

Design Thinking Case Study: Redesigning College Library Experience

Chetan Choudhary¹, Vrushabh Hete², Vinita Kale³, Suankit Harane⁴,
Bharti Sambhartode⁵, Milind Umekar⁶
¹⁻⁶(Smt. Kishoritai Bhoyar College Of Pharmacy, Kamptee, India)

Abstract:

Background: Design Thinking is a comprehensive strategy that goes beyond simple problem-solving and incorporates creativity, empathy, and iteration in offering solutions that not only meet but also surpass client expectations. It acts as a spark for creativity, encouraging the development of goods and experiences that genuinely connect with the target. This paper explores the application of design thinking principles in the redesign of a college library facility, emphasizing the utilization of a questionnaire to define the problem. The objective is to enhance the library environment, aligning it with evolving educational needs and technological advancements.

Materials and Methods: The project employs the five key principles of design thinking—Empathize, Define, Ideate, Prototype, and Test—as a structured framework. Initially, an Empathize phase involves engaging with stakeholders, including students, faculty, and librarians, to understand their diverse needs, expectations, and pain points in the current library setting. This empathetic approach establishes a foundation for redesign that resonates with the end-users.

Results: The Define phase leverages a questionnaire as a research tool to systematically gather insights and pinpoint specific challenges within the existing library facility. The questionnaire is designed to capture user preferences, concerns, and suggestions regarding space utilization, resources, accessibility, and technological integration. The data collected serves as a valuable resource for refining problem statements and framing the design challenge.

Subsequently, the Ideate phase encourages a collaborative brainstorming process to generate innovative solutions. This involves synthesizing the questionnaire responses to identify recurring themes and potential areas for improvement. The diverse perspectives gathered through the questionnaire facilitate a creative exchange of ideas, laying the groundwork for innovative design concepts.

The Prototype phase translates selected ideas into tangible models or mock-ups, allowing stakeholders to visualize potential changes in the library layout, furniture arrangement, and technological integrations. This iterative process incorporates feedback, refining prototypes for optimal user experience.

Finally, the Test phase involves piloting the proposed changes on a smaller scale, gathering feedback from users, and fine-tuning the design based on real-world interactions. This iterative testing ensures that the redesigned library meets the evolving needs of the college community.

Conclusion: In conclusion, the integration of design thinking principles, particularly the innovative use of a questionnaire, provides a structured and user-centric approach to redefine the college library facility.

Key Word: Design thinking; innovation; prototyping; Design Thinking methods; Questionnaire surveys.

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I. Introduction

Design Thinking is a strategy for creative problem-solving by prioritizing customers' requirements above everything else. It helps to engage a person in several opportunities like experimenting and creating a prototype model, gathering feedback from customers, and redesigning the product using innovative solutions¹.

While design thinking originated with designers, it is now widely used by people from all disciplines. One can apply design thinking to various fields such as architecture, engineering, business, etc. Design Thinking's unique approach can also lead to innovations in products, services, processes, environments, and other human experiences².

Four Principles of Design Thinking

Design thinking builds people's capacity to innovate by letting them adopt and practice an innovative mindset. The skills developed through design thinking can then be applied in a variety of ways, such as a design

sprint, a process for testing ideas which involves fast prototyping. The four principles of design thinking are as follows (Fig. 1)-

1. The Human Rule: "The nature of all design is social." In order to overcome the difficulties, it is necessary to acknowledge the human element in all activities and technologies and to satisfy human requirements. Instead of just coming up with creative but pointless items, the team will be able to solve real problems when it can relate to people and draw inspiration from their wants, emotions, and drives.
2. The Ambiguity Rule: "Ambiguity is inevitable." According to the uncertainty Rule, there will always be some degree of uncertainty in the activities. The investigations are carried out within the parameters of current knowledge and control occurrences within the limits of knowledge. Instead of trying to think of one perfect solution, think about reframing the problem or looking at it from all conceivable angles to get several possible solutions. It is about looking at different approaches toward problem solving.
3. The Redesign Rule: "All design is redesign." While technology and circumstances may change and evolve, basic human needs remain unchanged and only redesigning these needs may reach desired outcomes.
4. The Tangibility Rule: "Making ideas tangible facilitates communication." If we make our ideas tangible for prototypes, it facilitates designers to communicate effectively. After gathering the ideas, one shall start experimentation or building prototypes. Experimentation or building prototypes helps to realize which ideas work and which ones don't. Hypothesizing and testing will determine what changes will lead to an easier, frictionless or more intuitive path³.



Fig.1 Four principles of design thinking⁴

Design Thinking Models

In order to collect trustworthy data, analyze it, and forecast potential solutions, design thinking models demonstrate the ensuing techniques, procedures, and processes.

- Linear Process: a procedure that starts with clearly defined goals and assumptions on the results that are anticipated. This procedure follows a cycle that includes development, judgment, synthesis, and analysis.
- Dynamic Process: a procedure with predetermined goals and tasks that results in somewhat predictable results.
- Double Diamond design thinking model: a method of exploring further into a problem before implementing focused action (Fig. 2). It is a methodical process, either fully or partially, with predetermined objectives and tasks and fairly predictable results, similar to a dynamic process.
- Dynamic, Systemic, Upgoing process: a design methodology that starts with no assumptions about potential results. Every time an issue is discovered, this model is required. Improvements and alterations are also required, but it is unclear how to get there. This method is typically applied when there are many perspectives and complexity to the problem that has to be solved. Additionally, it is typically used to societal issues.

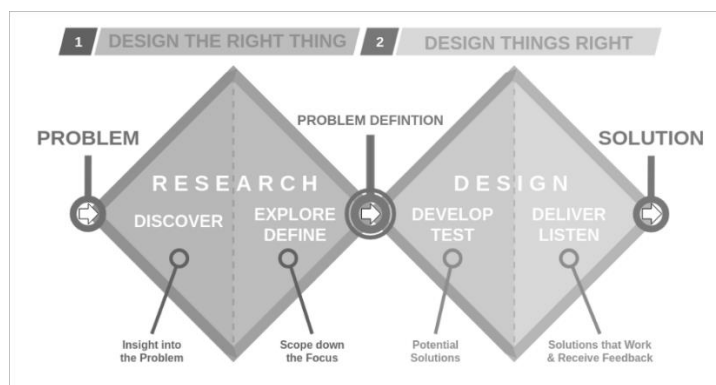


Fig 2. Illustration of the Double Diamond design thinking process⁵

Even though these models include a wide range of approaches and procedures, the audiences and the nature of the problem determine which model is most appropriate to use.

The Five Phases of Design Thinking

Design thinking follows a five-step model, according to the Hasso Plattner Institute of Design (d.school) (Fig.3). But according to certain models, there's also a sixth stage that's termed implementation. The six practical stages of the design thinking methodology:

1. Empathize

Accurately addressing the difficulties at hand requires empathy for the target audience and an understanding of their requirements. In order to understand customers' expectations and pinpoint underlying problems, this phase promotes observation and interaction with them. One strategy to start developing consumer empathy is to conduct qualitative interviews and surveys.

2. Define

In order to precisely describe the basic problem statement, a subsequent step is to collect and evaluate data from the "empathize" stage. A strong problem statement needs to be more human-centered and less like a corporate objective. This will assist in outlining the actual problem before moving on to the idea generation phase.

3. Ideate

Now that the target audience's expectations and a well-defined problem statement have been established, it's time to start coming up with ideas. In order to possibly address the problem statement, this step entails brainstorming and investigating original solutions.

4. Prototype

Finding the optimum solution for each problem that has been identified is the goal of this experimental phase. In order to do this, user testing is done with simplified versions of the idea, sometimes known as prototypes. Make modifications and create goods that best satisfy consumer wants on the basis of the feedback.

5. Test

When the final prototype is prepared, it's time to test it by seeing how the intended audience uses it and obtaining their opinions. At this interactive stage, adjustments can still be done to ensure that all user feedback is incorporated into the finished product.

6. Implement

The stage where the visualized product is put into practice is called implementation, and in some models it is considered the sixth and final stage. It is the result of all the earlier phases coming together after development to apply the finished product.

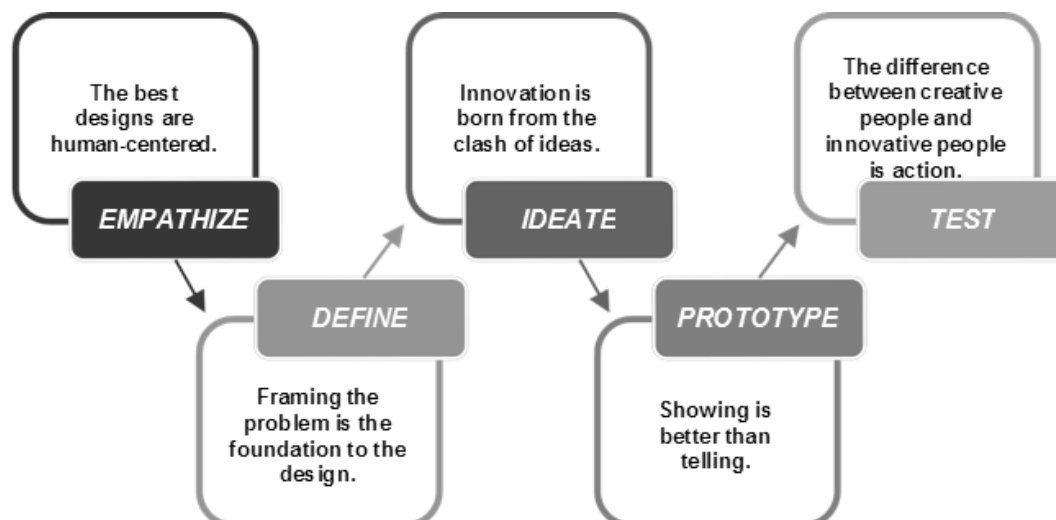


Fig. 3 General overview of design thinking about the five principles behind the approach and the process⁶

II. Material And Methods (Design Thinking In Action)

Design thinking in education is a transformative approach for administrators, fostering innovation and problem-solving. It encourages collaborative, empathetic, and user-centric solutions to educational challenges. Administrators play a vital role in creating a culture where educators embrace Design Thinking, ultimately enhancing learning experiences and outcomes^{7,8}.

Case Study

Smt. Kishoritai Bhoyar College of Pharmacy is known for its commitment to innovation and student-centric approach to education. However, the College Library and Information Centre, while resource-rich, has been facing challenges, especially post-COVID, in engaging students effectively and providing a seamless learning experience. The college leadership decides to apply Design Thinking principles to revamp the library experience.

To find the solution to the above problem the framework of design thinking was broken down into the following five actionable steps that make up the design thinking process.

Empathise

Empathy is crucial to a human-centred design process and empathy allows design thinkers to set aside his or her assumptions to gain insight into users and their needs. Librarians used empathy for library users and a deeper personal understanding of their problems and needs. Depending on time constraints, a considerable amount of information was gathered at this stage to use during the next stage and to develop the best possible product or services. A 09-question questionnaire was designed and circulated to students to fulfil the need of this stage. A total 95 students of III year were involved in this process⁹.

Define the Problem

During the Define stage, librarian received the user problems and gathered during the empathize stage. Librarian analysed, observations and synthesized the problems in order to define the core problems that need the solution and Problem statement in a user-centered manner.

Through this phase, the design team gained insights on to defining, ideating, prototyping, and testing solutions that truly addressed students' needs and emotions.

1. Accessibility: Ensuring that the library is easily accessible to all members of the student community, including those with disabilities or mobility constraints.
2. User Engagement: Enhancing user engagement and interactivity within the library to make it a more inviting and dynamic space.
3. Digital Integration: Finding ways to seamlessly integrate digital resources and technology into the library to meet the evolving needs of users.
4. Space Utilization: Optimizing the layout and functionality of the library space to cater to different learning and collaborative needs.
5. Content Relevance: Ensuring that the library's collection aligns with the diverse interests and requirements of the student community it serves.
6. Student Community Outreach: Strengthening community outreach and involvement to make the library a central hub for learning and cultural enrichment.

The specific problem statement would be developed through user research and empathizing with library users to understand their needs and pain points, ultimately leading to a more focused and actionable design challenge.

Ideate

At the third step of the Design Thinking process, the librarian was prepared to begin coming up with concepts. The librarian now began to 'think outside the box' in order to come up with fresh answers to the given problem.

Prototype

The librarian was prepared to offer the best option, simplified forms of the good or service, or a particular feature. In a small user group, the librarian tested the product and services. For every problem that was recognized in the first three stages, the goal of this exploratory phase was to find the most promising solution. Implemented in the prototypes, the solutions were assessed and, depending on the experiences of the users, either approved, improved, and reexamined, or rejected. The librarian ended up with the best solution to the challenges at this point.

Rapid Prototyping

The librarian had the opportunity to make and develop the solutions to the issues raised during the prototyping stage. Numerous revisions, alterations, reassessments, and replications of a prototype were made in response to user (or student) needs.

Test

In the five-stage model, this is the last stage. The new library design was suggested by the students. Changes and adjustments were made even in this phase to rule out solutions to problems and gain the most comprehensive understanding of the product or services and its users¹⁰.

III. Result & Discussion

The questionnaire was designed based on students feeling and suggestions during the empathy and define stages. The following (Table no 1) shows the questionnaire that was framed to redesign the library facility.

Table no. 1. Survey Questionnaire for library facility redesigning

S.No	Question
1	How important is it for you to have access to lessons or workshops within the library?
2	Do you visit library to look for information (for example research related to some activity)
3	Preferred Furniture Usage
4	How important is it for you to have access to power outlets near your preferred seating area?
5	What aspects of furniture quality are most important to you?
6	How often do you use the library's OPAC system for searching for books or other materials?
7	Would you prefer to access library resources and services through a mobile app?
8	What features would you like to see in a college library app?
9	How user-friendly do you expect the app to be in terms of navigation and accessibility?

The above questionnaire was circulated to 95 students of higher classes for the responses. The data of student's responses to the questions were collected and depicted in (Table no. 2) and (Fig. 4).

Table no. 2 Students Response in Questionnaire

Question	Sub Question	Response
How important is it for you to have access to lessons or workshops within the library?	Very Important	12 (12.5%)
	Important	29 (30.2%)
	Neutral	40 (41.7%)
	Not Very Important	15 (15.6%)
	Not Important at All	08 (8.3%)
Do you visit library to look for information (for example research related to some activity)	Never	11 (11.5%)
	Sometimes	86 (89.6%)
Preferred Furniture Usage	Individual study tables	53 (55.2%)
	Group study tables	37 (38.5%)
	Lounge seating	28 (29.2%)
	Reading chairs	40 (41.2%)
	Standing desks	08 (8.3%)
	Other (please specify)	04 (4.2%)
How important is it for you to have access to power outlets near your preferred seating area?	Very Important	58 (60.4%)
	Somewhat Important	36 (37.5%)
	Not Important	04 (4.2%)
What aspects of furniture quality are most important to you?	Comfort	83 (86.5%)
	Ergonomics	28 (29.2%)
	Aesthetics	36 (37.5%)
	Size and layout	10 (10.4%)
How often do you use the library's OPAC system for searching for books or other materials?	Daily	1.6 %
	Weekly	10.4 %
	Monthly	1.6 %
	Rarely	26 %
	Never	60.4 %
Would you prefer to access library resources and services through a mobile app?	Yes	90 (93.8%)
	No	07 (7.3%)
What features would you like to see in a college library app?	Search for books and resources	77 (80.2%)
	Check availability and reserve books	78 (81.3%)
	Access e-books and e-journals	67 (69.8%)
	Receive due date reminders	72 (75%)
	Explore library events and announcements	41 (42.7%)

How user-friendly do you expect the app to be in terms of navigation and accessibility?	Very user-friendly	68 (70.8%)
	Somewhat user-friendly	21 (21.9%)
	Neutral	14 (14.6%)

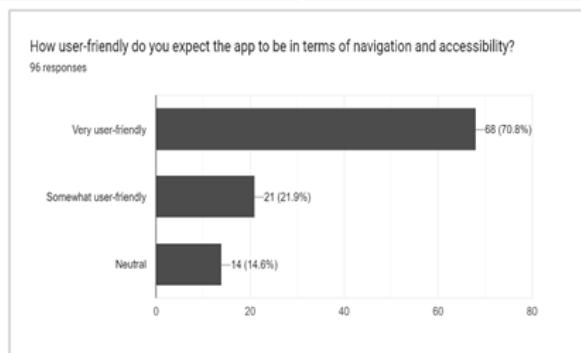
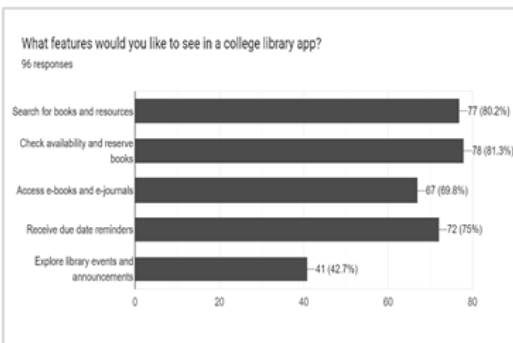
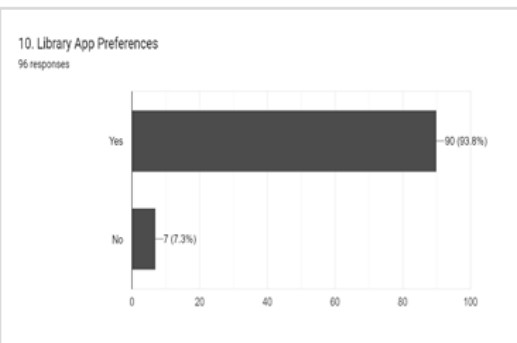
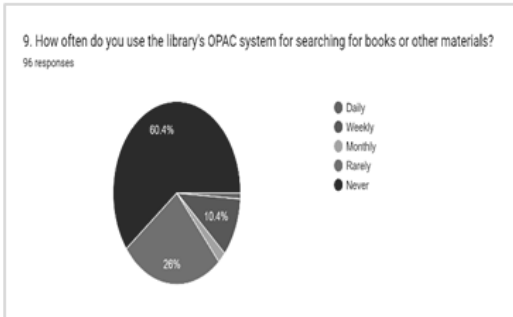
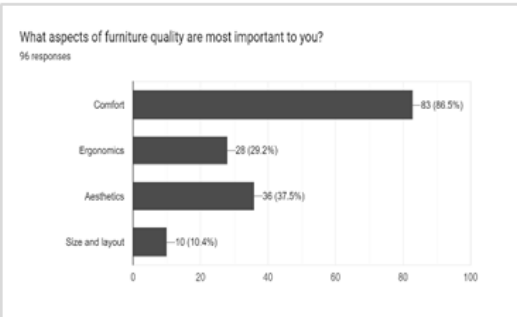
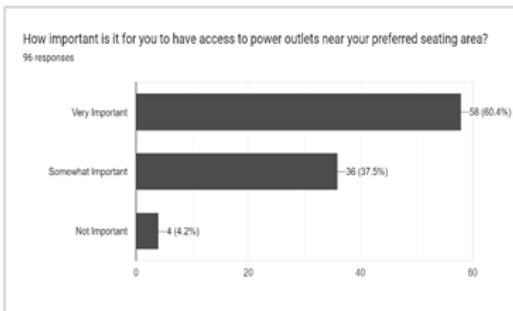
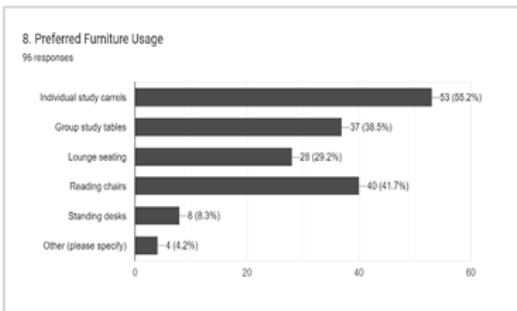
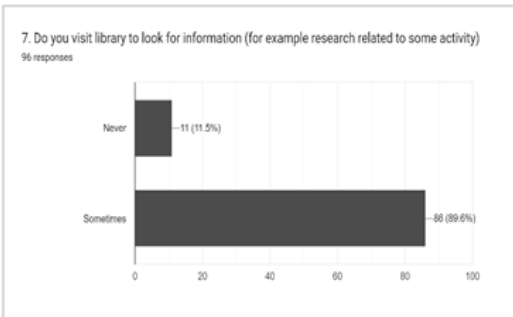
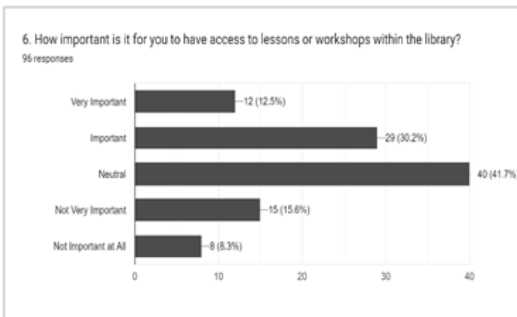


Fig.4. Illustration of Students Response in Questionnaire

Using the data of response of students on different defined Problems of library facility areas of improvement were identified by the librarian.

- Redesigning the physical layout to promote collaboration and learning spaces.
- Implementing a user-friendly mobile app for catalogue/book access and reservations.
- Integrating virtual reality for immersive learning experiences.
- Creating a personalized book recommendation system.
- Hosting community events and workshops.

Accordingly, a prototype of new layout for library was designed as shown in Fig.4.

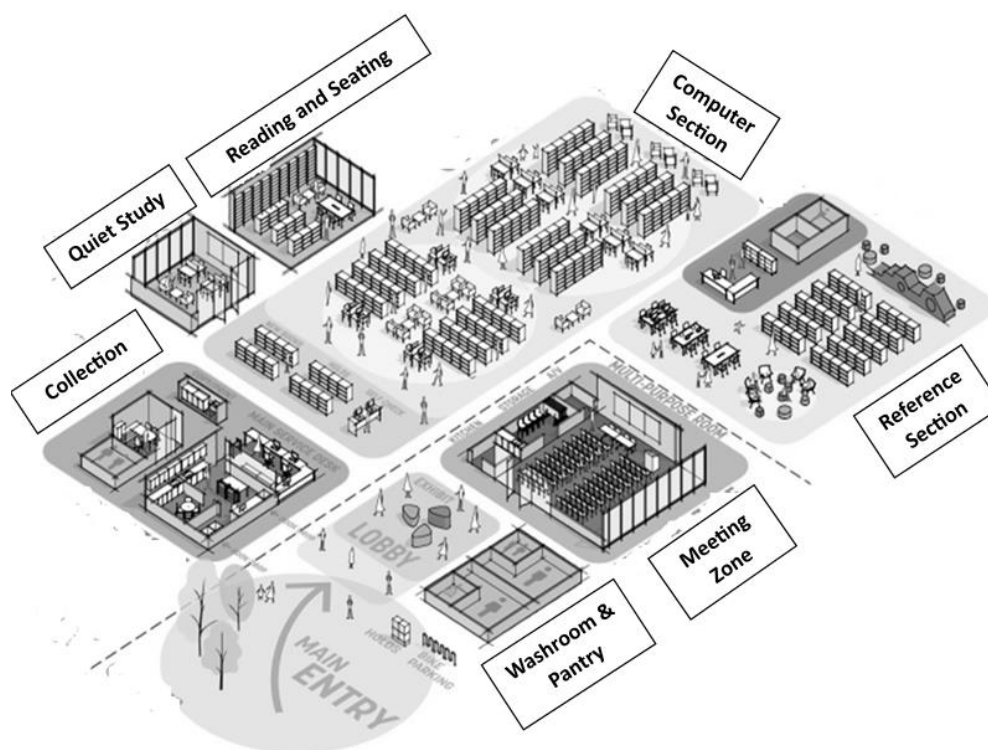


Fig.4 Illustration of prototype of new layout for library designed on the Basis of Student's Feedback

IV. Conclusion

By applying design thinking principles, Smt. Kishoritai Bhojar College of Pharmacy could successfully prepare a prototype for its library and information centre into a modern and engaging space that addresses user needs and preferences. The redesign not only will improve the resource accessibility but will also enhance collaboration and the overall learning experience for the students.

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