empathetic guidance to navigate their complex education pathways?"

Step 2: Administer Validation Survey

A structured survey was distributed with responses from 23 participants (21 parents, 2 students) to validate the existence of the guidance gap and quantify demand for an AI-driven solution. The survey asked about their experiences when their children moved from primary school to secondary school, how they look for information now, if they are happy with the tools they have, and if they would like to use a guidance system that is powered by AI.

Step 3: Compile the Master Dataset

All verified policy and school data was aggregated into a structured Excel file. Each row represented a policy rule, school cut-off range, subject prerequisite, or career-pathway mapping. This file served as the backend's dynamic reference, replacing hardcoded logic and enabling updates without code changes.

Step 4: Develop and Test the 6-Rule Gap Engine

The six-rule gap engine was coded in Python and iteratively tested against a bank of student profiles ranging from straightforward secondary school entries to complex non-standard scenarios. Each rule, Subject Fit (R1), Portfolio (R2), Grade Readiness (R3), Policy Constraints (R4), Test Timeline (R5), and Fragility (R6), was validated independently before being integrated into the unified recommendation pipeline.

Step 5: Build the Frontend Interface

The frontend was constructed, implementing three separate user flows: the four-step Quick Planner form, the ten-question Guided Conversation mode, and the Recovery Playbook dropdown interface. A progress tracker was integrated into the Guided Conversation mode to reduce cognitive load. The homepage was designed to communicate key trust signals, including the six gap-check rules and 18-month roadmap commitment, to establish credibility from first contact.

Step 6: Integrate the LLM Output Layer

Following successful logic testing, the OpenAI GPT-4o-mini API was integrated to transform the structured output of the rule engine into readable, empathetic text. Prompt engineering constraints were applied to ensure that LLM responses remained grounded in the rule engine's outputs and did not generate speculative recommendations beyond the scope of the verified dataset.

Step 7: Conduct Remote Usability Testing

The v2.0 prototype was shared with five user testers via the public Replit URL. Testers were asked to complete four structured tasks — Quick Planner (Task 1), Guided Conversation (Task 2), Recovery Playbook (Task 3), and a personalised scenario test (Task 4, optional) — and to submit feedback via a structured Google Form. Quantitative ratings and qualitative open-text responses were collected and analysed.

Step 8: Synthesise Findings and Prepare Recommendations

Survey and usability data were synthesised to identify priority improvement areas, validate the design decisions made during development, and formulate strategic and technical recommendations for future iterations of EduKaki.

Screenshots and Outputs

The EduKaki live web application can be accessed at https://edukaki.replit.app/, the information below are presented in place of embedded screenshots. These provide an overview of the main parts of the website and what happens when users interact with it. The screenshots are appended to this report as supplementary images under the Appendices.

Homepage

The EduKaki homepage clearly shows what the webpage is all about: helping users plan their education journey with a personalised 18-month plan. There are three easy options to choose from: a Quick Planner, Guided Conversation, and Recovery Playbook. Users can also see some important details that show the app's dependability, such as the six Gap-Check Rules, the promise of an 18-month roadmap, and the special R1-R6 insights framework. These features can help guide users through their education journey.

Quick Planner — Output Screen

When the user is done filling out the four-step Quick Planner form, the user will get a detailed report that includes a few key things: First, a score shown as a percentage for each of the six rule dimensions, called the gap readiness score. Next, the user will also get a list of gaps that were found, along with the specific rule codes that apply to each gap (e.g. "R1: Subject Fit - Physics not currently enrolled"). Lastly, the report will lay out an 18-month plan of action, broken down into three parts: things to do right away (within the first month), steps to take in the short term (over the next one to three months), and longer-term goals to work towards (over the next three to eighteen months).

Guided Conversation — Session Interface

The Guided Conversation mode is a user-friendly, conversational way of asking the app information. Each question is written in a conversational manner and it changes sequentially based on what the respondent has said previously. It can handle situations that are not typical. So even if the student's situation is a little unusual, the answers will still make sense and be relevant to what you are trying to achieve.

Recovery Playbook — Setback Response

The Recovery Playbook offers a list of common problems that students might face. The list includes failing a subject, missing important deadlines, and not doing well in exams. When one of these problems are picked, the system creates a plan to help responders get back on track. The plan has three parts:

1. Things to do right away
2. Steps to take in the medium term
3. Longer-term strategies to help recover.

The playbook gives students a clear roadmap to follow when they're struggling.

Methodology / Validation

Before working on the project further, the project team wanted to really see the need of having an app, and so they sent out a survey called "Questionnaire on AI-Enabled Personalised Education Pathway Planner". The survey was sent out to several members of the public, but only 23 were able to respond within the required timeline. The respondents were mostly parents (21 responses) and students (2 responses, aged between 13 to 17 years) in secondary school.

Survey Design and Administration

The survey was done through Google Forms online and was divided into four main parts:

1. Respondent demographics and the current level of their children
2. Questions on current information gathering on educational paths and the existing resources

3. Opinions of existing resources
4. Viewpoints on using artificial intelligence for guidance

Results Interpretation

Finding 1: The Guidance Gap is Real and Measurable

Most parents surveyed found it difficult to get reliable guidance. On a scale of 1 to 5, they rated it around 2.7, which leans towards median to difficult. One parent indicated, "You have to gather information from different sources, which is a hassle." Another parent said that because they did not have the right information, they started the DSA process too late. These data show that a lot of parents struggle to find the right information they need.

Finding 2: Existing Tools Underperform on Personalisation

The existing digital tools were rated by the respondents across four capacities:

- Ease of use and navigation
- Clarity of information
- Relevance to the current educational system
- Ability to provide personalised guidance.

Among the results lowest mean rating was given to Personalisation with a mean score of only 3.1 out of 5. Ease of use and navigation, clarity of the information provided and relevance to the current system all garnered equal mean scores of 3.0 out of 5. On top of these results, some respondents also pointed out that they were presented ambiguous information, there were too many websites to navigate and that some lacked good profile data.

Dimension Assessed	Mean Rating (1=Best, 5=Worst)
Ease of Use / Navigation	~3.0 / 5 (Moderate friction reported)
Clarity of Information	~3.0 / 5 (Moderate clarity gaps)
Relevance to Current System	~3.0 / 5 (Moderately relevant)
Personalisation Capability	3.1 / 5 (Lowest-rated; Significant Gap)

Finding 3: Universal Demand for AI-Powered Guidance

The usefulness of an AI-powered education pathway tool was backed by survey respondents. On average, they ranked themselves as very likely to use an AI-powered tool to help with getting pathway advice, giving it a rating of 4.2 out of 5. The results suggest that developing this tool would be a good idea, and meets a strong demand.

Finding 4: Feature Preferences Validate Core Design Decisions

Around 86% of the respondents said that they wanted to be able to compare different options when asked what they wanted in a tool that helps with decisions about education. Next, which comes at 82%, was to have a personalised plan which considers the student's individual circumstances. Respondents who gave their recommendation also suggested some other features, such as the inclusion of students' personal interests, not just their grades.

Finding 5: Primary Concerns Validate Architectural Decisions

Respondents were concerned about keeping their personal data safe, over reliance on AI and loss of human connections, and ensuring that the tool's source data is trustworthy. However, among the responses, they were most worried about the accuracy of AI and the risk of hallucination. The decision to use a rule-based engine that follows set rules, rather than a purely AI-driven model, was made to reduce the risk of false information. EduKaki also incorporates reminders for users to consult a counsellor face-to-face in certain situations where the outcome is uncertain.

Key Findings and Recommendations

Usability Test Overview

To better understand how people use EduKaki v2.0, a test was done with five respondents. They were given four tasks: one was to plan something quickly, another was to have a guided conversation, the third was to use a recovery playbook, and the last one was optional, where they could try out a scenario that was made just for them.

Key Finding 1: Output Wordiness Reduces Usability

Three of the five respondents independently noted that the text outputs generated by the application were excessively long and difficult to read. One tester rated their understanding of the roadmap at 60 out of 100, citing confusing phrasing. The wordiness issue was most pronounced in the 18-month roadmap section, where longer-term actions were described as "too generic and lacking specificity."

Recommendation: Introduce collapsible detail sections in the UI to allow users to expand the information relevant to their immediate needs and restructure the LLM prompt templates to apply bullet-pointed output for action items, and lastly apply a maximum word count for each roadmap section.

Key Finding 2: Subject Options Incomplete for Lower Secondary Students

Option Coverage: The subject options in our prototype did not fit some needs of students at the Lower Secondary levels, i.e. Secondary 1 and 2. At this stage, students are taking a standard set of subjects which are different from the combinations they will encounter at Upper Secondary. Because of this gap, some of our testers found that the recommendations they received did not match with their actual subject choices. We did not anticipate this, and it is something we need to address to make our app more user-friendly for all users.

Recommendation: An education-level filtering should be introduced so that only relevant subject options are displayed based on the student's reported current level. Extend the subject selection database to include the full range of lower secondary (Secondary 1–2) and upper secondary (Secondary 3–4) subject combinations.

Key Finding 3: Pathway Depth is Insufficient Beyond Secondary School

Pathway Depth Limitation: One limitation of the current iteration of the pathway planning tool is its focus on post-Secondary options. One respondent who tested the tool felt that it did not provide sufficient help with choosing a Junior College or with figuring out what to do after obtaining O-Level results. This reflects the current stage of development of the application.

Recommendation: Extend the rule engine to include a post-secondary layer covering ITE pathway suitability, polytechnic course-cluster alignment, and junior college subject combination recommendations, based on the student's O-Level projected results and career interests.

Key Finding 4: Trust is Conditional on Output Clarity

Even though it was based on a set of clear rules, not everyone trusted the tool's suggestions. People who understood how the tool worked, tended to trust it more. One of them said they looked at the suggestions and thought most of them were still useful. However, some were unsure about how to use it because the explanations were difficult to understand. For example, one person said the story behind the tool was confusing, which made them less confident in using it.

Recommendation: Provide a brief explanation of what each rule evaluates. This transparency will differentiate EduKaki from generic AI tools and build user confidence. It will also make sense to display the rule engine's architecture more explicitly within the application (e.g. labelling each recommendation with the gap rule from which it originates (e.g., "This action was triggered by R1: Subject Fit")

Key Finding 4: Recovery Playbook is Highly Valued

The Recovery Playbook mode consistently garnered positive feedback. One tester appreciated the phased structure of immediate, medium-term, and longer-term actions. While another one stated that it gave "well-defined actions to take when dealing with poor results". It was also pointed-out that the results were "short and simple, in contrast to the formats in Task 1 and 2."

Recommendation: We should make the Recovery Playbook better by adding more types of problems that students might face, like missing deadlines for DSA, asking to switch subjects, and going through appeals processes. The way the mode is set up now, with clear and quick actions, should be used to improve the Quick Planner and Guided Conversation modes, making them more user-friendly and effective. This will help students get the support they need in a more straightforward way. By doing this,

we can make sure that all the different tools we use to help students are working well together and providing the best possible experience.

Additional Challenges

Small Sample Size: The usability test involved a small sample size of five respondents, which, while yielding some qualitative depth, limits the statistical representativeness of findings.

Strategic Recommendations

The team has identified the following strategic directions for EduKaki's improvement, on top of the immediate usability developments:

1. **Technical Architecture and Data Strategy**

- **System Architecture & Model Selection**: To maintain the high level of trust identified in usability testing, EduKaki will continue to use a deterministic rule-based engine for core recommendation logic. This acts as a primary guardrail against the hallucinations common in generative AI, ensuring all advice aligns strictly with verified MOE policies with high accuracy.
- **Data and Guardrails:** Work with MOE and industry partners to implement automated data feeds with timely updates. Guardrails will be implemented that block non-educational queries and flag sensitive emotional keywords for human invention. A counselor can be alerted to reach out to students who use alarming keywords that require immediate help and attention.

2. **Human-Centric Governance and Risk Mitigation**

- **Institutional Adoption & Human Follow-up**: EduKaki is not intended to replace human expertise but to augment it. By automating routine career guidance, school counselors can focus on students who need increased assistance. A critical risk mitigation strategy is to prompt the user to follow up with a human counselor directly through the app, ensuring emotional support and verification of the AI recommended pathway.

- **Ethical Analytics & Data Permissions**: Moving beyond immediate usability, EduKaki will implement a granular consent framework. While the prototype currently does not save data to protect privacy, the production version will offer users the option to "opt-in" to anonymised data analytics. This data will be used to provide schools with aggregate insights into student anxiety trends or popular pathway gaps, creating organisational value while respecting individual privacy concerns.
- **Ethical Governance:** To ensure the fairness of the 6-Rule Engine, regular checks need to be done to fix any biases that might affect users. It is also important to clearly explain to users about the Fragility score (R6), and explain what it means. It has to be also highlighted that it is based on probabilities. This way, users can make more informed decisions, if they fully understand what they're looking at. The goal is to be fair and transparent in how the engine works, so everyone can trust the results.

3. **Sustainability and Commercialisation**

- **Maintenance & Scaling**: Future costs include the periodic updates of the Rule Engine to match shifting national education policies and the server costs associated with scaling the "Guided Conversation" feature.
- **Commercialisation Opportunities**: To ensure long-term sustainability, EduKaki can explore three revenue streams:

- **B2B Partnerships**: Working with tuition centers and education providers to integrate their specific program pathways as "premium" suggestions.
- **Freemium Model**: Charging a subscription for "Advanced Analytics," such as predictive grade forecasting based on historical school performance data.
- **SkillsFuture Integration**: Creating value for the lifelong learning ecosystem by linking secondary pathways to adult upskilling series, potentially attracting government grants or corporate sponsorships.

Conclusion and Future Work

Achievements

EduKaki represents a meaningful response to a gap in Singapore's education guidance landscape. As part of their IGD project, the team delivered on several fronts: through survey findings, they confirmed a genuine demand for an AI-powered, personalised education guidance tool; built a deterministic application governed by a six-rule process and anchored in verified MOE policies; launched a fully operational, publicly available web application featuring three separate interaction modes; and ran a usability study that yielded concrete recommendations for future improvements.

The results of the survey are clear that every person who responded thinks that an AI guidance tool is a good idea. With an average score of 4.2 out of 5, there is a high probability that they will use it. This shows that EduKaki is something people really need. The usability test also helped us make a good decision about how to build the tool. We chose to use a rule-based engine instead of just relying on AI to generate answers. When we explained how the rules work, the people testing the tool trusted the recommendations more. This goes to show that we have made the right choice.

Challenges Faced

Developing this project presents inherent difficulties. There were three primary challenges encountered during the applications’s development.

1. The team manually compiled and verified the policies and information from unstructured sources. This was both time-consuming and risky, as it may lead to omissions. This was done to counter the presence of fragmented data.
2. The cohort-specific complexities of the MOE policies needed to be transformed into consistent, programmable rules which required multiple iterations and extensive testing of nuances.
3. Because prompt engineering alone was not enough to prevent occasional instances of off-target guidance. This was made known during the user tests. Hence, ensuring that empathy and accuracy of data remains challenging.

Future Extensions

The following development priorities have been identified for future iterations of the app:

User Authentication and Session Continuity: The app should allow users to create accounts, save their recommendations, and return to previous planning sessions. This will allow the app to become a continuous planning companion.

Post-Secondary Pathway Extension: The use of the app should cover ITE pathway suitability, polytechnic course selections, and planning for the junior college subject combination to be useful for students in all post-secondary levels.

API-First Architecture: In order to ensure that the secondary schools are able to make full use of the app by having it embedded within their own portals, public APIs should be developed to broaden the reach.

Automated Data Feeds: To ensure real-time accuracy of school cut-off points and subject prerequisites, there needs to be change from manually updating datasets from MOE policy portals and integration with the SkillsFuture API.

Retrieval-Augmented Generation (RAG): To eliminate any risk of the AI doing hallucinations, RAG is needed for the Guided Conversation mode. This is necessary to direct the responses of the LLM directly from verified MOE policy documents.

Predictive Fragility Scoring: Introduce a machine learning layer for the Fragility rule (R6) that leverages historical student success patterns to generate probabilistic risk assessments rather than deterministic flags.

Bibliography

Institute of Mental Health. (2024, September 19). *National Youth Mental Health Study reveals about 1 in 3 youths in Singapore experienced severe or extremely severe mental health symptoms*. https://www.imh.com.sg/Newsroom/News-Releases/Documents/NYMHS_Press%20Release_FINAL19Sep2024.pdf

Ministry of Education Singapore. (2023). Secondary school subject-based banding. https://www.moe.gov.sg/secondary/courses/subject-based-banding

Ministry of Education Singapore. (2021). Primary School Leaving Examination: Achievement Level scoring system. https://www.moe.gov.sg/primary/psle/results/understanding-psle-results

Ministry of Education Singapore. (2024). SchoolFinder. https://www.moe.gov.sg/schoolfinder

Organisation for Economic Co-operation and Development. (2023). PISA 2022 results (Volume I): The state of learning and equity in education. OECD Publishing. https://doi.org/10.1787/53f23881-en

Singapore Examinations and Assessment Board. (2024). Direct School Admission — Secondary. https://www.seab.gov.sg/home/students/dsa

SkillsFuture Singapore. (2024). MySkillsFuture student portal. https://www.myskillsfuture.gov.sg/content/student/en/secondary.html

Tan, C. Y. (2023, March 22). *Tackling "educational regrets" among youth over post-secondary choices requires a radical mindset shift*. National Institute of Education, Nanyang Technological University. https://www.ntu.edu.sg/nie/news-events/news/detail/commentary-tackling-%27educational-regrets%27-among-youth-over-post-secondary-choices-requires-a-radical-mindset-shift

Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., Kaiser, L., & Polosukhin, I. (2017). Attention is all you need. Advances in Neural Information Processing Systems, 30, 5998–6008.

Wei, J., Wang, X., Schuurmans, D., Bosma, M., Ichter, B., Xia, F., Chi, E., Le, Q., & Zhou, D. (2022). Chain-of-thought prompting elicits reasoning in large language models. Advances in Neural Information Processing Systems, 35, 24824–24837.

Zhou, L., Gao, J., Li, D., & Shum, H.-Y. (2020). The design and implementation of XiaoIce, an empathetic social chatbot. Computational Linguistics, 46(1), 53–93. https://doi.org/10.1162/coli_a_00368

Appendices

Appendix A: Validation Survey — Summary Statistics

Survey title: Questionnaire on AI-Enabled Personalised Education Pathway Planner

Total respondents: 23 (21 Parents, 2 Students)

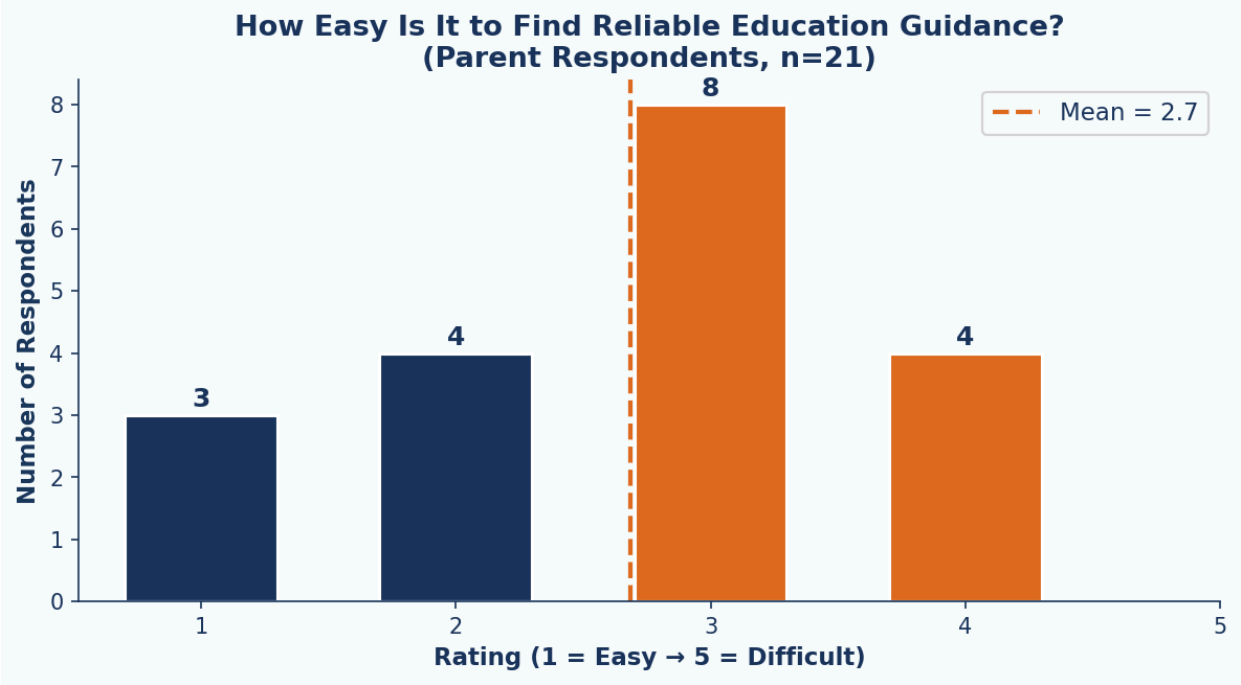
Administration period: March–April 2026

Refer to Attachment for full survey questions and raw data

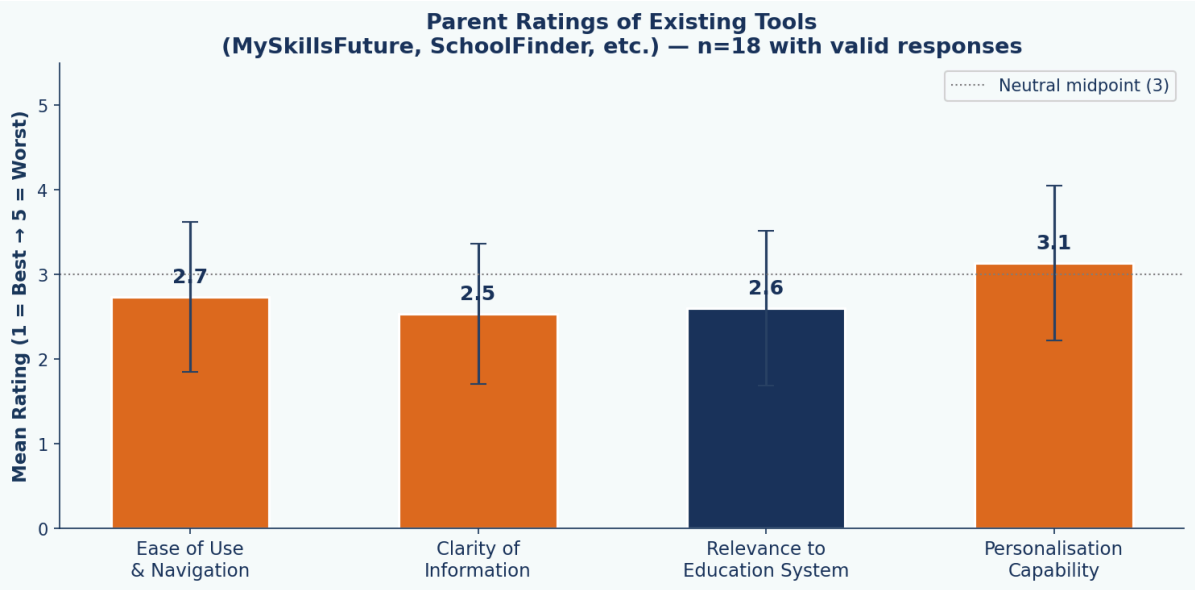
Questionnaire on AI-Enabled Personalised Education Pathway Planner (Responses)

)

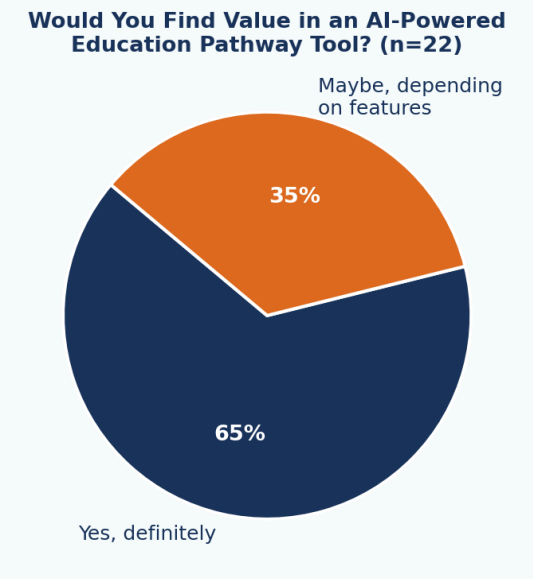
Survey Question	Key Result
Ease of finding reliable guidance (1=Easy, 5=Difficult)	Mean: 2.7/5 (Neutral to Difficult)



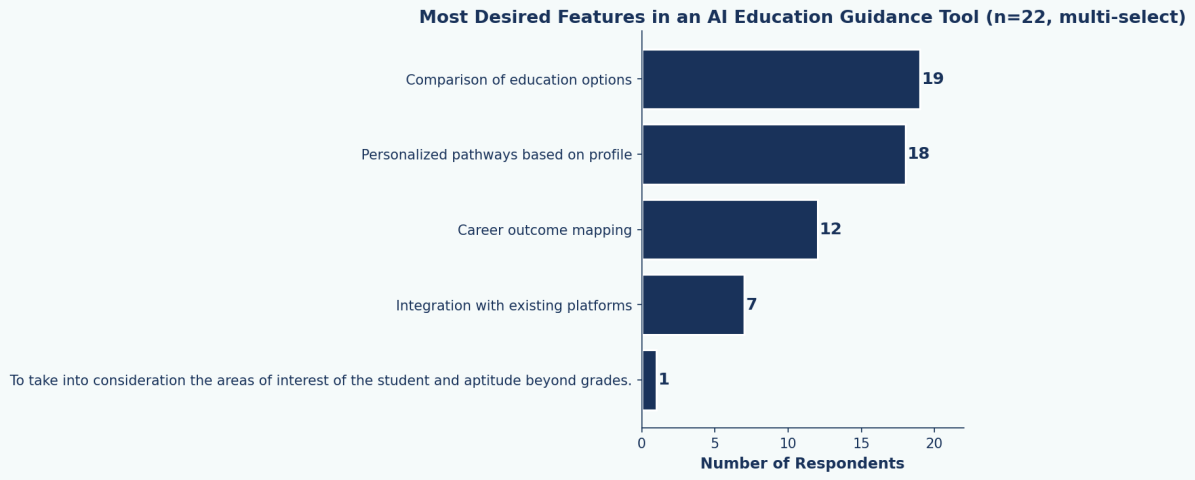
Survey Question	Key Result
Ease of use — existing tools	Mean: ~3.0/5
Clarity of information — existing tools	Mean: ~3.0/5
Relevance — existing tools	Mean: ~3.0/5
Personalisation capability — existing tools	Mean: 3.1/5 (Lowest rated)



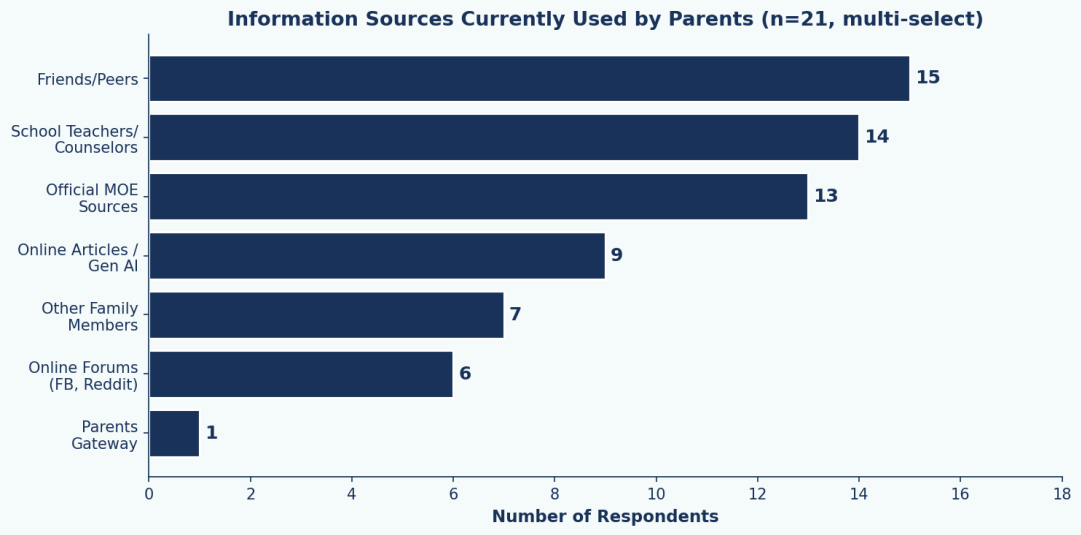
Survey Question	Key Result
Would find value in AI guidance tool	100% Yes (65% Definitely, 35% Maybe)



Survey Question	Key Result
Top desired feature: Compare education options	86% selected
Top desired feature: Personalised pathways by profile	82% selected
Most cited concern	Accuracy / AI Hallucination



Survey Question	Key Result
Information Sources Currently Used by Parents	71% Friends and Peers
	67% School Teachers/Counselors
	62% Official MOE Sources



Appendix B: Usability Test and Results

Survey title: EduKaki Usability Test

Total respondents: 5

Administration period: April 2026

Refer to Attachment for full survey questions and raw data

(EduKaki Usability Test (Responses))

Respondent	Child's Level	Overall Rating	Preferred Mode
R1	Sec 4 O-Level	3/5	Guided Conversation
R2	PSLE	4/5	Guided Conversation
R3	Secondary 1	5/5	Quick Planner
R4	Secondary 3	4/5	Both (sequentially)
R5	Secondary School	3/5	Guided Conversation

Appendix C: EduKaki 6-Rule Gap Engine Reference

Rule Code	Dimension	What It Evaluates

R1	Subject Fit	Whether current subjects align with target pathway prerequisites
R2	Portfolio	Whether co-curricular activities support the target pathway
R3	Grade Readiness	Whether grades meet minimum thresholds for target schools/programmes
R4	Policy Constraints	Whether MOE policies (SBB eligibility, cohort rules) affect options
R5	Test Timeline	Whether the student is on track for required entrance tests (DSA, aptitude)
R6	Fragility	Whether the plan has single points of failure needing contingency

Appendix D: EduKaki Prototype Version Comparison

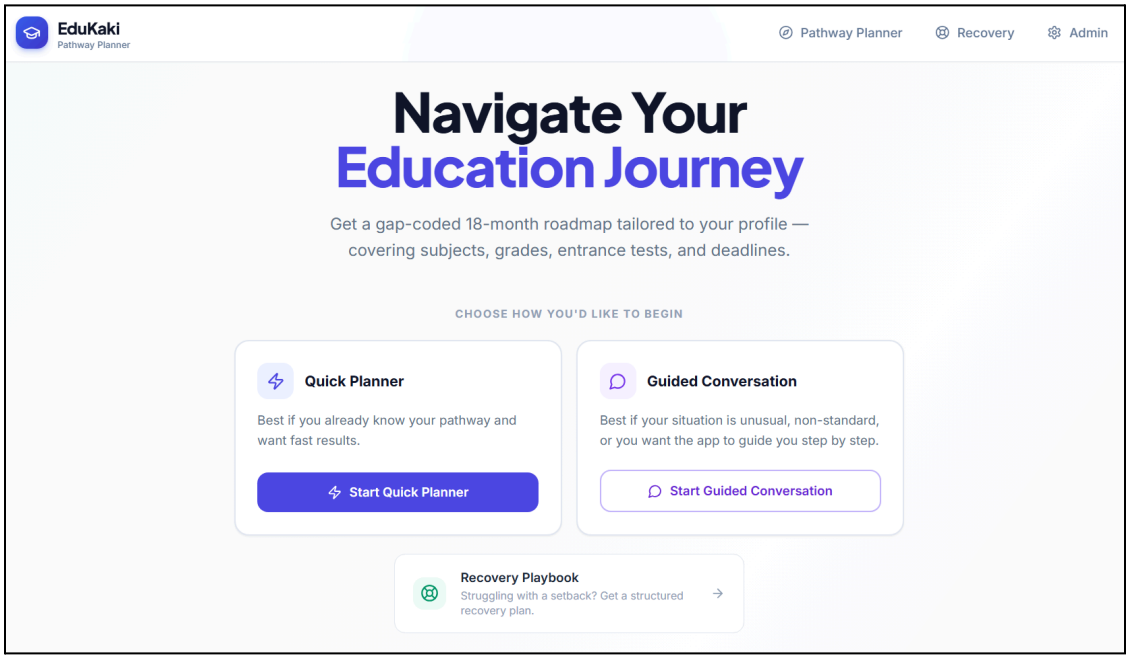
Dimension	Prototype v1.0	Prototype v2.0
Platform & UI	Basic wireframes / static mockups	Fully functional responsive web app (Replit)
Recommendation Logic	Hardcoded, linear pathways	Dynamic 6-Rule Gap Engine (R1–R6)
Interaction Modes	Single questionnaire form	Quick Planner, Guided Conversation, Recovery Playbook
Output Quality	Generic advice and school links	Personalised 18-month gap-coded roadmap
LLM Integration	None	OpenAI GPT-4o-mini for natural language generation

Appendix E: Live Application

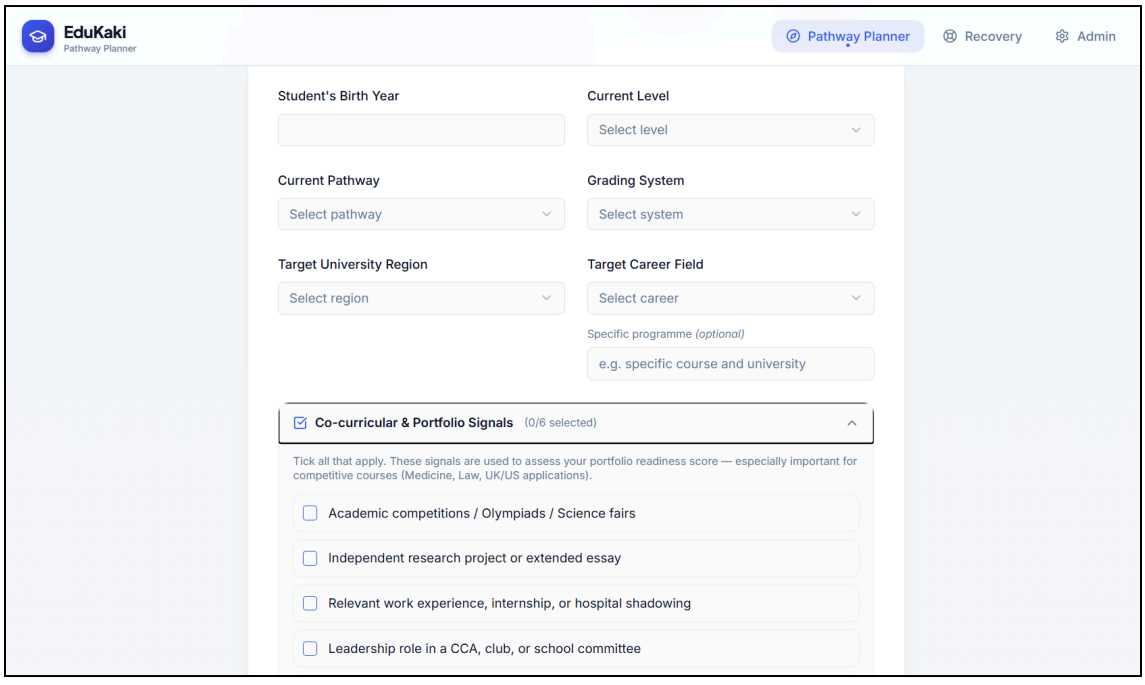
EduKaki is publicly accessible at: https://edukaki.replit.app/

The application was live and fully functional as of the submission date of this report (28 April 2026). The team recommends accessing the application via a desktop browser for the optimal user experience.

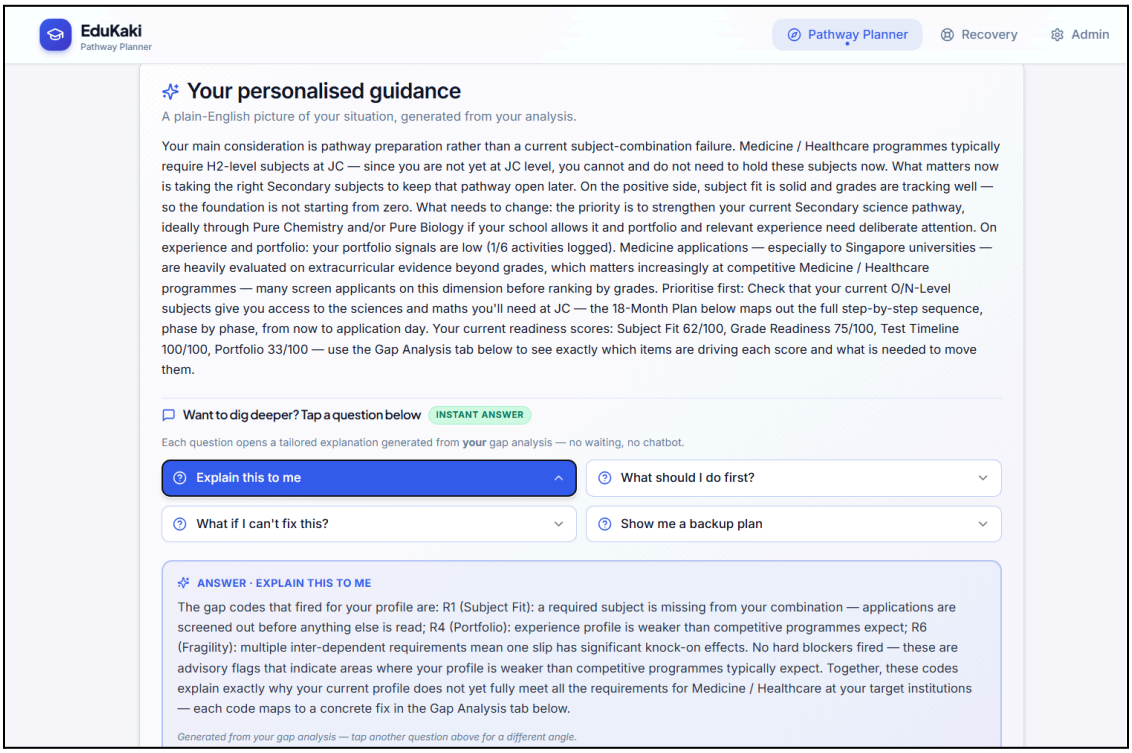
Appendix F: Prototype Screenshots



EduKaki homepage showing the three main interaction modes and the app's 18-month personalised pathway planning promise

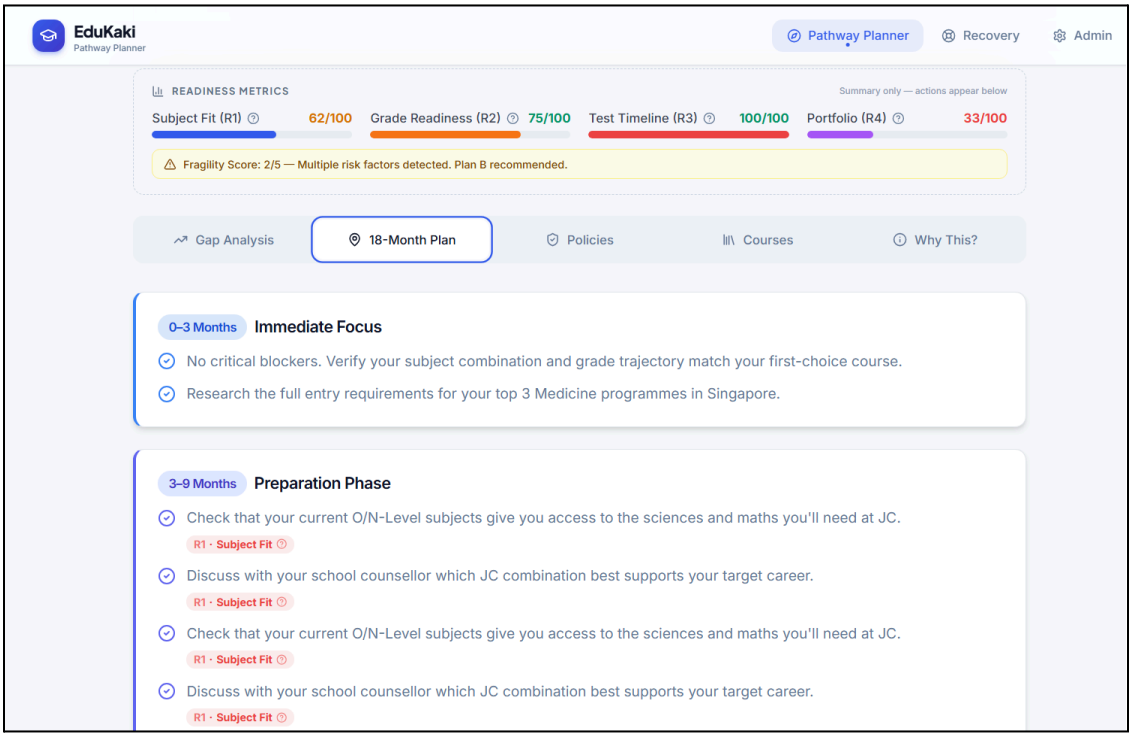


Quick Planner input screen where users provide their current education profile and target pathway

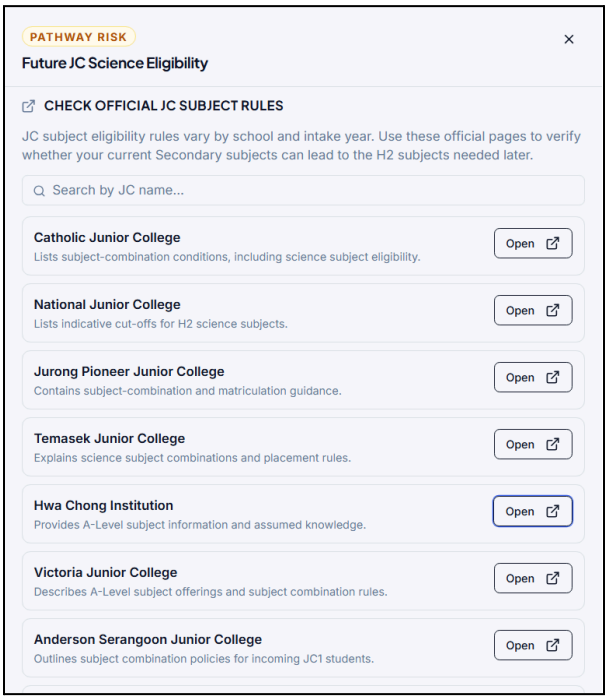

EduKaki
Pathway Planner
Pathway Planner
Recovery
Admin
Your personalised guidance
A plain-English picture of your situation, generated from your analysis.
Your main consideration is pathway preparation rather than a current subject-combination failure. Medicine / Healthcare programmes typically require H2-level subjects at JC — since you are not yet at JC level, you cannot and do not need to hold these subjects now. What matters now is taking the right Secondary subjects to keep that pathway open later. On the positive side, subject fit is solid and grades are tracking well — so the foundation is not starting from zero. What needs to change: the priority is to strengthen your current Secondary science pathway, ideally through Pure Chemistry and/or Pure Biology if your school allows it and portfolio and relevant experience need deliberate attention. On experience and portfolio: your portfolio signals are low (1/6 activities logged). Medicine applications — especially to Singapore universities — are heavily evaluated on extracurricular evidence beyond grades, which matters increasingly at competitive Medicine / Healthcare programmes — many screen applicants on this dimension before ranking by grades. Prioritise first: Check that your current O/N-Level subjects give you access to the sciences and maths you'll need at JC — the 18-Month Plan below maps out the full step-by-step sequence, phase by phase, from now to application day. Your current readiness scores: Subject Fit 62/100, Grade Readiness 75/100, Test Timeline 100/100, Portfolio 33/100 — use the Gap Analysis tab below to see exactly which items are driving each score and what is needed to move them.
Want to dig deeper? Tap a question below
INSTANT ANSWER
Each question opens a tailored explanation generated from your gap analysis — no waiting, no chatbot.
Explain this to me
What should I do first?
What if I can't fix this?
Show me a backup plan
ANSWER · EXPLAIN THIS TO ME
The gap codes that fired for your profile are: R1 (Subject Fit): a required subject is missing from your combination — applications are screened out before anything else is read; R4 (Portfolio): experience profile is weaker than competitive programmes expect; R6 (Fragility): multiple inter-dependent requirements mean one slip has significant knock-on effects. No hard blockers fired — these are advisory flags that indicate areas where your profile is weaker than competitive programmes typically expect. Together, these codes explain exactly why your current profile does not yet fully meet all the requirements for Medicine / Healthcare at your target institutions — each code maps to a concrete fix in the Gap Analysis tab below.
Generated from your gap analysis — tap another question above for a different angle.


WEAKNESS
Portfolio Readiness Gap
Your current portfolio signals are below what competitive Medicine programmes typically expect to see in an application.
WHY THIS MATTERS
For Medicine pathways — particularly Medicine, where demonstrated commitment to healthcare is assessed — portfolio signals go beyond academic results and are evaluated at interview and application stage.
YOUR CURRENT SITUATION
Your Portfolio Readiness score is 33/100. Medicine interviews and applications typically expect clinical exposure (volunteering, shadowing), sustained commitment to a relevant CCA, and evidence of reflective thinking about healthcare.
RECOMMENDED NEXT STEPS
Volunteer at a hospital, polyclinic, or eldercare facility — consistent weekly volunteering over 6+ months is more valued than short one-off events.
Join a science or healthcare-related CCA if you have not already done so.
Document your reflections on your healthcare experiences — what you observed, what surprised you, and what it confirmed about your interest in Medicine.
Consider applying for research attachment programmes if available at your school.
WHAT HAPPENS IF NOTHING CHANGES
Arriving at interviews or application season without meaningful portfolio signals puts you at a disadvantage against equally qualified candidates who can demonstrate sustained commitment and relevant experience.
QUESTIONS TO ASK YOUR SCHOOL

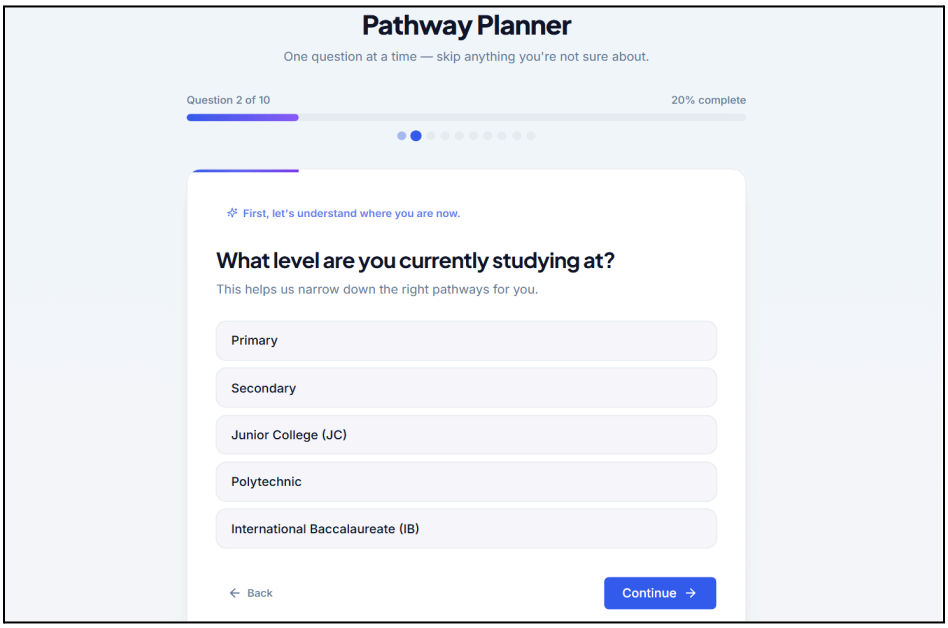
Quick Planner output showing gap readiness scores, triggered rule codes, and personalised recommendations



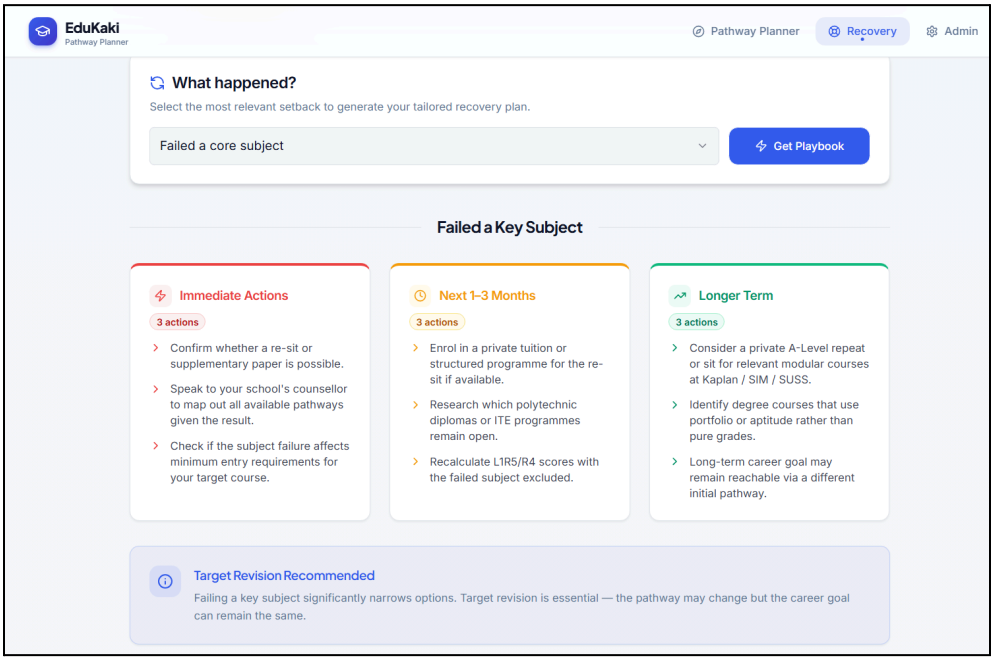
Personalised 18-month roadmap organised into immediate, short-term, and longer-term actions



Official pathway links allowing users to verify recommendations against source webpages



Guided Conversation mode using a step-by-step conversational interface to collect user information



Recovery Playbook interface allowing users to select common academic setbacks and phased recovery actions