

Industry Graduate Diploma

Integrated Learning Project

Artificial Intelligence (AI) in the Digital Economy

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

Final Showcase Presentation
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GROUP 1

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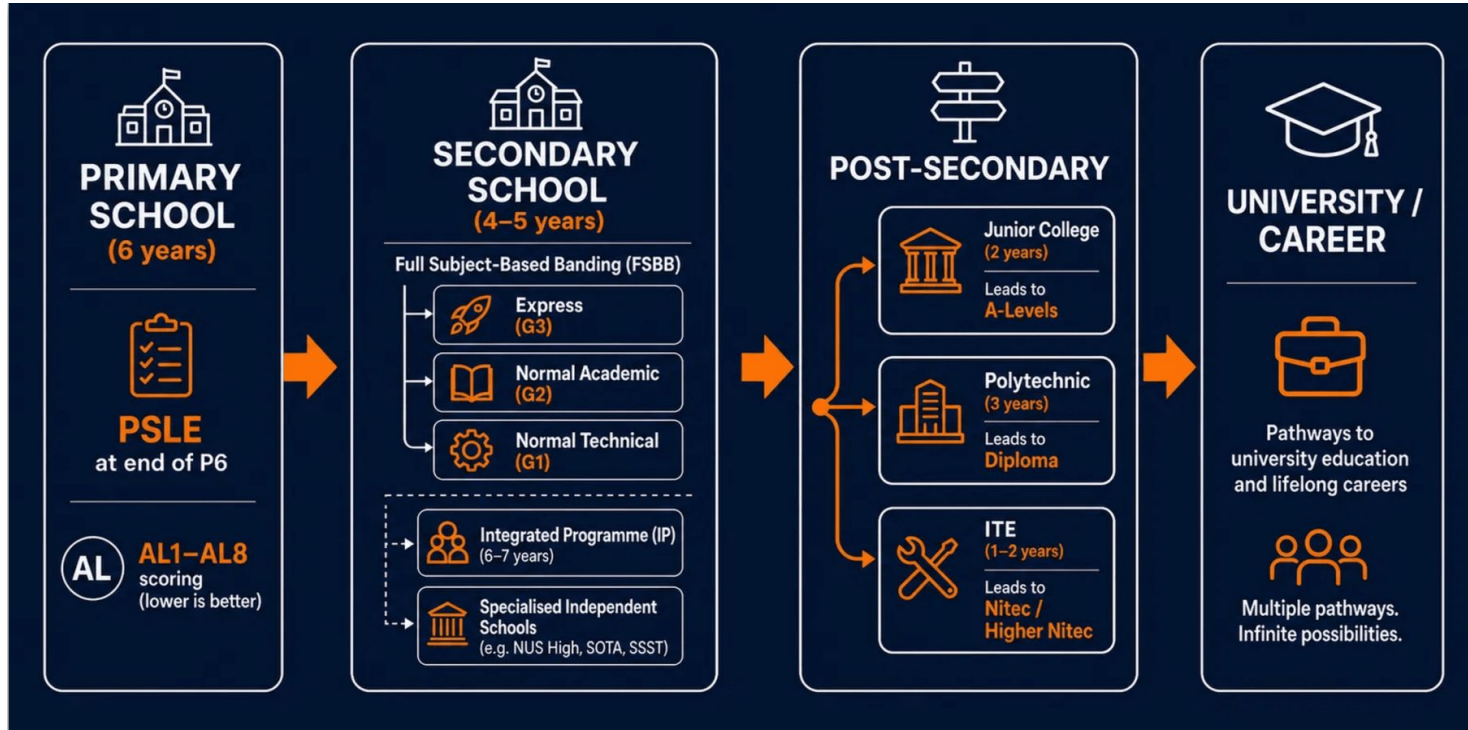
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LEARNING OBJECTIVES – Building an AI-Driven Solution

- 01** Identify a challenge, conduct research and apply AI to solve a tangible, real-world problem
- 02** Examine how AI technologies – natural language processing, generative AI's use
- 03** Use AI to process dataset and synthesise different sources of info – with output that provides customised guidance to help humans make decisions

Singapore's Education System is World-Class, but Complex to Navigate



THE PROBLEM: FAMILIES ARE LEFT TO NAVIGATE ALONE

Fragmented Information Forces Families to Make High-Stakes Decisions in the Dark

Despite the high stakes of education decisions, families in Singapore rely on a patchwork of sources: school websites, parent forums, tuition centre advisors, and word-of-mouth. No single tool connects a student's current academic profile to a personalised, end-to-end pathway recommendation.

01

FRAGMENTATION

Information on school options, subject prerequisites, entrance tests, and career pathways is scattered across MOE, SkillsFuture, individual school websites, and unofficial sources.

02

LACK OF PERSONALISATION

Existing tools (MOE SchoolFinder, MySkillsFuture for Students) provide general information but do not generate recommendations tailored to a specific student's grades, interests, and goals.

03

ABSENCE OF EMPATHY

Current tools present data but offer no guidance that feels contextual, supportive, or sensitive to how real families make decisions under pressure.

THE HUMAN COST: STRESS, ANXIETY, AND DECISION PARALYSIS

1 in 3 Singapore Youth Report Poor Mental Health — Education Pressure Is a Key Driver

The consequences of this navigation gap are measurable. Research consistently links Singapore's high-stakes education environment to elevated stress and anxiety among students and parents alike.

1 IN 3 YOUTH

A 2024 IMH national survey found that approximately one-third of youth in Singapore reported poor mental health symptoms, including depression, anxiety, and stress.

2X ACADEMIC STRESS

Academic stress is the leading trigger. Singaporean children receiving mental health services experience academic stress at roughly twice the rate of their expatriate counterparts.

TRANSITION ANXIETY

Parents face their own "transition anxiety" — a documented phenomenon where parental stress peaks during key education transition points such as PSLE and the S1 Posting Exercise.

THE SOLUTION

Better, more personalised guidance at these critical junctures can meaningfully reduce decision paralysis and anxiety for both students and parents.

EXISTING TOOLS FALL SHORT

Current Digital Tools Provide Information, Not Personalised Guidance

TOOL	WHAT IT DOES	WHAT IT LACKS
MOE SchoolFinder	Lists secondary schools with cut-off scores	No personalised match to student profile
MySkillsFuture	Explores career interests and pathways	No connection to current academic profile or gaps
School Websites	Provides school-specific information	Siloed; no cross-pathway comparison
Parent Forums	Peer advice and anecdotes (e.g. KiasuParents)	Unverified, inconsistent, not personalised

THE CORE GAP

None of these tools systematically identify a student's developmental gaps, nor generate personalised, end-to-end recommendations that connect a student's current profile to a defined future goal.

Defining the Challenge & Validating the Need

"How Might We empower Singapore students (and parents) with personalised, empathetic guidance to navigate their complex education pathways?"

Research Methodology

- **Target Audience:** Surveyed 23 respondents (21 parents, 2 students) navigating the Singapore education system.
- **Focus Area:** Evaluated experiences with high-stakes transitions, particularly the post-PSLE Secondary 1 Posting Exercise.
- **Assessment:** Measured the effectiveness of existing tools (MOE SchoolFinder, MySkillsFuture) and gauged demand for AI-driven solutions.

Key Research Insights

- **The Empathy Gap:** Parents experience significant "transition anxiety" due to fragmented information and high-stakes decisions.
- **Lack of Personalisation:** Existing tools scored lowest (3.1/5) on their ability to provide tailored, context-aware advice.
- **Strong Demand Signal:** 100% of respondents saw value in an AI tool, specifically requesting comparative analysis and personalised roadmaps.

SURVEY RESULTS: THE GUIDANCE GAP

Finding Guidance is Difficult & Personalisation is Missing

Finding Guidance is Difficult

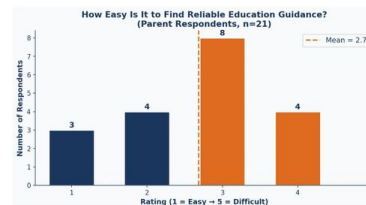
Parents rated the ease of finding reliable education guidance currently at a mean of **2.7 out of 5**. Responses cluster around neutral-to-difficult.

"Information needs to be gathered separately from different sources"

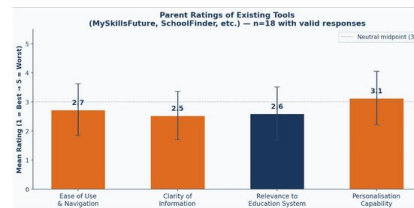
Personalisation is Missing

Existing online tools (e.g., MOE SchoolFinder) scored lowest on **Personalisation Capability** (3.1/5), indicating a gap for tailored advice.

EASE OF FINDING RELIABLE GUIDANCE



RATINGS OF EXISTING TOOLS



SURVEY RESULTS: DEMAND FOR AI ASSISTANCE

Unanimous Value Perception & High Likelihood of Adoption

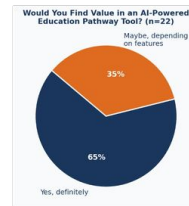
Unanimous Value Perception

100% of respondents indicated they would find value in an AI-powered education pathway tool (65% "Yes, definitely", 35% "Maybe").

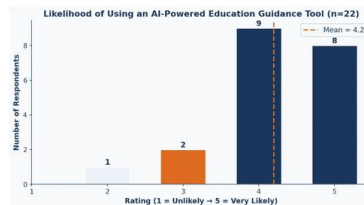
High Likelihood of Adoption

The likelihood of using an AI-powered guidance framework was high, with a mean rating of **4.2 out of 5**. 77% rated 4 or 5.

AI TOOL VALUE PERCEPTION



LIKELIHOOD OF ADOPTION



SURVEY RESULTS: FEATURE PREFERENCES & CONCERNS

Validating the Core Functionality of EduKaki

Top Desired Features

- **Comparison of education options (86%)**
- **Personalised pathways based on profile (82%)**

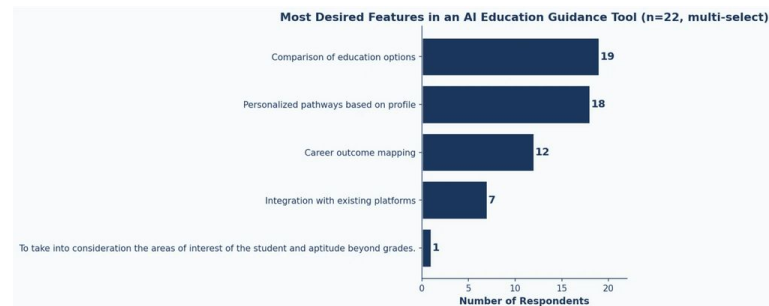
These preferences directly validate the core functionality of EduKaki's 6-Rule Gap Engine.

Primary User Concerns

The most frequently cited concern was **Accuracy and Hallucination**.

This validates our architectural decision to use a deterministic rule engine rather than relying purely on an LLM for policy advice.

MOST DESIRED FEATURES IN AN AI TOOL



METHODOLOGY: HOW WE BUILT EDUKAKI

A Four-Phase Approach from Raw Data to Refined Prototype

Our development process was deliberately structured to ensure policy accuracy and logical rigour before focusing on user experience and interface design.

PHASE 01

Data Collection & Structuring

Gathered and verified policies, school data, and prerequisites from fragmented sources. Structured into a unified, machine-readable dataset. Surveyed parents and students

PHASE 02

Rule Engine Development

We translated complex education policies into the 6-rule gap engine (R1–R6), establishing the core logic that drives all personalised pathway recommendations.

PHASE 03

Prototype v1.0 (Logic Testing)

We built an initial functional prototype using AI tools (Replit, ChatGPT). This phase focused entirely on testing the accuracy of the rule engine and the validity of the generated pathways.

PHASE 04

Prototype v2.0 (UX Refinement)

Once the logic was validated, we built the final, user-friendly interface with the three distinct interaction modes. Pending user testing with 10 respondents.

INTRODUCING EDUKAKI

EduKaki: Singapore's First Rule-Based, Gap-Coded Education Pathway Planner

EduKaki is an AI-enabled web application designed to bridge the guidance gap for Singapore students aged 10–16 and their parents. It translates complex MOE policies, subject prerequisites, and pathway requirements into a personalised, actionable 18-month roadmap — in plain English.

PERSONALISED

Recommendations are generated based on the student's specific PSLE score range, current subjects, grades, interests, and target career field.

ACTIONABLE

Every output is gap-coded (R1–R6) so users know exactly which gap triggered each recommended action.

EMPATHETIC

Guidance is delivered in conversational prose, not just data tables, making it feel like an advisor rather than a report.

ACCESSIBLE

Free, web-based, and designed to be completed in under 3 minutes.

HOW EDUKAKI WORKS: THE 6-RULE GAP ENGINE

A 6-Rule Engine Checks Every Student Profile Against Critical Pathway Requirements

EduKaki's recommendation logic is built on a structured, rule-based engine that evaluates six dimensions of a student's readiness for their target pathway:

R1 SUBJECT FIT

Whether current subjects align with target pathway prerequisites.

R2 PORTFOLIO

Whether co-curricular activities and portfolio signals support the target pathway.

R3 GRADE READINESS

Whether grades meet minimum thresholds for target schools or programmes.

R4 POLICY CONSTRAINTS

Whether MOE policies (e.g. SBB eligibility, cohort-specific rules) affect the student's options.

R5 TEST TIMELINE

Whether the student is on track for required entrance tests (e.g. DSA, aptitude tests).

R6 FRAGILITY

Whether the student's plan has single points of failure that need contingency planning.

Each gap identified is tagged with its rule code in the output, giving users full transparency into why each recommendation was made.

THREE WAYS TO USE EDUKAKI

Three Modes Designed for Different User Needs and Situations

EduKaki offers three distinct interaction modes, ensuring the tool is useful regardless of how much a user already knows about their pathway:

MODE 1 — QUICK PLANNER

Best for students who already have a pathway in mind and want fast, gap-coded results. Users answer 4 steps (Situation → Profile → Subjects → Grades) and receive an 18-month roadmap in under 3 minutes.

MODE 2 — GUIDED CONVERSATION

Best for students in non-standard situations (returning from overseas, gap year, changing school systems). The app guides users through 10 questions one at a time, adapting to their responses to generate a contextually appropriate roadmap.

MODE 3 — RECOVERY PLAYBOOK

Designed for students facing setbacks — weak prelim results, subject failures, or missed deadlines. Users select their specific challenge and receive a structured, phased recovery plan with immediate, medium-term, and longer-term actions.

PROTOTYPE WALKTHROUGH: QUICK PLANNER

Quick Planner: A 4-Step Form That Generates a Personalised Gap-Coded Roadmap

The Quick Planner guides users through four structured steps to capture their unique context and academic standing. The result is a fully personalised, gap-coded 18-month action plan.

STEP 1

Situation

Non-standard contexts (returning from overseas, gap year, system change).

STEP 2

Profile

Birth year, current level, pathway, grading, target region, career and co-curricular signals.

STEPS 3 & 4

Subjects & Grades

Subject choices and current grades evaluated against pathway prerequisites.

RESULT

18-Month Action Plan

A personalised, gap-coded roadmap with immediate actions, warnings and blockers from the 6-rule engine.

PROTOTYPE WALKTHROUGH: STUDENT PROFILE INPUT

Rich Profile Inputs Enable Highly Personalised Pathway Recommendations

The profile step collects six key dimensions of the student's situation. This multi-dimensional input is what enables EduKaki to generate recommendations that are genuinely personalised — not generic advice that applies to all students equally.

01

CURRENT ACADEMIC LEVEL

02

EDUCATION PATHWAY

03

GRADING SYSTEM

04

TARGET UNIVERSITY REGION

05

TARGET CAREER FIELD

06

CO-CURRICULAR SIGNALS

The Result: A profile rich enough to trigger specific, actionable rules in the gap engine, ensuring every piece of advice is contextually relevant.

PROTOTYPE WALKTHROUGH: GUIDED CONVERSATION

Guided Conversation Mode: An Empathetic, Step-by-Step Advisor for Complex Situations

STEP-BY-STEP NAVIGATION

The Guided Conversation mode presents one question at a time across 10 questions, complete with a progress tracker showing completion percentage to keep users oriented.

BUILT FOR NON-STANDARD SITUATIONS

This mode is specifically designed for students in unique circumstances—such as returning from overseas, taking a gap year, or changing school systems—where a simple form may not capture the full context.

EMPATHETIC EXPERIENCE

The conversational format significantly reduces cognitive load and makes the experience feel supportive rather than bureaucratic, directly addressing the empathy gap identified in existing tools.

PROTOTYPE WALKTHROUGH: RECOVERY PLAYBOOK

Recovery Playbook: Structured Support for Students Facing Setbacks

The Recovery Playbook addresses a critical but underserved need: what should a student do when things go wrong? Users select their specific setback from a dropdown menu and receive a structured, phased recovery plan.

The Missing Dimension: Providing structured recovery plans for academic setbacks is absent from existing MOE tools, making EduKaki uniquely empathetic to the real-world student experience.

STEP 01

Identify Setback

Users select their specific challenge from a concise list of common academic and pathway setbacks.

STEP 02

Generate Plan

The engine maps the selected setback to a targeted, context-aware recovery strategy.

STEP 03

Execute Recovery

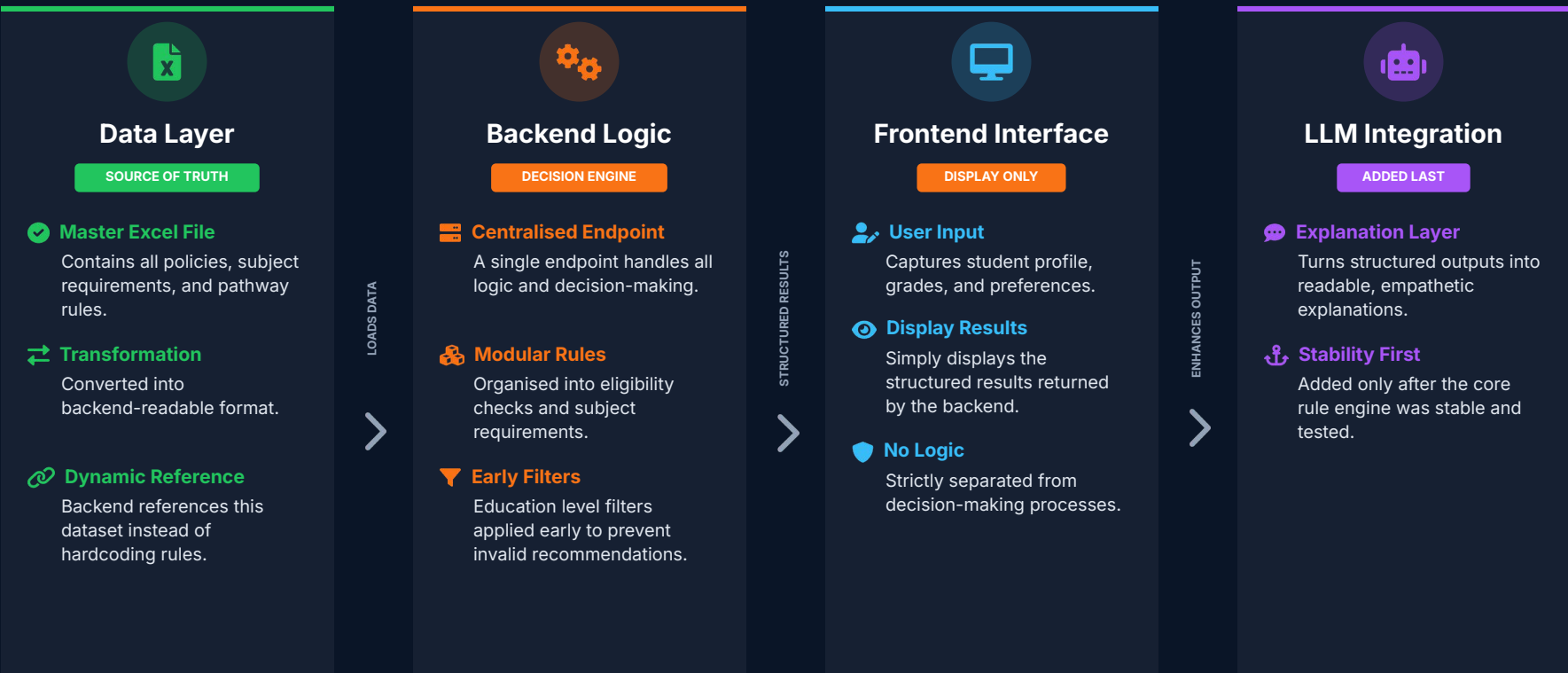
Users receive a phased action plan detailing immediate, medium-term, and longer-term steps to get back on track.

EDUKAKI PROTOTYPE

<https://edukaki.replit.app/>



System Architecture: How the Frontend-Backend Split Was Built



In short: Excel was used as the source of truth for rules, transformed into backend-readable data. The backend handles all decision-making via a centralised endpoint, returning structured results to the frontend. The LLM was added last to provide readable explanations.

Challenges: Data Currency and User Trust are the Primary Hurdles to Scale



DATA CURRENCY

THE CHALLENGE

Maintaining a unified, up-to-date dataset of MOE policies, school cut-off points, and subject prerequisites across a rapidly evolving education landscape.

BUSINESS IMPACT

Outdated or inaccurate data directly undermines the core value proposition, leading to flawed pathway recommendations.



USER TRUST

THE CHALLENGE

Overcoming parental skepticism towards AI-generated advice in high-stakes, emotionally charged education decisions.

BUSINESS IMPACT

Low adoption and retention rates if users perceive the system as an opaque "black box" rather than a reliable co-pilot.



TECHNICAL DEBT

THE CHALLENGE

Transitioning from a rapid prototype architecture (Replit) to a robust, scalable, production-ready cloud infrastructure.

BUSINESS IMPACT

Performance bottlenecks, increased maintenance overhead, and potential downtime as the user base expands.

Risk Register: Proactive Mitigation Strategies Ensure System Reliability and Safety

RISK MATRIX

IMPACT		R2	R1
		R3	
			R4
	LIKELIHOOD		

KEY RISKS & MITIGATIONS

R1: Data Obsolescence

HIGH RISK

MOE policies or school cut-off points change, rendering the engine's advice inaccurate.

Implement automated scraping of MOE/SEAB sites with manual review triggers before DB updates.

R2: System Outage / API Failure

HIGH RISK

OpenAI API downtime prevents the generation of conversational guidance.

Design graceful degradation: fallback to displaying raw rule-engine outputs if LLM fails.

R3: LLM Hallucination

MEDIUM RISK

The LLM generates plausible but factually incorrect educational advice.

Strict prompt engineering; LLM is restricted to formatting rule-engine outputs, not generating facts.

R4: User Misinterpretation

MEDIUM RISK

Parents treat AI suggestions as guidance rather than binding MOE directives.

Prominent UI disclaimers and mandatory "Consult your school" prompts in all outputs.

STRATEGIC RECOMMENDATIONS

INDUSTRY VALUE CREATION

- SkillsFuture Integration: Align EduKaki with SkillsFuture Series.
- EdTech Ecosystem: Partner with local counselling firms and AI roadmaps.
- Policy Implementation: Provide real-time feedback on student demand vs policy.

MOE

SSG/WSG

Private Tutors

ORGANISATIONAL READINESS

- Institutional Adoption: Pilot as a self-directed ECG tool in schools.
- Change Management: Train ECG counsellors on interpreting Gap Codes (R1-R6).
- Resource Allocation: Move from manual entry to automated API feeds.

ETHICAL FRAMEWORK & GOVERNANCE

Ensure fairness across demographics and maintain transparency:

Bias Mitigation: Regular audits of the 6-Rule Engine to avoid socio-economic bias.

Transparency: Disclose the fragility (R6) score; clarify recommendations are probabilistic aids.

TECHNICAL RECOMMENDATIONS

DATA ARCHITECTURE

SOURCES & QUALITY

- Automated Feeds: Transition from manual updates to web-scraping MOE policy portals and SkillsFuture API integrations.
- Governance: Implement a "Policy Truth" database to version-control school prerequisites.
- User Profiles: Introduce secure authentication to store longitudinal student data.

MODEL ROADMAP

HYBRID INTELLIGENCE

- Deterministic Core: Retain the 6-Rule Gap Engine for high-stakes compliance (R1-R5).
- LLM Integration: Use RAG (Retrieval-Augmented Generation) for the "Guided Conversation" mode to ensure accuracy.
- ML Layer: Introduce predictive modeling for "Fragility" (R6) based on historical student success patterns.

SYSTEM SCALING

INFRASTRUCTURE

- Microservices: Decouple the React frontend from the Gap Engine to allow independent scaling.
- API-First: Develop public APIs for secondary schools to embed EduKaki widgets in their portals.
- Performance: Optimize Vite build for low-bandwidth access in diverse school environments.

VALUE CREATION SUMMARY



INDUSTRY LEVEL

EDTECH SECTOR GROWTH

Setting a new standard for "Compliance-First" AI in education, moving beyond generic LLM advice to rule-grounded roadmaps.

SKILLSFUTURE ECOSYSTEM

Bridging the gap between secondary education and lifelong learning by aligning early pathways with national skills frameworks.

POLICY IMPLEMENTATION

Reducing the friction of complex MOE policy changes by translating them into actionable, personalized student roadmaps.



ORGANISATIONAL LEVEL

SCHOOLS & INSTITUTIONS

Enhancing ECG efficiency by automating routine pathway planning, allowing counsellors to focus on high-need student interventions.

ENRICHMENT CENTRES

Providing tuition and enrichment providers with data-driven insights to align their offerings with student pathway gaps.

PARENTS & END-USERS

Empowering parents with clarity and confidence (4.2/5 adoption likelihood) through transparent, 18-month actionable roadmaps.

100%

DEMAND SIGNAL

4.2 / 5

ADOPTION LIKELIHOOD

82%

DESIRE PERSONALISED PATHWAYS

Q&A THANK YOU

GROUP 1

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