education sciences

MDPI

Article

Exploring the Potential of Low-Barrier AI Tools for Culturally Responsive STEM Learning: Early Māori and Pacific Learner Insights from the TechTahi Platform

Toiroa Williams [1,*], Minh Nguyen [2], Tania Ka'ai [1], Manju Vallayil [2], Nogiata Tukimata [1] and Tania Smith-Henderson [1]

[1] Te Ipukarea Research Institute, Auckland University of Technology, Auckland 1010, New Zealand; tania.kaai@aut.ac.nz (T.K.); nogiata.tukimata@aut.ac.nz (N.T.); tania.smith-henderson@aut.ac.nz (T.S.-H.)
[2] School of Engineering, Computer and Mathematical Sciences, Auckland University of Technology, Auckland 1010, New Zealand; minh.nguyen@aut.ac.nz (M.N.); manju.vallayil.vijayalekshmi@autuni.ac.nz (M.V.)
* Correspondence: toiroa.williams@aut.ac.nz

Abstract

Recent advances in large language models (LLMs) have enabled new forms of software creation through natural-language interaction. However, many AI-assisted coding tools continue to assume familiarity with development environments, programming workflows, and technical conventions, which may limit accessibility for early-stage learners and communities historically underrepresented in digital participation. This challenge is particularly relevant in Aotearoa New Zealand, where Māori and Pacific peoples remain underrepresented across STEM and technology pathways. This paper introduces TechTahi, a browser-based, syntax-free AI-assisted platform designed to support low-barrier digital creation through natural-language prompts and immediate in-browser previews. The study had two aims: to describe the design rationale and workflow of TechTahi and to explore early learner perceptions following initial use of the platform. An exploratory pilot design was employed. Five participants completed a post-use survey after hands-on interaction with TechTahi. Responses were analysed descriptively, with open-ended feedback reviewed for recurring themes. Findings suggested generally positive perceptions of accessibility and ease of use, particularly the ability to create working applications without prior coding knowledge. Participants also identified opportunities for culturally relevant features, including language support and locally meaningful design elements, alongside areas for improvement such as clearer onboarding guidance and reduced information density. These preliminary findings suggest that syntax-free, culturally responsive AI creation tools may offer promising pathways for widening participation in digital learning. Further research with larger and more diverse samples is needed to evaluate longer-term educational impact.

Keywords: Māori and Pacific learners; STEM education; Mātauranga Māori; culturally responsive pedagogy; Indigenous knowledge systems; generative AI in education; large language models; AI-enabled learning environments; syntax-free and no-code programming; end-user programming; community computing

Academic Editor: Heidi Cian

Received: 20 March 2026
Revised: 13 May 2026
Accepted: 15 May 2026
Published: 21 May 2026

1. Introduction

Digital technologies, including recent advances in Artificial Intelligence (AI), are increasingly shaping economic opportunity and social futures in Aotearoa New Zealand.

The technology sector's rapid growth, strong workforce demand, and comparatively high salaries position it as an important pathway to stable, high-value employment. Yet Māori comprise only around 5% of the digital technology workforce and Pacific peoples approximately 4.4% (Worth, 2023), indicating that these communities remain underrepresented in a sector central to future prosperity. Addressing inequitable pathways into technology and STEM-related fields is therefore an urgent educational and social priority.

These disparities do not reflect a lack of capability or knowledge within Māori and Pacific communities. Māori and Pacific peoples possess long-standing scientific, technological, and mathematical knowledge systems grounded in sophisticated forms of observation, analysis, and problem-solving. Mātauranga Māori encompasses astronomy, ecology, engineering, navigation, and environmental sciences developed through generations of systematic inquiry and lived practice (Durie, 2004; Hikuroa, 2017). Similarly, Pacific societies have sustained deep scientific traditions through wayfinding, oceanographic knowledge, and celestial navigation (Lewis, 1994; Thaman, 2009). These Indigenous epistemologies provide strong foundations for contemporary STEM learning and innovation.

Research further shows that Māori and Pacific learners thrive in culturally affirming educational environments where identity, language, and relational ways of knowing are recognised (Bishop et al., 2009; Chu et al., 2013). Strength-based pedagogies that centre whānau relationships, collective learning practices, and Indigenous knowledge have been associated with improved belonging, confidence, and academic engagement (Airini et al., 2010; Macfarlane et al., 2015). However, Māori and Pacific students remain underrepresented across key STEM pathways. Studies attribute these patterns to systemic rather than individual factors, including institutional norms that marginalise Indigenous identities and knowledge systems (E. Curtis et al., 2014; Kidman & Chu, 2019; Mou & Olsson, 2019; Naepi, 2019).

At the same time, the rapid expansion of AI presents both opportunities and risks. AI-enabled tools may help scaffold learning, personalise support, and lower technical barriers through natural-language interaction (Holmes et al., 2019; Luckin, 2018). However, mainstream systems may also reproduce cultural bias, overlook linguistic diversity, or fail to reflect Indigenous worldviews (Kukutai & Taylor, 2016; McLachlan & Kukutai, 2020). Existing AI-assisted coding and app-building tools frequently continue to assume familiarity with technical workflows, development environments, or programming conventions, which may limit accessibility for early-stage learners and those historically excluded from digital participation.

TechTahi was developed in response to this gap. TechTahi is a browser-based, syntax-free AI-assisted platform that enables users to create digital applications through natural-language interaction rather than conventional coding syntax. Positioned within the Te Ao Hangarau Māori context, the platform was designed to explore how AI-enabled creation tools might support accessible, culturally responsive pathways into digital learning and innovation.

Accordingly, this paper has two aims: first, to describe the design rationale and workflow of the TechTahi platform; and second, to report exploratory findings from an initial pilot study involving learner feedback following hands-on use of the system.

To guide the exploratory study, the following research questions were addressed:

1. How do participants perceive the accessibility and usability of TechTahi following initial use?
2. What opportunities and challenges do participants identify when using TechTahi for digital creation?
3. How do participants perceive the cultural relevance and future potential of TechTahi as an AI-enabled learning tool?

2. Background

2.1. Māori and Pacific Participation in STEM

STEM education plays an important role in preparing learners to participate in an increasingly complex and technologically driven society. Strong foundations in science, technology, engineering, and mathematics can support access to future study, employment, innovation, and informed civic participation (Millar, 1996; Stuckey et al., 2013; Thomas & Durant, 1987). For Māori and Pacific learners in Aotearoa, New Zealand, equitable participation in STEM is also closely connected to broader goals of social mobility, community wellbeing, and representation in fields that shape national futures.

Despite this importance, substantial disparities remain across STEM pathways. National reports have identified persistent gaps in science achievement, tertiary participation, retention, and completion for Māori and Pacific learners compared with other groups (Naepi et al., 2021). These inequities continue into advanced academic and research careers, where Māori and Pacific peoples remain underrepresented within universities and Crown Research Institutes (T. McAllister et al., 2022; T. G. McAllister et al., 2020). Together, these patterns suggest that barriers emerge across the educational pipeline rather than at a single transition point.

2.2. Structural and Cultural Barriers in STEM Education

Research consistently indicates that these disparities are not explained by learner capability, but by the extent to which educational systems recognise and support Indigenous identities, languages, and ways of knowing. Relatedly, Māori and Pacific learners have been shown to benefit from culturally responsive learning environments (Airini et al., 2010; Bishop et al., 2009; Chu et al., 2013; Macfarlane et al., 2015).

At the same time, tertiary institutions have been criticised for reproducing institutional norms that marginalise Indigenous learners and knowledge systems. Naepi (2019) describes aspects of this dynamic as the white imprint, while other studies document experiences of racism, cultural unsafety, and the dismissal or tokenistic treatment of Indigenous knowledge within academic settings (E. T. Curtis et al., 2012; Kidman & Chu, 2019; Kidman et al., 2015; Mou & Olsson, 2019). Within STEM disciplines, such conditions may weaken belonging and contribute to lower persistence and progression.

Mātauranga Māori offers an important counterpoint to deficit narratives. As a knowledge system grounded in observation, relationships, and long-term engagement with Te Taiao, it includes sophisticated approaches to inquiry, navigation, ecology, engineering, and environmental understanding (Durie, 2004; Hikuroa, 2017; Jones Brayboy & Maughan, 2009). Recognising the legitimacy of Indigenous knowledge systems can broaden understandings of what counts as STEM knowledge and support more inclusive learning environments.

2.3. AI-Assisted Programming, Accessibility, and Emerging Opportunities

Recent progress in LLM-based systems has expanded opportunities for generating software through plain-language prompts (Chang et al., 2024). AI-assisted coding tools and so-called "vibe coding" workflows enable users to generate and refine code through prompts rather than writing all code manually (Geng et al., 2026). These developments may help lower some technical barriers and expand access to digital creation.

However, many current tools continue to assume familiarity with integrated development environments (IDEs), project files, cloud accounts, debugging processes, deployment workflows, or programming conventions. Such assumptions may remain challenging in educational and community contexts where learners use shared devices, have limited permissions to install software, or possess uneven prior exposure to coding concepts (Coleman

& Luton, 2021; Li & Wu, 2022; Sinanaj et al., 2022). As a result, the benefits of AI-assisted programming may not be evenly distributed.

These issues are particularly relevant in Indigenous and community contexts, where concerns may also include affordability, data sovereignty, linguistic inclusion, and alignment with local values and practices (Kukutai & Taylor, 2016; McLachlan & Kukutai, 2020). AI tools intended to support Māori and Pacific learners, therefore, need to be considered not only in terms of technical capability, but also in relation to accessibility, cultural responsiveness, and community control.

Taken together, this literature suggests a need for AI-enabled creation environments that are low-barrier, culturally responsive, and suitable for diverse educational settings. TechTahi was developed as an exploratory response to this gap.

3. The TechTahi Platform

TechTahi is a browser-based, syntax-free AI-assisted programming environment developed to support accessible and low-friction software creation in educational and community contexts. TechTahi enables participants to:

- describe desired input–output behaviour in natural language within a browser-based interface;
- send refined prompts to a choice of LLMs (e.g., ChatGPT, DeepSeek, Claude, Gemini, or Meta AI, depending on the versions publicly available at the time of use);
- paste the returned code into TechTahi and instantly preview a working application, without compilers or local tooling; and
- iteratively fix, enhance, and share applications using a guided, repeatable procedure.

Rather than attempting to conceal the underlying role of LLMs, TechTahi treats external AI models as interchangeable collaborators. The platform provides carefully scaffolded instructions that help users structure their requests and systematically improve code, while leaving the selection of an AI provider flexible.

We begin with an example and some screenshots so that the reader can visualise what the system can do. Let us consider the TechTahi web system, available at: https://www.ecms.nz/techtahi/ (accessed on 14 May 2026).

The main interface is simple and intuitive, as shown in Figure 1.

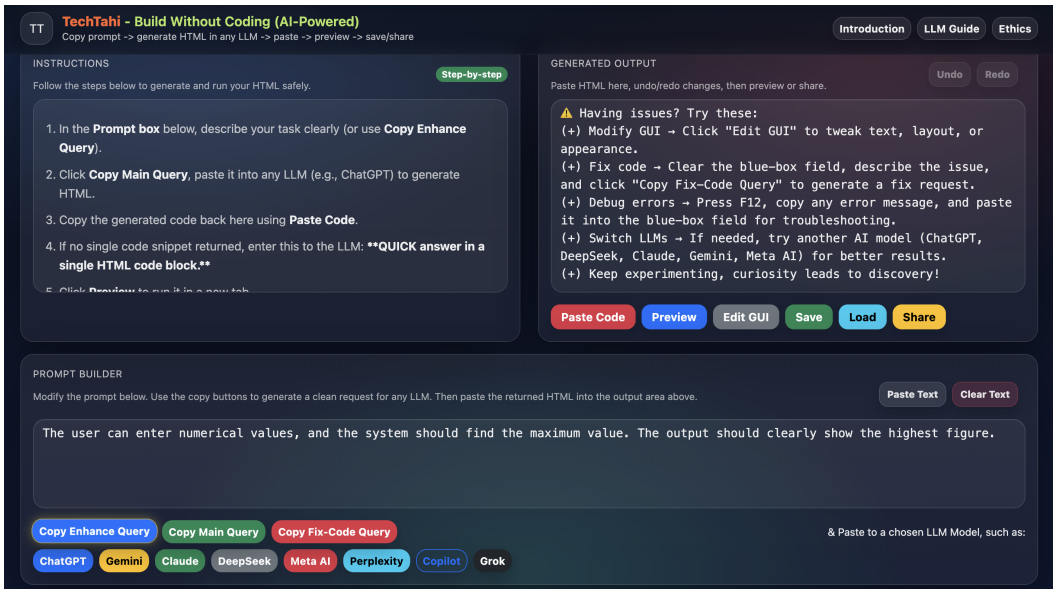

Figure 1. TechTahi main interface and controls.

Suppose a student is learning mathematics and wants to determine whether a parabola and a line intersect. In purely algebraic form, this can be difficult to visualise. Even with a graphing calculator, the process may not be straightforward, since the student must navigate multiple formatting rules and input controls.

With TechTahi, however, the student can simply describe the task in natural language. For example, the student might write:

> *"draw 2 lines, one is y = x ^ 2 + 2x + 3 and y = 4x, and show if they cut each other or not and where"*

After entering the description and pressing a few buttons, TechTahi automatically generates the result, as shown in Figure 2. The two plotted lines clearly do not intersect, which is immediately apparent from the visualization. In this example, a working visual output was generated within a short interaction cycle.

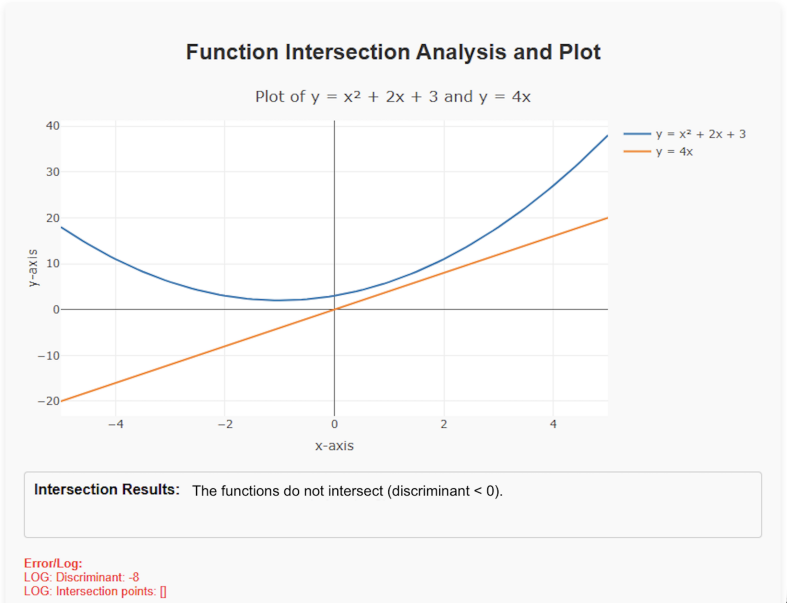

Figure 2. Example output showing the intersection between a parabola and a line.

TechTahi was initially motivated by the *Te Ao Hangarau Māori* initiative and is shaped by Aotearoa New Zealand guidance on responsible GenAI use for Māori, Pacific Peoples, and other ethnic communities, with a focus on data sovereignty (Kukutai & Taylor, 2016), avoiding bias and harm, and honouring Māori–Crown relationships in decisions about AI. Within this context, TechTahi is used to co-design interactive learning tools, cultural storytelling resources, and lightweight prototypes in ways that keep Māori data governance, consent, and tikanga at the centre of how AI capabilities are applied.

This paper makes three contributions. First, it documents the design and workflow of TechTahi as a browser-based, syntax-free AI creation platform developed for accessible and community-oriented use. Second, it reports exploratory pilot feedback from early users following initial interaction with the platform. Third, it discusses how low-barrier AI creation tools may inform future culturally responsive approaches to STEM learning and digital participation.

3.1. Design Principles

TechTahi was developed around four design principles informed by practical considerations relevant to educational, community, and low-barrier use contexts:

1. Syntax-free creation. Users should not be required to learn programming syntax, frameworks, or build tools. All interactions occur through natural-language descrip-

tions of tasks, inputs, and outputs. Code generation is intentionally fast, typically returning results within 10–30 s, avoiding the long wait times, often minutes or hours, seen in other code-generation or live-coding systems.

2. Zero-install, device-agnostic access. The platform runs entirely in the browser, requiring no local installation, compiler setup, or cloud-hosted environment. Only the necessary libraries are downloaded to the user's device, and once generated, code remains fully local. This design aims to minimize centralized storage of user-generated project data and to support locally controlled workflows, supporting communities that prefer offline, cost-free, and privacy-preserving tools.
3. Transparent AI orchestration. Rather than locking users into a single model, TechTahi interoperates with multiple LLM providers (ChatGPT, DeepSeek, Claude, Gemini, Meta AI, etc.). This enables experimentation, flexibility, and resilience against changes in any one service, while keeping the underlying orchestration clear and user-controllable.
4. Community sharing and remixing. Users can publish, share, and remix creations through a dedicated sharing platform, supporting peer learning and community-driven innovation. These features are designed to remain simple and accessible, aligning with communities that value practicality and low barriers to participation.

3.2. User Workflow

The TechTahi interface is intentionally simple and text-centric. The workflow, presented through on-screen guidance, begins with the user describing a desired task in plain language within a text area. Users may refine this description through an "Enhance Query" function, after which the generated prompt can be copied and submitted to an external LLM interface (e.g., ChatGPT, DeepSeek, Claude, Gemini, or Meta AI) to request executable code, typically in HTML/CSS/JavaScript.

Once code is returned, it can be pasted back into TechTahi and previewed directly in the browser without requiring a separate compiler or development environment. If the output does not meet expectations, the platform provides additional scaffolded prompts for interface modification, bug fixing, and troubleshooting, including guidance on using browser developer tools and sharing visible error messages with the LLM. When satisfied with the result, users may save outputs locally for future use.

Throughout this process, TechTahi encourages experimentation and iteration, including trying alternative prompts, comparing model outputs, and refining designs through repeated interaction.

3.3. Platform Architecture

At a high level, TechTahi consists of:

- a browser-based user interface written in standard web technologies;
- a sandboxed runtime for executing user-provided HTML/CSS/JavaScript safely;
- a set of pre-crafted prompt templates for common operations (initial code generation, fixing code, GUI modification, debugging);
- storage and retrieval mechanisms for saving user projects and exposing them via the sharing platform; and
- lightweight server-side components that manage sessions and enforce security constraints (e.g., limiting network access from generated code).

Crucially, TechTahi does not require server-side LLM hosting. Instead, it delegates model invocation to the user's chosen LLM interface, which may run in a separate browser tab or application. This keeps the TechTahi backend simple, reduces operational costs, and avoids centralising sensitive prompts or outputs.

3.4. Use Cases

Knowledge Creation and Digital Literacy

TechTahi was initially introduced in workshop settings as part of broader activities exploring emerging digital tools. In these sessions, participants, including students, educators, and community members, used TechTahi to design small applications aligned with their interests. Examples included language learning resources such as flashcards, quizzes, and interactive stories; simple data dashboards for visualising CSV datasets or open data feeds; and calculators or simulators related to science, mathematics, or everyday tasks.

By starting from natural language descriptions, participants were able to focus on articulating the behaviour they wanted rather than the syntax required to implement it. In this way, TechTahi may provide a useful environment for introductory computational thinking and digital literacy without requiring prior programming knowledge. The next section outlines the study methods and participant feedback process used to evaluate early learner experiences of this approach.

4. Methods

4.1. Study Design

This paper reports an exploratory pilot study designed to examine early learner perceptions of TechTahi following initial hands-on use. Participants completed a guided task-based interaction with the platform followed by a post-use feedback survey. The present paper reports findings from the survey component.

4.2. Participants and Recruitment

Participants were recruited from Auckland University of Technology (AUT). The study focused on Māori and Pacific learners and invited students enrolled in AUT programmes to trial TechTahi and provide feedback on usability and future improvement. Eligibility was based on participants identifying as Māori or Pacific and being enrolled in relevant AUT study programmes. Participation was voluntary, and five participants completed the survey reported in this paper.

Participants represented a range of academic programmes, including computer science, mathematics, business, events management, and Māori-focused study pathways. This diversity provided early insight into how learners from both STEM and non-STEM backgrounds responded to the platform.

4.3. Procedure

Participants attended a session of approximately one hour in a designated research setting at AUT. They first received an introduction to the study and to the TechTahi platform, with an opportunity to ask questions before providing consent. Participants then completed a guided practical activity involving simple digital creation tasks using TechTahi. Following the session, participants were provided with a link to an anonymous online survey, which could be completed afterward at a convenient time within the following week.

4.4. Survey Instrument

The post-use survey was developed by one of the principal investigators of the study to support the exploratory aims of the pilot evaluation and to gather early feedback on learner experiences with TechTahi. Survey items were informed by the study research questions and focused on usability, accessibility, confidence when interacting with digital tools, perceived barriers to coding, cultural relevance, and potential future applications of the platform.

The 19-item survey included a combination of structured and open-ended questions. Structured items used simple categorical and Likert-style response formats to capture participants' perceptions of ease of use, confidence, accessibility, and perceived usefulness. Open-ended questions invited participants to describe the kinds of projects they would like to create, features they considered important for Māori or Indigenous learners, frustrations encountered during use, and broader reflections on the platform experience. Examples of survey items are provided in Table 1.

Table 1. Examples of survey items used in the exploratory pilot study.

Survey Focus	Example Item	Response Format
Ease of use	"How easy was it to follow the TechTahi instructions?"	5-point Likert-style scale
Confidence	"Did using TechTahi make you feel more confident experimenting with digital tools?"	Yes/Maybe/No
Accessibility	"Do you think TechTahi reduces barriers to learning to code?"	Yes/No/Unsure
Community relevance	"Do you think TechTahi could be useful in supporting te reo Māori, Pasifika, or other community projects?"	Yes/Maybe/No/Unsure
Cultural relevance	"What features could be added to make TechTahi more meaningful for Māori or Indigenous learners?"	Open-ended
User experience	"What was the most frustrating part of using TechTahi?"	Open-ended

Participants could skip any survey questions they did not wish to answer. However, responses were obtained for all open-ended questions that were presented to participants.

4.5. Analysis

Given the small pilot sample, analysis was descriptive and exploratory rather than inferential. Closed-response items were reviewed to identify simple response patterns across the five participants, such as whether responses tended to indicate ease of use, increased confidence, perceived usefulness, or uncertainty. These summaries were used only to contextualise the qualitative feedback and were not treated as statistically generalisable findings.

Open-ended responses were manually reviewed question by question. Responses were first read in full, then compared across participants to identify repeated ideas, phrases, or concerns. For example, comments about ease of use, rapid feedback, and understanding how code works were grouped under accessibility and confidence; responses about websites, games, community tools, te reo Māori, visuals, and story-based learning were grouped under creative, community-oriented, and culturally relevant uses; and comments about instructions, dense information, loading screens, and language-related difficulties were grouped under points of friction. These patterns informed the structure of the ex-

ploratory findings section. Short participant phrases were retained where they helped illustrate the theme directly.

4.6. Ethics

The study was conducted in accordance with the rules, regulations, and guidelines of the Auckland University of Technology Ethics Committee (AUTEC). Ethical approval for research involving human participants was granted on 28 November 2025 for a three-year period until 28 November 2028 (AUTEC Approval No. 25/368). All participants received a participant information sheet and provided informed consent prior to participation. Survey responses were anonymous, and findings are reported in non-identifiable form.

5. Exploratory Findings and Discussion

This section presents exploratory themes drawn from survey feedback provided by five participants following initial use of TechTahi. Given the small pilot sample, these findings should be interpreted as preliminary perceptions rather than generalisable outcomes.

5.1. Accessibility and Ease of Use: Lowering Entry Barriers to Digital Creation

One of the recurring themes across survey responses was the perceived ease of use of TechTahi. Despite varied levels of prior technical exposure, multiple participants reported that executing generated code was accessible, suggesting that TechTahi was viewed as an approachable entry point to digital creation. In addition, comments such as "made it a bit easier for me to understand what was happening" and "I liked it once I understood it" suggest that some learners were able to grasp the core workflow, even when they did not consider themselves technically confident.

The simplicity of TechTahi's copy–paste–preview cycle appeared to play an important role in participants' reported experiences of ease of use. Multiple participants indicated that the platform "helped [them] understand how to create things" and gave them "more knowledge on understanding how to create" applications without needing to understand the details of code syntax. By reducing the need to engage with programming syntax at the outset, these responses suggest that TechTahi may have potential as a lower-barrier entry point for learners who might otherwise feel discouraged by perceived complexity.

The immediacy of feedback, particularly the ability to see an application running within seconds, was also highlighted positively by participants. Some respondents described the tool as impressive and noted how quickly it transformed their ideas into functioning prototypes. These early responses may suggest that rapid feedback can contribute to learner confidence and a sense of agency, factors often associated with sustained engagement in digital learning contexts.

5.2. Growing Confidence and Emerging Computational Thinking

Although TechTahi does not require users to write syntactically correct code, some participants appeared to engage with foundational computational ideas during use. Multiple respondents noted that the platform helped them understand "what was happening" inside the generated code, suggesting that exposure to AI-mediated code creation may make programming processes more approachable.

Responses also indicated early awareness that clearer prompts can influence output quality, that iteration can improve results, and that experimentation may form part of the learning process. These preliminary perceptions suggest that syntax-free AI environments may support introductory forms of computational thinking while reducing some of the intimidation often associated with learning to code.

5.3. Learner Aspirations: Creative, Community-Oriented, and Culturally Relevant Projects

When asked what they would like to create using TechTahi, participants described a diverse range of possible projects, including websites, games, story-based applications, and tools intended to help communities or support people to engage with technology without coding skills. These responses suggest that learners did not view the platform only as a technical exercise, but also as a means of creating resources with personal, educational, or community value.

The interest in community-serving applications is notable, as technology was often framed in relation to whānau, community, and collective wellbeing rather than solely individual use. Although based on a small exploratory sample, these responses may align with perspectives that emphasise contribution, reciprocity, and relational engagement within learning contexts.

Participants also expressed interest in tools that reflect linguistic and cultural identity, including requests for "more reo," native language support, culturally relevant visuals, community-focused project templates, and story-driven learning experiences. Taken together, these responses suggest that future development of TechTahi may benefit from embedding cultural responsiveness alongside technical functionality, particularly through language inclusion, relevant imagery, and community-oriented forms of creation.

5.4. Points of Friction: Instructional Clarity and Cognitive Load

Despite generally positive first-use feedback, multiple participants also noted specific challenges. The most common difficulty involved understanding the instructions or navigating information that felt "too jammed together" or overwhelming at first glance. These comments suggest that some challenges may have related less to the underlying task itself and more to how information was presented to first-time users.

A small number of respondents also mentioned minor performance issues such as slow loading. One participant referenced "Māori" under difficulties, which may indicate linguistic or contextual mismatch, although the meaning of this brief response cannot be interpreted with certainty. It may suggest that the instructions or interface did not fully align with that participant's expectations or preferred forms of communication.

Taken together, these responses indicate several areas for future refinement, including staged instructions, clearer and more conversational language, greater use of examples and visuals, and culturally relevant scaffolds such as story-based introductions. For tools intended to support Māori and Pacific learners, clarity, accessibility, and cultural resonance may be important aspects of effective interface design.

5.5. Overall Perceptions and Early Promise

Finally, participants were asked whether they would recommend TechTahi to others. All respondents who answered indicated that they would, citing reasons such as ease of use, broad accessibility, speed, functionality, and suitability for people without coding knowledge. Although this result should be interpreted cautiously given the very small sample, it suggests a positive initial response among participants from different academic backgrounds.

At this early stage, willingness to recommend can be viewed as an indicator of perceived usefulness, usability, and first-use acceptability rather than as evidence of sustained educational impact. Even so, these responses suggest that TechTahi was viewed as a promising and approachable tool for introductory digital creation.

6. Discussion

6.1. Early Implications for Culturally Responsive AI in STEM

The exploratory findings suggest that participants viewed TechTahi as an accessible entry point to digital creation. Ease of use, rapid feedback, and the ability to generate working outputs through natural language were positively noted by participants. These early perceptions may indicate that syntax-free AI tools could help reduce some procedural barriers often associated with traditional coding environments.

Participants also highlighted the importance of culturally relevant design elements, including clearer language, visual scaffolding, and greater inclusion of te reo Māori and community-oriented examples. This aligns with prior literature suggesting that Māori and Pacific learners may benefit from learning environments that affirm identity, language, and relational ways of knowing. While these findings are preliminary, they suggest that cultural responsiveness may be an important design consideration for AI-enabled STEM tools.

6.2. Generative AI in Action

An additional feature of TechTahi is that it makes the role of generative AI more visible within the creation process rather than obscuring it behind a single automated action. Users are encouraged to reflect on their task, formulate prompts, and inspect the resulting outputs through iterative testing.

In principle, this type of workflow may help support early awareness of how prompt quality can influence generated outputs, how responses may vary across AI systems, and how refinement through iteration can improve results. Demonstration-based use in teaching contexts may also help make these processes more transparent and approachable for novice learners.

6.3. Comparison with Vibe-Coding Platforms

Alongside IDE-based vibe coding, a growing ecosystem of AI-assisted coding and app-building platforms has emerged. Many of these systems offer prompt-driven workflows that translate natural-language descriptions into deployable applications. Common features include integrated hosting, back-end services, user authentication, databases, and cloud-based deployment environments.

TechTahi occupies a different position within this broader landscape. Rather than functioning as an IDE plug-in or a fully hosted commercial app builder, TechTahi was designed as a browser-based, syntax-free environment intended for rapid prototyping, educational use, and community workshops. Its design emphasises low-barrier access, simplicity, and greater scope for local user control over code and content.

Table 2 provides a conceptual comparison between common characteristics of AI-assisted vibe-coding environments and the design orientation of TechTahi.

Table 2. Conceptual comparison between vibe coding with AI-enabled IDEs and TechTahi.

Dimension	Vibe Coding (AI IDE)	TechTahi
Installation and setup	Requires downloading and installing an IDE (Cursor, Windsurf, etc.), managing API keys, and sometimes installing Git or language runtimes.	Runs entirely in the browser; no installation, compilers, or runtime configuration required.

Table 2. *Cont.*

Dimension	Vibe Coding (AI IDE)	TechTahi
Mental model	Users must understand projects, files, extensions, diffs, and sometimes terminals.	Users only need to understand input–output behaviour and basic web interactions (type, copy, paste, click).
Error handling	Relies on reading console error messages, navigating multiple files, and often consulting documentation.	Encourages copying any visible error message into the blue text area and using a "Fix-Code Query" template to request guided fixes from an LLM.
Tool complexity	IDE exposes many advanced features (MCP, extensions, rule files, multi-model orchestration) that can overwhelm beginners.	Single-page interface with explicit step-by-step instructions and a small set of clearly labelled buttons.
Speed from idea to prototype	Time is spent on environment setup, configuration, and debugging tool issues before code even runs.	Users can move from describing an idea to seeing a running prototype in a few iterations, often within minutes, as there is no environment overhead and generation typically completes in 10–30 s.
Device requirements	Assumes a laptop or desktop where software can be installed and updated.	Works on any modern device with a browser (including locked-down school machines, tablets, and shared lab PCs).
Sharing and remixing	Requires familiarity with Git, GitHub, or file sharing to distribute projects.	Integrated sharing platform allows users to publish and browse creations via simple web links.
Target audiences	Suited to aspiring developers and technically inclined users who are willing to learn IDE and version control concepts.	Designed for students, educators, and community members, including those with minimal technical background.

6.4. Design Implications for Future Development

Multiple responses indicated that onboarding and instructional clarity remain important. Although participants generally responded positively to the platform, some found the interface initially dense or difficult to navigate. Future iterations of TechTahi may benefit from staged instructions, guided examples, simplified language, and culturally relevant templates that support first-time users.

6.5. Limitations and Future Research

This study is limited by its very small sample size (n = 5), exploratory pilot design, and reliance on self-reported first-use perceptions. As participation was voluntary, the findings may also reflect possible self-selection bias. No longitudinal follow-up or comparative

evaluation was undertaken. The results should therefore be interpreted as exploratory rather than generalisable evidence of educational impact.

Future research should involve larger and more diverse participant groups, longitudinal and comparative evaluation, and co-design approaches with Māori and Pacific communities to better understand how culturally grounded AI tools may support sustained STEM engagement.

7. Conclusions

This paper introduced TechTahi, a browser-based, syntax-free platform designed to support software creation through natural language interaction. By combining external large language models with immediate in-browser previews, the platform offers a low-friction approach to digital prototyping for learners with limited prior coding experience.

An exploratory pilot study involving five participants provided early insights into how learners perceived the platform during initial use. Responses suggested positive perceptions of accessibility, usability, and creative potential, while also identifying the importance of clear guidance and culturally relevant design features.

These findings should be interpreted cautiously given the small sample size and preliminary nature of the study. Further research with larger and more diverse participant groups, longitudinal evaluation, comparative studies, and community co-design processes is required.

Overall, TechTahi may be viewed as an early proof of concept for how AI-enabled learning tools might be designed to support accessibility, learner agency, and cultural responsiveness within emerging STEM education contexts.

Author Contributions: Conceptualization, T.W. and M.N.; methodology, T.W.; software, M.N.; validation, T.W., M.N. and T.K.; formal analysis, M.V.; investigation, N.T.; resources, M.N.; data curation, N.T.; writing—original draft preparation, M.V.; writing—review and editing, T.W. and M.N.; visualization, M.V.; supervision, T.K.; project administration, T.S.-H.; funding acquisition, T.W., M.N. and T.S.-H. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The study was conducted in accordance with the approval rules, regulations, and guidelines of the Auckland University of Technology Ethics Committee (AUTEC) and was approved on the 28 November 2025 for three years until 28 November 2028 with Ethics Approval Number 25/368 for studies involving human participants.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Acknowledgments: The authors would like to thank the participants who generously shared their time and experiences for the survey activities. We also acknowledge the support and guidance of colleagues at Te Ipukarea Research Institute, Auckland University of Technology, whose insights contributed to the development and refinement of this work. Any views expressed are those of the authors.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

Abbreviations

The following abbreviations are used in this manuscript:

LLMs	Large Language Models
AI	Artificial Intelligence
IDE	Integrated Development Environments
API	Application Programming Interface

References

Airini, D. B., Curtis, E., Johnson, O., Luatua, F., O'Shea, M., Rakena, T. O., Reynolds, G., Sauni, P., Huirua, T. S., Tarawa, T. S., Savage, T., & Ulugia-Pua, M. (2010). *Success for all: Improving Māori and Pasifika student success in degree-level studies*. Teaching and learning research report for the New Zealand Council for Educational Research. New Zealand Council for Educational Research.

Bishop, R., Berryman, M., Cavanagh, T., & Teddy, L. (2009). Te Kotahitanga: Addressing educational disparities facing Māori students. *Teaching and Teacher Education*, *25*(5), 734–742. [CrossRef]

Chang, Y., Wang, X., Wang, J., Wu, Y., Yang, L., Zhu, K., Chen, H., Yi, X., Wang, C., Wang, Y., Ye, W., Zhang, Y., Chang, Y., Yu, P. S., Yang, Q., & Xie, X. (2024). A survey on evaluation of large language models. *ACM Transactions on Intelligent Systems and Technology*, *15*(3), 1–45. [CrossRef]

Chu, C., Abella, I., & Paurini, S. (2013). *What helps Māori and Pasifika students succeed in tertiary education?* Ako Aotearoa.

Coleman, C., & Luton, J. (2021). Familiar 'innovative' spaces: ECE, drama, physical education, and marae-based learning. *New Zealand Journal of Educational Studies*, *56*(Suppl. S1), 167–180. [CrossRef]

Curtis, E., Reid, P., & Jones, R. (2014). Decolonising the academy: Implications for Māori students and academics. *MAI Journal*, *3*(1), 40–52.

Curtis, E. T., Wikaire, E., Lualua-Aati, T., Kool, B., Nepia, W., Ruka, M., Honey, M., Kelly, F., & Poole, P. (2012). *Tātou Tātou; Success for all: Improving Māori student success*. Ako Aotearoa.

Durie, M. (2004, March 11). *Exploring the interface between science and Indigenous knowledge*. 5th APEC Research and Development Leaders Forum (pp. 2–21), Christchurch, New Zealand.

Geng, F., Shah, A., Li, H., Mulla, N., Swanson, S., Soosai Raj, G., Zingaro, D., & Porter, L. (2026). Exploring student-AI interactions in vibe coding. In *Proceedings of the 28th Australasian computing education conference* (pp. 45–54). ACM.

Hikuroa, D. (2017). Mātauranga Māori—The ūkaipō of knowledge in New Zealand. *Journal of the Royal Society of New Zealand*, *47*(1), 5–10. [CrossRef]

Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications*. Center for Curriculum Redesign.

Jones Brayboy, B. M., & Maughan, E. (2009). Indigenous knowledges and the story of the bean. *Harvard Educational Review*, *79*(1), 1–21. [CrossRef]

Kidman, J., & Chu, C. (2019). *"We're not treated like professionals": Māori and Pasifika scientists' experiences of academia* (Tech. Rep.). Royal Society Te Apārangi.

Kidman, J., Chu, C., Fernandez, S., & Abella, I. (2015). *Māori scholars and the university*. Ngā Pae o te Māramatanga.

Kukutai, T., & Taylor, J. (2016). *Indigenous data sovereignty: Toward an agenda*. ANU Press.

Lewis, D. (1994). *We, the navigators: The ancient art of landfinding in the Pacific* (2nd ed.). University of Hawai'i Press.

Li, L., & Wu, Z. (2022). How can no/low code platforms help end-users develop ml applications?—A systematic review. In *International conference on human-computer interaction* (pp. 338–356). Springer Nature.

Luckin, R. (2018). *Machine learning and human intelligence. The future of education for the 21st century*. UCL Institute of Education Press.

Macfarlane, A. H., Macfarlane, S., & Webber, M. (2015). *Sociocultural realities: Exploring new horizons*. HarperCollins.

McAllister, T., Naepi, S., Walker, L., Gillon, A., Clark, P., Lambert, E., McCambridge, A. B., Thoms, C., Housiaux, J., Ehau-Taumaunu, H., Waikauri Connell, C. J., Keenan, R., Thomas, K.-L., Maslen-Miller, A., Tupaea, M., Mauriohooho, K., Puli'uvea, C., Rapata, H., Akevai Nicholas, S., … Alipia, T. (2022). Seen but unheard: Navigating turbulent waters as Māori and Pacific postgraduate students in STEM. *Journal of the Royal Society of New Zealand*, *52*, 116–134. [CrossRef]

McAllister, T. G., Kokaua, J., Naepi, S., Kidman, J., & Theodore, R. (2020). Glass ceilings in New Zealand universities. *MAI Journal*, *9*(3), 272–285. [CrossRef]

McLachlan, J., & Kukutai, T. (2020). Data sovereignty and the governance of algorithmic bias. *Policy Quarterly*, *16*(1), 22–28.

Millar, R. (1996). Towards a science curriculum for public understanding. *School Science Review*, *77*(280), 7–18.

Mou, J., & Olsson, C. (2019). Racism, coloniality, and whiteness in New Zealand tertiary STEM education. *New Zealand Journal of Educational Studies*, *54*, 271–286.

Naepi, S. (2019). Why isn't my professor pasifika?: Snapshot of the academic workforce in New Zealand universities. *MAI Journal*, *8*, 219–234. [CrossRef]

Naepi, S., Wilson, E., Lagos, S., Manuela, S., McAllister, T. G., Kidman, J., Theodore, R., & Kokaua, J. (2021). Where are we now? Patterns of Māori and Pasifika enrolment in the natural and physical science and society and culture fields in Aotearoa New Zealand. *Higher Education Research & Development*, *40*(1), 90–103. [CrossRef]

Sinanaj, L., Ajdari, J., Hamiti, M., & Zenuni, X. (2022). A comparison between online compilers: A case study. In *2022 11th mediterranean conference on embedded computing (MECO)* (pp. 1–6). IEEE.

Stuckey, M., Hofstein, A., Mamlok-Naaman, R., & Eilks, I. (2013). The meaning of 'relevance' in science education and its implications for the science curriculum. *Studies in Science Education*, *49*(1), 1–34. [CrossRef]

Thaman, K. H. (2009). Towards cultural democracy in Pacific education. *International Journal for the Scholarship of Teaching and Learning*, *3*(2), 1–9.

Thomas, G., & Durant, J. (1987). Why Should We Promote the Public Understanding of Science? *Scientific Literacy Papers*, *Summer*, 1–14. Available online: https://ocw.mit.edu/courses/sts-014-principles-and-practice-of-science-communication-spring-2006/resources/durant_promote/ (accessed on 14 May 2026).

Worth, T. (2023, December). *Barriers to diversity in the aotearoa tech sector* (Tech. Rep.). Research Note. Research conducted by Te Whatu Hura | Toi Mai Research Advisor. Workforce Development Council.