

**DESIGN THINKING AND PROBLEM SOLVING SKILLS AMONG STUDENTS
USING THE MIND MAPPING TECHNIQUE- A CASE STUDY****Dr. Rajdeep K.Manwani**Professor & Head Academic Research, Sindhi College, Bengaluru,
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Principal@sindhicollege.com**Dr Padmavathy.K**Professor & Head, English Department Sindhi College, Bengaluru
Padmavathyaishu19@gmail.com**Abstract**

The ultimate outcome of higher education is to make graduates ready to take over the future challenges and excel in their career. This career can either be working as employee (in private company / Government sector) or be a leader of self-start-up (entrepreneurship). Problem solving ability and critical thinking have undoubtedly remained the most essential skills expected from graduates by employers as well as investors / money lending agencies of a start-up. Problem solving ability goes beyond professional life, where it is needed even to manage and lead a happy personal life. The success celebration of any solution depends mainly on how the problem solvers have defined the problem. It is rightly said, 'A well-defined problem is half solution done'. Design Thinking is a method of solving problems addressing humans' needs and desires in a technologically feasible and strategically viable way. It focuses on achieving practical results and solutions in a multi-disciplinary way. This work describes the use of mind-mapping technique in defining effective problems, ultimately enhancing the problem-solving ability amongst learners with a focus on using Design Thinking approach of Problem-Solving.

Key words- Design Thinking, problem solving, mind-mapping**Introduction**

The 21st century is about new challenges and problems which require a new set of skills. The world around us is evolving rapidly, and students in higher education need to learn essential skills such as critical reasoning, problem solving and critical thinking. Many studies have shown that students today need to develop these skills to solve key real-world problems. Because of the importance of these skills, many education institutes are trying to incorporate these skills into their curriculum. The role of teachers thus increases in finding the innovative methodologies to serve the purpose and facilitate students to acquire these skills.

Need for Developing Problem Solving Skill

In the past, students followed a mechanical progression in education. Every year posed new challenges and concepts for them as they undertook a standardized, one-size-fits-all curriculum and examinations. Education was concerned with getting the correct answer and scoring high grades, to reach the next level. There was little room for out of the box thinking that considered innovative solutions. The more information students could retain and regurgitate, the better equipped they were for an exam, ultimately translating to their real-life success. As a result, students were kept astray from practical skills and complex real-world problems they would eventually face after finishing their formative years in school and college. However, the 21st-century problems require both theoretical as well as practical knowledge. Students need to think out of the box to find suitable solutions to new and upcoming challenges. The ‘National Education Policy – 2020’ also aims at helping students develop problem-solving skills and make them more fit for future challenges and opportunities.

Concept of Problem- Solving

Problem-solving is a systematic process that involves critical reasoning and thinking to find a suitable solution to problems to achieve desired objectives. Following are the reasons why problem-solving is essential for school students:

- o It helps students distinguish between solvable issues and problems that cannot be solved.
- o It is necessary for preparing students to face complex multi-disciplinary and multi-variable problems.
- o Students who learn problem-solving skills often have a deeper understanding of causality.
- o When students solve complex problems individually or in a group, they become more resilient. They learn to look at problems from a new and different perspectives. Therefore, it makes them capable of taking more calculated risks.
- o Problem-solving is essential to a student’s development because confident and productive students usually grow up as successful and confident employees as well as managers.
- o When students practice problem solving consistently, they can develop better social and situational awareness.
- o Employers always demand individuals who can work in a group and can jump out of their inherent thinking mode, especially since many of the challenges that the world faces today are unique and new.

The World Economic Forum has also recognized problem-solving skills as one of the ten essential 21st-century skills. A focus on problem-solving during the years of graduation helps students be more resourceful, confident, and think methodically. It enables students to find constructive and unique solutions to the problems of current times. Parents and teachers need to focus on these skills for their child’s overall development.

Methodology of Problem Solving - Design Thinking for Creative Problem Solving

Out of the different methodologies adopted for problem solving, Design Thinking is an important and advanced one. Design thinking is a philosophy as well as a process aiming to find innovative solutions to the problems. Design thinking started out as a process for creating sleek new technology and products. But this methodology is now widely used across both the private and public sectors, for business and personal projects, all around the world. Design-thinking methodology was popularized by design consulting firm IDEO. The methods gained momentum in the larger business world after Tim Brown, the chief executive officer of IDEO, wrote an article in 2008 for the Harvard Business Review about the use of design thinking in business—including at a California hospital, a Japanese bicycle company, and the healthcare industry in India.

Design thinking is a process for solving problems by prioritizing the user’s needs above all else. It relies on observing, with empathy, how people interact with their environments, and employs an iterative, hands-on approach to creating innovative solutions. Design thinking is “human-centered,” which means that it uses evidence of how consumers (humans) actually engage with a product or service, rather than how someone else or an organization thinks they will engage with it. To be truly human-centered, designers watch how users use a product or service and continue to refine the product or service in order to improve the consumer’s experience. This is the “iterative” part of design thinking. It favours moving quickly to get prototypes out to test, rather than endless research or rumination. In contrast to traditional problem-solving, which is a linear process of identifying a problem and then brainstorming solutions, design thinking only works if it is iterative. It is less of a means to get to a single solution, and more of a way to continuously evolve your thinking and respond to user-needs. Though there are different blends of design thinking methodologies, here, the basic methodology is explained:

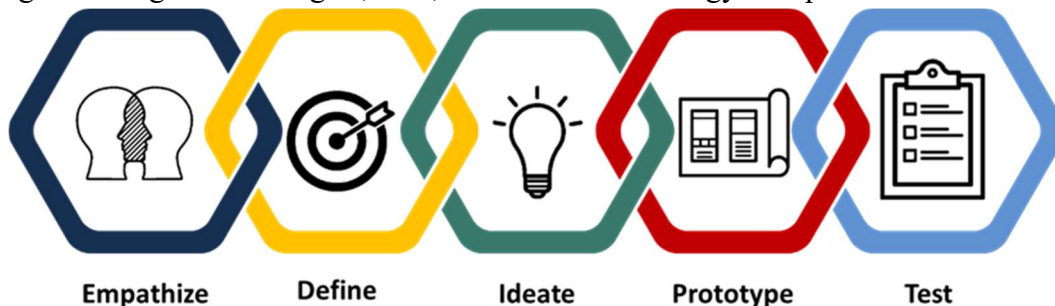


Fig.1 Stages in Design Thinking

Empathise – In this first step, a high understanding of users and their requirements is gathered by following empathising with users and conducting interviews of the users. A deep dive is taken into user-needs and their emotional insights associated with the problem. It generates a broad list of activities, requirements, challenges, emotions and so on.

Define –This stage comprises of analysing the complex (mixed) data received in earlier stage of empathising. It requires skills such as sorting the data, categorizing the data, data interpretation and interlinking the categories of data. As the saying goes, ‘A well-defined problem is half solution done’, this stage is the most critical stage in problem solving.

Ideate – This stage includes the ideation process for getting multiple solutions to the problem.

Here, all the possible ways of solving the problem are discussed and brainstormed and the most suitable or the solutions addressing maximum user-needs are finalized for next step. It applies use of the knowledge base, creativity, science and technology.

Prototype – The ideas which were shortlisted in earlier stage are further taken up for prototyping wherein the models of these solution ideas are made out using sketches, flowcharts, wireframes, software, physical models from cheap materials, etc.

Test – After preparing prototypes, its time to validate the chosen solution ideas. Goals and evaluation criteria are set and observations/feedback about performance of the prototypes are noted down. Further, a comparative study of these results is done to optimize and find a final solution to the given problem.

Using Mind-Mapping Technique for Formulating Problems in Design Thinking (Define Stage of Design Thinking)

Einstein nailed the definition of problem solving. He said, “The formulation of the problem is often more essential than its solution, which may be merely a matter of mathematical or experimental skill.” It is very clear that including the highest possible variations and extractions of data obtained prior to problem formulation, is very important in problem solving. Further, interpretation of the bulk data can be made easy by understanding interlinking of the categorized data. Thus, there is a need of some special effort to be put in problem formulation which shall include all the required aspects as well as it shall not confuse the ones into the process. Mind maps are a one-of-a-kind way to stay organized as well as an effective way of sharing detailed information. Mind maps are an excellent way to be creative while also connecting your findings.

Mind mapping is a great way to brainstorm, plan, or turn ideas into the steps needed to make it real. This technique was developed by Tony Buzan. Mind Mapping is a technique of visual representation to show relationship between various ideas, concepts or other information. It helps in project planning, collecting and organizing data, brainstorming and solve problems. The mind maps can be prepared by using colour pencils and papers. Today, we also have digital tools for the same.

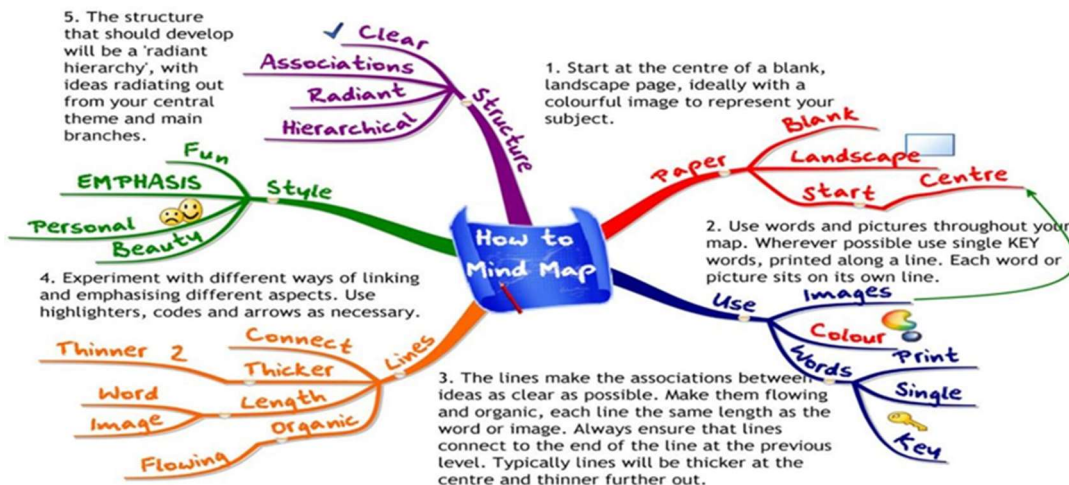


Fig.2 Mind-Mapping Process

Steps used in Mind-Mapping

- o All mind maps begin with a main concept or idea to which rest of the map revolves around, so choosing that idea or topic is the first step. Begin by creating an image or writing a word which represents that first main idea.
- o From that main idea, create branches (as many as needed), that each represent a single word that relates to the main topic. It's helpful to use different colours and images to differentiate the branches and sub-topics.
- o Then, create sub-branches that stem from the main branches to further expand on ideas and concepts. These sub-branches will also contain words that elaborate on the topic of the branch it stems from. This helps develop and elaborate on the overall theme of the mind map.

The best way to explain a how to mind map is by using the mind map itself (refer figure 2).

Case Study –Applying Mind-Mapping Technique to Formulate Problems from Empathy Data obtained for Persons with disability

A batch of students of Third Year (Bachelor of commerce –B COM Course) was assigned to formulate problems for the persons with disability as an assignment work for the subject of 'Creativity and Inovation'. They were expected to follow the initial step of design thinking i.e. Empathising with the users as explained above. They had to collect empathy data by:

1. assuming themselves as persons with disability
2. gathering observation data from their peers
3. conducting interviews of the real persons with disability

Further they had to list out all the activities of the concerned people, put up the variation cases in these listed activities and finally find out the pain points leading to possible problem statements.

The students completed the task and had brought the information. It was observed that they were not in a position to summarize the information and come up with the concluding remarks. They were overwhelmed by the amount of data and variety of data they obtained. Some of the students were confused and were not in a position to finalise the problem statements.

Further these students were trained to develop mind-maps as discussed earlier and asked to apply the mind-mapping technique to the empathy data of the persons with disability. It was observed that, the process of developing mind map based on the information they collected, facilitated them to categorize the data, set-up correlations and present the summarized form of information in an effective and easily understandable way. The simple mind-map as shown below was developed in a brainstorming session. Further, the map was taken up for next brainstorming session that led to the formulation of the problem statements. The same is also represented in figure.3 below. A significant shift in the problem-solving approach of students was observed and the activity gave a boost to these students as they could overcome the feeling of overwhelming and confusion with the help of mind- mapping technique.

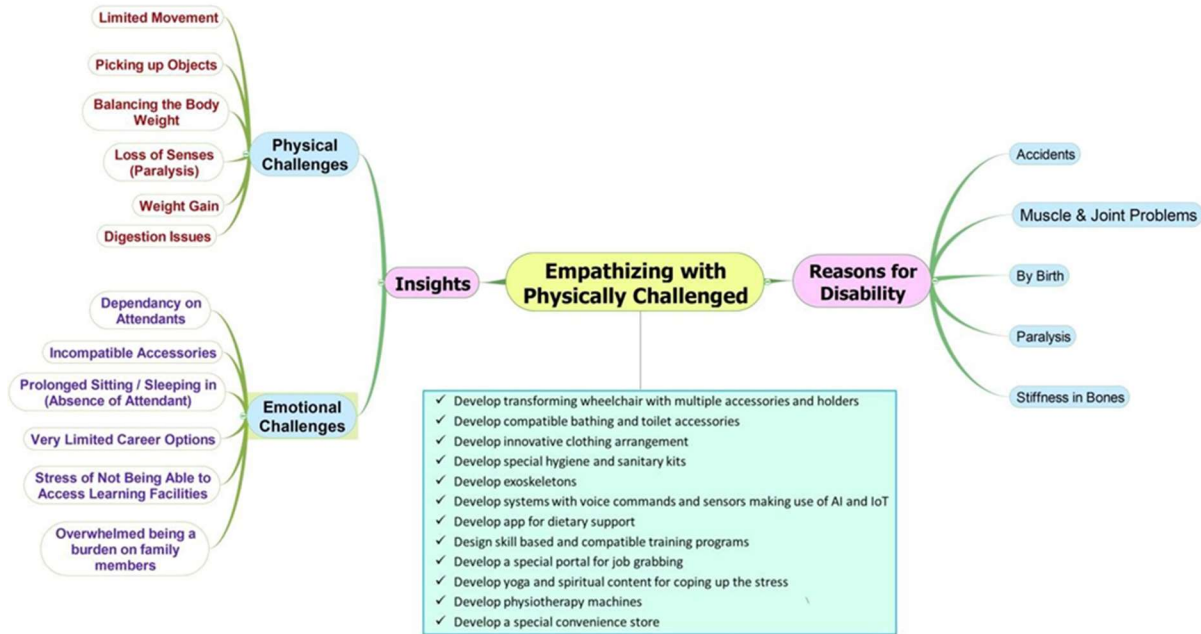


Fig.3 Mind-Mapping of Empathy Data Obtained from Persons with disability

Conclusion

The following conclusions are drawn at the end of this work:

1. Problem Solving skill is an essential skill to be imparted to students in a view to comply with the National Education Policy – 2020 and prepare students for future challenges and opportunities.
2. Use of Design thinking approach focuses on the formulating an all-inclusive problem due to inclusion of high-level empathising with the user before defining the problems to solve.
3. Mind-mapping is an effective tool to organise and present information for brainstorming and likewise ideation sessions.
4. Use of mind-mapping facilitates organising empathy data, establishing co-relations between various data categories related to user and thus helping students to formulate problems effectively.
5. This way of blending the methodologies, encouraged students and helped them to overcome confusions and overwhelming caused due to random data received.

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