

## **Cultivating Lifelong Learning Through Community-Embedded Making: A Case Study of Klongsan MAKE in Bangkok**

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### **Abstract**

Lifelong learning is a central goal of contemporary education systems, yet many initiatives remain fragmented across formal schooling, informal learning, and community engagement. This paper examines Klongsan MAKE, a community-embedded initiative in the Khlong San district of Bangkok, Thailand, positioning hands-on making as a continuous learning practice spanning schools, a district-based maker hub, and local community networks. The study builds on long-term observations indicating persistent gaps in making skills and experiential learning, followed by qualitative field research involving 11 schools in Khlong San and nearby districts, teachers, students, and community partners. Using participatory observation, in-depth interviews, and co-creation workshops, the research investigates how making functions as a lifelong learning mechanism by supporting continuity, learner agency, and integration across formal and informal learning contexts. Findings indicate that Klongsan MAKE strengthens conceptual understanding of STEAM and develops lifelong learning dispositions, including hands-on confidence (reduced fear and embarrassment in trying, failing, and iterating), curiosity, problem-solving, collaboration, and self-directed exploration. The initiative also reshapes educators' roles and activates community members as co-learners, mentors, and facilitators. The paper argues that lifelong learning is most effectively cultivated when making is embedded within place-based ecosystems rather than confined to classrooms or specialized facilities. Klongsan MAKE is proposed as a replicable, area-based model for developing lifelong learning ecosystems through accessible, community-driven making practices.

*Keywords:* lifelong learning, maker culture, steam education, hands-on learning, place-based learning ecosystems

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## Introduction

Lifelong learning has become a critical paradigm for navigating rapid technological, social, and economic change. Rather than viewing learning as limited to childhood or formal schooling, lifelong learning emphasizes continuity, adaptability, and the capacity to learn across the lifespan. International frameworks further emphasize that lifelong learning systems require cross-sector coordination, linking education, community development, and local governance, so that learning becomes embedded in everyday urban life rather than confined to institutions (UNESCO Institute for Lifelong Learning [UIL], 2015). Despite its prominence in policy discourse, however, lifelong learning often remains weakly connected to everyday educational practice, particularly in school-based systems.

In many contexts, formal education continues to prioritize curriculum coverage and assessment, leaving limited space for experiential learning that supports curiosity, agency, and self-directed learning. At the same time, informal learning environments, such as maker spaces, community workshops, and creative hubs, often operate separately from schools. This separation produces fragmented learning pathways and weak continuity between what learners do in school and what they learn through everyday life, an issue learning city approaches explicitly seek to address through inclusive access, community participation, and sustainable local learning ecosystems (UIL, 2015). Research on how learning works also suggests that sustained learning depends on motivation, appropriate practice opportunities, supportive learning climates, and learners' ability to connect prior knowledge with new experiences (Ambrose et al., 2010).

This paper examines *Klongsan MAKE* as a response to these challenges. Developed in the Khlong San district of Bangkok, the initiative reframes hands-on making not merely as a pedagogical tool for STEAM education, but as a *lifelong learning practice* connecting children, teachers, community members, and makers within a shared learning ecosystem. The initiative aligns with learning city logic by mobilizing local actors and spaces, schools, community settings, and maker hubs, as distributed learning infrastructure (UIL, 2015). The study addresses three research questions.

1. How can hands-on making support lifelong learning dispositions across age groups?
2. What ecosystem conditions enable continuity between formal and informal learning?
3. How can community-based making contribute to sustainable lifelong learning systems?

## Lifelong Learning and Community-Embedded Making

Lifelong learning is commonly defined as learning that occurs throughout life, across formal, non-formal, and informal settings. Central to lifelong learning are learner agency, motivation, and the ability to learn how to learn through habits of inquiry, reflection, and adaptation (UIL, 2015). Hands-on making aligns strongly with these aims because it requires exploration, iteration, and reflection, processes that mirror how individuals learn beyond formal schooling. Contemporary maker education research positions making as a participatory culture where learning emerges through designing, building, and sharing artifacts in socially supported environments (Halverson & Sheridan, 2014; Martin, 2015). This social dimension is consistent with sociocultural learning theory, which emphasizes how learning develops through interaction, mediation, and shared meaning-making with others (Vygotsky, 1978), and with communities of practice perspectives that frame learning as increasing participation in shared practices over time (Wenger, 1998).

In addition, practical learning design guidance suggests that effective learning environments should offer multiple modes of engagement, not only “classroom instruction,” but also activity-based learning, learning through collaborative work, and learning embedded in everyday contexts (Office of Knowledge Management and Development [OKMD] & TK Park, n.d.). Such variety is also reflected in research and practice examples that treat the city itself as a learning platform, where public space can be redesigned to support participation, play, and inclusive access (Vertiz, 2020), and where restorative approaches strengthen community relationships through shared civic life and local collaboration (Roe & McCay, 2023). These perspectives position making not as a temporary instructional strategy, but as a sustainable learning mode that can cultivate lifelong learning dispositions over time.

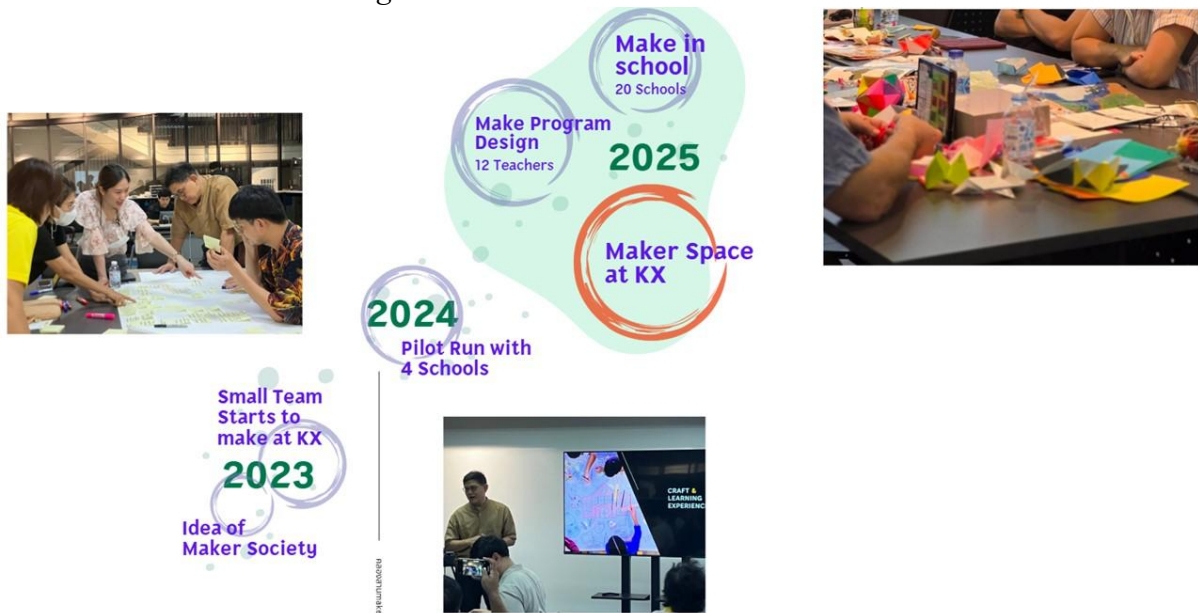
### **Research Context: Khlong San as a Lifelong Learning Space**

Khlong San is an urban district in Bangkok characterized by social diversity, creative economic activities, and strong community identities. Schools coexist alongside local crafts, small businesses, cultural institutions, and creative hubs. This mix creates fertile conditions for exploring lifelong learning beyond institutional boundaries and for situating making within everyday urban life, an approach consistent with creative city thinking that links learning, creativity, and local development (Thailand Creative & Design Center [TCDC], 2012).

Despite these assets, schools in the area face constraints common to dense urban settings, including limited space and facilities, rigid schedules, and pressure to meet curricular demands. Meanwhile, maker-oriented institutions such as FabLab Bangkok and the KX Building possess technical expertise and resources but may remain peripheral to everyday learning if not systematically connected to schools and communities. Klonsan MAKE emerged as an attempt to connect these domains by treating the district itself as a lifelong learning environment where learning can flow between schools, community spaces, maker facilities, and public events (UIL, 2015). Workshops were intentionally delivered across both school campuses and the KX/FabLab hub to enable learning continuity, shared access to tools, and repeated engagement beyond one-off classroom activities. In parallel, Klonsan MAKE was designed as a district-level support system, planning for a tool-lending mechanism, a reuse-material inventory, and gradual maker space expansion, to reduce barriers to participation and sustain making as an everyday lifelong learning practice.

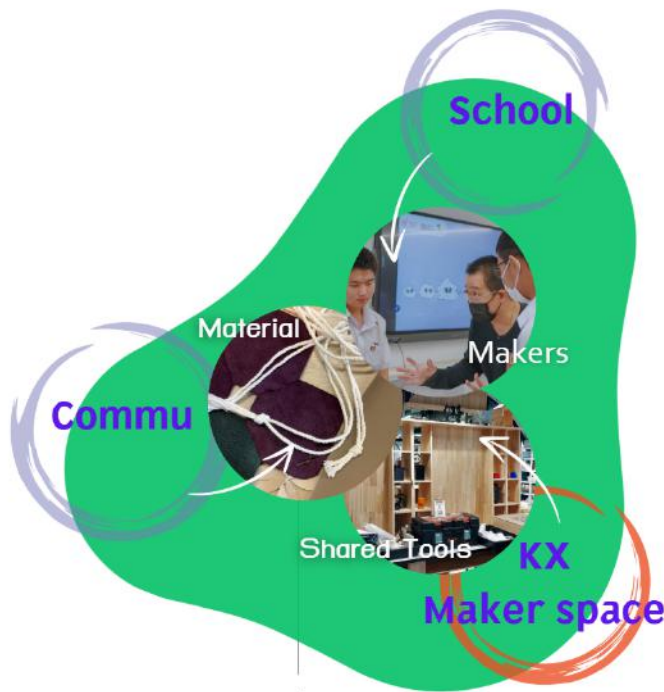
**Figure 1**

*Development Trajectory of Klongsan MAKE (2023–2025): From Early Prototyping at KX to Multi-school Pilot and Scaling Phase.*



**Figure 2**

*Methodology: Klongsan MAKE Ecosystem Model Linking Schools, Community Participation, and the KX/FabLab Hub Through Shared Tools, Accessible Materials, and Maker Mentorship.*



This study employed a qualitative, participatory research design focused on understanding learning processes over time. Rather than evaluating short-term outcomes, the research examined how learning dispositions and relationships developed across repeated interactions within the Klong San ecosystem.

Data was collected through participatory observation in eight school and community workshops conducted across two main settings: partner school campus and FabLab Bangkok (as part of the KX/FabLab hub). Each workshop was implemented through four types of making activities: (1) leathercraft, (2) paper-based making, (3) toy making, and (4) digital fabrication followed by hands-on assembly and refinement. Observations focused on learning behaviors and interaction patterns, including student initiative, collaboration dynamics, moments of difficulty (e.g., tool handling, material constraints, time pressure), and evidence of iteration (testing, revising, and improving outcomes). The research team maintained structured field notes and conducted brief post-activity reflections with facilitators and teachers to capture practical insights about what enabled or constrained implementation in each context.

In-depth interviews were conducted with 16 teachers and administrators, including both teachers who were already interested in maker-based activities and teachers who had little prior experience with this approach. Interviews emphasized school context, motivational drivers, and forms of resistance, including comfort levels in facilitating making activities, perceived curriculum fit, classroom management concerns, and factors affecting willingness to integrate making into routine learning. Two co-creation workshops—one focused on “What should we make?” and another on “Making in schools”—involved teachers, students, parents, and makers. These sessions supported the synthesis of practical integration strategies for in-class and out-of-class learning and were also used to validate and refine analytical themes emerging from interviews and observations.

The project involved 11 schools and over 200 participants, including public and private schools of different sizes. Activity formats were co-designed based on the characteristics and resources of each school, as well as teacher interests, to ensure feasible entry points for implementation. Formats included Scratch programming, freestyle making, craft-based making, and introductory digital fabrication. Many activities were intentionally designed to be open-ended and repeatable so teachers could adapt them to school constraints (space, time, budget, and locally available resources), while encouraging learners to continue experimenting beyond workshop sessions through transferable techniques and home- or peer-based activities outside class time.

### Figure 3

*Co-creation Workshop With Teachers and Students at the Maker Space (KX/FabLab Hub). Stakeholders Clustered Around Prototypes and Sticky-Note Insights to Map Needs, Constraints, and Feasible Making Activities.*



### Findings

Four key findings are presented to explain how Klongsan MAKE operated as a lifelong learning mechanism across settings.

## **Making as a Bridge Between Formal and Informal Learning**

Across sites, students consistently brought “outside-school knowledge” into making tasks such as familiarity with household tools, craft practices, online hobbies, and informal problem-solving learned from family members or community contexts. In conventional Thai schooling, these experiences often remain invisible because classroom success is typically aligned with correctness, memorization, and standardized outcomes. Klongsan MAKE changed the rules of participation by legitimizing informal knowledge as a learning resource. Students could begin with what they already knew (e.g., folding, cutting, basic assembly, digital play with Scratch) and then extend into new concepts through guided experimentation.

This bridging effect was especially visible when activities were framed as open-ended challenges rather than fixed exercises. For instance, Scratch programming tasks became more meaningful when students embedded local narratives, characters, or daily-life scenarios. Similarly, craft-based tasks (e.g., basic leathercraft, packaging design, or prototype-building with simple materials) enabled students to connect school concepts to objects they could hold, adjust, and improve, turning abstract STEAM ideas into personally relevant experiences. As a result, students demonstrated greater persistence and willingness to revise their work, particularly when they perceived their making as “real” rather than merely schoolwork.

## **Development of Lifelong Learning Dispositions**

A key pattern across activities was the emergence of *hands-on confidence*, defined here as reduced fear and embarrassment when attempting unfamiliar tasks, combined with an increased willingness to test ideas, accept failure, and iterate. Hands-on confidence did not appear automatically; it grew through repeated exposure to making routines: trying, seeing what happens, discussing outcomes, and refining. Importantly, this disposition was observed not only in students but also in teachers, many of whom initially expressed concern about unpredictable results, limited equipment, or time constraints. Over time, teachers became more comfortable with uncertainty and began to value “productive mistakes” as part of learning.

As hands-on confidence increased, other lifelong learning dispositions became more visible: curiosity (students asked more “what if” questions), reflection (students described why something failed), and agency (students proposed their own adjustments rather than waiting for instructions). Collaboration also became more purposeful. Rather than dividing labor mechanically, students negotiated ideas, compared prototypes, and helped troubleshoot one another’s work, behaviors that align with lifelong learning as participation in shared practice rather than isolated individual achievement.

## **Teachers and Community Members as Co-learners**

Klongsan MAKE functioned as a co-learning environment where the teacher’s role shifted from “expert deliverer” to “learning facilitator.” Teachers described facilitating inquiry by helping students articulate goals, identify constraints, and reflect on iterations. Community makers and practitioners acted as mentors who modeled making practices and encouraged learners to take initiative. This distributed expertise reduced dependence on any single instructor and made the model more sustainable, especially in schools where specialized STEAM staff or fabrication equipment is limited.

The KX/FabLab hub played a critical “bridging infrastructure” role in this process. Because tools, guidance, and space were available at the hub, schools could access resources without needing to immediately build full facilities. This lowered the threshold for participation and allowed teachers to focus on pedagogy and student engagement rather than technical setup alone.

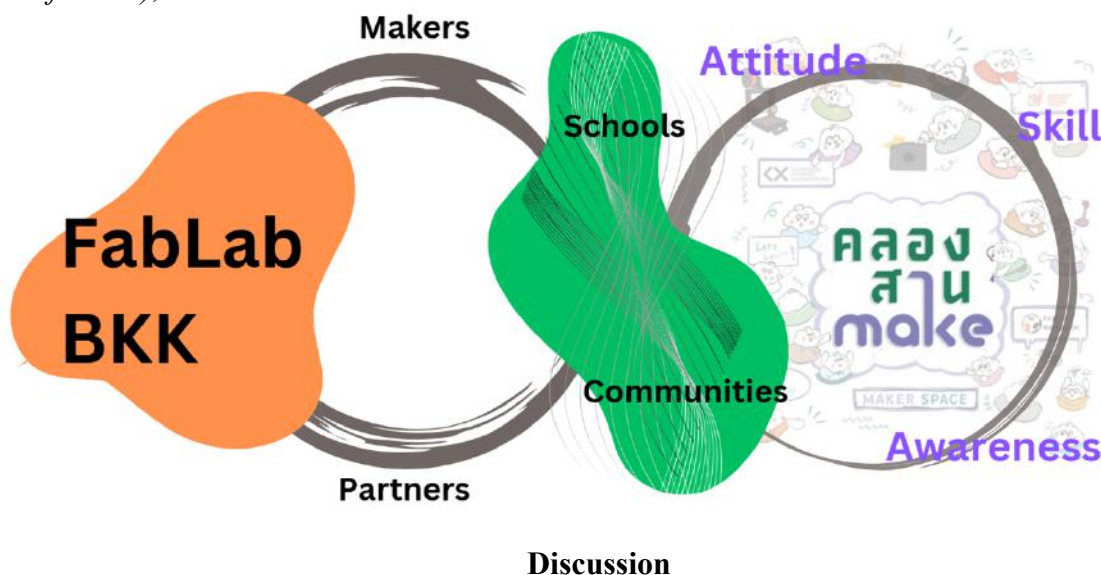
### Public Visibility and Learning Continuity

Public-facing moments, especially exhibitions and Bangkok Design Week-related activities, strengthened continuity by validating learners’ work beyond school boundaries. When students saw their prototypes and stories displayed publicly, making became socially meaningful, not merely instructional. This visibility also supported stakeholder alignment: schools, parents, local partners, and the maker hub shared a common narrative of Khlong San as a district where learning can be hands-on and community supported.

Finally, the project’s planned district-level supports, *tool lending, material reuse, and Maker Space expansion*, are not merely operational details; they represent ecosystem conditions that enable lifelong learning to persist over time. Access to shared tools and low-cost materials increases the likelihood that making can continue between formal sessions, be repeated across grades, and be adopted by additional schools. In this sense, Klongsan MAKE demonstrates that lifelong learning is sustained not only through pedagogy, but also through practical infrastructures that make learning-by-doing feasible in everyday school and community life.

#### Figure 4

*Outcome Pathway of Klongsan MAKE: How the KX/FabLab Hub and Partner Network Connect Makers With Schools and Communities to Develop Awareness, Attitudes (Hands-On Confidence), and Skills.*



The findings suggest that lifelong learning does not emerge from isolated programs but from ecosystems that support continuity, access, and social meaning. Klongsan MAKE succeeded by building linkages rather than relying on single-site facilities. This aligns with learning city guidance emphasizing coordinated local ecosystems that connect formal, non-formal, and informal learning opportunities and widen participation across the lifespan (UIL, 2015).

First, Klongsan MAKE reduced barriers between learning contexts through shared resource management, including access to tools and learning resources across schools and the KX/FabLab hub. Interviews indicated that a lack of tools and equipment is one of the most common obstacles when schools attempt to encourage students to begin making, especially in the early stages. Teachers explained that students are often more motivated when they can explore tools and devices, because tools create excitement, novelty, and a sense of “real making,” rather than relying only on manual activities such as paper folding. This pattern is consistent with research-based learning principles showing that motivation, practice opportunities, and supportive conditions strongly shape persistence and learning outcomes (Ambrose et al., 2010). In this sense, shared access to tools functions not merely as logistical support but also as a motivational trigger that helps learners initiate making behaviors and sustain engagement long enough for learning dispositions to develop.

### Figure 5

*In-School Making Session: Teachers Facilitate Tool Use and Troubleshooting to Sustain Learning Continuity Beyond the Maker Hub.*



Second, Klongsan MAKE valued everyday knowledge alongside practice-based value. It positioned making not only as a pedagogical strategy but also as a meaningful activity connected to community life and the possibility of economic extension through creativity and production. This matters in contexts where formal curricula can unintentionally frame learning as specialized, difficult, or disconnected from everyday life. Klongsan MAKE worked against this separation by encouraging teachers and students to observe and appreciate making in all contexts and by treating everyday making as legitimate learning. This emphasis on varied learning modes, learning by doing, learning through collaborative activity, and learning embedded in daily contexts, echoes the activity-based learning framing illustrated in your guideline materials (OKMD & TK Park, n.d.) and supports learning city objectives around participation, inclusion, and lifelong learning culture (UIL, 2015).

A distinctive contribution of the initiative is its emphasis on starting from what already exists in community life. By connecting learning to familiar practices, household tools and objects, repair and modification of everyday items, informal production, and local crafts, students gained more opportunities to learn through observation and questioning. Instead of following a linear pathway from theory to application (as typical in classroom instruction), learners began from real situations and then asked what principles or theories explain how something works. This “experience-to-theory” movement supported deeper conceptual understanding and made learning feel relevant, achievable, and continuous, an essential condition for lifelong learning systems (UIL, 2015).

**Figure 6**

*Student-Made Prototypes From Hands-On Workshops: Simple, Low-Cost Making Activities That Strengthen Confidence and Craftsmanship.*



Third, the initiative created repeated, low-cost opportunities for engagement, emphasizing easy entry, affordability, and continuity over time. This mechanism matters because it demonstrates that hands-on learning can be low-cost and does not need to be equated with invention, professional design, or high-end production. By separating making from “perfect products” and luxury materials, Klongsan MAKE reduced pressure around aesthetics, material quality, and polished outcomes. Instead, it highlighted the educational value of making itself, trying, adjusting, and learning through the process, which makes participation more inclusive and sustainable across different school contexts (Martin, 2015). These features also reflect broader learning city priorities: lowering participation barriers, strengthening community learning opportunities, and building local learning infrastructure (UIL, 2015).

Together, these ecosystem features align with lifelong learning principles by supporting repeated participation, learner agency, and learning across settings. Making practices become more sustainable when learning is socially supported, through peer collaboration, mentorship, and shared norms, rather than treated as an individual task (Halverson & Sheridan, 2014; Wenger, 1998). In this study, hands-on confidence emerged as a particularly important mechanism: when learners felt safe to try, fail, and iterate, they became more willing to pursue self-directed learning beyond the immediate activity. This matters because time-bound lessons and curriculum expectations often create pressure for “correct” outputs, which can reduce experimentation and weaken confidence (Ambrose et al., 2010). Similarly, when teachers experienced facilitation and co-learning roles, they were more likely to reframe learning as an ongoing process rather than a fixed curriculum sequence, consistent with sociocultural views of learning as mediated participation (Vygotsky, 1978).

Finally, integrating public-facing activities strengthened continuity by validating learning in wider community contexts. Public space can function as “learning infrastructure” when it is intentionally designed for participation and accessibility, including playful, child-centered engagement (Vertiz, 2020). In parallel, restorative city perspectives emphasize rebuilding social relationships and civic life through shared community processes and environments, which resonates with Klongsan MAKE’s emphasis on collaboration and community-embedded practice (Roe & McCay, 2023). In this regard, FabLab Bangkok and public learning spaces can serve as bridging infrastructure between in-school and out-of-school learning, expanding learning space, building a making-based learning foundation, and cultivating a culture that respects both one’s own making and the making of others, rather than valuing only “perfect” final products (Halverson & Sheridan, 2014; UIL, 2015).

## Conclusion

This paper examined Klongsan MAKE as a case of cultivating lifelong learning through community-embedded making in the Khlong San district of Bangkok. The study found that making practices strengthened STEAM understanding through tangible, hands-on experiences where learners could test ideas, observe outcomes, and learn through iteration. Alongside conceptual learning, the initiative developed lifelong learning dispositions, hands-on confidence, curiosity, collaboration, and self-directed exploration, that support learning beyond classroom boundaries.

Klongsan MAKE also reconfigured educator roles from content delivery to facilitation and activated community members as co-learners and mentors, reinforcing learning as a shared social practice. The paper argues that lifelong learning is most effectively cultivated when making is embedded within place-based ecosystems rather than confined to classrooms or specialized facilities. As a replicable model, Klongsan MAKE highlights the value of district-based shared infrastructure, tool lending, material reuse, and hub-and-school programming, to reduce barriers to participation and sustain learning continuity over time.

Future work may strengthen the model through deeper longitudinal tracking of learner trajectories and by examining how district-level maker ecosystems can connect with wider lifelong learning policy frameworks. Further development may also expand community, civil society, and private-sector participation to strengthen social norms that value continuous hands-on learning, supporting a sustainable making culture for children, youth, and the broader community.

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## Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The authors declare that ChatGPT (OpenAI), an AI-assisted writing tool, was used to support English language refinement and structural editing of the manuscript. The use was limited to improving clarity, coherence, and academic phrasing. The ideas, design, procedures, findings, analyses, and discussion are based on the authors' research activities and project documentation, and the authors reviewed and finalized all content.

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