Inspiring Innovation through Design Thinking: Lessons from a graduate-level course offered during the pandemic in Pakistan

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Abstract
There is a consensus that in a world impacted by COVID-19, the relationship between education and technology must be re-considered. Design Thinking has been an effective technique for fostering innovative thinking. This paper discusses the application of Design Thinking as a pedagogical innovation at the Aga Khan University Institute for Educational Development Pakistan in a graduate-level online course for teachers. Participants were invited to learn about the Design Thinking process and technology integration by engaging in a Design Thinking process to identify a problem and develop ideas needed in their professional teaching contexts. Data were analysed using an autoethnographic approach to determine the effectiveness of Design Thinking in inspiring innovations in education. Design Thinking was a novel approach for the participants, and many stated they will include it in their work in the future. The participants' design problems were related to evaluation, learner engagement, and online and technology-enhanced learning ethics. The empathy stage helped in a deeper understanding of taken-for-granted teaching issues. The process encouraged participation and voice, particularly among the female participants. Teacher education must adapt to encourage innovations in classrooms. Educators in similar contexts may find the lessons valuable.

Keywords: Innovations, Technology, Teacher Education, Design Thinking, Pakistan

Introduction
This paper describes an innovative approach to graduate education implemented at a university in Pakistan during the global pandemic to address the changing realities of education. Design Thinking (DT henceforth) was adopted as an approach for content and teaching. We begin by describing the context and relevant literature, then describe the course design and teaching approach implemented in the course and the research method. Next, findings from the participants’ feedback survey and facilitators’ reflections are presented. We conclude with a discussion of key findings and implications that educators in similar contexts may find relevant.

There is a growing recognition that in a world in which we learn to live with COVID-19 imposed constraints, we must rethink education and the role of technology. This is important for challenging contexts like Pakistan, where during COVID-19, the educational processes were negatively affected by factors such as a lack of technology infrastructure, teacher preparation and poorly designed online learning programmes (World Bank, 2022). According to one estimate, the pandemic has exacerbated the inequalities whereby “eight percent of adolescent girls and 21 percent of adolescent boys are no longer in school.” (World Bank, 2022).

We use the term challenging context (Crichton & Onguko, 2013) rather than more commonly used terms such as developing world, third world, global south, or low and middle-income countries. The term challenging contexts is more generous in its terminology as it recognises the universal issues the world’s citizens face at various times and to various degrees. A recent World Economic Forum article supported our position when it stated this about UK, the world’s fifth largest economy: “Picture a country where a fifth of the population lives in poverty. People have to choose between eating or heating their homes and children go to school hungry. Homelessness is rising. And basic services are in crisis, leaving many struggling to cope.” (Edmond, May 2019, 1 & 2). Crichton & Onguko (2013) cited in Crichton (2013) define challenging
contexts as “settings in which individuals, due to a variety of circumstances, conditions, or environmental constraints”, lack access to:

- consistently available and affordable electricity
- reliable, unfiltered, or uncensored Internet
- previous formal learning and / or opportunities for ongoing formal learning that support individual learning needs
- non-formal, yet appropriate learning opportunities
- participation in learning activities due to cultural or religious reasons
- transportation and mobility
- other access situations linked directly to poverty (health, fees, low wages, inappropriate clothing, etc.).

While this list is not exhaustive, it does reflect the lived experience of many marginalised people globally (Crichton & Onguko, 2013). Unfortunately, the conditions identified above are commonly experienced today, and they require respectful consideration, especially when engaging the teachers to consider the future of education.

The concept of design in education or teachers as designers has a long history (Schon 1983; Henriksen et al. 2020). The Stanford University's d.School developed DT as a human-centred iterative process that is used to foster creativity and create change in a variety of contexts. As a process, DT encourages its users to take a positive, proactive, and hopeful approach to tackle complex challenges. It encourages divergent, lateral thinking, which allows for understanding the problem rather than rapid, sometimes short-sighted problem-solving. DT encourages users to realise it is possible "... to creatively attack the world's greatest problems and meet people's most urgent needs” (Hatch, 2014, p.10). The d.School’s, DT consists of five interconnected, iterative stages (Figure 1).

**Figure 1**
A schematic representation of the five inter-related, iterative steps of Design Thinking

These stages are flexible, and while often experienced within a short sprint, they can be adapted to various contexts and stopped and started to allow for information gathering, consulting, and other research-related activities (Crichton, Botha-Ravyse, & Moss 2019).

The DT process is valuable when it is used to investigate complex or wicked problems, such as living and learning in the world of COVID-19. Buchanan (1992) defined *wicked problems* as problems that seem impossible to solve such as...
most of the current United Nations Sustainable Millennium Goals (https://sdgs.un.org). These problems require innovative
solutions, i.e., solutions that disrupt typical responses that often generate the same results. As Tim Brown, Executive CEO of
IDEO (www.ideo.org), states, “Design Thinking is a human-centered approach to innovation” becoming a design thinker
helps us develop attributes such as:

- Empathy and considering the world from several angles
- Integrative thinking and learning to build something new by combining the potential and limitations of ideas
- Maintaining and gaining optimism, implying that no matter how complex a problem's limitations are, at least one
  feasible solution is better than the alternatives
- Experimenting by raising questions and probing in innovative ways that lead to entirely new outcomes
- Recognising the power of the Japanese proverb "None of us is as smart as all of us!" and collaborate with others.

These attributed are much needed to re-image education in the world impacted by COVID-19 presenting a compelling case for adopting DT in education programmes.

Method

Course Design and Teaching

The Aga Khan University Institute for Educational Development, located in Karachi, Pakistan offers programmes
for teachers. The course entitled Learning and Teaching with Technology is a 3-credit elective course for master's degree
students at the Aga Khan University Pakistan. Prior to the pandemic, the course covered the essential concepts, definitions,
thories, frameworks, and research on technologies in education. Working with peers, participants considered pedagogical,
ethical, and social issues arising from using technology in education. Also, they examined global and local policies and
practices affecting the use of technology. The course encouraged developing a more nuanced understanding of the pitfalls
and pace of technology use in education, considering the haphazard relationship between social science and policy related to
technology in education research policy and practice. Participants had opportunities to engage with experts in the field and
explore examples of appropriate technology in various contexts. The focus of the course was on the pedagogical aspects of
technology in education, and it assumed digital literacy and prior experiences of technology use.

Due to the educational disruptions caused by the global pandemic, the course needed to be revised to address the
concerns highlighted by COVID-19. We began reviewing the course in May 2021 intending to make it relevant for the
participants in the COVID-19 impacted world. After considering various options, DT was used as a pedagogical innovation
to frame the course. The sixteen-week course was an elective option for K-12 teachers, and medical educators enrolled in
various master's level programmes at AKU in Pakistan. We made changes to enable participants to explore and develop
ways to enhance students' engagement and learning outcomes in various educational contexts impacted by COVID-19.
Participants were expected to develop competencies for integrating appropriate technologies and related pedagogies in
educational contexts and make thoughtful decisions about the most appropriate use of technologies to enhance educational
outcomes. The course encouraged critical reasoning about what technologies are and how they might be used in education
and social innovation.

During the course, participants used Empathy, Problem Definition, and Ideate stages to identify problems they had
experienced during COVID-19 and generate a range of ideas to address them. The approach encouraged participants to
understand the DT process, see it in actual use in various applications, experience each step in the process in a facilitated way, and use the process to develop a learning resource needed within their professional teaching contexts. The course content was structured into various phases of DT as follows (Figure 2):

**Figure 2**
*How Course Content was Aligned with Design Thinking Stages 1–3*

Since the actual process of DT was new to most participants, each week along with the course content, we introduced the concepts of DT and the stages. Each week participants were expected to spend approximately 9 hours on course-related activities. We divided the course time into two modes:

- asynchronous and independent learning 7.5 to 7 hours a week
- synchronous class interactions via Zoom 1.5 to 2 hours per week

The week started with asynchronous and independent learning, with learners accessing course content and activities to be completed during the week via the course website on the Virtual Learning Environment. The activities included discussions, sharing experiences via Wikis & Padlet, watching videos, or reading, followed by reflecting on questions. At the end of the course, participants provided feedback on the effectiveness of DT to inspire the innovative use of technology in Pakistani classrooms.

**Research**

An autoethnographic approach (Ellis, Adams & Bochner 2010) was used to understand how and in what ways did our use of DT impact our learners’ thinking, and experiences in the course. Data comprised facilitators’ field notes (i.e., our journals, email communications, and notes from our weekly planning sessions), course artefacts, class discussion notes, and
end of course feedback from the participants. Autoethnography was consistent with the participatory design and the iterative process of DT allowing the authors to compare notes as the course progressed, develop empathy, and make practice informed decisions.

Findings

Feedback from the participants

Ten out of 20 participants responded to the feedback questionnaire at the end of the course. The demographic details of those who responded to the survey are as follows:

Table 1

Demographic details of the participants

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male (M) n=4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female (F) n= 6</td>
</tr>
<tr>
<td>Career stage</td>
<td>Experienced Teacher (10 + years) – n=4</td>
</tr>
<tr>
<td></td>
<td>Mid-career Teacher (5 to 10 years) – n=2</td>
</tr>
<tr>
<td></td>
<td>Early career Teacher (first 5 years) – n= 4</td>
</tr>
<tr>
<td>Area of professional expertise</td>
<td>Medical Education (ME) n=6</td>
</tr>
<tr>
<td></td>
<td>K-12/School Education (SE) n=4</td>
</tr>
</tbody>
</table>

Responding to questions about the relevance of DT, all ten respondents mentioned that:

- It was the first time they had formally applied a DT approach.
- They were able to understand DT through the way the course laid it out.
- They will use DT in the future.
- They see the value of DT in their educational context.

The participants mentioned that empathy interviews helped define the problem and/or change the idea around the problem. They commented on the value of empathy interviews and noted that this stage helped them understand the problems:

"In our case, we were well aware that the problem we had highlighted was real and very relevant even before we conducted the interviews, but after the empathy conversations, I discovered their importance, power, and impact. I feel this is the most important step of DT, and it paves the way for further thinking and consequent action." (F, ME7)

"The empathy interviews help[ed] me to define the problem in a more empathetic way, and I found [out] how the participants were directly [a]ffected by the wicked problem." (F, SE8)
Participants’ Design Problems and Ideas

Most common problems were related to assessment and learner engagement issues in online courses, followed by issues of teacher readiness or online teaching of clinical skills and other issues such as increasing instances of cyber-bullying. Some examples are in Table 2.

Table 2
Examples of problems and ideas identified by the course participants

<table>
<thead>
<tr>
<th>Problem</th>
<th>Ideation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of student engagement and attention due to the use of mobile-phones and smart devices during the class</td>
<td>Sync Learning: a tool incorporating active learning approaches using Bloom's taxonomy</td>
</tr>
<tr>
<td>Lack of innovation and creativity among students of secondary classes in government schools in Sindh Board Examination</td>
<td>Training of teachers on digital pedagogies for inculcating creativity and innovation, and follow-up of students in classes</td>
</tr>
<tr>
<td>High occurrence of bullying by and of school children</td>
<td>Web-based awareness raising campaign for students and teachers</td>
</tr>
<tr>
<td>Glaring gaps in educational practices which have resulted in compromised knowledge, attitudes, and skills in medical students.</td>
<td>Open Education Resources and training of faculty</td>
</tr>
</tbody>
</table>

Positive Learning

The participants identified facilitation, teaching approach and content as the strength of the course. Most of the participants noted that the facilitators not only had the knowledge of the DT process but also, they applied the principles in the teaching process and modelled online facilitation:

• “I have learnt how empathy, encouragement and a non-judgmental attitude fosters learning.” (F, ME7)
• “I learnt … how to use technology to seek a solution, opportunity and explore [design]thinking using technology. Indeed, a great exposure and expert facilitator who leads us throughout the semester.” (M, SE9)

The participants appreciated the practical application of DT and collaborative assessment where peers were involved in the assessment process. Two participants appreciated the multi-disciplinary approach and diversity of the student population: “The beauty of this course was the diversity. I liked it and tried to adapt [to] the diversity.” (F, SE8)

Challenges faced by the Participants

The challenges identified by the participants were related to the modality, content, and teaching approach. Since this was the first-time participants had applied the DT process, the most frequently cited challenge was to learn and apply the process simultaneously. In terms of course modality, two K-12 participants commented that they would have preferred face-to-face classes or longer synchronous classes. One participant found Friday evening classes challenging after a long and hectic week. Participants noted that learning to use new tools for brainstorming during ideation or using PowerPoint to develop video pitches was challenging. One participant noted that “Working with peers from different professional and
contextual backgrounds” (F, SE8) was a challenge for them, and three K-12 teacher-participants mentioned that they would prefer separate classes for medical educators and K-12 teachers.

Facilitators’ Reflections

DT is often criticized as being too resource-intensive and only wealthy institutions can afford it; however, our experience in this course was that when we invited our participants to imagine something new, despite limited resources, they were surprised by the results, and their thinking improved as a result. The participants' positive feedback demonstrates the success of this approach in the Pakistani context and our reflections suggests areas to be considered for the future.

The adoption of the DT approach allowed us to personalize learning for the participants, which meant that each participant was able to receive feedback on their specific problem and DT project. While the personalized learning approach was beneficial to the participants, it required additional effort and time from the participants and the facilitators. Because of the structure of the courses, both parties struggled to invest the required time. We noticed women participants participated activity and engaged deeply with the new concepts and approaches and think that online modality coupled with design skills can be a viable approach of working with women teachers. The autoethnographic approach allowed us to model the DT process for our learners, make necessary revisions to the course content as the course progressed, and reflect on our learning and experiences. Our participants valued empathy interviews and the ideation process. Most of our learners noted the value that they saw in watching us, both synchronously and asynchronously, responding to learning concerns and making adjustments. We were able to engage in metacognition about our collective learning.

All too often, in graduate teaching, especially in teacher education, courses are more theoretical or conceptual than applied or experiential. Had we been able to support this course with the design equivalent of a maker lab or studio experience, the learners would have been able to complete the DT cycle and begin to prototype and test their innovative learning resources. This would have been an essential component of the learning, recognizing that if we want educators to make changes to their practices, they must be afforded time and support to make the change and use appropriate technologies. We know this to be true through our work in connecting the Maker Movement and DT (Crichton et al, 2019; Crichton, Nicholas, & Vikiru 2018).

Discussion

By applying the DT process to foster innovation, while we encouraged reflection on the ideas' feasibility, viability, and desirability, we disrupted three areas of practice: culture, context, and modality, enabling educators from different disciplines to explore educational problems from multiple perspectives. We found the DT process appropriate as it enabled our participants to “…first recognize the constraints imposed by these challenges and then attempt to ameliorate them by providing appropriate actions and activities that minimally disrupt the context and populaces' lives” (Bourne, Crichton, & Carter, 2015 cited in Crichton et al. 2019 p. 8). Within the context of DT, innovation is often described as residing in the sweet spot between Desirability, Viability and feasibility in terms of business (Gartside, 2021). Based on our work, we suggest that Viability reflects the needs/constraints of the course and learning environment; Feasibility includes readiness and access issues, and Desirability should involve all stakeholders, as shown in Figure 3 below. Further, innovation, while
typically viewed as something entirely new, can also be something that has been renewed and revisited through the lens of empathy and usability.

**Figure 3**
*The Three Lenses of Innovation (Gartside, 2021) and our adaptation*

When teaching and learning in challenging contexts, Spiro (1990) suggests the instructors must recognize the relevance of place and engage in the anthropological act of making the familiar strange and the strange familiar. Making the familiar strange requires us "to come to view the familiar with a greater degree of objectivity than would otherwise be the case" (p. 48). Further, while the teachers may not fully comprehend the many and varied nuances of the contextual challenges, s/he might learn enough to ask deeper questions and allow both teachers and participants to act with a sense of agency. Much-needed reciprocity is required to allow those engaged in the learning to gain value from the instruction. Therefore, we found that an autoethnographic approach to the study of our innovation, i.e., using DT as a framework for a graduate course, allowed us to model the DT process for our learners, iterate the course structure and content as needed, and begin to empathize more deeply with our learners' needs and concerns. Autoethnography proved to be a rich approach to support the participatory design and the initial elements of the DT process – empathy, definition, and ideation.

Despite positive outcomes, DT was not positively received by all the learners. Several struggled with the ambiguity of the openness of the final assignment – the definition and description of a learning resource within their teaching contexts. Some learners initially struggled to see the usefulness of empathy interviews, feeling that the importance of the content to be learned trumped the need to understand why their learners might struggle to learn it. This appeared to represent a more traditional view in higher education and teacher education that a complex and essential context needed to be studied harder and that it was not necessarily the instructor's role to make that context more accessible or simpler to learn.

We could not progress beyond the ideation stage due to the absence of a studio or lab. The equivalent of lab or studio experience may be needed to introduce innovative pedagogies and create learning resources at the graduate level. In our case, it's a studio experience that allows the participants to work through the innovation and then have just-in-time mentors to support the innovation and have them succeed. We argue that education programmes should be structured differently, with credits for a studio experience and a capstone project that produces a tangible artefact that can be incubated.
School teachers learning with medical educators was a new experience for the participants, and as facilitators, we had to make adjustments to allow space for both disciplines. A few schoolteachers in the course expressed their preference to study with schoolteachers only. From their perspective, issues of schools and teachers are different and cannot be properly appreciated in a multi-disciplinary learning environment. On the other hand, the medical educators appreciated having schoolteachers in the course as they were able to engage with the concepts in a more comprehensive way. We believe that this difference in perception and expectation is crucial because, in an increasingly connected world connected and where multi-disciplinarity is the norm, schoolteachers need to be immersed in learning experiences with higher ed teachers to understand the demands and expectations. As a novel approach in Pakistan, this idea will take more time and effort to be adopted.

Conclusions and Implications

We suggest that DT is relevant and applicable for teacher education in Pakistan as it engages teachers in questioning the familiar and bringing innovations rather than mere recipients of new knowledge. We suggest the following key messages from our experiences:

- In challenging contexts, DT as a process may foster innovative ideas and practices in teacher education programmes. Therefore, if not all, empathy and ideation stages of DT should be adopted in teacher education to address educational challenges in the world impacted by COVID-19.
- Co-designing and co-teaching are valuable because they allow participants to gain diverse perspectives and experiences. Modelling, co-designing and co-teaching enable teachers to adopt such practices. Therefore, maker lab or studio-based learning experiences should be incorporated into higher education and teacher education programmes.
- Greater interactions between schoolteachers and higher education teachers will equip them with a better awareness of the diverse experiences, demands and expectations, allowing them to prepare students better.
References


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