Introduction of design and design thinking to highschool students, using new media technology

B.Des Project Project- 2 (batch -2020)

Shuvam Bharti 16U130026

Guide: Prof. Ravi Poovaiah



Declaration

I declare that this written report represents my final year project, where I create all the ideas and materials. I have adequately cited and referenced the sources when-ever others' ideas, images, or words are included.

I also declare that I have adhered to all principles of academic honesty and integrity. I have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke a penal response from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Student's Name : Shuvam Bharti Roll No. : 16U130026

Signature: Date: 9th July 2020

Approval Sheet

B.Des. Project "Introduction of design and design media technology" by Shuvam Bharti is approved Bachelor of Design.	
Guide :	Internal Examiner :
Chairman:	External Examiner :

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1 Overview

Abstract

In the current globalized world, there is hardly any boundary between goods and products that everyone is consuming. To meet the global standards, all the designed products and services ignore its effects on different culture and people. Often, this unthoughtful consumption and introduction of such products leave a long-lasting environmental and cultural dent. Understanding how things are made and the thought process behind can probably give a better understanding among people about products and their effects. Design education creates this opportunity to become more sensitive towards this consumption.

The design process includes knowledge-gathering, analysis, discovery, and conceptualization resulting in a problem-solving activity, which in turn leads to experiential learning.

In this digital world of learning, high school can hardly find proper design learning material or platform at an early age as it asks for extra efforts and does not actively complement other subjects.

The introduction of the design process among students also aims to bring out those curious minds who might ask questions about their new and old existing beliefs, trends and create their own meaning out of it.

Objective

Being from a non-metro city, I hardly had any knowledge about design or rather had very rudimentary knowledge about design. Thus, this project allow me to help other students like me who may gain a better understanding about design compared to me when I was in school and get an ahead start.

Having this belief that "One can say that he or she knows something only if they know how to teach it to others." I am a final-year student exposed to the design and design process, its implications, and its limitations. This project provided me the opportunity to reflect on my last four years of experience. And as this project is a challenge in itself to achieve as everyone has their perception of what design is, redefining it for specific age groups not only furthered my knowledge about it but also took me back to my learning years when prof. Mandar Rane, in a course, asked, "What is design?" I still have an evolving definition of design, and this project gave me a new perspective.

Introduction

This project aims to enable high school students to relate more to there learned science and mathematical studies at an early age and understand the application in real-life scenarios. Introducing Design to high school students makes it one of the best ways to do so, as it makes students critical thinkers, open-minded and exploratory, giving them a tool to understand their surroundings and culture.

It creates awareness about Design among students, which can play a significant role in finding appropriate solutions to local problems.

Project try to make the learning of the design process combined with the science concepts such that it doesn't feel like an extra effort added to their already existing course work keeping in mind that the provided solution is going to complement students already existing subjects rather than a stand-alone subject. Most of the solutions thought are such that it can be procured readily by the students, mainly belonging to middle-class families.

2 Resarch



[0]Fig. 2.1, Designing for Children educational meet

"A National meet on introducing 'Design and Innovation' in school curriculum was held at IDC, IIT Bombay, during February 2009. A report was submitted as a set of recommendations to the Ministry of Human Resources and Development and the various directorates of school education. The outcome of the meet was the report on introducing 'Design and Innovation' in school Curriculum in India." This report sets the initial ground for the project. It gives detailed insights on the introduction of design education and its challenges that can be faced in India and sets the requirements one should fulfill for proper training. It introduces three significant fieldsets that any solution should define (i) Curriculum (ii)methods of learning design (iii)modalities for implementing the solution.

It also introduces a different set of philosophies of design education, for instance, should Design be introduced as a method for teaching? Or Should Design be taught as a separate subject?

And what could be a holistic method of teaching?

This project has an initial constraint to use new media technology to meet the future need of teaching design. Hence, the next study involves a detailed analysis of platforms that teach different concepts using new media like applications, interactive videos, etc. It included a broad spectrum of case studies that involve free platforms like youtube, educational platforms like khan academy, and design exhibitions in museums like Moma.

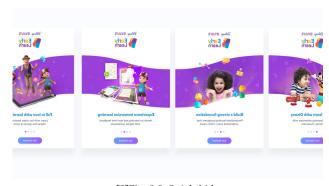
Byju's Educational Platform

Byju's is an online tutoring firm; they use lecture videos for teaching. They have their mobile application and website where one can make their account to save their progress. In Byju's videos instructor explains concepts using animations and storytelling for concept explanation. They provide options to consult a professional anytime and get you more personalized feedback. (Fig 1.1) Most of the videos use English as a teaching language, and they divided videos according to standards, and each standard class comes as a package.

To teach children of younger ages, they try to make learning through games that are more interaction-based to keep the children involved, attentive, and have fun while learning rather than watching videos. (Fig 1.2)



[1]Fig. 2.2, Byju's website

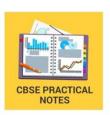


[2]Fig. 2.3, Byju's kids















BYJU'S





The Learning App

JEE/NEET Commerce Bank PO IAS BYJU'S Home Learning Program

O/O

Avail No Cost EMIs on BYJU'S Courses

Class 1-3 Class 4-10 - CBSE/ICSE/State Board JEE/NEET Crash Course

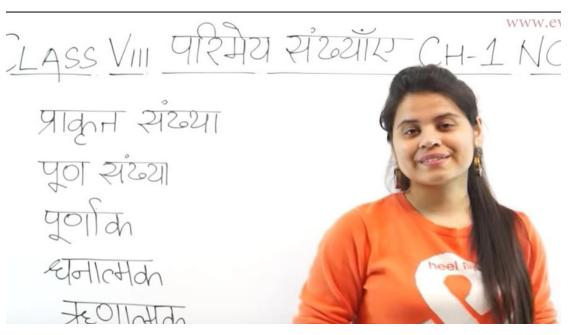
[3]Fig. 2.4, Byju's reading materials

[4]Fig. 2.5, Byju's Loan

Byju's provides not only lectures but also offers extra useful source material for further reading like a compilation of different science projects, practical notes, sample papers, previous year exam papers, etc. It enables students to go beyond their course study and syllabus.

They have a good understanding of the Indian market, which shows skepticism in new products or adapting to the new way of doing previous work. They provide not only trial subscription but also an option to choose for installment payment for different courses. They even realize that everyone cannot afford their course materials in one single payment; to tackle this, they also provide financial support in loan for the amount.

Youtube (E-Vidyarthi Channel)



[5]Fig. 2.6, E-vidyarthi a youtube channel

Youtube, a video-sharing website, allows people to share videos freely, and hence it has become one of the significant places people share their skills and knowledge. One of them is the E-Vidyarthi channel. In this channel, instructors explain the concept on a whiteboard. It's like simulating a classroom teaching between a teacher and students. But being a youtube channel, it has its constraints like all the teaching is unidirectional. One cannot ask questions, so it's like only learning no feedback, and even though they have a comment section, there are a lot of unrelated questions and answers. One of the good things is that one can get all the teaching in their regional language.

Youtube (Open University Channel)



[6]Fig. 2.7, Open university youtube channel

Open University is one of the educational channels on youtube. Other than their free videos, they also have certified courses on different subjects. Their youtube channel videos majorly use animation and storytelling with voice-over background to explain concepts or talk about history. Like other youtube channels, it is unidirectional teaching with no feedback. They use English as there teaching language.

Swayam (Design and innovation)

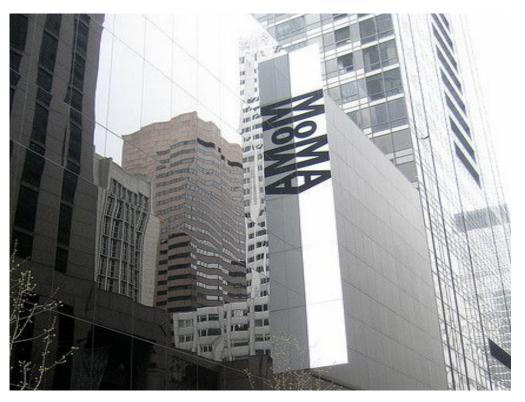


[7]Fig. 2.8, Swayam, design and innovation

Swayam is also an online educational initiative of the Indian government. It contains lecture videos from 8th standard till Postgraduate.

Design and innovation are one of its courses which uses storytelling creatively to explain what is design through different design case scenarios and real-life experience of designers. Videos Are divided into modules and try to give how design may have different meanings in different contexts and how they influence culture and society. Here users can ask questions on the discussion forum, and you get reference material as well as assignments by the end of each module. Being a government initiative, they offer course lectures are in different regional languages.

MoMA



[8]Fig. 2.9, Museum of Modern Arts

The Museum of Modern Art is an interesting case study. It not only has an excellent collection of design antiques but also has its stories and evolution of design objects and its production process. They conduct regular exhibitions and workshops for children and parents as well with Planed School visits. They even do special workshops for people with disabilities and workshops for teachers on how to incorporate modern and contemporary art in classrooms.

Apart from exhibitions and workshops, they also have online courses, which can be accessed by anyone throughout the globe as many people can't visit the museum.

Conclusion

As we go through all the case studies, we can identify that most educational teaching firms choose to reach their users through either websites or mobile applications to maximize their reach. Even though most of them majorly use videos as a medium of teaching, they differ widely from animations, recordings of real-life lectures, interviews, etc. There is a new emerging trend, where the educational content is being made into digital games to make learning more fun and interactive. One of the things that can be observe is that among all the studied educational hubs, they do not have any specific design courses or application-based teaching for Lower or Higher secondary standards. And even if there are some design related courses available, they are entirely disconnected from Highschool syllabus.

This study brings the important concern of affordability and accessibility as this project targets middle-class families; the target audience should be able to readily acquire the solution. From personal observations acquiring a physical product for extra learning in high school, when board exams are introduced, it will be a rare case in a middle-class family. Hence like previous case studies, a website or mobile application does tackle this problem of affordance.

3

Curriculum

As the medium of teaching becomes clearer, the next set of questions arises, like what should be taught in design education? Should it be hands-on learning or theoretical transfer of knowledge? How much of information and knowledge can students handle? Should it be one to many kind of teaching or many to one kind of teaching? Should it be integrated with other subjects, or should it be a stand-alone subject? With these questions in mind, the next study involves analyzing the high school design syllabus of different countries. The countries are chosen such that it has a variety of population, culture, and demography.

Singapore Design Syllabus



[12]Fig. 3.1, Singapore Flag

Design teaching in Singapore is made as a stand-alone subject. It provides a learning platform where pupils undertake a series of projects progressively to consolidate their learning and acquire new knowledge and skills. These projects range from teacher-controlled structured projects, at the start, to pupil-driven open-ended projects that are based on real-world contexts.[9]. Their aim through D&T education is to build on the innate human ability for pupils to grow their confidence in sketching and making to create and innovate.

They divide their design content into two parts, namely (i) Design and (ii) Technology. Health and safety is one crucial aspect taught together with the respective contents.

The design section involves: Analysis, Idea Conceptualisation, Development, Research, Prototyping, design brief, design specifications visual use of line, circle, sphere, cube, cone, pyramid, crating, ability to understand anthropometric data, ergonomics, user, functionality, environment, size and proportion, materials, construction methods, aesthetics, structures, mechanisms, electronic orthographic projection, proportion, dimensioning, symbols, materials list of isometric/perspective crating and color pencil rendering.

Whereas Technology section involves: understanding of basic modeling materials, toughness, durability, stiffness, strength, hardness, elasticity, Explore different materials like wood, metal, plastics by marking out, shaping, joining, and assembling and finishing. Learn the functional properties of batteries, switches, light-emitting diodes, resistors levers, linkages, pulleys, gears natural and human-made structures, frame and shell structures, static load, dynamic load, tension, compression, bending, torsion, shear, gussets, and braces.

They follow many to one teaching method, where learning is a partnership between teachers and pupils. Pupils are assessed through the Design Project that requires demonstration of the learning outcomes across the content sections. In which project consist of 80% marks and report 20% marks.

Papua New Guinea Design Syllabus



[13]Fig. 3.2, Papua New Guinea Flag

One of the rationales behind introducing D&T in Papua New Guinea is that it aims to provide life long skills and opportunities for students who return to the communities to live a productive life as well as for those who will go onto work or further study as their present economy in Papua New Guinea makes it difficult for most students to gain formal employment after they leave school.

Their curriculum principles try to keep the cultural relevance, use of vernacular language in teaching, ethics, and morals values, attempts to remove gender baise and give equal opportunity to students with special needs.

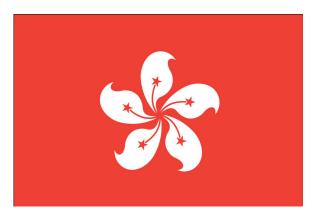
The key focus of their curriculum of D&T subjects is to provide all students with real-life and relevant learning experiences. And make it essential that students are aware of and value community and local knowledge and realize that learning takes place inside and outside the school context. [11]

They introduce D&T as an elective subject among, Practical Skills, Home Economics, and Computing from which students can choose either two.

The content of D&T is divided into four parts which consist of, Traditional and modern technologies: which include a comparison of materials used in the production of traditional and contemporary items such as boats, clothing, Bilas, crafts, construction techniques, and tools – conventional and modern communication and information technologies, for example, development of telephone, television, computers, etc. Elements of design: necessary drawing skills, size, shape, color, and texture, function, utility, and aesthetics. Design and technological change: understanding the impact of design and technological change on everyday life, appropriate technology – adaptation and sustainability—the design brief: steps in the design process, applying the design process to make a product.

The students' assessment is based on provided two tasks in 1st task students asked to develop diagrams, charts, models, or an annotated collection of at least two items highlighting changes in design and technology and the impact of those changes. 2nd task involves designing and constructing a child's toy, musical instrument, model, ornament or other item using found materials such as cans, styrofoam, etc. [11]

Hong Kong Design Syllabus



[14] Fig. 3.3, Hong Kong Flag

Prediction of Technological Changes in the Future Hong Kong syllabus aims at providing learning opportunities for students to develop the technological awareness, literacy, capability, and lifelong learning patterns that students need to live and work effectively in an ever-changing technological society.

Their syllabus is an activity-based and project-based approach that emphasizes knowledge, hands-on experience as well as practical skills, and they avoid craft-based, and skill training works. In addition, teachers are also encouraged to use appropriate Information Technology (IT) tools during the teaching and learning of Design & Technology, especially in computer-aided design, information acquisition, processing, and presentation. [10]

The content of D&T is divided into four parts which include:

- (1) The Nature and Impact of Technology for Yesterday, Today & Tomorrow in which students understand the difference between natural and man-made objects through different examples and inventions and try the prediction of technological changes in the future.
- (2) Design and Communication in this, they learn about design considerations, the introduction of the design process, and graphical communication.
- (3) The Tools and Machines of Technology which involves hands-on skill learning workshop safety, common tools and machinery used in technology,
- (4) Characteristics and Properties of Different Materials.

They acknowledge that the primary function of course work is to test skills, knowledge, aptitude/behavior changes, or educational attainment, which cannot be easily or reliably tested in a final examination. Hence they assess students based on their continuous performance of practical skills and project work.

Conclusion

Through the following study, it is clear that design education is a vast subject that involves Analysis skills to compare and understand surroundings, design process, aesthetics, practical skill to understand the function and use of machinery, practical understanding of the material, and its properties, documenting and marketing of the output. In all the case studies, the design is introduced as a separate subject, and it is divided into smaller parts to be taught in 3-4 years of duration. Except Singapore teachers do the complete assessment. All the countries follow project-based teaching. Where in the end, students are asked for a group or solo project.

Acknowledged Constrains

The study of the Design curriculum shows the vastness of design education. Any solution introduced for 3 - 4 years of time frame doesn't seem like a feasible task. Hence a specific section of the design education should be targeted for this project. And as the curriculum is constrained likewise, the targeted audience should be restricted as well. Catering the need for a whole of high school students is a massive task for a solo project with 4 and 1/2 months of duration.

There are certain aspects of design education that must be included like ways of evaluation, exploration of a new skill, hands-on experience, and increase in understanding of surrounding designed object.

4

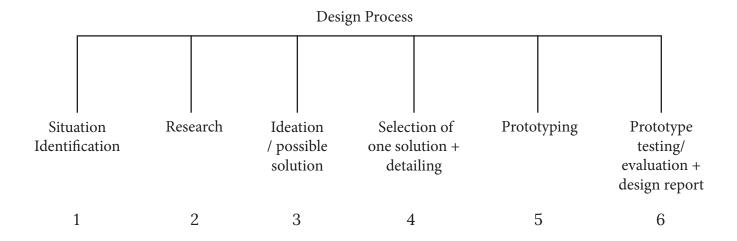
Main Stream Subject's Syllabus

As previously discussed, the constraints of the audience. This project aims to target only 8th standard students and their needs. As in the 8th standard, science as a subject is further divided into physics, chemistry, and biology, hence providing segregation to the complex topics. Following are the identified topics of science and Mathematics of 8th standard that can be introduced in provided solution as their application can be observed in simple day to day life objects: Visualising solids -Front, side and top view, Mapping spaces, Area, 2d/3d -Volume, Intro to the graph, Basic probability and charts, Practical Geometry, Simple interest, and compound interest/tax, Basic concept of light, Material (plastics, non-metal/metal), Electric Current and its effects.

5 Design Education Content

Addressing the previously identified vastness of design education, the content of the design education has been constrained to the Introduction of the design and design process. The aim is for students to have a better understanding of the design and be able to use the design process by themselves. As design has still not been introduced by the government as a subject, any solution presented should complement the other significant subjects.

The design process will include the following steps:



6 Design Brief

From the research done and constrains identified the project brief can be stated as follows:

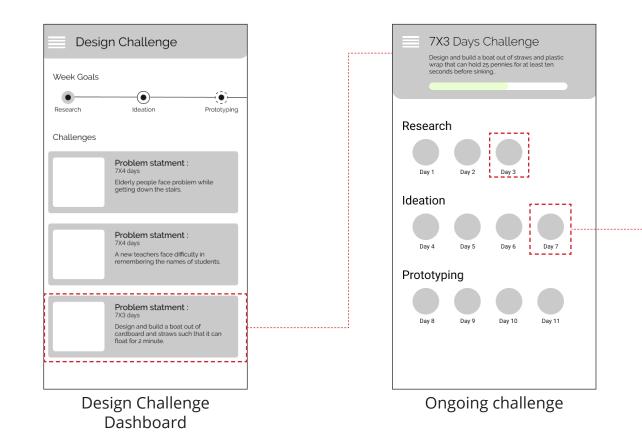
To design a platform for 8th standard students for the introduction of design and design process such that they get hands on experience of design and be able to analyse the outcome they get by following the process.

Following are the goals of the project:

- 1. Brodend the understanding of design among students.
- 2. Make the design process interesting for students.
- 3. A balance between design process, science and maths.
- 4. Ease for students to evaluate the outcome.
- 5. A proper way to share the outcome.

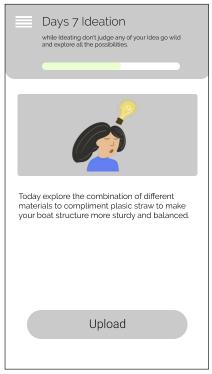
Ideation (A) Design challenge app



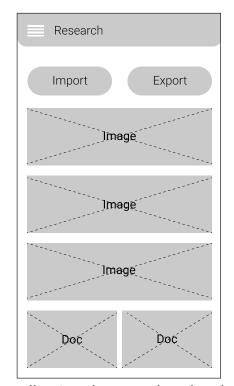


Daily design challenge application is an idea that tries to get students involved in daily step-wise design challenges, in which they not only learn about the design process but also learn how to go about solving problems on their own and reflecting on it. It also helps them to share their design journey on their social platforms.

This Idea introduces the cronstrain of time frame to complete a project. It breaks down design process in further smaller day to day steps and present them as challenges.



Ideation + 8th std concepts

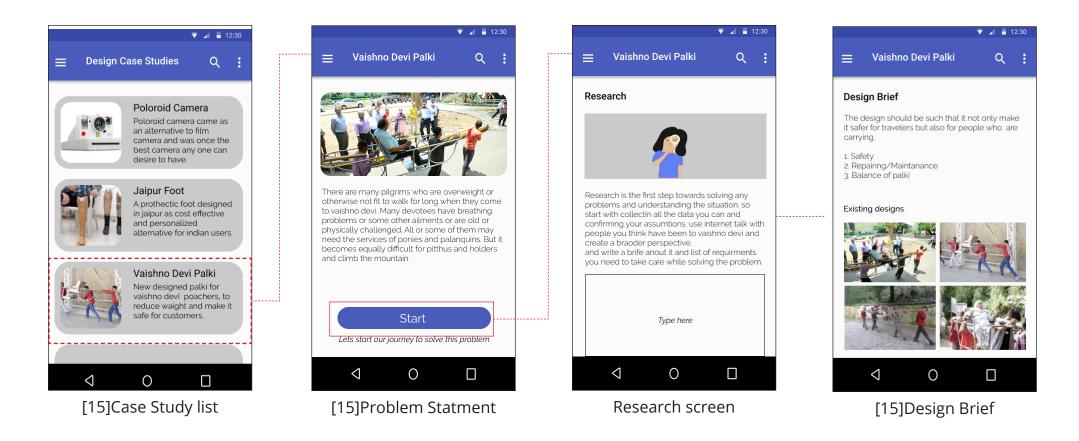


Collecting the completed task

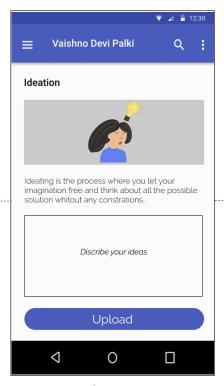
During Ideation phase it integrate the other main stream subject concepts adn provide them with oportunity for a application based learning of different technology.

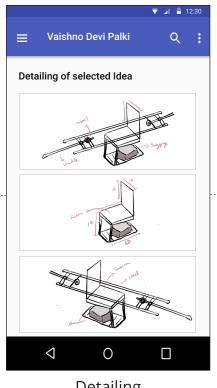
(B) Design Case Studies App

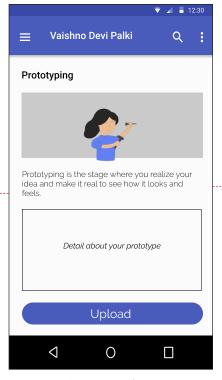


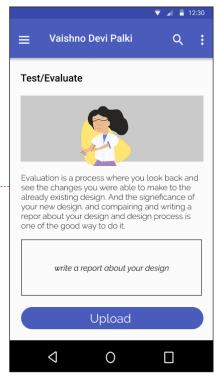


The case study design app helps its user to understand the design process and gives a platform to compare the final product or outcome with an existing design. It enables users to understand with real-life design problem solutions. Here they learn to understand the thinking behind a designed object and its cultural and social importance.





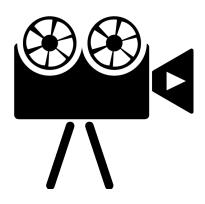




Ideation Detailing Prototyping Evaluation

(C) Science Exhibition Video

The idea is to make an 8-10 min long video explaining what is design process its application, how it can be used by students in doing their science projects and come up with their new ideas. The video explains the whole process through one example of making it.



Flow of the Video with an example of making a boat







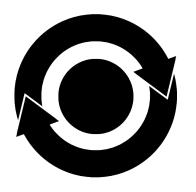


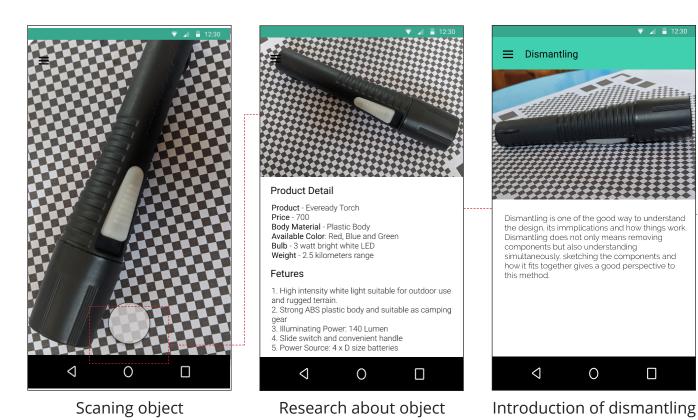






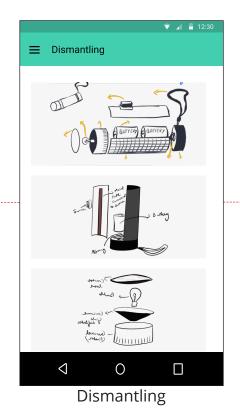
(D) Re-Design app

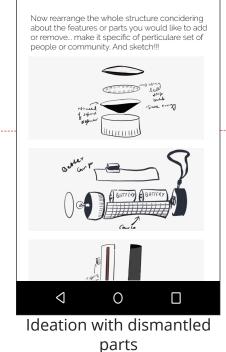




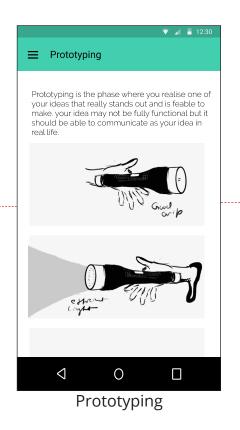
This app helps its user to understand how and why a product is made. It also makes its user more sensitive towards the logic, decision made behind making a product and understanding the design process.

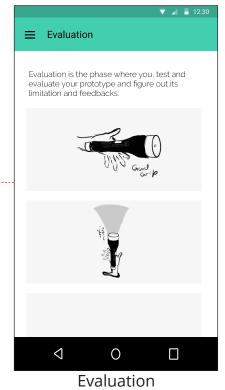
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■ Ideation





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8

Concept Evaluation

In the current scenario of pandamic lockdown, I was luck to find one of my cousion who gave his 8th standard exam last month. Even though I could not take review from any other students it was very helpfull to track down the limitations of the concepts. I aslo took this opportunity to check my biases expectations against these concepts.

MM

	Design Challenge App	Case Study App	Science Exibition Video	Re-Design App
My expctations	It makes the design porcess very simple but lack fun element. It will ask for self motivation.	Comparison with exixting design make evaluation easy but can become overwhelming.	Gives a context to design process and its usability but student might think it as too much work.	Has fun element of exploration but a good designed object is harder to redesign.
User Remarks	Easy to keep on updating the progress. But everyday is too much.	Helps to put forward one's own view. But prototyping can be very difficult.	In Group exhibition the process will help. Will be too much work for a science project.	Possibility of outcome is more. will use juggard. Complex things can be difficult to redesign.
User Impression	★★★☆ 43	***	★★☆☆ ☆	****

9 Final Concept

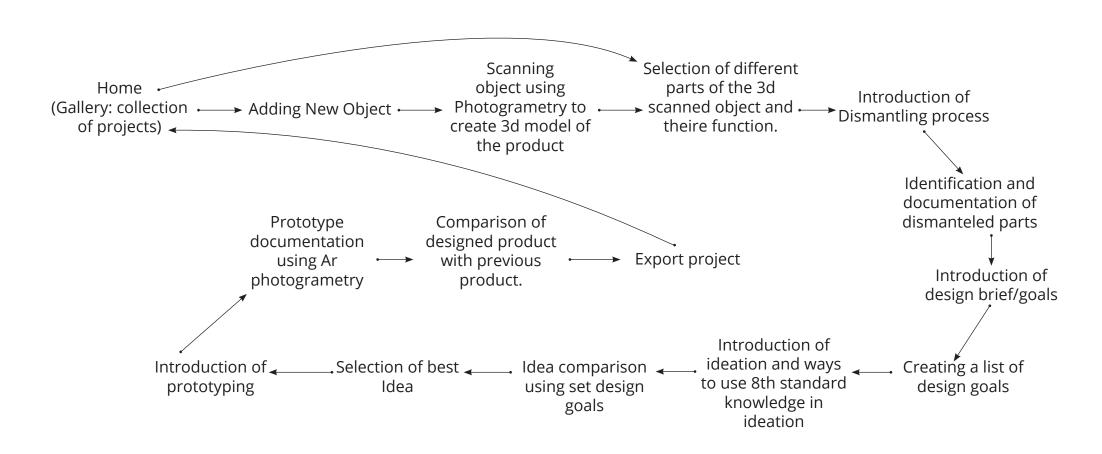
Selected Concept

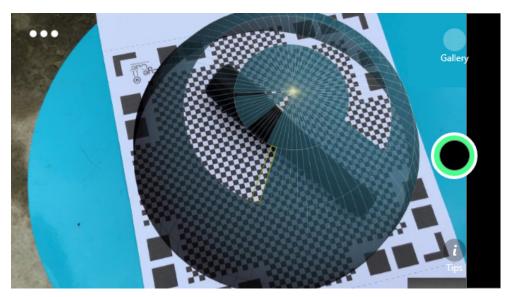


After comparative concept analysis and user feedback Re-Design app is take for further detailing. During the concept feedback session, the user appreciated this idea as he said, "Oh! I keep on opening things and reassembling them because there are many gadgets in my home that don't work. I might be able to use this to have some fun". This idea conditions the user with the design process and provides a platform to see value in a task that was considered as satisfying exploration.

Concept Details

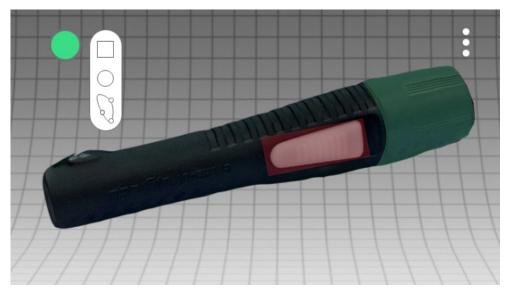
Application Flow is designed such that their is a harmony of virtual and real world, it is made such that user do not feel any disconnect between both while learning.





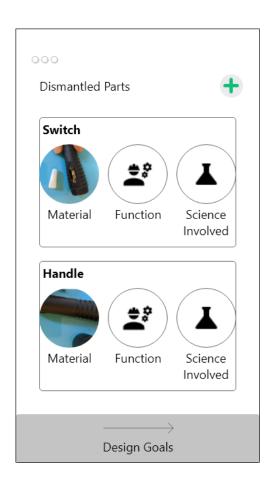
Scaning of the selected object

The user's design journey starts with scanning a simple object that should fit in the provided Ar Mat. Bigger the object bigger, the Mat will be required. Mat also prohibits users from redesigning too big objects. Ar Mat forms a hemisphere around it with the object kept in the middle. Hemisphere becomes red if the camera gets too far or too close to the object. Hemisphere is further divided by longitudinal lines and latitudinal lines. Once the area formed by these lines is captured, it vanishes. This process of scanning uses the concept of photogrammetry. Photogrammetry is used for photography in surveying and mapping. It's a process to measure distances between objects and utilize images to create 3D renderings. A 3D render of the object makes it easy for later comparison as the object will be modified.[17]



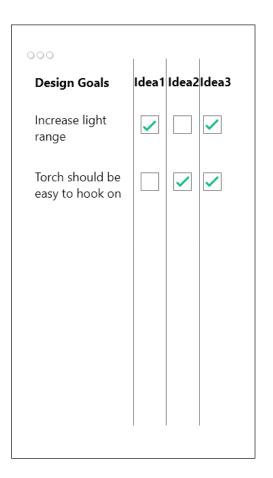
Object part selection

A 3D rendered mesh is formed after scanning. Users can select different parts of the render for which three selection tools are provided circle, square, and a free pen tool. After selection, users can name the parts with their functional details. This process allows users to begin the 1st breaking down of the product.



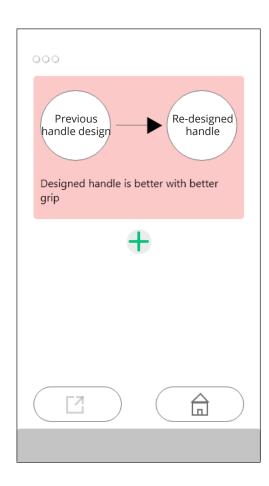
Dismantled Parts

While dismantling, the second level breakdown of the object's part is introduced. Users are asked to identify the material, function of the dismantled part, and science concepts it relates.



Idea comparison with design goals

Selecting an Idea for prototyping can be a confusing task. To tackle this problem, the application introduces a checklist of previously specified design goals through which the users can compare their ideas.



Comparision of re-designed objects with preious object

A comparison of the new re-designed object with the object's previous design is a significant phase. This is the point where users realize and see the difference achieved through the process. Already identified different parts of the designed object make it easier. 3D model of the object makes it even better as user can compare the objects using AR.

10 Pilot Test



10.1, Pilot Testing with printed wire-frames



10.2, Dismantling of a torch by user during pilot testing

With the detailed wireframes, a second user test was conducted. The user went through the complete process of scanning (fig 10.1), dismantling (fig 10.2) prototyping, and comparison using the wireframes consecutively.

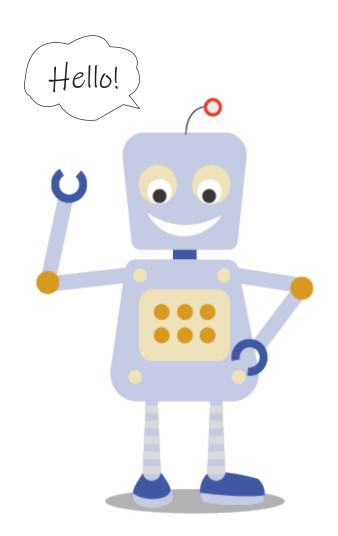
The following are the insights gained from user test:

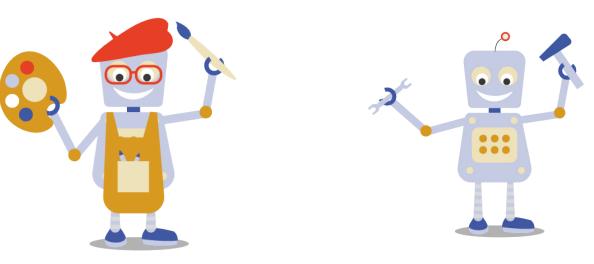
- After scanning a part, the user was confused about how and where to put the part's details. Should he just fill identified part name or mention details as well?
- The was used to the conventional back button, which made him struggle while trying to go back to reaccess the information.
- Information on different steps of the design process is clear, but the next task was not clear. (Instruction part should be improved)
- Progress consideration for the project to start from where it was left.
- In the ideation phase, users felt lost after thinking one idea, but once reminded about the different concepts they have already learned, the process becomes more manageable.
- Users like to take second person feedback while ideating; majorly with people, they are comfortable sharing ideas.
- While ideating, he even took inspiration from the sci-fi movie he watched, which had a similar product.

All the insights received were taken into consideration, and accordingly, changes were made.

11 Content

The book "Design and Technology" by Games Garrett is used for the development of content, but it has been made more contextualized to the Indian users. A robot character is introduced as a process guide named Dodo who explains all the process and task the users should accomplish to move ahead.





Dodo introducting ideation information

Dodo explaning method of prototyping



Dodo shows how to dismantle by dismantling himself

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User Journey

- 1. The user journey begins with the gallery screen, which contains the previous projects and allows to add a new project.
- 2. Once pressed on the '+' icon, the app takes the user to the scanning instruction page. After all the instructions are swiped left camera starts working for scanning.
- 3. After scanning, the 3d model pops up for the selection of different parts. Each selection takes a part name and extra-functional detail.
- 4. Then the App guide pops up to explains about dismantling and how to document the disassembled parts.
- 5. While documentation of disassembled parts app asks for material used to make the part, function of the part, and science concepts, it can relate. Once the documentation of parts is done, which asks for at least two documented parts, the user can press on the design Goals button.
- 6. The app guide pops up, explains what design goal is, and how to make a list of design goals. After swiping all the explanations, make the list window opens for design goal input.
- 7. After the design goals list is completed, the app guide explains the ideation concept by using the goals set. Then the App guide asks for idea sketches, and after every idea sketch /input, the app guide asks for the next idea to involve one concept of 8th standard science and mathematics.
- 8. App asks for at least three ideas to move forward to idea selection. After the ideation phase, a comparison screen pops, which asks to tick which idea fulfills which design goal.
- 9. And based on that app, suggest the ideal idea to prototype on which users can agree or disagree based on their interest.
- 10. After which App guide pops and explains the idea of prototyping and asks for prototype scanning proceeded to the selection of modified parts for comparison.
- 11. After completion of the comparison app guide, congratulate, and ask if the user wants to share the redesigned product model or get a pdf report.
- 12. After export app goes back to the project gallery.

13 Evaluation



User Scaning Object



User Ideating for the product test

It was a challenge to work with minimal resources due to lockdown introduced in the COVID-19 situation, but I was lucky to find one of my cousins to progress with the project. Even though I could not code and develop the application, a high-fidelity prototype was used for the evaluation process, followed by a set of questionnaires. The questionnaire included the following set of questions:

- What was the most liked part of the whole experience?
- · Which part was the most challenging?
- Can you sum up the steps followed, followed by you?
- · Would you like to share your design with your friends?
- · What are your thoughts about the use of general class concepts while ideating?
- What is one thing you would like to change?
- On a scale of 5, how much will you give for fun and interesting?
- When is the next time you see yourself using this app next if asked?

Insights gained after evaluation:

- The user liked to see the scanned object in Ar the most and how their prototyped product looked like a real product.
- Even though the user could not remember the exact step name involved, he could easily explain everything he did after completing the process.
- It was also observed that during the ideation phase user starts thinking about the application of things they learned in schools.
- The user was more open-minded and less judgemental about the things he was doing as there was no grading was involved.
- There was a desire to share the outcome with friends as it was presentable.

14 Conclusion

Future Scope

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The user well received the solution as it showed them the value to have a curious mind. It completed its primary goal to broaden the perspective about design among students and introduce the design process among them. It also increases the sensitivity of students towards the details in an everyday object. Though the product is in its early stage, it has a lot of potentials, and through the involvement of different activities, other parts of design education like understanding of aesthetics, material study, etc. can be included.

The solution introduced is one of a kind, but it still cannot be monetized, a lot of work is required to make it a complete product. But as we see, MHRD pushing for the design education in school and Due to COVID months of lockdown, which has shown people the possibility of working and learning from home. It can leave a lasting impact on students and teachers. This product gets an upper edge in both the situation and possibly can play a significant role in later years to come for school going students.

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- https://swayam.gov.in/nd1_noc19_de05/preview
- [16]https://en.wikipedia.org/wiki/Photogrammetry

17 FAQ's

Throughout the project, some questions popped up on a regular basis. Some of the questions were especially important to address as they questioned the fundamental ideas of this project. I will like to discuss them here for whoever may have similar thoughts regarding this project.

Q1. If the target audience has to be limited, why choose the 8th class? Ans. As mentioned in the report before that in 8th class, science is divided into three parts physics, chemistry, and biology. This separation helps in handling the concepts of sciences. As students are not used to this separation, they do not entirely incline toward one part of science, say physics or chemistry while ideating. Additionally, in the 8th standard, students are introduced to 3D objects in mathematics. Hence the solution can help in understanding concepts of maths as well.

Q2. Why not print media? All the content can be made into a book or a poster? Ans. The project aims to target the future audience, which involves using new media to reduce the challenge of dependence and distance. Without denying the power of print media, the project for a completely different scenario.

Q3. Where is the fun element?

Ans. Even though the provided solution does not include storytelling or gamification of the content, the fun element lies in the exploration and physical interaction with the object. There is a sense of satisfaction to see the outcome, there is a gamble of failure and success, and even there could be a subtle sense of competition among friends when they share their designed objects.

Q4. Why not any educator's perspective is considered in the solution? Ans. The project aims to sensitize the students about design with an open and accepting mind. The involvement of any educator perspective posses the risk of either rebellious emotions or pressure of what is right or wrong among teens.