Design Thinking for Socio-Technological Endeavors: Experiences from the Virtual Laboratory (VLab) and Connected Learning for STEM (CL4STEM) Projects

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Abstract

Design thinking is a foremost technique for solving varying kind of wicked problems in different domains. Educators and practitioners have used DT widely in the global north to build enduring technology systems. Despite these potentials, there is a dearth of knowledge and application of Design Thinking (DT) as a methodology for solving complex, technology-based problems in the global south, but more prominently in Nigeria. Furthermore, the inadequacies of equipment and classrooms have impacted on the learning of science and engineering in most educational institutions. We reflected on two separate workshops that introduce the Design Thinking approach, to educators, (and in one of the workshops – students and industrial partners) towards collaboratively generating ideas towards enabling equitable access to learning resources. We share from our findings that design thinking impacts on the quality and sustainability of digital product or services developed in global south countries like Nigeria.

Background

According to (Brown, 2008), design thinking is a concept that promises increase in innovativeness through a more user-centred approach to innovation. As it produces positive outcome in settings which are characterized by incomplete, contradictory, ambiguous, and changing requirements (Rauth, 2010)

However, no evidence of this type of training or application in the curriculum of Nigerian University education. In addition, there is no evidence this is employed by educators or industrial partners for development of educational technology interventions or indigenous digital products in Nigeria.

Fig. 1 : Phases of Design Thinking

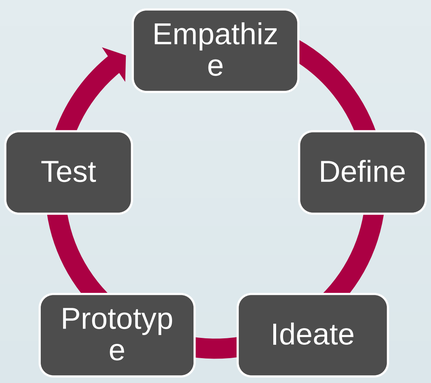


Fig. 2 : Interdisciplinary cycles of Design Thinking

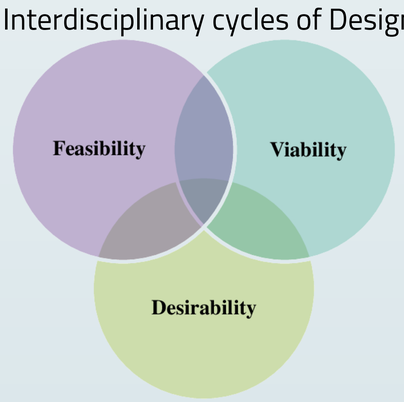
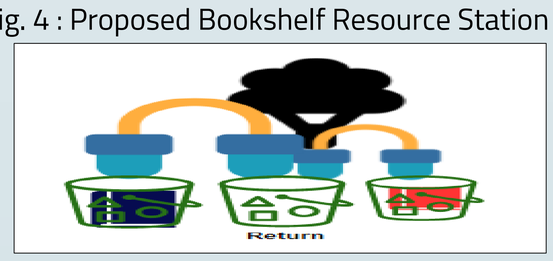


Image Source: Miha Prebil [2]

Fig. 3 : virtual laboratory (https://vlabnigeria.org)

Fig. 4 : Proposed Bookshelf Resource Station

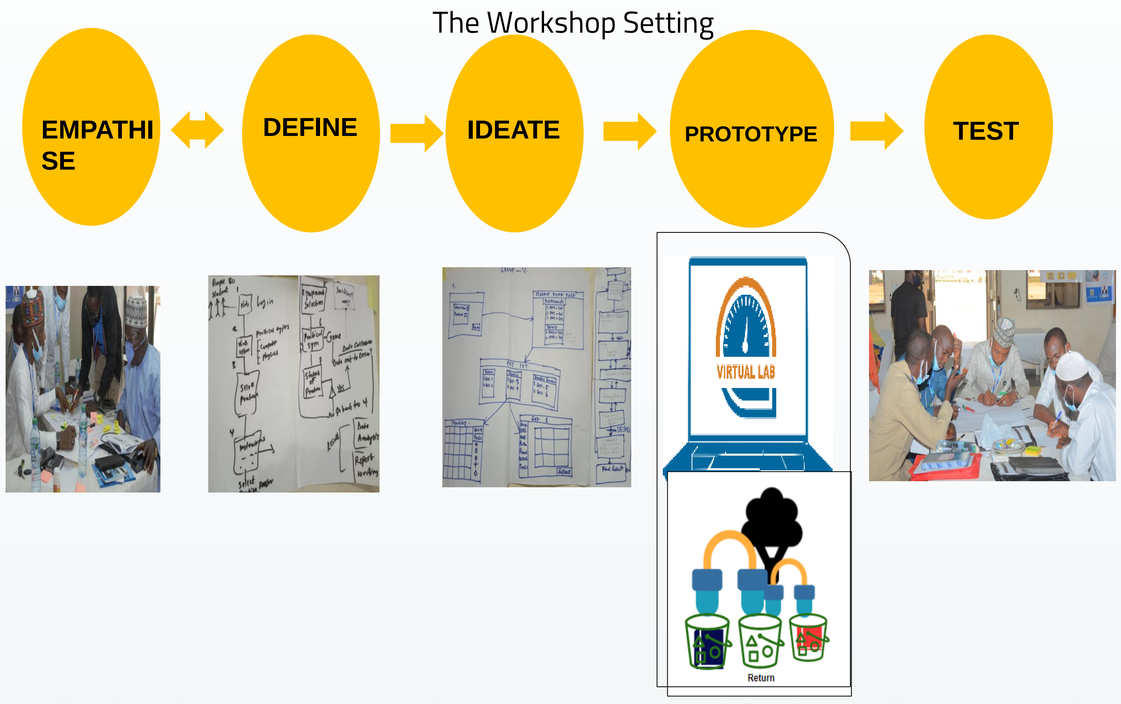


We employed five phases (Figure 1) in a workshop mode in two separate workshops to develop access to two distinct educational resource (a laboratory system (figure 3) and a rural based inclusive book resource station (figure 4).

These activities are carried out collaboratively by a team aimed toward generating new ideas and solve existing problems of inadequate and inequitable access to science laboratories, for the first team; and a lack of access to reading learning materials due to poor design of bookshelves in rural setting, in the second case study.

Methodology

The Workshop Setting



Following the DT process above, as accounted further in (Kawu, et. Al, 2021) for the first case study, participants proposed a virtual laboratory system that enable equitable access to learning materials for Science and Engineering practical, which resulted in https://vlabnigeria.org (see Figure 3).

In the second DT workshop, educators were engaged in an activity in designing the prototype for an inclusive bookshelf, participants exhibited novelty as they suggested book display by hanging books from a tree in buckets as ways of enabling access, one bucket to hold returned books, others to hold for the different grades or levels of the users (Figure 4).

Results

*In the case of the Vlab project, one participant posits that it will help greatly in solving what he describe as a “learning by rumour” situation. In his words, “learning by rumour” takes place when students at the back in a class cannot hear their teacher, and so rely on the students closer to understand any concept been explained in the class.

1) Satisfaction: Most participants expressed their satisfaction with the workshop and how pleased they were with the workshop as a means of educating them and developing the solutions.

2) Improvement: Most participants mentioned that the workshop had improved their understanding and worldview. Some requests were made by few participants on the quality of the workshop. E.g; Respondent highlighted the need for better logistical arrangements, like the use of multiple halls to avoid interference between brainstorming groups.

3) New Experience: Educators expressed that they were exposed to some new tools in digital medium such as freemind, PhET and online poll, which thus enable them to think freely about solutions.

Conclusion

This paper presented the experiences in undertaking two (2) workshops on design thinking towards improving the knowledge of design thinking and developing solutions to socio-technical problems in educational settings. We can report that the workshops improved participants’ understanding of design thinking but also enable novel solutions to emerge in the process. It aid in solving wicked problems like “learning by rumour”.

References

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