Active Learning as a Catalyst for Curricular Transformation: Insights from a Collaborative Faculty Development Workshop

Figure 1: *Participants of the faculty development workshop held in March 2023 in Nairobi, Kenya.*

Invention Education improves lives through invention by establishing an ecosystem that fosters technical innovation, improves health, and reduces poverty. Together with our collaborators in Malawi, Tanzania, Nigeria, Ethiopia, and the United States, we formed the Africa Invention Education (IvE) Network to develop a scalable model for invention education that empowers innovators to address pressing local and global challenges. The Africa IvE Network enables university stakeholders, including students, recent graduates, and faculty, to engage in local innovation ecosystems.

In Kenya, there is a nationally-driven agenda to support pathways for innovation at the individual, institutional, and national levels. Rice360, in collaboration with Kenyatta University and with funding support from the Lemelson Foundation, expanded IvE in the country to enable universities to engage more actively in the national innovation ecosystem.

In this foundation-setting work, Rice360, in collaboration with stakeholders from universities and the broader innovation ecosystem, sought to (i) identify invention education priorities with the highest value to impact

the local innovation ecosystem, (ii) engage with stakeholders in the innovation ecosystem beyond university settings (e.g., industries, innovation hubs, regulatory authorities, and funders) to understand their unique goals, needs, and opportunities with the highest value for engaging with universities in Kenya, and (iii) convene invention education and innovation ecosystem stakeholders to create and disseminate a plan of action that enables universities to engage in the Kenya innovation ecosystem more fully.

Overview

In line with objective one, in March 2023, Kenyatta University and Rice University held a one–week faculty development workshop at Safari Park Hotel in Nairobi, Kenya. Workshop participants included 35 faculty members from Kenyatta University (KU), including deans from three departments within KU as shown in **Table 1** and **Figure 1**.

Table 1: *Faculty and institutions represented at the faculty development workshop in March 2023.*

Name	School/Department
Fidelis Kilonzo	School of Engineering and Architecture (SE&A)
June Madete	SE&A
Mike Asiyo	SE&A
Victor Mwongera	SE&A
Morrison Mutuku	School of Business and Economics (SB&E)
Perris Chege	SB&E
Lydia Gachengo	SB&E
Perez Onono	SB&E
Rosemary James	SB&E
Francis Kiarie	SB&E
Eunice Atsali	School of Health Sciences (SHS)
Maina Mwangi	Chandaria Business Innovation and Incubation Centre
Stephen Waithaka	SE&A
Dan Ojwang	SE&A
Maina Muuro	SE&A
Duncan Kamau	SE&A
Duncan Irungu	SE&A
Kenneth Iloka	SE&A
James Ogutu	SHS
Lister Onsongo	SHS
Eric Ndombi	SHS
MUSEMBI SUSAN	School of Pure and Applied Sciences (SPAS)
Julius Korir	SB&E
Stephen Muathe	SB&E
Wesley Kirui	SE&A
Eric Araka	SE&A
Joyce Otunga	SE&A
Lucy Wankuru	SHS
Priscilla Kabue	SHS
Nickcy Mbuthia	SHS
Eric Masika	SPAS
Pamela Mbae	CBIIC
Violet Tindi	RIO
Sylvia Anzagi	KU

Jeniffer Nyambura	KU

The main objectives of this workshop were to introduce various strategies for improving student learning outcomes, disseminate information about active learning methods, equip faculty to implement active learning in their classrooms, discuss potential barriers and strategies to overcome them, provide opportunities to incorporate active learning into current curriculum, and practice and receive feedback from peers and facilitators.

The general agenda for the workshop was organized in the following manner:

- Day 1: Active learning techniques
- Day 2: Active learning techniques, group bonding activity
- Day 3: Module Design
- Day 4: Active learning techniques, Design Challenge
- Day 5: Design Challenge

Active Learning

Active learning strategies were introduced conceptually and demonstrated through activities in the workshop. These included active learning strategies to supplement lectures and replace lectures.

To introduce these concepts, a short design challenge, the tower challenge, was included on the first day of the workshop. For this activity, participants worked in teams of 4-5 to create the tallest and most stable tower they could design with a limited number of index cards, as seen in **Figure 2**. Discussion after the activity was used to establish the concepts conveyed through the activity, such as team building, planning, management, and design. This activity introduced and demonstrated the concepts of project-based learning, gallery walks (looking at others' work), peer feedback, testing and refinement (through interactions), and scaffolding.

Some of the methods/activities discussed and practiced throughout the workshop included:

- In-class questions
- Minute papers
- Think-pair-share
- In-class problems
- Gallery Walk
- Project-Based Learning
- Labs, Studio
- Problem-based learning
- Peer Feedback
- Testing and refinement (through interactions)
- Scaffolding
- Group share out

Figure 2: *Participants engaging in workshop activities.*

Group Bonding Activity

On the afternoon of Day 2, participants joined a group activity, taking a tour of Karunguru Coffee Farm. This activity resulted in cross-disciplinary interactions and provided space to get to know other workshop participants and facilitators in a less formal setting. Participants expressed that they enjoyed this aspect of the workshop, finding time to interact with others at their university with whom they usually would not have crossed paths. Having this activity early in the workshop established relationships and a level of comfort within the group that significantly improved participation and the learning experience for the remainder of the workshop.

Module Design

Participants were asked to bring in a syllabus, an exam/quiz/assessment, and a lecture for one of their courses to actively revise in the workshop and receive feedback. The syllabi were revised considering Bloom's taxonomy and appropriate verb choices to improve learning objectives and learning outcomes to reflect a range of levels in Bloom's Taxonomy. The course content (lectures) and assessments were then revised to align with the learning outcomes. The lectures were revised to incorporate 3-4 active learning methods into the class period. Participants split into groups of 5-6 and taught the rest of the group a mini-lecture (3-5 minutes) incorporating active learning strategies and received feedback from the "students" (other group members) and the facilitator. Assessments were then revised to align with the learning outcomes and course content. They then created a partial module map that they would like to teach,

focusing on the three sections: learning outcomes, learning experiences, and learning assessments. Participants expressed appreciation for the time to actively work on incorporating what they learned into their courses, practicing the content, and receiving feedback, leaving them with a plan and skills to implement what they learned into their courses.

Design Challenge

The design challenge was a group activity used to demonstrate project-based learning. Participants worked in groups of four to create a “bajaj” that could run down a wire/zipline (“road”) in the shortest amount of time while safely carrying two “people” (ping pong balls). This activity demonstrated project-based learning, introducing the concept of low-fidelity prototyping and how this can be implemented with limited resources.

Figure 3: *Attendees engaging in a group discussion during the faculty development workshop.*

Key Takeaways

Incorporating active learning techniques: The workshop's active learning strategies will be actively incorporated into the teaching strategies used by participants. They understand the importance of incorporating more active learning opportunities into their lessons and engaging students through participation.

Collaboration and teamwork: Participants emphasize the value of teamwork and collaborating with colleagues, engineers, and other professionals. They intend to work together on issues related to research, innovation, and startup projects because they value interdisciplinary interactions.

Curriculum development and review: The knowledge obtained during the workshop will be used by the participants to improve the development and evaluation of curricula. Through the use of active learning

methodologies and quality assurance, they aim to connect better learning objectives, lesson objectives, and program learning.

Continuous improvement and gradual implementation: Participants stated that they intend to gradually implement the strategies they have learned in order to continuously improve their teaching methods. While seeking support from colleagues and imparting their knowledge to others, they understand the necessity of redesigning notes, updating courses, and adjusting to new learning approaches.

Recommendations

Ongoing training and support: Offer continuing training and seminars that concentrate on using design studios, PBL, PJBL, and other active learning methodologies to promote participants' use of active learning tactics. Participants will become more competent and confident when putting these strategies into practice.

Resource allocation: Provide design studios and labs with more resources because innovation necessitates resources. This can involve offering the required tools and technical assistance to encourage the efficient application of active learning methodologies.

Faculty collaboration and exchange: Interdisciplinary methods can be encouraged, and active learning efforts can be strengthened even more by facilitating collaborations and exchanges between faculty members from other disciplines. Establishing forums where faculty members can share their successes, setbacks, and success stories can promote a culture of cooperation and ongoing development.