

Kokiri Lab: STEM Inquiry Makerspace

Programme Design Document

Whanganui Intermediate School, Pilot Launch Term 3 2026

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Executive Overview

Kokiri Lab is a school-based STEM inquiry programme that develops scientific reasoning, ethical AI literacy, and environmental systems thinking through sustained, place-based investigation. It is delivered by Regenpreneur Ltd at Whanganui Intermediate School, beginning as a low-risk pilot in Term 3 2026 and designed to scale through evidence rather than ambition.

Its core strength lies in the quality of its inquiry design, not in the sophistication of its tools.

The name Kokiri means to move forward with energy and purpose. The programme exists to support young people who are curious, capable, and committed to shaping a better future for themselves and their communities.

What happens in 2026

The pilot year runs on two tracks.

Tier 1 is an embedded inquiry programme for all Year 7 and 8 students, delivered within regular curriculum time.

Tier 2 is a capped after-school programme for up to 20 voluntary participants, including Year 6 students from feeder schools who join for a one-term exploratory experience with no expectation of ongoing commitment.

Two themes anchor the pilot year. **AwaKai** uses aquaponics to drive environmental inquiry. **NuiBot** uses robotics and sensing to explore technological systems. Both are grounded in the same inquiry framework and develop the same core reasoning practices.

The **GrowHub** digital inquiry platform is piloted and validated as both a learning tool and a research instrument. Research ethics approval is pursued through the university process underpinning the doctoral study.

What evidence will exist by December 2026

By the end of the pilot year, the programme will have clear evidence of whether it is working. The targets are specific and measurable.

- 85% or more of Tier 1 students complete the minimum set of inquiry evidence
- 70% or more of Tier 2 students are retained across the term
- Teachers observe growth in at least two of four core reasoning practices for the majority of students
- GrowHub reasoning indicators are validated, or their limits are clearly mapped
- Full compliance with research ethics is confirmed across all data collection
- A decision about whether to introduce Level 2 microcredential delivery in 2027 is made in consultation with Skills Group

Key decisions for 2027

The pilot is designed to answer the questions that matter for responsible expansion. Should delivery expand to additional cohorts or sites? Is the evidence sufficient to introduce credentialled pathways? Does the programme need an additional trained facilitator? Is GrowHub ready for deployment beyond the pilot? What adjustments are required based on what we learn?

Programme at a glance

Full name: Kokiri Lab: STEM Inquiry Makerspace

Delivery entity: Regenpreneur Ltd (registered charitable company)

Host school: Whanganui Intermediate School

Target learners: Year 6 (feeder schools), Year 7 to 8 (Whanganui Intermediate), expanding to Year 9 to 13

Pilot timing: Terms 3 to 4, 2026

Visible spine: Ethical AI, environmental systems, inquiry

Distinctive feature: Deliberate development of scientific reasoning through sustained inquiry

Research validation: Doctoral study on human-centred learning analytics for STEM inquiry

Credential pathway: NZQA microcredentials through Skills Group partnership (from 2027)

Design ethos: Inquiry first, tools second. Low floor, high ceiling. Evidence over performance.

From inputs to impact

The programme begins with a trained facilitator embedded in the host school, dedicated curriculum time for Tier 1, an after-school venue for Tier 2, basic inquiry equipment including water testing kits, electronics, and growing systems, the GrowHub digital platform, sector partnerships, and a doctoral research design with university supervision.

These inputs drive sustained inquiry cycles across environmental and technological themes, weekly data collection and reflection, integrated AI literacy and ethical evaluation, prototyping and design iteration, portfolio and design journal development, and community showcases.

In the short term, the programme aims to improve epistemic reasoning across four practices, build ethical AI literacy, develop systems thinking in environmental and technological contexts, and increase student confidence in inquiry, investigation, and communication.

In the long term, the programme aims to build regional STEM capability through a sustained pathway, establish credential pathways from Level 1 through Level 3, create a scalable model of place-based STEM inquiry for regional New Zealand, and contribute to the international evidence base on learning analytics and epistemic reasoning in schools.

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1. Programme Identity and Purpose

In 2026, Kokiri Lab is not a product, not a startup, and not an AI brand. It is a learning programme that includes AI literacy as part of a broader commitment to ethical, inquiry-driven STEM education. It does not require students to have prior technical experience. It does not select for high achievers. It does not depend on expensive equipment to function. Every theme is designed to work from day one with minimal resources, while allowing depth and sophistication to grow over time as funding and partnerships develop.

What the community asked for

The programme was deliberately shaped by what people actually said they wanted. A 2025 national educator survey of 365 respondents revealed that the community did not primarily ask for fancy tools, 3D printers, or generative AI creativity. They asked for ethical AI understanding, real-world environmental connection, meaningful projects, community impact, structured thinking, and confidence (Pedley, 2025).

Of the elements surveyed, Ethical and Responsible AI scored highest at 93 out of 100. Introduction to AI scored 90. Environmental and Social Impact scored 86.7. Robotics scored 76, 3D Fabrication scored 73, and AI Creativity scored lowest at 68.

These findings confirmed that the visible spine of the programme should be ethical AI, environmental systems, and inquiry. The makerspace is the engine that turns thinking into tangible outcomes. It is not the identity of the programme. This distinction matters because it shapes every design decision. When resources are limited, the programme invests first in the quality of inquiry and the depth of ethical reasoning, not in the sophistication of the equipment. When new themes are developed, they are evaluated first on whether they generate genuine investigable questions and authentic uncertainty, not on whether they involve impressive technology.

The distinctive feature

The programme's strongest distinctive feature is the deliberate development of epistemic reasoning within environmental and technological inquiry. Epistemic reasoning refers to a cluster of practices that are central to authentic scientific and technological work.

Evidence-based thinking means claims are grounded in specific data rather than assumption or opinion. **Systematic comparison** means patterns are examined across conditions, time periods, or data sources rather than drawn from single observations. **Reasoned revision** means underlying thinking is reconsidered when evidence warrants it, rather than simply correcting surface errors. **Calibrated uncertainty** means the limits of what evidence can and cannot support are explicitly acknowledged rather than ignored or overstated.

These are the practices that authentic science demands and that the doctoral research underpinning the programme is designed to measure, validate, and support. This positions Kokiri Lab alongside international best practice in inquiry-based education, where concept-driven inquiry, critical

thinking, and global competence are treated as foundational rather than aspirational (Erickson, Lanning, and French, 2017; Hare, 2010).

Three interconnected purposes

The programme serves three audiences simultaneously, and the design is shaped by the needs of each.

For students, Kokiri Lab provides a place where curiosity is taken seriously. Students ask genuine questions, investigate with real tools, build things that work, and develop the confidence to navigate a world shaped by rapid technological change as informed, capable, and ethical creators. The programme does not ask students to perform STEM competence for an audience. It asks them to develop it for themselves.

For the school and community, the programme provides an accessible, values-led pathway into STEM learning that removes common barriers to participation and builds local capability in a region where such opportunities have historically been limited. It is designed to complement and strengthen the school's existing curriculum rather than compete with it.

For education more broadly, the programme provides a living model of what inquiry-based STEM learning looks like when it is grounded in place, supported by rigorous research, and designed for sustainability rather than spectacle. The doctoral research is designed to produce findings useful well beyond Whanganui, contributing to the international evidence base on learning analytics, epistemic reasoning, and school-based STEM inquiry.

2. Programme Context

Whanganui's young people deserve the same quality of access to future-focused STEM learning as students in larger urban centres. Yet for many rangatahi in regional Aotearoa New Zealand, opportunities to engage meaningfully with emerging technologies remain limited by geography, resource, and systemic inequity. The challenge is not that young people lack interest or capability. It is that the opportunities are not there.

Schools in regional centres often lack specialist STEM teachers, dedicated makerspace facilities, or the budget to maintain advanced equipment. After-school programmes that do exist tend to concentrate in larger cities, and even those often focus on technology as an end in itself rather than as a tool for understanding the world (NZTech, 2022; Education Review Office, 2021).

What the stakeholder survey confirmed

The 2025 stakeholder survey confirmed these patterns with statistical significance across 365 respondents. Approximately 95% rated the programme as highly valuable or cautiously positive (Pedley, 2025).

Six primary themes emerged from qualitative analysis of open-ended responses. Each shaped the programme directly.

Equity of access appeared in 66% of responses. The programme responds with free after-school delivery, a school-based venue, low-resource baseline design, and feeder school outreach.

Tangible outcomes and pathways appeared in 53% of responses. The programme responds with portfolio-based evidence, a microcredential pathway from 2027, and community showcases.

Cultural relevance and tikanga Maori appeared in 50% of responses. The programme responds with kaupapa Maori values embedded in design, place-based inquiry, te reo integration, and iwi advisory development.

Ethics and responsible technology use appeared in 46% of responses. The programme responds by making ethical AI the highest-priority element, framing AI outputs as claims to check, and embedding transparency throughout.

Tool fluency and everyday application appeared in 41% of responses. The programme responds by using familiar tools alongside more advanced equipment and connecting learning to practical real-world applications.

Inclusive design for diverse learners appeared in 26% of responses. The programme responds with non-deficit language, differentiated scaffolding, emotional safety, and neurodiversity-aware design.

National and international alignment

Nationally, Te Mataiaho calls for learning experiences that are contextualised in learners' lives, connected across learning areas, progressive in complexity, and culturally sustaining (Ministry of Education, 2023). The Digital Technologies curriculum area emphasises computational thinking, designing and developing digital outcomes, and understanding digital technologies in context (Ministry of Education, 2017).

The programme also aligns with emerging international guidance. UNESCO's 2023 framework emphasises that AI literacy must be taught alongside critical evaluation, ethical reasoning, and human agency. The OECD's 2025 analysis argues that schools must prepare students not just to use AI but to understand its limitations, question its outputs, and exercise independent judgement. The World Economic Forum's 2023 Future of Jobs report identifies analytical thinking, creative thinking, and technological literacy among the most important skills for the coming decade. These are precisely the capabilities the programme is designed to develop.

The host school

Whanganui Intermediate School is the natural home for this programme. It serves Year 7 and 8 students from across the city and draws from a network of contributing primary schools. It is centrally located, accessible by public transport, and within walking distance of several feeder schools.

The programme is led by Richard Pedley, who teaches at the school and is therefore embedded in its daily rhythms, relationships, and curriculum. The programme does not arrive from outside. It grows from within.

The school's role is clear and bounded. Whanganui Intermediate provides students, curriculum context, a venue for after-school delivery, and a supportive environment for inquiry learning. It is not the applicant for grants and is not responsible for programme governance. That responsibility sits with Regenpreneur Ltd. This distinction keeps the school safe, avoids burdening leadership with funding compliance, and ensures the programme can continue even if staffing or timetables change.

Sector endorsements

The programme is supported by endorsements from organisations across the education, technology, and environmental sectors. These represent advisory support and strategic alignment rather than contractual delivery partnerships.

Skills Group endorses the programme's approach to microcredential pathway development. Active discussions are underway regarding credential alignment for Level 2 and Level 3 delivery from 2027.

EdTechNZ endorses the programme's approach to ethical AI education through an advisory relationship.

EnviroStrat endorses alignment with environmental strategy goals through an advisory relationship.

Horizons Regional Council endorses alignment with regional biodiversity and stewardship goals. Potential future collaboration on environmental monitoring projects is being explored.

3. Why Whanganui: A Place-Based Rationale

Kokiri Lab is not a programme that could exist anywhere and has been placed in Whanganui for convenience. It is shaped by this place and the questions this place demands.

Place-based education is not achieved by mentioning a location. It is achieved when the learning is rooted in questions that are authentic to the community, when the environment itself becomes a source of inquiry, and when students can see the connection between what they are investigating in the classroom and what is happening outside the window. In Whanganui, those connections are unusually rich and globally significant.

Te Awa Tupua: The river as ancestor

The Whanganui Awa is the longest navigable river in Aotearoa New Zealand and holds a unique position in global environmental law. In 2017, Te Awa Tupua was recognised as a legal person through the Whanganui River Claims Settlement Act, the first time in the world a river had been granted legal personhood. For Whanganui whanau and for the iwi who fought for over 160 years for this recognition, the awa is not a resource to be managed. It is a living ancestor.

Ko au te awa, ko te awa ko au. I am the river, the river is me.

This context gives the programme's freshwater inquiry a depth that cannot be replicated from a textbook. When students monitor water chemistry in an aquaponics system, they are learning the skills and developing the reasoning to engage with questions that matter profoundly to their community. What does it mean to care for water? How do human systems affect freshwater health? What does responsible stewardship look like when the river has legal standing as a person?

These are not hypothetical questions designed to generate engagement. They are real questions that this community is actively navigating, and young people deserve to be part of that conversation with the skills and confidence to contribute meaningfully.

Local environmental context

Whanganui faces the environmental pressures common to many regional centres, but they are immediate and visible here in ways that make them authentic learning contexts rather than abstract case studies. Agricultural intensification in the upper catchment contributes to nutrient loading and sediment runoff. Urban stormwater carries contaminants into local waterways. Biodiversity in riparian margins has declined as land use has intensified. The challenge of balancing economic activity with ecological health is a live conversation in this community, not a distant policy debate.

These pressures are visible from the school grounds. They appear in local news. They are discussed at kitchen tables. For students in Kokiri Lab, these are not problems to read about. They are problems to investigate.

Local questions, global patterns

At the same time, these local questions connect directly to global patterns. Freshwater degradation, food system sustainability, biodiversity monitoring, and the relationship between legal frameworks and environmental protection are live issues in every region of the world.

A student who can design a water quality monitoring protocol for an aquaponics system in Whanganui can apply the same reasoning to freshwater management in the Pacific Islands, agricultural runoff in Southeast Asia, or urban water systems in Europe. The specific content is local. The scientific reasoning, the ethical judgement, and the capacity to investigate complex systems are universal.

The local is the entry point. The learning is universal. The programme exists in Whanganui because this is where the questions are real, the community connections are genuine, and the opportunity to build something meaningful for rangatahi is both urgent and achievable.

4. Curriculum Resilience in a Transitional Environment

The programme is designed during a period of active curriculum revision in Aotearoa New Zealand. Te Mataiaho is still evolving, particularly in science and technology, and final strand structures may shift before or during the pilot. This creates a legitimate concern for school leaders: will this programme still align with the curriculum next year?

Kokiri Lab is structured to remain resilient under curriculum revision for three reasons.

First, the programme is organised around capabilities rather than narrow achievement objectives. Investigation, evidence-based reasoning, systems thinking, communication, and ethical judgement are emphasised in every version of the New Zealand Curriculum and in every major international framework. They are unlikely to disappear under any revision because they represent what science and technology education is fundamentally trying to achieve.

Second, the inquiry framework is conceptual rather than content-dependent. The organising concepts of systems and interdependence, evidence and uncertainty, design and iteration, responsibility and impact, and perspective and bias describe ways of thinking about the world, not specific content that could be reorganised into a different strand.

Third, the Nature of Science and Nature of Technology components that anchor every theme address the overarching goals of the curriculum rather than specific content prescriptions. Investigating in science, communicating in science, participating and contributing, and understanding about science are the enduring architecture of the New Zealand science curriculum.

The programme will be reviewed against any finalised curriculum revisions before each delivery cycle. However, adjustments are likely to involve updating language and mapping references rather than redesigning the programme itself. School leaders can adopt the programme with confidence that its foundations are stable.

5. Programme Architecture: The Two-Tier Model

The programme's long-term stability depends on a clear separation between two complementary functions. This was informed by critical appraisal that identified the risk of layering three excellent but structurally distinct elements, environmental inquiry, AI-mediated research, and after-school makerspace pathway, without explicitly integrating them. The two-tier model gives each element a clear home while maintaining coherence across the whole.

Tier 1: The epistemic reasoning lab

Tier 1 runs within the regular school programme at Whanganui Intermediate, embedded in science and technology curriculum time. All Year 7 and 8 students participate as part of their normal learning. This is not an opt-in enrichment activity. It is curriculum delivery through an inquiry framework that meets and exceeds the requirements of the science and technology learning areas.

Tier 1 provides the stable, longitudinal research environment that the doctoral study requires. This includes guaranteed weekly contact with the same cohort, a consistent group of learners whose development can be tracked meaningfully, institutional legitimacy that supports ethics approval and data collection, and controlled conditions that allow learning analytics indicators to be validated against human-coded evidence.

The GrowHub digital inquiry platform is piloted and validated in Tier 1 first, because this is where the conditions for rigorous research are strongest.

It is important to clarify for school leaders and whanau that participation in the learning programme does not require participation in the research. No student will be disadvantaged for opting out of the research component. Research findings focus on programme improvement and the validation of learning analytics indicators, not on ranking or comparing individual students.

How a typical Tier 1 inquiry cycle works

The following example illustrates the practical rhythm of a ten-week Tier 1 inquiry cycle using the AwaKai theme. This is indicative rather than prescriptive. The facilitator adjusts pacing based on student engagement, data availability, and the natural rhythm of the living system being investigated.

Weeks 1 to 2: Observe and orient. Students are introduced to the aquaponics system. They observe the system in operation, sketch system maps showing components and connections, record initial observations, and begin learning data collection protocols for pH, ammonia, temperature, and plant growth. Key outputs include a system map diagram, initial observation notes, and baseline data entries.

Weeks 3 to 4: Question and plan. Students identify patterns or puzzles from their initial observations and frame investigable questions. They plan their data collection schedule, identify variables they want to track, and make predictions based on their current understanding. Key outputs include a framed inquiry question, a data collection plan, and initial predictions with reasoning.

Weeks 5 to 6: Investigate and collect. Students collect data systematically over multiple sessions, maintaining their data logs on GrowHub. They begin comparing observations across time points and

across different parts of the system. Key outputs include a sustained dataset with a minimum of three to four data points across time, and comparative observations recorded.

Weeks 7 to 8: Analyse and revise. Students examine their accumulated data for patterns, test their initial predictions against evidence, and revise their thinking where the evidence warrants it. They distinguish between well-supported claims and tentative ones, and identify what their data does and does not tell them. Key outputs include evidence-linked claims, revision reflections, and uncertainty calibration statements.

Weeks 9 to 10: Communicate and reflect. Students prepare and deliver explanations of their findings to peers, using data, diagrams, and system explanations to support their reasoning. They complete their design statements and consequence reflections. Key outputs include an oral or written presentation of findings, a design statement, a system explanation, and a consequence reflection.

This rhythm ensures every student moves through the full inquiry cycle while maintaining flexibility for the facilitator to respond to the unpredictable realities of working with a living system. If ammonia levels spike unexpectedly in Week 4, that becomes the inquiry. If plants show unexpected growth patterns in Week 6, the data collection plan adapts. The structure provides shape. The living system provides authenticity.

Assessment position

Tier 1 inquiry evidence contributes to teacher professional judgement in science and technology but is not separately graded as a standalone subject. The artefacts students produce, including data logs, evidence-linked claims, revision reflections, system explanations, and design statements, provide rich evidence of learning. However, Kokiri Lab does not generate separate grades, rankings, or marks. Assessment is formative. It exists to support learning and to inform teaching, not to sort students.

This position is deliberate. It protects the inquiry environment from the distorting effects of high-stakes grading, which research consistently shows can undermine the risk-taking, uncertainty tolerance, and genuine revision that authentic inquiry demands (Black and Wiliam, 1998). It also ensures that the programme remains accessible to all students regardless of prior achievement.

Minimum viable evidence set

To ensure that Tier 1 inquiry is rigorous and accountable rather than loosely exploratory, every student is expected to produce a minimum viable evidence set by the end of each inquiry cycle. This set defines the floor, not the ceiling. Many students will produce work that significantly exceeds these minimums. But the minimums ensure that every student, regardless of starting point, engages with the core reasoning practices the programme exists to develop.

Every student produces the following eight artefacts.

One sustained dataset with a minimum of three to four data points collected across time, demonstrating the ability to collect and maintain data systematically.

One evidence-linked claim, demonstrating the ability to ground an assertion in specific, identified evidence.

One comparative observation, demonstrating the ability to examine patterns across conditions, time periods, or data sources.

One revision reflection, demonstrating the ability to explain what changed in thinking and why, not just what changed in the answer.

One uncertainty calibration statement, demonstrating the ability to distinguish between what the evidence supports strongly and what remains tentative.

One design statement, demonstrating the ability to articulate what problem is being solved, for whom, and why it matters.

One system explanation with diagram, demonstrating the ability to explain how a system works as inputs, processing, outputs, and feedback.

One consequence reflection, demonstrating the ability to consider what might change if the technology were widely adopted, who benefits, and who might not.

This evidence set is lightweight enough to be achievable by every student within the normal rhythm of the inquiry cycle, but substantive enough to demonstrate genuine engagement with the reasoning practices that matter.

Tier 2: The innovation and prototype lab

Tier 2 runs after school as a voluntary enrichment programme. It provides the creative, hands-on, project-based extension that deepens engagement and connects inquiry to making, design, and community impact. Where Tier 1 develops the reasoning, Tier 2 materialises it. Students who participate in both tiers experience the full arc of the programme, from question to investigation to prototype to communication.

A Year 6 transition stream allows students from regional feeder schools to participate as a transitional and community-building pathway. This stream is small-scale and optional, designed to build bridges between primary and intermediate education rather than to recruit or create pressure. Year 6 participation is designed as a one-term exploratory experience. There is no expectation of multi-term commitment at primary age. Students who later enrol at Whanganui Intermediate encounter the programme again through Tier 1, with prior experience enriching rather than repeating their engagement.

Progression pathway

The programme is structured across year levels and tiers as follows.

Year 6 students from feeder schools participate in Tier 2 after school at the Transition level as a pilot in 2026, focused on foundational inquiry, familiarisation, and community building.

Year 7 to 8 students at Whanganui Intermediate participate in Tier 1 during school time plus optional Tier 2 at Level 1, focused on environmental inquiry, epistemic practices, and ethical AI. This is the pilot in 2026.

Year 9 to 10 students are planned for Tier 2 at Level 1 from 2027 to 2028, focused on sustained inquiry, portfolio building, and design capability.

Year 11 to 12 students are planned for Tier 2 at Level 2 from 2027 to 2028, focused on independent projects and microcredential assessment.

Year 12 to 13 students are planned for Tier 2 at Level 3 from 2028 onward, focused on self-directed projects, mentorship, and public exhibition.

Progression between levels is capability-based, not purely age-based. The pilot in 2026 focuses on Tier 1 and Tier 2 at Level 1 only. Levels 2 and 3 are developed for 2027 and beyond, informed by pilot evidence and credential alignment with Skills Group.

Tier 2 operational realism

The after-school model must account for three operational realities that directly affect quality and sustainability. These are addressed explicitly because funders and school leaders rightly want to see that the programme is realistic, not just optimistic.

Fatigue management. After-school sessions run from 3:00 to 4:30 PM, and students arrive carrying cognitive and physical fatigue from a full school day. Every session begins with a brief physical reset, which may be a short movement activity, a walk to check the aquaponics system, or a hands-on setup task. Sessions are structured in two blocks of approximately 35 to 40 minutes with a natural transition point between them.

Staffing contingency. If the facilitator is unavailable, the session is cancelled and rescheduled or replaced with a structured self-directed task. The programme does not run with untrained substitute supervision. Quality is prioritised over continuity.

Cohort size. The Tier 2 pilot is capped at 20 students per session. This cap is non-negotiable during the pilot year. It ensures the facilitator can provide meaningful feedback, maintain safety, and generate the quality of interaction that both the learning programme and the research require. Expansion requires additional trained facilitation, not simply additional enrolment.

6. The Inquiry Framework and Epistemic Practices

Every learning experience within Kokiri Lab is structured around inquiry. Students do not begin with a tool and look for something to do with it. They begin with a question, a problem, or an observation, and the tools become the means through which they investigate, create, and communicate their understanding. This is grounded in decades of research showing that students develop the deepest understanding when they engage with authentic questions, work with genuine uncertainty, and construct their own interpretations from evidence (Chinn and Malhotra, 2002; Sandoval, 2005; Manz, 2015; Barron and Darling-Hammond, 2008).

The Kokiri inquiry cycle

The programme uses a consistent learning spine across all themes and both tiers. The cycle is recursive, meaning students return to earlier phases as their understanding deepens rather than moving through it once in a linear sequence.

Observe. Students notice patterns, collect data, and examine phenomena. The key question is: what is happening here?

Question. Students identify what they want to understand and frame investigable questions. The key question is: what do we want to find out, and why?

Design. Students plan investigations, sketch prototypes, and select methods and materials. The key question is: how could we find out, and what could we build?

Test. Students run experiments, build prototypes, collect evidence, and try approaches. The key question is: what happens when we try this?

Reflect. Students evaluate evidence, revise thinking, and consider implications and ethics. The key question is: what does our evidence tell us, and what does it not tell us?

Communicate. Students share findings, present designs, and explain reasoning to others. The key question is: how can we explain what we found and why it matters?

Kokiri Lab deliberately preserves the uncertainty that makes authentic inquiry valuable. When students monitor a living aquaponics system, the fish do not behave predictably. When students classify insects, the AI tool sometimes gets it wrong. When students program a robot, the code does not always produce the expected behaviour. These are not failures of the programme. They are the conditions under which genuine inquiry occurs. If everything worked perfectly every time, there would be nothing to investigate (Crawford, 2014).

The organising concepts

Inquiry is organised around five transferable concepts that thread through every theme and become more sophisticated as students progress.

Systems and interdependence. Parts of a system affect each other. Changing one variable creates effects elsewhere. Understanding a system means understanding relationships, not just components. In AwaKai, fish health affects water chemistry affects plant growth. In NuiBot, sensor input affects processing logic affects motor output.

Evidence and uncertainty. Knowledge is built from evidence, but evidence has limits and requires interpretation. In AwaKai, water chemistry data shows trends but does not prove causation. In NuiBot, sensor readings vary between trials and a single test does not confirm reliability.

Design and iteration. Good solutions emerge through cycles of making, testing, and refining. First attempts are starting points, not finished products. In AwaKai, system improvements are tested against data. In NuiBot, code and hardware are tested, debugged, and redesigned.

Responsibility and impact. Technologies and decisions affect people, communities, and ecosystems. In AwaKai, this means freshwater stewardship, food system ethics, and questions about who benefits from local food production. In NuiBot, it means considering privacy implications of monitoring and the environmental cost of electronics.

Perspective and bias. Knowledge is shaped by who creates it, what tools are used, and whose needs are centred. In AwaKai, this means asking whose food systems are studied and what counts as success. In NuiBot, it means asking what assumptions are built into a sensor's design and whose problems are being solved.

The four epistemic practices

Drawing on the doctoral research, Kokiri Lab focuses on developing four observable reasoning practices. These are drawn from established research on how people evaluate evidence, construct knowledge, and handle uncertainty (Chinn, Buckland, and Samarapungavan, 2011; Kelly, 2008; Sandoval, 2005). They are also the specific constructs the doctoral study is designed to measure through GrowHub.

Evidence-claim linkage means grounding assertions in specific, identified evidence. At Year 6 to 8 level, this sounds like: "The lettuce in tray B grew 2cm less than tray A this week, and the pH in tray B has been below 6.0 for three days." At advanced level, it sounds like: "The correlation between feeding rate increase on Monday and ammonia spike on Wednesday suggests a 48-hour lag in the nitrogen processing capacity of our biofilter." This matters because claims without evidence are opinions.

Comparative reasoning means examining patterns systematically across conditions, time periods, or data sources. At Year 6 to 8 level: "The trap caught more moths on Tuesday than Thursday. Tuesday was warmer and there was no moon." At advanced level: "Comparing three weeks of data across two locations shows consistently higher diversity at the sheltered site, but the difference is smaller in weeks with stable weather." This matters because single observations mislead.

Revision depth means addressing underlying reasoning when revising, not just surface corrections. At Year 6 to 8 level: "I thought the fish were sick because they were not eating, but actually the pH was too low, so I need to check water chemistry first next time." At advanced level: "My initial hypothesis about temperature was wrong. The data shows pH and ammonia interact more strongly. I need to redesign my monitoring." This matters because the ability to change your mind when evidence warrants it is one of the most important intellectual capacities a person can develop.

Uncertainty handling means distinguishing well-supported claims from tentative ones. At Year 6 to 8 level: "I think the plants grew better in tray A, but I only measured for one week so I am not sure yet." At advanced level: "The data supports a moderate confidence claim about feeding rate effects, but our sample size is small and we cannot rule out temperature as a confounding variable." This matters because knowing what you do not know is as important as knowing what you do.

Epistemic practices: a quick reference for teachers

This reference is designed to be used during lessons without requiring the full programme document.

Evidence-claim linkage: "Show me where you got that." When it is happening, students say things like: "The pH dropped to 5.8 on Wednesday, so I think that is why the plants looked wilted on Thursday." When it is missing, students say things like: "The plants are dying because the water is bad" or "I just know." The prompt to use is: "What is your evidence for that? Can you point to something specific?"

Comparative reasoning: "What is different and why might that matter?" When it is happening, students say: "Tray A grew more than Tray B, and the only difference was the light." When it is missing, students draw conclusions from a single observation as though it were definitive. The prompt to use is: "How does that compare to last time, or in the other group, or under different conditions?"

Revision depth: "I changed my thinking, not just my answer." When it is happening, students say: "I used to think it was temperature, but now I think pH matters more because the data shows..." When it is missing, students erase an answer and write a different one without being able to explain what changed. The prompt to use is: "What made you change your mind? What was wrong with your earlier thinking?"

Uncertainty handling: "I am fairly sure, but here is what I do not know yet." When it is happening, students say: "I think it is the feeding rate, but I have only tested for one week so I am not certain." When it is missing, students express total certainty from limited evidence. The prompt to use is: "How confident are you? What would make you more confident? What could you be wrong about?"

Epistemic practices and the doctoral research

The relationship between the epistemic practices and the doctoral research must be understood clearly. The PhD does not simply observe whether students enjoy the programme. It rigorously tests whether trace-based indicators computed from student activity on GrowHub can validly detect the quality of these four practices. If they can, the programme has a validated framework for understanding and supporting student reasoning at scale. If they cannot, or can only partially, the research maps exactly where the limits are and what would be needed to address them. Both outcomes are valuable contributions to the field (Knight, Buckingham Shum, and Littleton, 2014; Gasevic, Dawson, and Siemens, 2015).

For evidence-claim linkage, GrowHub uses text analysis of references to specific data, dates, and measurements. Success means the indicator score correlates with human judgement. If it fails, it may be detecting word count rather than reasoning.

For comparative reasoning, GrowHub tracks use of comparison tools and references to multiple conditions. Success means the indicator retains explanatory power after controlling for entry length and frequency. If it fails, comparison may be implicit in student thinking but not captured in text.

For revision depth, GrowHub analyses revision history for surface edits versus reasoning-level changes. Success means the indicator distinguishes substantive revision from cosmetic correction. If it fails, students who think carefully but write less may be under-represented.

For uncertainty handling, GrowHub analyses language for hedging and confidence calibration. Success means the indicator distinguishes calibrated uncertainty from blanket hedging. If it fails, uncertainty language may reflect writing style rather than epistemic sophistication.

This transparency about what indicators might miss is not a weakness. It is a defining feature. The PhD is designed to produce valuable findings regardless of outcome (Messick, 1995; Wise and Shaffer, 2015).

7. International Mindedness, Approaches to Learning, and Studio Norms

While the programme is firmly grounded in the New Zealand Curriculum and delivered in an Aotearoa context, it deliberately cultivates the habits of mind, the disposition toward perspective-taking, and the structured approaches to learning that international research identifies as essential for developing young people who can think critically, act ethically, and engage meaningfully with a complex world (Hare, 2010; Singh and Qi, 2013; Erickson, Lanning, and French, 2017).

International mindedness by design

International mindedness is not achieved by studying international topics. It is developed through learning habits that connect local inquiry to global patterns, compare perspectives across contexts, and cultivate responsibility that extends beyond the classroom (Haywood, 2007; Singh and Qi, 2013; Cause, 2011).

Kokiri Lab embeds this through three recurring routines.

The local-global lens is built into every theme. At a designated point in each inquiry cycle, students answer: where else in the world does this problem show up, and what do people do about it there? In AwaKai, this means comparing Whanganui's water and food systems with aquaponics in Pacific island communities, urban hydroponics in Singapore, or community food systems in drought-affected regions. In NuiBot, it means examining how sensor-based monitoring is used in the Amazon, in sub-Saharan African agriculture, or in densely populated cities. The goal is perspective-taking and systems comparison.

A short comparative case study is built into each term. This is a structured activity lasting one to two sessions where students examine how a similar problem is approached in a different setting, identify what is shared and what is different, and discuss what they can learn. Future themes extend this approach: MaramaTrap compares Whanganui biodiversity with citizen science networks globally and biodiversity hotspots in the tropics. SkyLab examines how engineers worldwide learn from nature and how context shapes design.

An impact and responsibility reflection explicitly includes people beyond the classroom. Students consider who might benefit from their work, who might be harmed, and whose voices are missing.

Approaches to learning

International research identifies five categories that are directly relevant to sustained STEM inquiry: thinking skills, communication skills, research skills, self-management skills, and social skills. Making these visible helps students develop metacognition alongside content knowledge (Zimmerman, 2002; Winne and Hadwin, 1998).

Kokiri Lab makes approaches to learning visible through a fortnightly focus. Each fortnight, one skill cluster receives explicit attention, modelling, and feedback. This does not mean other skills are ignored. It means one area is highlighted so students develop conscious awareness of how they are learning. The schedule is advisory rather than rigid. If a genuine inquiry moment demands different skills, the facilitator follows the learning rather than the calendar.

In AwaKai, the typical rhythm is research skills in weeks 1 to 2 (accurate data recording, using evidence to justify decisions), thinking skills in weeks 3 to 4 (identifying patterns, comparing observations, evaluating explanations), communication skills in weeks 5 to 6 (explaining findings clearly, using diagrams and data, presenting to peers), and self-management skills in weeks 7 to 8 (planning next steps, managing time, persisting when things do not work).

In NuiBot, the rhythm shifts. Self-management skills lead in weeks 1 to 2 (following assembly instructions, organising components, planning before building), thinking skills follow in weeks 3 to 4 (debugging code, identifying problems, testing systematically), social skills appear in weeks 5 to 6 (collaborating on design, giving and receiving feedback), and communication skills close in weeks 7 to 8 (explaining how a system works, demonstrating a device, presenting design rationale).

Each fortnight includes clear student success criteria. For example, during a research skills fortnight, a student should be able to say: "I can record data accurately with dates and conditions. I can use my data to explain why I think something is happening. I can identify what my data does not tell me."

Studio norms

The learning environment is built on a set of norms that describe what values look like in the specific context of inquiry and making. These are introduced in the first session of each term and reinforced through facilitator language, feedback, and the culture of the studio. They are not assessed or graded. They are the social and ethical architecture of the space.

Principled means using AI honestly. When AI helps generate an idea, you say so. When AI gives an answer, you check it. You do not present AI output as your own thinking.

Open-minded means being willing to change your interpretation when data contradicts your first idea. Listening to a peer who sees the pattern differently and considering whether their reading has merit.

Reflective means using the design journal not as a record of what you did but as a tool for understanding why you made the choices you made, what you would change, and what you learned about your own thinking.

Risk-taker means trying a design approach you are not sure will work, testing an idea that might fail, and treating failure as information rather than as a verdict on your capability.

Caring means taking responsibility for the living systems in your care, designing with the needs of others in mind, and considering the impact of your work on people and place.

Inquirer means asking questions because you genuinely want to understand, following unexpected observations rather than ignoring them, and being willing to say "I do not know yet, but I want to find out."

Thinker means pausing before accepting an answer, including from AI. Looking for evidence before forming a conclusion. Considering what might be wrong with your reasoning, not just what supports it.

Communicator means explaining your thinking so others can understand it, question it, and build on it. Listening carefully enough to ask a question that moves the conversation forward.

8. Curriculum Alignment: Strand-Level Mapping

This section provides the explicit curriculum mapping that school leaders, boards, and the Education Review Office require for confidence that the programme constitutes legitimate curriculum design. It moves beyond conceptual alignment to show precisely how curriculum strands are addressed. This matters because Tier 1 is delivered within curriculum time. School leaders need to demonstrate that time spent on Kokiri Lab inquiry is time spent meeting curriculum requirements, not time diverted from them.

Science strand coverage

The New Zealand Curriculum organises science into four contextual strands plus the overarching Nature of Science strand (Ministry of Education, 2007; 2023). Kokiri Lab addresses all five. The following describes what each theme covers most strongly.

AwaKai provides strong coverage of the Living World through life processes such as the nitrogen cycle, plant uptake, fish biology, and nutrient cycling, and through ecology including interdependence, habitat, and food webs. It provides strong coverage of the Material World through chemical reactions such as ammonia-to-nitrate conversion and pH chemistry, and of Planet Earth and Beyond through freshwater quality and the impact of land use. Physical World and other Material World content receive moderate coverage through energy transformations and material selection for prototypes.

NuiBot provides strong coverage of the Physical World through energy, electrical circuits, and energy transformations. It provides moderate coverage of forces and of material properties through practical material selection for prototypes. Living World and Planet Earth and Beyond content is not the primary focus of this theme.

MaramaTrap, planned for 2027, will provide strong coverage of ecology and biodiversity, moderate coverage of life processes and evolution through adaptation and species variation, and moderate Planet Earth and Beyond coverage through atmosphere and seasonal variation effects on data.

SkyLab, planned for 2027, will provide strong coverage of forces including lift, drag, gravity, and structural stability, strong coverage of evolution through biomimicry and adaptation, and moderate coverage of energy and atmosphere.

Nature of Science as the backbone

Nature of Science is the overarching unifying strand, and it functions as the backbone of every theme. Every term plan is structured around four Nature of Science components as explicit planning headings. Before any content or activity is planned, the facilitator addresses four questions.

Investigating in science. What investigation methods are students using, what data are they collecting, and how are they managing uncertainty? In AwaKai, students monitor water chemistry over weeks, track multiple variables, and interpret ambiguous trends. In NuiBot, students conduct controlled testing, systematic debugging, and measure reliability across conditions.

Communicating in science. How are students documenting, explaining, and sharing their findings? In AwaKai, through data logs, system diagrams, oral explanations, and presentations. In NuiBot,

through system schematics, code documentation, device demonstrations, and explanation of design rationale.

Participating and contributing. How does the inquiry connect to real-world issues and community? In AwaKai, through freshwater stewardship, food systems, sustainability, and Te Awa Tupua. In NuiBot, through environmental monitoring applications, accessibility technology, and community problem-solving.

Understanding about science. What are students learning about how scientific knowledge is developed, tested, and revised? In AwaKai, that science involves sustained observation, accumulated evidence, and revision when new data challenges existing interpretations. In NuiBot, that science involves controlled testing, replication, and the understanding that results depend on conditions.

Technology strand coverage

The New Zealand Curriculum organises technology into three strands: Technological Practice, Technological Knowledge, and Nature of Technology (Ministry of Education, 2017). Each strand is made visible through a routine artefact required across every theme.

Technological Practice is addressed through a design statement. Students articulate what problem they are solving, for whom, and why it matters. This makes purpose and audience explicit and develops brief development capability.

Technological Knowledge is addressed through a system explanation with diagram. Students explain how their system works as inputs, processing, outputs, and feedback. This demonstrates understanding of how things work, not just that they work.

Nature of Technology is addressed through a consequence reflection. Students consider what might change if lots of people used this technology, what unintended effects could occur, and who benefits and who might not. This develops critical awareness of technology as socially constructed and value-laden.

These artefacts are lightweight, each requiring no more than a paragraph or a labelled diagram. But they make the technology strands visible in student work and generate reasoning evidence that supports both formative assessment and research.

9. AI as Creative and Critical Partner

The programme's approach to AI is grounded in the ethical framework the stakeholder survey identified as the community's highest priority. AI is not positioned as a productivity tool that helps students work faster, nor as a creative engine that generates ideas on their behalf. It is positioned as an object of inquiry and as an optional partner whose outputs require the same critical evaluation that students apply to any other source of evidence.

This aligns with UNESCO's 2023 guidance that AI literacy must include critical evaluation and human agency, and with the OECD's 2025 analysis that schools must prepare students to understand AI's limitations and maintain independent judgement.

How AI appears in the programme

AI tools are integrated in three ways, each reinforcing the epistemic practices described in Section 6.

AI as an object of inquiry. Students learn what AI is, how it works at a conceptual level, what it can and cannot do, and what ethical questions arise from its use. They examine questions such as how AI classification tools are trained, what happens when training data is biased, who is responsible when an AI system makes a harmful decision, and what the difference is between an AI-generated answer and a human-reasoned one.

AI as a classification and analysis tool. In environmental inquiry, students may use AI-powered tools to classify organisms or identify patterns in data. The critical move is that AI output is always treated as a claim to be checked, not as an answer to be accepted. When the AI misidentifies an insect or suggests an implausible pattern, that becomes a learning moment. An AI classification is not evidence. It is a hypothesis that requires human verification.

AI as a creative and critical partner in design. Students may use generative AI to brainstorm ideas, draft explanations, or explore alternatives. When they do, they are required to be transparent about it.

Developmental tiering

AI integration is scaled to match cognitive readiness. **Year 6 students** in the transition stream engage with AI awareness and guided classification checking. They learn that AI exists and can classify images. They compare an AI classification with their own observation and discuss whether they agree. Engagement is facilitator-guided and concrete.

Year 7 to 8 students engage in structured AI interrogation, bias exploration, and design brainstorming. They use AI classification tools independently and evaluate outputs against evidence. They explore how training data affects accuracy. They may use generative AI for brainstorming with full transparency.

This tiering is not about restricting access. It is about building the evaluative capacity that meaningful AI use requires.

AI integration is optional and platform-independent

AI use is optional within the programme. A full term of AwaKai or NuiBot can run with no AI involvement. The programme does not depend on any specific generative AI platform, and no session requires students to use AI tools to complete their work.

The programme's AI stance can be summarised in four principles. AI is a tool, not an authority. AI outputs are claims to be checked, not answers to be accepted. Transparency about AI use is a non-negotiable studio norm. The programme functions fully without AI and incorporates it only where it adds genuine learning value.

10. Data Governance and Student Data Sovereignty

GrowHub is built on Google Cloud infrastructure. All data generated by students is subject to clear governance principles. This section exists because data governance is not a technical afterthought. It is a values question, and the programme's credibility depends on addressing it transparently.

Core principles

Data minimisation. The platform collects only data that serves a defined learning or research purpose. No behavioural tracking, location data, or personal profiling is conducted beyond what is described in the research ethics application.

Role-based access. Student data is accessible only to the programme facilitator, the student themselves, and with consent the doctoral researcher. No data is shared with third parties, sold, or used for commercial purposes.

Storage and jurisdiction transparency. The programme acknowledges that data stored on Google Cloud may be held outside Aotearoa New Zealand. This is disclosed to participants and whanau as part of informed consent.

No automated decision-making about students. GrowHub analytics support facilitator understanding and student reflection. No algorithmic output is used to grade, rank, stream, or make decisions about individual students. This is a fundamental design principle, not a current limitation that might change later.

Data retention

Student data is retained for the duration of enrolment plus two years to allow for research analysis and portfolio continuity. Research datasets are anonymised at the point of analysis and stored separately from identifiable records. Whanau may request deletion of identifiable data at any time where legally permissible under the Privacy Act 2020 and research ethics approval.

Maori data sovereignty

The programme recognises the principles articulated by Te Mana Raraunga, the Maori Data Sovereignty Network. These principles assert that Maori data should be subject to Maori governance, that data about Maori learners carries obligations beyond individual consent, and that indigenous data sovereignty is a matter of rangatiratanga.

In practice, this means aggregated data about Maori learners will not be published without consultation with relevant iwi or advisory partners. The programme commits to developing a Maori data governance advisory relationship as it scales. Research outputs will not identify Maori learners or communities without explicit, informed, and ongoing consent.

This area is acknowledged as developing rather than complete. The pilot provides an opportunity to build appropriate relationships before data collection scales beyond the initial site. The commitment is to get this right through genuine relationship-building rather than to claim it is already resolved through policy compliance alone.

11. Level 2 and Level 3: Development Pathway for 2027 and Beyond

The pilot year focuses exclusively on Level 1 delivery. Levels 2 and 3 are not delivered in 2026. They are described here to show the intended trajectory and to provide Skills Group, funders, and school leaders with confidence that the programme has a credible development pathway.

Level descriptions

Level 1 is the foundation. Students develop core epistemic practices through guided inquiry, build familiarity with the inquiry cycle and design journal, and produce the minimum viable evidence set. The facilitator provides significant scaffolding. Level 1 is where students learn how to learn through inquiry.

Level 2 is the independent practitioner level. Students design and conduct their own inquiry projects with decreasing scaffolding. They manage sustained datasets independently, frame their own investigable questions, and produce portfolio artefacts demonstrating all four reasoning practices. Microcredential assessment begins at this level, aligned with NZQA requirements through the Skills Group partnership.

Level 3 is the open innovation level. Students undertake self-directed projects addressing genuine community or environmental challenges. They mentor younger students, present their work to external audiences, and produce evidence of sustained, independent, ethically grounded inquiry. Level 3 connects to post-school pathways and community impact.

Readiness markers for Level 1 to Level 2

Progression is capability-based. A student does not advance because they have attended for a certain number of terms. They advance when they consistently demonstrate the following.

Independent evidence-claim linkage. The student consistently grounds claims in evidence without facilitator prompting, visible in design journal entries and GrowHub reflections.

Sustained dataset management. The student can maintain a dataset across multiple sessions, recording accurately and consistently without step-by-step reminders.

Self-directed design cycle. The student can move through the inquiry cycle with decreasing scaffolding, visible in their design journal and facilitator observation records.

Portfolio evidence of all four epistemic practices. The student's accumulated work shows evidence of evidence-claim linkage, comparative reasoning, revision depth, and uncertainty handling.

Readiness markers for Level 2 to Level 3

Independent project framing. The student can identify a genuine problem, frame an investigable question, and design an approach without facilitator direction.

Ethical impact analysis. The student can articulate who benefits and who might be affected, what unintended consequences could arise, and how to mitigate them.

External presentation capability. The student can explain their work and findings to an audience outside the programme clearly and professionally.

Mentorship readiness. The student can support younger learners by asking good questions rather than giving answers.

12. Partnerships and Community Connections

The programme is supported by relationships with organisations across several sectors. These take different forms, and it is important to describe each accurately. Funders and school leaders are rightly cautious about inflated partnership claims.

Skills Group is a pathway alignment partner. They endorse the programme's approach to microcredential development. Active discussions are underway for Level 2 and 3 credential alignment from 2027. This is not yet a contractual relationship.

EdTechNZ provides sector endorsement, endorsing the programme's approach to ethical AI education through an advisory relationship.

EnviroStrat provides strategic alignment, endorsing alignment with environmental strategy goals through an advisory relationship.

Horizons Regional Council provides regional alignment, endorsing alignment with biodiversity and stewardship goals. Future collaboration on environmental monitoring is being explored.

Whanganui Intermediate School is the host school, providing students, curriculum context, venue, and a supportive environment. It is not the grant applicant and is not responsible for programme governance.

Regenpreneur Ltd is the delivery entity, a registered charitable company responsible for governance, funding applications, compliance, and delivery.

The programme's partnership strategy is to build relationships slowly, deliver on commitments, and allow partnerships to deepen based on demonstrated value.

13. Financial Sustainability

The pilot year operates on a lean cost base that reflects the programme's low-floor design.

Equipment baseline covers water testing kits, basic electronics, aquaponics materials, and consumables. This is essential for pilot launch at low cost.

Digital platform covers GrowHub development and maintenance on Google Cloud. Development costs are front-loaded in the pilot year.

Facilitator time covers after-school facilitation for Tier 2. Tier 1 delivery is within the existing teaching role.

Professional development covers facilitator training and inquiry pedagogy development. This is essential in the pilot year and reduces over time.

Community engagement covers whanau communication, showcase events, and feeder school outreach. Moderate cost but essential for legitimacy.

Research costs cover ethics applications, data analysis tools, and conference presentation. These are primarily covered through the doctoral programme.

Funding strategy

The pilot is funded through charitable grants, in-kind contributions from the host school, and the facilitator's existing teaching role. For 2027 and beyond, the strategy rests on three pillars: demonstrated impact from the pilot, microcredential pathway alignment that may generate modest revenue, and potential replication partnerships.

The programme does not depend on any single funding source. Tier 1 continues regardless of external funding because it is embedded in the facilitator's role. Tier 2 requires external funding and would pause rather than dilute if funding were insufficient.

14. Evaluation, Evidence, and Programme Improvement

The evaluation framework serves two purposes simultaneously. For the programme, it provides evidence to improve delivery, demonstrate impact, and justify continued investment. For the doctoral research, it provides validated data. These purposes are complementary but distinct.

Pilot success thresholds

These are not aspirational targets. They are the minimum indicators that would justify continuation in 2027.

Tier 1 completion is targeted at 85% or above of students completing the minimum viable evidence set, measured through portfolio review.

Tier 2 retention is targeted at 70% or above of enrolled students completing the term, measured through attendance records.

Epistemic practice growth is targeted at growth in at least two of four practices for the majority of students, measured through facilitator observation.

Research ethics compliance requires full compliance throughout the pilot, measured through ethics audit each term.

GrowHub indicator validity requires at least moderate correlation between indicators and human-coded artefact quality, measured through PhD convergent validity analysis.

Whanau and student satisfaction is targeted at 80% or above rating the programme positively, measured through end-of-term survey.

Level 2 pathway decision must be made with supporting evidence by December 2026.

What happens if thresholds are not met

If Tier 1 completion falls below 85%, the programme investigates whether the minimum evidence set is appropriately calibrated, whether pacing needs adjustment, or whether specific groups are under-served.

If Tier 2 retention falls below 70%, the programme investigates whether timing, structure, or content is creating barriers and whether fatigue management is sufficient.

If GrowHub indicators do not achieve moderate validity, the research documents this as a contribution to the field, mapping the boundaries of what analytics can detect, and the programme adjusts its reliance on analytics accordingly.

These responses are built into the evaluation design from the outset. They are not contingency plans for unlikely failures. They are the disciplined response of a programme that takes its own evidence seriously.

15. Replication Model and Conditions for Scaling

The programme is designed for Whanganui, but the inquiry framework, the epistemic practices, and GrowHub are designed to be portable.

What is required

Any replication site needs a dedicated space suitable for inquiry and making, at minimum a classroom with water access, storage, and basic workshop capability. A trained facilitator who understands inquiry pedagogy and can operate GrowHub is essential. Basic equipment appropriate to the chosen theme is needed. Platform access to GrowHub would be provided through Regenpreneur Ltd.

What is non-negotiable

The inquiry spine, the Observe-Question-Design-Test-Reflect-Communicate cycle, structures all learning. The four epistemic practices as explicit development goals must remain. The design journal as a core student artefact provides the primary evidence of thinking. The ethical AI stance, that AI outputs are claims to check rather than answers to accept, is foundational.

What is adaptable

Inquiry themes can and should change to reflect local context. A coastal school might focus on marine ecology. An urban school might focus on air quality. The specific equipment can vary. Cultural partnerships will differ and should be developed locally with the same care the Whanganui programme brings to its relationship with the awa and local iwi.

The goal is to enable other communities to build their own version of what Kokiri Lab represents rather than to replicate Whanganui's programme in a different location.

16. Health, Safety, and Duty of Care

The programme involves students working with living systems, water, electronic components, and workshop tools. These activities are central to the inquiry experience and require explicit safety protocols.

Aquaponics and living systems

Students wash hands before and after handling any part of the system. No student drinks or tastes water from the system. Water testing involves commercially available kits with no hazardous reagents. Fish feeding and maintenance are under direct facilitator supervision. Students with open cuts wear disposable gloves. The system is maintained to prevent stagnant water, mosquito breeding, or mould growth.

Electronics and workshop safety

All electronic projects operate at low voltage, typically 5V or below, using battery or USB power. Soldering, if introduced at Level 2, is conducted only under direct supervision with ventilation and eye protection. Small components are stored securely and distributed by the facilitator. Hand tools are used under supervision with explicit instruction.

General supervision

The facilitator maintains line-of-sight supervision at all times. No student is left unsupervised. After-school sessions operate under the same duty of care standards as regular school activities. Emergency contact information is held for all Tier 2 participants. Equipment malfunction, injury, or safety concerns are reported through the school's existing incident system.

Protocols are reviewed at the beginning of each term. The facilitator holds a current first aid certificate. The school's existing health and safety policies apply, and Regenpreneur Ltd carries appropriate public liability insurance.

17. Risk, Mitigation, and Contingency Planning

Every programme faces risks. The measure of a serious programme is not the absence of risk but the quality of its response.

Facilitator unavailability. Likelihood: moderate. Impact: high. Tier 1 is embedded in school staffing. Tier 2 session plans are documented. If the facilitator is temporarily unavailable, Tier 2 sessions pause rather than run with untrained substitutes. If the facilitator departs permanently, Regenpreneur Ltd appoints a trained successor.

Low Tier 2 enrolment or retention. Likelihood: moderate. Impact: moderate. The programme addresses this through feeder school engagement, fatigue-aware session design, and varied content. If enrolment falls below viable levels, Tier 2 consolidates to fewer sessions rather than lowering the cap.

Demand exceeds Tier 2 capacity. Likelihood: low to moderate. Impact: low. The non-negotiable cap of 20 is communicated from enrolment. A waitlist operates on a first-come basis. No expansion without additional trained facilitation.

Equipment failure or loss. Likelihood: moderate. Impact: low to moderate. Basic equipment is low-cost and replaceable. The low-floor design ensures meaningful inquiry can occur with minimal technology.

GrowHub technical issues. Likelihood: low to moderate. Impact: moderate. The platform is tested before deployment. Offline backup protocols exist. Students use paper-based data logs as backup if needed.

Curriculum revision misalignment. Likelihood: low. Impact: low. The programme is capability-based and reviewed against updates before each cycle.

Research ethics complications. Likelihood: low. Impact: high. The ethics application is prepared with full transparency. If complications arise, the research pauses while the learning programme continues unaffected.

Funding discontinuation after pilot. Likelihood: moderate. Impact: high. Tier 1 continues within the existing role. Tier 2 pauses until funding is secured. The programme does not accumulate commitments it cannot meet.

Community concerns about AI. Likelihood: low to moderate. Impact: moderate. AI is optional and the ethical stance is communicated clearly. AI components can be removed without affecting programme integrity.

Living system failure. Likelihood: moderate. Impact: low. Systems are maintained to protocol with backup supplies. System failure becomes an inquiry opportunity, consistent with the programme's approach to uncertainty.

Three critical contingencies

If demand exceeds capacity, the programme does not expand cohort sizes. Additional sessions may be added if facilitator capacity allows, but the quality threshold per session is not compromised.

If the facilitator leaves permanently, Regenpreneur Ltd appoints a trained successor. Tier 2 pauses during transition. A programme that continues in name but abandons its foundations has not been sustained. It has been hollowed out.

If funding does not continue, Tier 1 continues in reduced format within the existing role. Tier 2 pauses until funding is secured. Honest pausing is preferable to degraded delivery.

18. Timeline: 2026 Pilot Through 2027 Expansion

Term 1 2026: Preparation

Confirmed activities include finalising the programme design, initiating equipment procurement, GrowHub development and testing, submitting the research ethics application, beginning feeder school engagement, and facilitator professional development. Decision-dependent activities include confirming ethics approval and submitting funding applications.

Term 2 2026: Preparation

Confirmed activities include equipment installation, aquaponics system cycling and stabilisation, GrowHub beta testing, initiating consent processes with whanau, and holding feeder school information sessions. Decision-dependent activities include confirming ethics approval, securing initial funding, and finalising the host school agreement.

Term 3 2026: Pilot launch

Confirmed activities include launching Tier 1 with AwaKai inquiry for all Year 7 to 8 students, launching Tier 2 after-school sessions for up to 20 students including the Year 6 transition stream, deploying GrowHub for data collection and reflection, and beginning research data collection with consenting participants. A mid-term review of enrolment, retention, and operational issues is decision-dependent.

Term 4 2026: Pilot continuation

Confirmed activities include continuing Tier 1 with a second inquiry cycle or deepened investigation, continuing Tier 2 with NuiBot introduced alongside AwaKai, holding an end-of-year community showcase, and evaluating the pilot against defined success thresholds. Decision-dependent activities include the Level 2 pathway decision with Skills Group, 2027 funding applications informed by pilot data, and a facilitator capacity assessment.

2027 projected timeline

Term 1 involves continuing and potentially expanding Level 1, finalising Level 2 design if the decision gate is passed, recruiting additional facilitation if funded, and refining GrowHub. This depends on confirmed 2027 funding and Skills Group credential alignment.

Term 2 involves beginning the Level 2 pilot for students meeting readiness markers, developing new themes including MaramaTrap and SkyLab, and expanding feeder school engagement. This depends on credential framework approval and equipment procurement.

Terms 3 to 4 involve full Level 1 and Level 2 delivery, continued doctoral research data collection, an expanded community showcase, and beginning replication model documentation. This depends on sustained funding, sufficient facilitator capacity, and research progress.

This timeline is deliberately conservative. Each stage is triggered by evidence from the previous stage. The programme grows when the evidence says it is ready