UNIHUBS Project

Co-funded by the European Union

KNUST Workshop

Evaluation Report

2025

Pedagogical Innovations for Teaching and Learning in HEIs: Teaching AI Coding (Vibe Coding) Capacity Building

By:

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Executive Summary

A recent capacity-building workshop equipped 25 higher education lecturers with a cutting-edge pedagogical framework to transform their classrooms by integrating AI and natural language coding (Vibe coding). The one-day intensive workshop, "Pedagogical Innovations for Teaching and Learning in Higher Education Institutions: Teaching AI Coding/ Vibe Coding," was held on November 5, 2025, at the Prempeh II Library ICT Lab, KNUST. As part of the UNIHUBS project's capacity-building phase, it aimed to empower lecturers from KNUST, the University of Cape Coast (UCC), and KNUST-affiliated Colleges of Education with innovative strategies for integrating artificial intelligence (AI) and vibe coding (natural language-based AI coding) into their teaching practice. Facilitated by a team of experts led by Prof. Harry Barton Essel, the workshop introduced a new pedagogical frame that combines the "GamiFllipped" approach, a hybrid of gamification and flipped learning with the PICRAT model. This model evaluates a student's interaction with technology as Passive, Interactive, or Creative, and the facilitator's use as Replacement, Amplification, or Transformation. The integrated framework guides facilitators in shifting students from passive receivers to active creators, while moving their own use of technology from simple substitution to true transformation of learning experiences. Over 8 hours, participants engaged in a blend of presentations, hands-on activities, and collaborative discussions, using key EdTech tools to model innovation. The tools included Google NotebookLM, an AI-driven "virtual research assistant; Wooclap, an interactive platform for real-time engagement; Wayground, a suite of AI-powered content creation tools; and Canvas LMS for organising materials. A major highlight was a practical Vibe coding session in which participants used Google AI Studio to develop functional educational apps, such as AI-driven tutoring bots and interactive quizzes, leveraging only natural language prompts. A peer voting session added a fun, gamified layer, with the top three creations showcased and discussed.

Introduction and Background

UNIHUBS is a collaborative initiative aimed at enhancing the capacity of higher education institutions (HEIs) in Africa by integrating innovative educational approaches that meet the needs of the digital innovation labour market. In alignment with the EU-AU Innovation Agenda, the project focuses on modernising curricula and strengthening links between academia and industry through training workshops and co-creation of educational materials. As part of this capacity-building effort, a pedagogical innovation workshop was organised at KNUST's Prempeh II Library ICT Lab on November 5, 2025. The workshop specifically targeted the improvement of teaching strategies with innovative approaches for fostering entrepreneurial intentions among university students, essentially, encouraging students to develop the mindset and desire to initiate digital entrepreneurial ventures. University lecturers play a pivotal role in this, so the workshop was designed to equip participants (lecturers) with new pedagogical tools and mindsets to inspire entrepreneurship in the classroom.

A conceptual framework (See figure 1) was introduced to underpin the workshop's content, highlighting three key components believed to drive Digital Entrepreneurial Intention in education: Generative AI (GenAI) Literacy, Design Thinking, and Innovative Digital Attitude. This framework, depicted in the figure below, posits that by becoming literate in generative AI technologies and adopting design thinking methodologies, educators can cultivate an innovative attitude toward digital tools and pedagogies, an attitude which in turn enhances their ability to nurture entrepreneurial intentions in students. Recent research supports these linkages; thus, an innovative digital attitude in educators has been shown to positively influence digital entrepreneurial intentions (Lopes et al., 2025), and the integration of generative AI in education can significantly boost students' entrepreneurial self-efficacy and intention (Xie & Wang, 2025). Likewise, using design thinking in teaching fosters creative problem-solving and experiential learning, which are crucial for entrepreneurship education (Lopes et al., 2025).

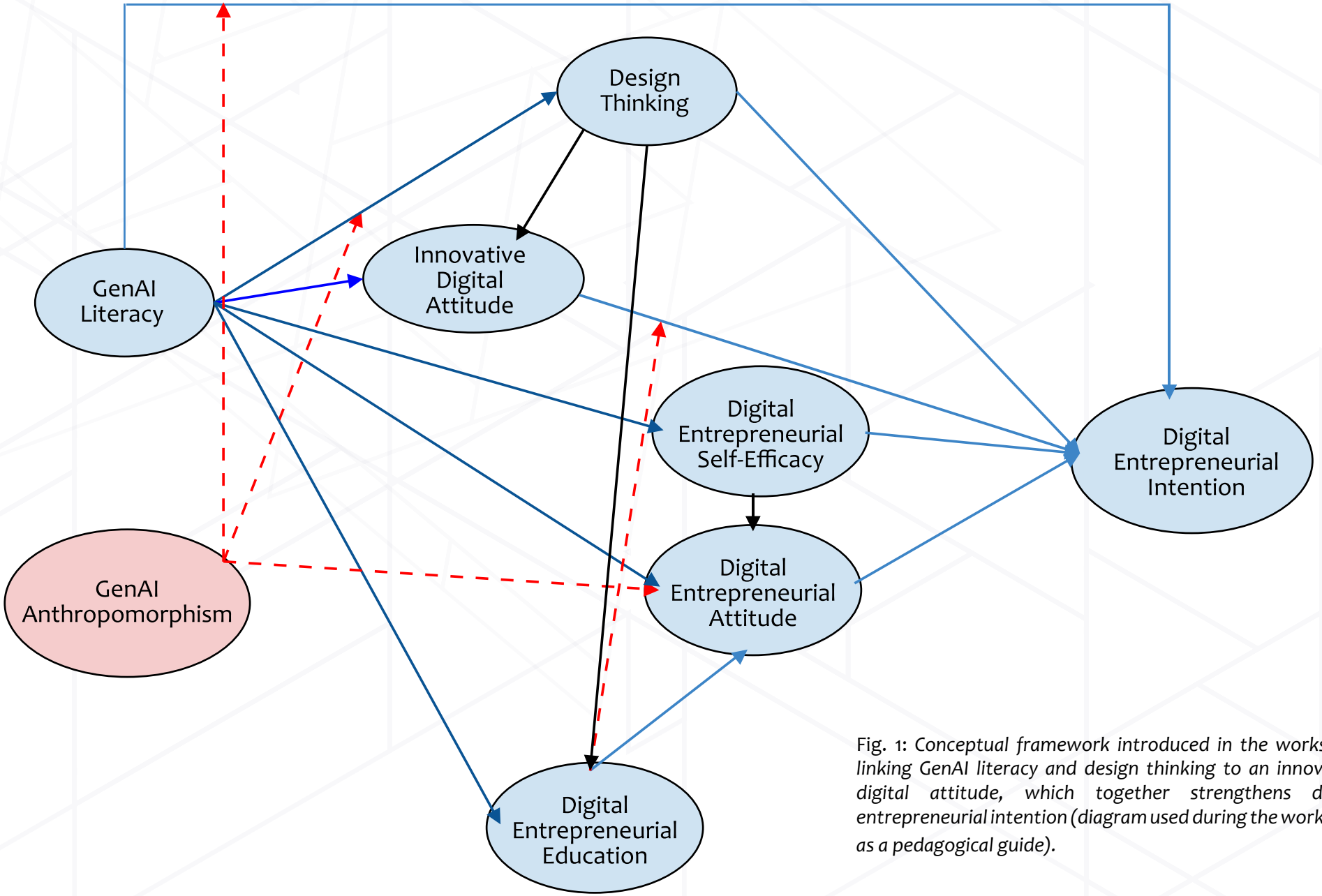
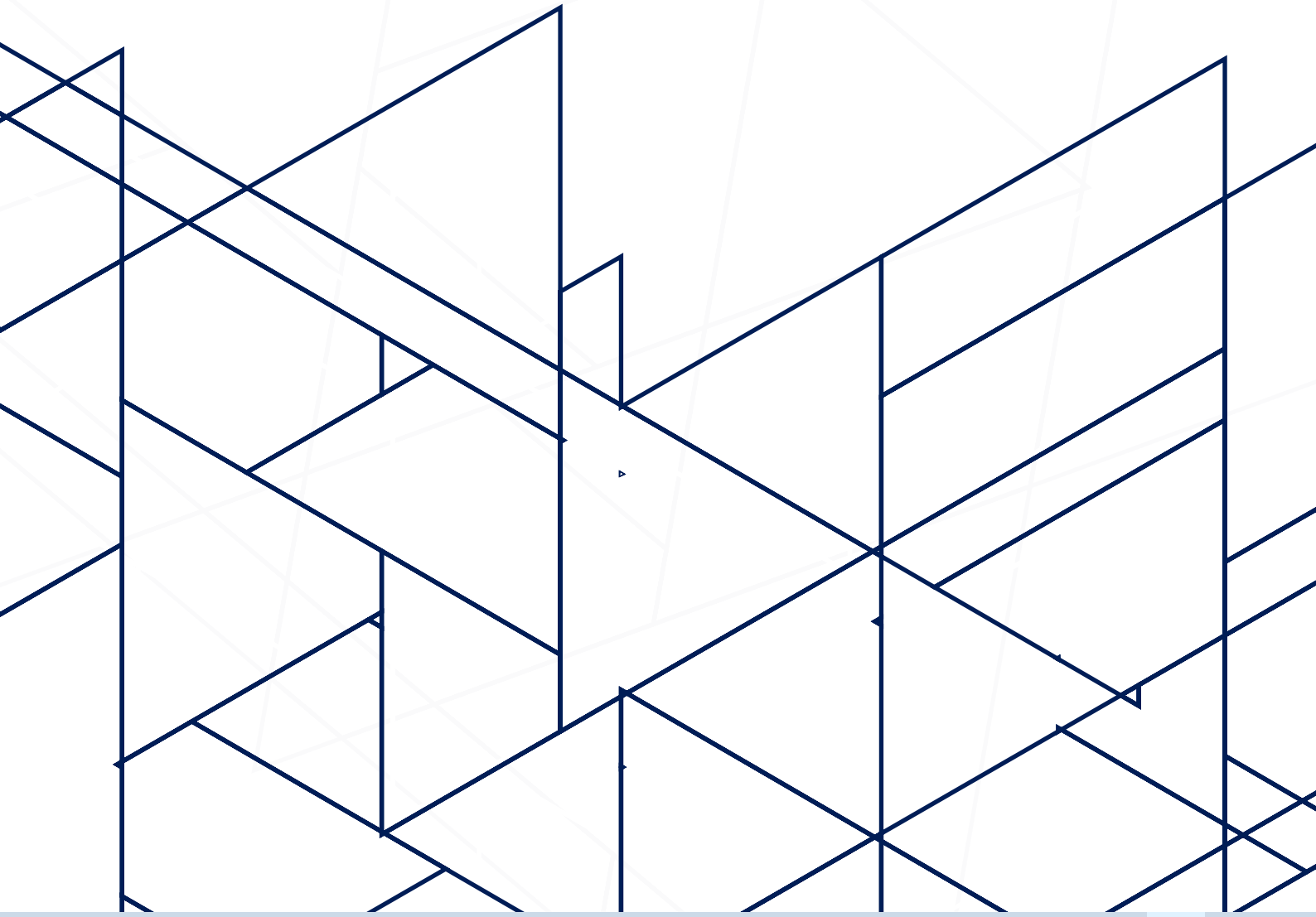


Fig. 1: *Conceptual framework introduced in the workshop, linking GenAI literacy and design thinking to an innovative digital attitude, which together strengthens digital entrepreneurial intention (diagram used during the workshop as a pedagogical guide).*

By grounding the workshop in this framework, participants could see the why behind each activity – understanding, for example, that learning to use AI tools (GenAI Literacy) and employing human-centred design approaches (Design Thinking) were not just tech fads but strategic means to cultivate a forward-thinking mindset (Innovative Digital Attitude) conducive to entrepreneurship. This foundation set a clear rationale for the workshop's theme, *"Pedagogical Innovations for Teaching and Learning in HEIs: Teaching AI Coding / Vibe Coding."* The term "Vibe Coding" refers to an approach of building applications by conversing with AI coding assistants (an innovative paradigm for teaching coding), illustrating how generative AI can lower barriers to prototyping ideas.



Objectives of the Workshop

The workshop was organised with several clear objectives in mind, aligned with the UNIHUBS project goals and the needs of the participating institutions. It aimed to show that through GenAI literacy, design thinking activities, and an innovative mindset, participants can effectively spark students' interest in entrepreneurship and build their confidence to initiate digital enterprises. Furthermore, the workshop activities ensured that participants not only learned theory but also practised creating something tangible (e.g., an educational application using AI); thus, each participant leaves with a prototype they personally worked on, illustrating the innovative pedagogy in action. To achieve these goals, the workshop was guided by the following:

1. To introduce innovative teaching frameworks and strategies to enhance entrepreneurship education, emphasising active, technology-rich methods that foster student engagement and creativity.
2. To train participants in a hybrid GamiFlipped model, a fusion of gamification and flipped-classroom pedagogy, to make participants more interactive and student-centred.
3. To familiarise participants with digital pedagogic tools (AI research assistants, real-time polling, gamified quizzes, and LMS) to support collaborative learning and assessment.
4. To develop exemplar teaching applications by having participants collaborate on AI-based prototypes (using Google AI Studio) that demonstrate the new approaches.
5. To collect participant feedback and reflections on the learning experience to inform continuous improvement of HEI training initiatives.

These objectives were communicated at the outset and revisited throughout the workshop. They provided a roadmap for the day's activities, ensuring that every session, from discussions of theory to hands-on coding, was purposefully directed toward the overarching goal of enriching entrepreneurship education in higher institutions.

Participant Demographics and Facilitation Team

The workshop was hosted at the Prempeh II Library ICT Lab at KNUST, a venue chosen to provide a modern technological environment that, in theory, could mitigate some of the pervasive technical challenges faced in the region. A total of 25 participants from selected Ghanaian higher education institutions took part in the workshop. The composition of participants is shown in Table 1.

Table 1: Participant Distribution by Institution Type

Institution Type	Institution	Number of Lecturers	Strategic Rationale
University	Kwame Nkrumah University of Science and Technology (KNUST)	10	These were faculty members from KNUST, representing multiple disciplines (with a concentration likely in areas such as computer science, business/entrepreneurship, or teacher education, given the workshop theme). As KNUST was the host institution, it had the largest group of participants.
University	University of Cape Coast (UCC)	5	Their inclusion fostered inter-university collaboration and shared learning between two of Ghana's major universities.
Teacher Training Colleges	KNUST-affiliated Colleges of Education	10	Their presence ensured that the knowledge from the workshop could cascade to teacher trainees, potentially amplifying the impact across many schools. It also signaled an effort to align teacher education with the latest pedagogical innovations being adopted at the university level.
Total		**25**	

The instruction was expertly handled by Prof. Harry Barton Essel (Lead Facilitator), Dr. Mrs. Akosua Tachie-Menson (Training Coordinator/Online Facilitator), and Esi Eduafua Johnson (Assistant Training Coordinator/Online Facilitator).

Methodology and Pedagogical Design

Workshop Instructional Strategy: GamiFlipped Hybrid Model

The workshop employed an interactive and participant-centred methodology, blending flipped learning, gamification, collaborative projects, and reflection. The GamiFlipped approach, a strategic fusion of Gamification and Flipped Learning, was chosen to deliver the complex material effectively. Gamification involves integrating game elements such as point systems, leaderboards, and badges into conventional learning activities to increase engagement and sustained motivation (Marinensi et al., 2024; Al-Azawi et al., 2016). The Flipped Learning model requires foundational content (such as concepts of GenAI literacy and the PICRAT model) to be reviewed independently, maximising synchronous classroom time for high-value, active application and creation (Ng & Lo, 2022). The use of this hybrid model was essential in the context of teaching complex, high-stakes topics such as AI coding (Vibe Coding) and pedagogical innovation. GamiFlipped promotes learner engagement and provides supportive feedback via game design elements. Furthermore, the flipped component ensures that hands-on time in the ICT Lab is not spent on passive knowledge absorption but is dedicated entirely to applied creation (Vibe Coding), which is critical for achieving the high-level goals defined by the technology integration model.

Technological Integration Protocol: Alignment with the PICRAT Classification

All learning activities were mapped to the PICRAT model of technology integration. Facilitators explained PICRAT's two axes:

1. Student-Technology Relationship (Passive, Interactive, Creative).
2. Teacher-Technology Impact (Replacement, Amplification, Transformation). During hands-on sessions, participants categorised each activity using PICRAT; for instance, an interactive live poll on Wooclap (students actively responding) would amplify the traditional lecture format. This reflective exercise helped participants design activities aimed at the higher "Creative/ Transformative" quadrant, where participants create artefacts (e.g. coding an app) and facilitators radically enhance pedagogy.

Implementation, Digital Tools, and Activities

Generative AI Tools leveraged

The success of the workshop depended on the strategic use of powerful, yet accessible, GenAI tools. These included:

Google AI Studio

This cloud-based suite enabled teams to build AI apps with no code/ low code. After logging in, participants could write prompts and deploy AI chatbots or image generators as part of their project. For example, a participant created a prototype AI tutor that answers questions related to entrepreneurship. The session demonstrated how participants harnessed state-of-the-art AI to create learning tools, aligning with current trends in digital education.

Google NotebookLM

An AI "thinking partner" by Google that helps summarise and organise information. Participants leveraged NotebookLM to research pedagogical concepts and extract insights for their projects.

Enhancing Engagement, Assessment, and Management Tools

In the workshop, the facilitators also employed integrated digital tools to manage the GamiFlipped approach and ensure engagement. Table 2 illustrates the integration of digital tools and pedagogical alignment.

Wayground (Quizizz)

This platform supports gamified quizzes and lessons. Teams used it to play digital quiz games that reinforced workshop content. Its competitive elements (points, badges, leaderboards) turned review questions into friendly contests, demonstrating how such games make learning fun.

Wooclap

A live polling and engagement platform. Participants answered multiple-choice, open-ended, and word-cloud questions via Wooclap on their devices. Wooclap's real-time interactivity and variety of question types (quizzes, polls, surveys, etc.) helped maintain attention and provided instant feedback. For example, participants polled each other on teaching preferences, instantly seeing aggregated results on the screen.

Canvas LMS (Teachers)

The workshop employed Canvas to host course materials. Slides, reading lists, and assignments were shared via Canvas; participants also practised setting up quizzes there. Canvas is a widely used Learning Management System that

> *"makes it easy for instructors to manage digital materials distribution, assignments, communications, grading, and other aspects of instruction."*

Using Canvas familiarised participants with an integrated platform for organising courses and delivering online content.

Table 2: Digital Tool Integration and Pedagogical Alignment

Digital Tool	Primary Function	GamiFlipped Component Supported	Targeted PICRAT Alignment	Significance for Entrepreneurship Education
Google AI Studio (Vibe Coding)	Rapid Prototyping / Application Design	Active Application	Creative / Transformative (CT)	Low-barrier creation of market-ready entrepreneurial solutions.
Google NotebookLM	Content Curation / Research Scaffolding	Flipped Preparation	Interactive / Amplification (IA)	Facilitates rapid research needed for market validation and project planning.
Wooclap / Wayground	Real-time Assessment / Feedback	Gamification/ Engagement	Interactive / Replacement (IR) to Interactive / Amplification (IA)	Monitors comprehension of complex AI concepts and provides motivational feedback.
Canvas for Teachers LMS	Blended Learning Management	Structure/Tracking	Replacement / Amplification (RA)	Ensures sustainable, centralised delivery of Flipped Learning content post-workshop.

Detailed activity sequence

The workshop day was organised into thematic sessions, each building on the previous:

Opening and Framework Presentation

The lead facilitator began with a concise presentation of the conceptual framework linking GenAI literacy, design thinking, innovative attitude, and entrepreneurial intention. This set the stage and gave participants a theoretical model to keep in mind. Rather than a passive enagagement, this segment was made interactive by posing reflective questions to the participants (e.g., "How do you think AI tools could change your students' willingness to start a business?") and collecting responses via Wooclap word clouds. This ensured even the introduction was participatory. The framework was referred to throughout the day as a guiding reference.

Technology Integration and PICRAT Discussion:

Next, the lead facilitator introduced the PICRAT model to frame how technology would be used in the workshop activities. Participants learned about evaluating an activity based on student engagement (Passive, Interactive, Creative) and the teacher's use of technology (Replacement, Amplification, Transformation). With examples, the participants discussed how a simple activity (like watching a video) could be transformed into a creative, transformative task with the right approach. This discussion prepared them to be thoughtful when designing their own learning activities later, ensuring alignment with best practices in Edtech integration.

Hands-on Tool Rotations

The workshop was based on experiential learning through tool-based stations. Participants rotated (in small groups/world cafe) through different facilitated stations, each focused on one of the core tools and strategies.

Station 1:

NotebookLM Integration - participants were tasked with exploring how an AI-powered notebook could assist in lesson planning or content summarisation. For example, they uploaded a course syllabus or article and asked the AI to generate quiz questions or summaries.

Station 2:

Interactive Engagement with Wooclap and Wayground - Here, participants took on the role of students to experience various interactive activities, such as polls, word clouds, and live Q&A, in a classroom setting.

Station 3:

AI Coding (Vibe Coding) Demo - The lead facilitator demonstrated "vibe coding" essentially using a Google AI Studio to build a simple web app. The facilitator showed how to create a basic idea-sharing website by prompting an AI coding assistant step-by-step.

Capstone Project – AI Studio Hackathon

The afternoon was dedicated to a hands-on project where each participant applied what they learned to develop an educational application prototype using Google AI Studio. The task was framed as a mini-hackathon:

> *"Build a digital tool or app that could enhance teaching and learning in your context, leveraging generative AI."*

Examples of projects participants embarked on included:

1. A Chatbot Tutor for an entrepreneurship course that could answer students' FAQs about starting a business.
2. An AI-driven Quiz Generator that teachers can use to produce practice questions from any textbook chapter automatically.
3. A Personalised Career Coach app for students, which asks about their interests and suggests entrepreneurship pathways or resources.
4. An Interactive Simulation (text-based) of launching a startup, where students make decisions and the AI simulates outcomes (thus teaching entrepreneurial concepts experientially).

Participants had roughly 2 hours for the development. They first outlined their concepts leveraging design thinking (empathising with student needs, defining the problem, ideating a solution). Then they used Google AI Studio's interface to implement a prototype. Facilitators circulated to assist with technical issues and prompt the educators to apply PICRAT thinking.

Project Showcase and Peer Voting

Upon completion, each participant gave a brief 3-minute demo of their prototype to the whole group. In the spirit of gamification, a peer voting was conducted to select the top three projects. Using Wooclap or an online poll, participants rated each project on criteria like innovativeness, educational value, and feasibility. The votes were tallied instantly. The top 3 projects were selected, and the developers of these winning prototypes were invited to briefly discuss how they would implement and refine their idea.

Reflection and Closing Discussion

The workshop concluded with a structured reflection session. Participants were asked to individually note down key takeaways, any remaining questions, and their plans for applying the new strategies. Then, through a facilitated discussion (both in-person and via an online Canvas discussion board for those who preferred writing), they shared these reflections. Some guiding questions used were:

> *"What was the most significant insight you gained today?", "What challenges do you anticipate in applying these methods, and how might you overcome them?",*

and

> *"How do you envision your teaching changing as a result of this workshop?"*

The group's responses were captured and later summarised by the facilitators as part of the workshop report. Finally, Prof. Essel tied the discussion back to the conceptual framework, underscoring how the day's activities exemplified GenAI literacy (through AI Studio and NotebookLM use), design thinking (through the project planning), and innovative attitude (through everyone's willingness to try new tools), all contributing toward the goal of nurturing digital entrepreneurship in students.

Outcomes and Examplar Project

The workshop yielded several concrete outcomes and exemplar projects that illustrated the potential impact of the introduced pedagogical innovations. These outcomes can be categorised into learning outcomes for the participants, tangible project outputs, and broader impacts on teaching practice.

Enhanced Educator Skills and Mindsets

All participants demonstrated a clear improvement in their understanding and skill by the end of the workshop. For instance, in a comparative self-assessment (done via a Wooclap survey) at the start and end of the day, participants rated their confidence in leveraging AI tools for teaching significantly higher post-workshop. Many noted that they had moved from scepticism or uncertainty about AI to concrete ideas on how to apply it. Likewise, their approach to lesson design shifted. Through the design thinking exercises, they practised focusing on student needs and interactivity, rather than starting from content alone. This mindset change (cultivating an innovative digital attitude) was perhaps the most important outcome, as it means participants are now more likely to experiment and innovate in their teaching.

Exemplar AI-Powered Educational Applications

A highlight of the workshop was the suite of prototype applications developed by the participants leveraging Google AI Studio. Every participant managed to create a working prototype by the conclusion. Some notable exemplars included:

1. **"Entrepreneurship FAQ Chatbot":** Developed by participant A, this chatbot can answer common questions students ask in an introductory entrepreneurship course (e.g., "How do I register a startup in Ghana?"). It draws on a knowledge base provided by the participant and uses a generative AI model (Gemini) to formulate responses. The chatbot can be embedded in the course's Canvas page (via link) to assist provide 24/7 support to students. This project was voted one of the top three, as peers felt it could immediately add value by supplementing teacher availability and encouraging student curiosity.

2. **"Startup Simulation Game":** Developed by Participant, this is another top-voted project was is an interactive text-based simulation where students make a series of decisions in launching a virtual startup (e.g., choosing a product idea, budgeting, marketing strategy). Depending on their inputs, the AI narrates consequences and new challenges, effectively creating a choose-your-own-adventure style game on business development. This prototype, though simple in its initial form, showed the power of combining gamification with scenario-based learning. It has potential as a class exercise or assignment to let students practice entrepreneurial decision-making in a safe environment.

3. **"AI Business Idea Evaluator":** Created by Participant E, this tool takes a short description of a student's business idea and generates an analysis highlighting strengths, potential challenges, and suggestions for improvement. It uses prompt-based analysis (via AI Studio's large language model) to simulate what an expert mentor might advise. The idea behind this application is to give students quick feedback on their entrepreneurial

ideas, thereby motivating them to refine their thinking. Participants were excited about this prototype because it can make mentoring scalable in large classes.

4. **"Adaptive Quiz Generator for Course Revision":** Participant C built a prototype that allows an instructor to input a chapter or lecture notes, and the AI generates a set of quiz questions (with answers) covering the key points. The quiz can be output in a format ready to import into Canvas quizzes. This addresses the common challenge of creating fresh practice questions and could be a huge time-saver for educators. It was noted that such a tool also benefits students by providing endless variations of practice questions, thus reinforcing learning.

These exemplars were presented and discussed, providing all participants with a portfolio of ideas to consider and reflect upon. Importantly, they demonstrated how GenAI can be harnessed creatively for educational purposes, something that was previously abstract before the workshop but became very concrete through these projects. Each project was tied back to the framework: They required GenAI literacy to build educational apps where participants had to learn how to prompt and manage AI output; Many of the participant employed design thinking before building their solution; They certainly reflected an innovative attitude considering the fact that lecturers, in one day, went from little knowledge of these tools to producing prototypes is evidence of their willingness to innovate and "learn by doing."

Contributions to UNIHUBS Goals

The outputs of this workshop directly feed into the larger UNIHUBS project outcomes. The conceptual framework itself, now piloted in a training context, might be refined and documented as part of the project's intellectual contributions. Additionally, the exemplary projects could be further developed (with support from UNIHUBS) into fully functional tools or case studies. For example, the Entrepreneurship FAQ Chatbot could be expanded with more data and officially deployed for student use, turning a workshop prototype into a pilot project for the university. Such developments underscore the capacity-building success as participants are now not just consumers of knowledge but creators of educational innovation.

Immediate Action Plans

Each participant left with an action plan, a short-term change or a new activity they would implement in their teaching. Some of these included, introducing at least one Wooclap activity in the first week of their next class to increase interactivity; running a flipped classroom experiment by recording a lecture and using class time for discussions; organising a student hackathon or project similar to what they experienced, perhaps on a smaller scale by having students leverage an AI tool to develop a simple business plan as part of their coursework; and sharing what they learned with colleagues in their department.

Participant Reflections

During the concluding reflection session, participants provided insightful feedback on their experiences, learning, and future intentions. The reflections were gathered through written comments on the Canvas LMS discussion forum. Several common themes and notable points emerged:

Empowerment and Confidence

Many participants expressed that the workshop was "eye-opening" and gave them newfound confidence to experiment with technology in their teaching. One participant remarked (paraphrasing),

> *"I always thought AI was too complex for me to use in class, but now I've not only used it, but I've built something with it. I feel empowered to keep exploring."*

This sentiment of overcoming initial apprehension and gaining confidence was widely shared. The workshop's supportive, hands-on approach was credited with reducing fear of the unknown. Participants realised that they could handle them and saw the value, which was a big motivational boost, by actually trying the tools in a guided environment.

Value of Design Thinking and Active Learning

Participants noted that the design thinking exercises and the emphasis on active learning strategies (like PICRAT and GamiFlipped) made them rethink their teaching approach. A participant reflected that she had been focusing too much on covering content, but this workshop reminded her of the importance of engaging students in "learning by doing". Participants appreciated how the workshop modelled those strategies, for example, the way the facilitators flipped the classroom for them and used gamification.

> *"I can now personally attest to the effectiveness of GamiFlipped and PICRAT methods, and I believe it would help me to convince colleagues to support such pedagogical changes."*

Connections to Entrepreneurial Teaching

There was consensus that the workshop successfully connected the dots between pedagogy and entrepreneurial intention. Participants who taught entrepreneurship and other business courses found the content immediately relevant, as well as those from other disciplines (like computer science or education). A participant reflected (paraphrasing),

> *"Entrepreneurial intention isn't only for business students, but it's about creative thinking and initiative, which I can foster even in a general education course."*

This demonstrates a broader internalisation of the workshop's theme that an innovative mindset and entrepreneurial intention can be infused across subjects.

Challenges Acknowledged

In their reflections, participants also candidly discussed anticipated challenges of implementing what they had learned. A common concern was resource constraints and infrastructure, for example, ensuring that computer labs or classrooms have the necessary devices and internet connectivity for students to use tools like Wooclap or AI Studio. Some participants were concerned about students' access to devices or whether all students have the digital literacy to use these tools.

> *"In my institution, one of the biggest challenges I foresee is getting enough computers to handle digital teaching innovations."*

Another challenge noted was resistance to change. As reflected by a participant,

> *"I, myself, had been pushed out of their comfort zone, and it was rewarding, but I anticipate some colleagues or even students might resist new methods initially, especially some students might not do the pre-class work in a flipped model, or colleagues might question using AI due to academic integrity concerns."*

Commitment to Ongoing Learning

A strong theme was that the workshop felt like a beginning rather than an end. Participants expressed eagerness to continue learning and practising. In fact, the creation of the post-workshop online group was welcomed as a way to maintain momentum. Some indicated personal learning goals, such as getting an advanced understanding of Google AI Studio or designing a full course module as a pilot. The reflection prompt

> *"What will you do in the next 1-3 months as a result of this workshop?"*

yielded concrete answers. A participant recounted,

> *"I'm considering running an internal mini-workshop for colleagues to integrate one major project assignment using AI for students."*

This shows that participants left with not just abstract inspiration but actionable plans.

Challenges, Lessons Learned, and Strategic Recommendations

Analysis of Implementation Challenges

Despite the success of the pedagogical model, several contextual challenges were encountered.

Initial Technical Adaptation Gaps

The sheer volume and variety of new digital tools (NotebookLM, AI Studio, Wooclap, Wayground, Canvas) presented a steep initial learning curve for some lecturers. This complexity, if not addressed through sustained support, risks leading to "tech fatigue" and low sustained adoption after the workshop.

Risk of AI Dependency

The efficacy of GenAI tools relies on their function as "cognitive partners" that augment human creation. However, successful, ethical implementation requires students (and therefore instructors) to develop robust critical evaluation skills alongside tool usage to mitigate the risk of over-reliance and unquestioning acceptance of AI-generated output.

Lessons Learned for Future Capacity Building

The experience yielded critical lessons for future scaling efforts:

Efficacy of Low-Code/No-Code

The high volume of successful applications generated through Vibe Coding confirmed that low-barrier tools are essential for maximising participation across varied academic faculties. Future capacity-building efforts must continue to prioritise low-code approaches to ensure accessibility.

Resilience of Hybrid Design

The GamiFlipped approach provided necessary pedagogical resilience. The asynchronous Flipped component allowed participants to manage their learning despite intermittent connectivity challenges. This balance of flexible online preparation with high-impact, in-person application is vital for successful implementation in resource-constrained environments.

Strategic Recommendations

Based on the outcomes and identified challenges, the following strategic recommendations are proposed to ensure the long-term impact and scalability of the UNIHUBS pedagogical innovations:

Extend the Workshop Duration

A two-day workshop format or multiple shorter sessions spread over a few days will be considered. This will allow participants to dive deeper into each topic without feeling rushed. An extended schedule could allocate one day for exploring concepts and tools (GenAI literacy, design thinking, small activities) and another day for intensive hands-on project development and implementation planning. More time would enable participants to refine their prototypes and perhaps even test them with peers, leading to more polished outputs

Customised Tracks or Differentiation

Given the varying skill levels, it may be beneficial to design the workshop with multiple tracks or differentiated activities

to accommodate different learning needs. For example, an "Introductory Track" for those new to educational technology, and an "Advanced Track" for those who already have some experience and want to push boundaries. Certain sessions can be split accordingly, or facilitators can prepare additional challenge tasks for students who are fast learners. This way, each participant remains appropriately challenged and supported, improving overall satisfaction and effectiveness.

Integration of Student Feedback

If feasible, incorporate students or student perspectives into the workshop. For instance, inviting a few students to participate in a panel or demo session where they react to the tools or teaching methods. Hearing student voices can ground the discussion in reality and emphasise the impact of pedagogical changes on learners. It could be motivating for lecturers to see student enthusiasm for interactive, techenabled learning, which reinforces why these innovations matter. Additionally, a student demo of something like vibe coding could be very illustrative for teachers.

Involve Institutional Leaders

For broader impact, consider having a segment that involves department heads or administrators, especially in workshops aimed at implementing significant pedagogical shifts. A recommendation is to invite these leaders for the final hour of the workshop or a separate briefing where participants showcase what they learned and created. Seeing tangible outcomes and lecturer enthusiasm might encourage leadership to provide support (like resources or policy flexibility) for these innovations. At the least, keeping administrators informed builds a supportive environment for participants to implement changes.

Scaling and Localisation

As UNIHUBS operates across countries (Ghana, Kenya, Tanzania, etc.), consider tailoring the workshop content to the local context when scaling up. The core theme of GenAI, design thinking, and innovative attitudes is universal, but examples and tools might need adaptation to what's accessible and relevant in each context. Additionally, offering the workshop with region-specific examples could increase effectiveness. The recommendation is to pilot similar workshops in other partner universities, using this KNUST workshop as a model, but engage local co-facilitators who understand the participants. This will enrich the programme and ensure it's culturally and institutionally appropriate everywhere it's delivered.

Conclusion

The UNIHUBS capacity-building workshop successfully executed a theory-driven intervention, achieving a significant milestone in modernising pedagogical innovations across participating HEIs in Ghana. By strategically combining the GamiFlipped methodology with the transformative objectives of the PICRAT model, and by leveraging the accessibility of Vibe Coding via Google AI Studio, the project provided tangible evidence that high-leverage technology integration is feasible for cultivating Digital Entrepreneurial Intention, even among participants with varied technical backgrounds. The successful prototyping of digital exemplar applications confirms the potential for participants to shift their role from content deliverers to facilitators of creation, a fundamental requirement for fostering a future-ready education ecosystem. However, for this capacity building to be sustainable and scalable, the implementation team must transition from mere technical training to policy advocacy, addressing the foundational systemic bottleneck of persistent digital infrastructure limitations. Continuous efforts to foster critical GenAI literacy, ethical understanding, and critical evaluation skills will be paramount to ensure that AI serves as an empowerment tool rather than contributing to technological dependency.

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Appendixes

A. Post-Workshop Evaluation Questionnaire

Section A: Workshop Content and Delivery

1. The objectives of the workshop were clearly stated and achieved.
2. The workshop content was relevant to my role as a university educator.
3. The integration of GenAI Literacy, Design Thinking, and Innovative Digital Attitude was clear and informative.
4. The workshop deepened my understanding of how to teach entrepreneurial intention using innovative strategies.
5. The balance between theory and practical application was appropriate.
6. The GamiFlipped approach (Gamification + Flipped Learning) enhanced my engagement and learning.
7. The PICRAT model helped me reflect on technology integration in my teaching.

Section B: Facilitation and Instructional Support

8. The facilitators demonstrated a deep understanding of the subject matter.
9. The facilitators encouraged participation and addressed questions effectively.
10. The training pace and time allocation were appropriate for the activities conducted.
11. The reflection session was meaningful and allowed me to internalise what I learned.

Section C: Tools and Resources

12. The digital tools used (e.g., NotebookLM, Wooclap, Google AI Studio, Wayground, Canvas) were relevant and easy to use.
13. I gained confidence in using AI tools such as Google AI Studio for educational purposes.
14. The hands-on app development activity was useful in translating ideas into practice.

Section D: Learning Outcomes and Impact

15. I feel more confident in integrating GenAI and digital tools into my teaching.
16. I have developed an improved attitude toward using innovative teaching strategies.
17. I intend to apply the concepts of Design Thinking and Innovative Digital Attitude in my future teaching practices.
18. The workshop improved my capacity to foster entrepreneurial self-efficacy and intention in students.

Section E: Overall Satisfaction

19. Overall, I am satisfied with the workshop experience.
20. I would recommend this workshop to colleagues in higher education.

Section F: Open-Ended Reflections

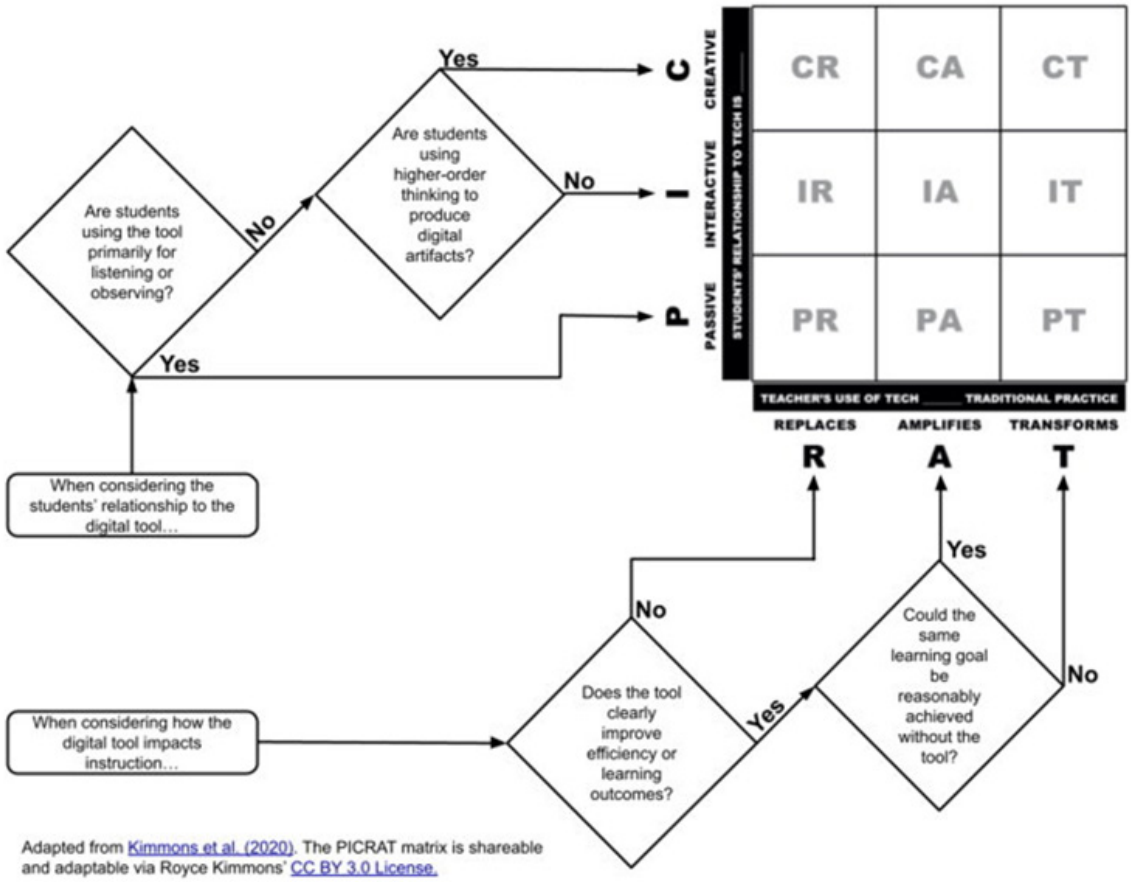
21. What was the most valuable aspect of the workshop for you?
22. What suggestions do you have for improving future workshops?
23. How do you plan to apply what you learned in your own teaching context?

B. Post-Workshop Reflective Questions (Canvas LMS)

1. What new insights did you gain about teaching entrepreneurial intention using AI tools such as Google AI Studio?
2. How has the GamiFlipped approach (Gamification + Flipped Learning) changed your perspective on student engagement in your courses?
3. In what ways do you plan to integrate GenAI literacy into your instructional practices?
4. Describe how the concept of Design Thinking influenced your app development or lesson planning during the workshop.
5. What is your personal definition of "Innovative Digital Attitude," and how do you envision cultivating it in your students?
6. Reflecting on the PICRAT model, what was your technology use type during the workshop, and how would you like to evolve it in future teaching scenarios?
7. Which activity or tool did you find most impactful for your learning, and why?
8. What challenges did you face during the app development session, and how did you overcome them?
9. How has this workshop influenced your views on fostering digital entrepreneurial intention among learners?
10. What specific actions will you take in the next academic term to apply what you have learned?

C. PICRAT Matrix Flowchart

Note. Flowchart for determining whether technology-integrated activity is Replacement, Amplification, or Transformation. From "PICRAT flow chart," by Biola (n.d.). Copyright 2020 by Royce Kimmons' CC BY 3.0 License.



Adapted from Kimmons et al. (2020). The PICRAT matrix is shareable and adaptable via Royce Kimmons' CC BY 3.0 License.

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