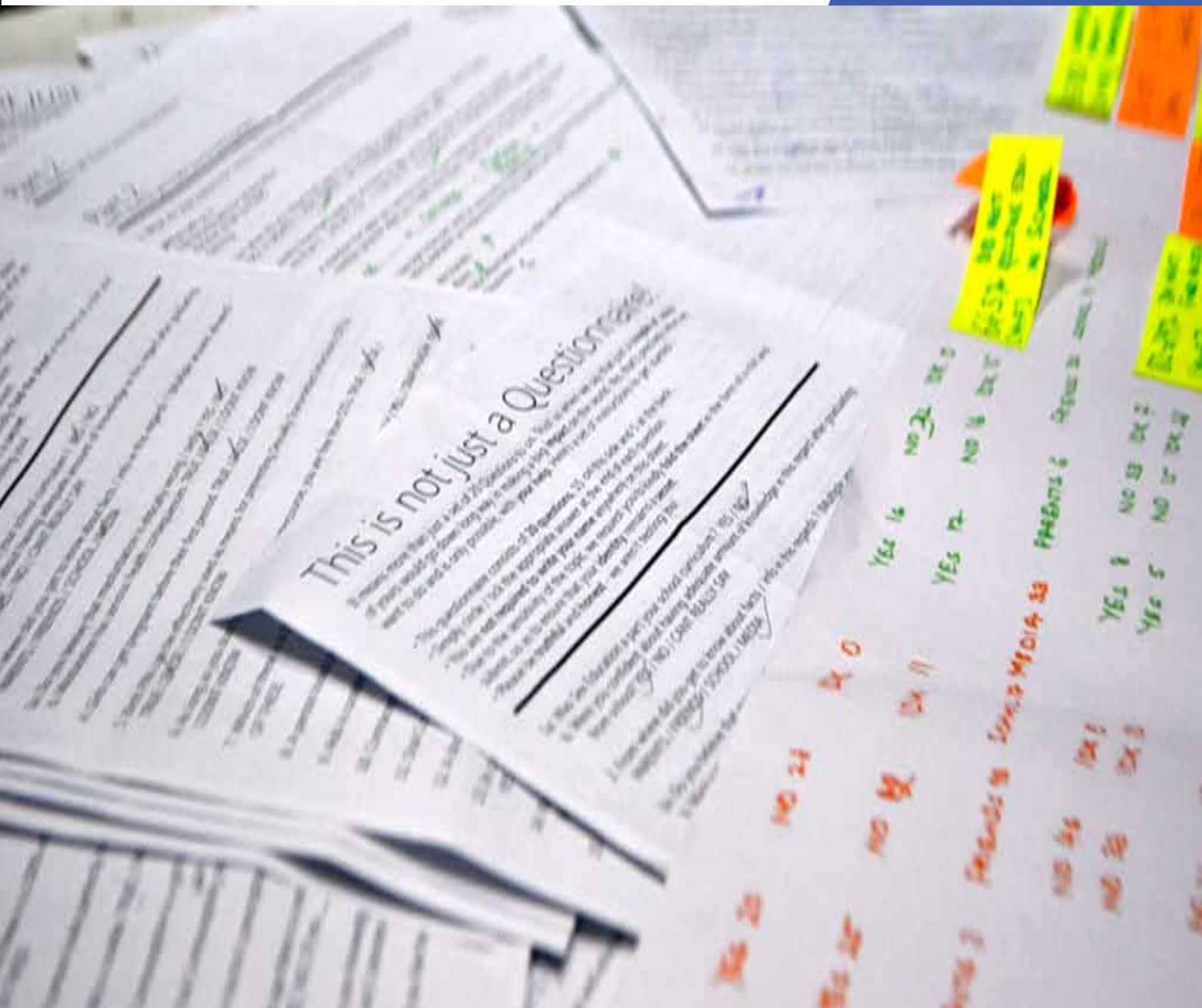


# DESIGN FOR ALL

MARCH 2013

VOL.8 NO.3



UNDERGRADUATE PROGRAMME  
Department of Design  
IIT Guwahati

Head, Department of Design, IIT Guwahati  
*Prof. (Dr.) Debkumar Chakrabarti*

Guest Editor, Final Year, B.Design  
*Aditya Ponnada*

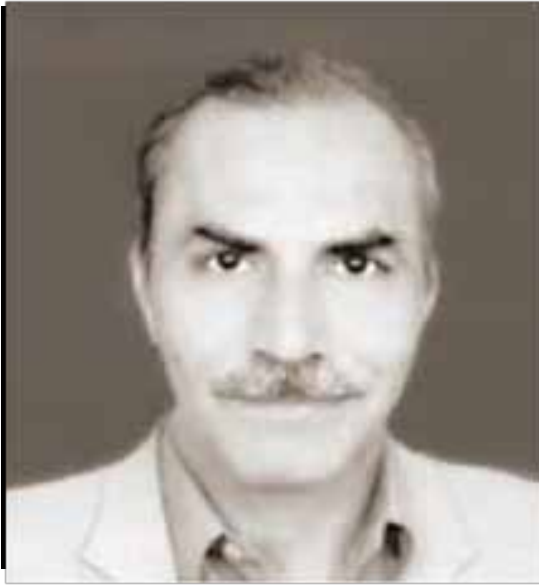
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# DESIGN FOR ALL

MARCH 2013  
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Why does man bombard mountains into pieces and rest only after turning into dust? This phenomenon is universal and has happened throughout the human history. What does it confirm? Is it just an act of destruction or wishes to turn everything that is larger in size into miniature to prove his power. Why is swimming pool designed? Is it not act of depicting vast ocean in the miniature that is the reason pools are all over the world represent blue color of the ocean. Why does man wish to do so? It is my hypothesis that man has come into the existence because of mutation of single sperm of man and woman and that cell is so powerful that it has all the information of what to do, when to do, how to do and when to terminate the entire life. That sperm has information for activating all parts of the human body for directing & achieving desired objectives. When an individual attains puberty it allows to change the hormones for becoming male or female with specific characters or to stop releasing as time is over or progress is as per instructions or it also signals the decaying and aging and ultimately lead to end of existence i.e. death. He wishes to create the same phenomena 'I should develop something what a cell can do.' He realized that fertilization or germination is a system and this is the essential step for beginning of any system but it should have right ingredients at right time at place and in this case it begins when man and woman copulate and logical conclusions is that woman conceives and delivers the child. That forces man to think in logical way to look for ingredients for germination of system and later on that will help in successful attempt for miniaturization. Is socket and bracket of electrical devices not based on concept of male and female for delivery of desired results? Is it not attempt of replica of male and female for producing agricultural products in miniaturization and knowledge enhanced it turns to farming? Is nursery not miniaturization of vast farm where person can control the environments for better results? Is man's act to imitate and logical end is with miniaturization representing nothing but an attempt of trying to replicate for winning over the nature or proving superiority over the God. Is it not

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this act of man of proving superiority over visible or invisible forces and in this process somewhere his senses loses the judgment of what is right and wrong?

Is Child a miniature of God or devil? All possibilities exist within the child. Similarly when person tries to miniaturize it has advantages and moves along with possible disadvantages. The design of zip is nothing but miniature form of replacing tedious act of closing of many buttons with comforts and ease. Man might be inspired with bird to design the airplane. It was an act from smaller to larger. As technology is advancing size is reducing and power of plane is augmenting. Many components put together make a system in which each one is crucial for reaching the doors of success. Just as in our airplane the role of battery is as important as say of other components to produce the energy that should perform various components to achieve desired goals. Sometime designers succeed in designing components which can perform with that energy produced by battery or some time these focus on battery for enhancing its performance. Sometime imbalance occurs in attempt to achieve that size not sufficient for performing under produce energy of battery and leads to havoc. In recent case a battery could not performed with desired outcome and it proved to be sole reason for responsible of grounding dreamline series of prominent airline's manufacturer. What was pride of owning that series is now shame for nation?

Man has learnt that in nature when clouds of opposite charges collide that produces lighting of high voltage in the sky. That vast design of nature is impossible for man to create so he expressed that in miniature and it gradually proved reason of existence of the battery. Other side act of miniaturization has turned to madness and man is responsible for axing trees, animals and no end of this act is foreseeable. It is grave and staring threat to the sustainability of environments. It may produce serious danger to the very existence of mankind. Nature inner wish is not to produce super intelligent person that may threaten her own existence and in this attempt it is supporting the miniaturization. If we look at the history of development of man we find that our primitive or ancient ancestors were with heavily buildup and their survival was on physical strength. That era is gone and man has made his life more secure as compared to our ancestors. Modern man is not born for heavy body because it has lost its relevance .Gradually man is losing physical side what it used to be and his size. It is obviously resulting in miniaturization. As technology is advancing mental faculty is improving and physical labor is reducing so his physical appearances are getting less importance. This act is generating a bringing new set of problem ancient men & women had never confronted. Woman with smaller pelvis faces problem of delivering the child because child's head cannot come out of narrow bone. In medical term we call CPD (Cephalo pelvic disproportion).They are left with only option of surgery. Surgery has come into existence and we can say it is the byproduct of the miniaturization.

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Miniaturization has opened new way for mankind and it has also created new problems. What was size of the surgery in old times is not same in present time. Technology of surgery has improved to that level that a cell can be treated or with minimal insertion a major surgery can be performed and healing that used to take months for recovery to be normal for a patient is now matter of few hours. It has benefited the mankind because of miniaturization. Stem cell treatment is act of identifying the miniature cell that is responsible for growth, development and maintenance of specific organs of man and by planting into the patient cure is possible in every age.

Ancient man learnt the art of living in group, designing shelter discovering of fire for cooking then for illumination that helped him to change thought process and turned him so called “modern man”. Design of huts might be copy of nest or gradually he moved to meet the challenges of vagaries of weather that forced him to design the houses with mud by baked bricks & stone and finally with reinforced concrete construction. The idea of using stone might have come to his mind from design of his ancient cave. Stones were heavy and to cut these into size of his wish with the help of designed hammer, chisel etc. When the stone was larger and life span was short to cut it in life span they devised dynamite. It is an act of miniaturization. Once it was designed as pebbles or sand granules that led to RCC for designing larger, taller buildings. ‘Miniaturization helps us in moving from larger to smaller & vice versa.’ Cooking with fire was responsible to cut the food into pieces, grinding for flour for evenly cooking and it helped in designing various cutting & grinding tools. To hold the fire they designed earthen, oil and petroleum stoves. Match sticks are miniature of holding the fire and as we strike it ignite small fire for catching into flammable material for converting into bigger fire. Design of toys has come into existence because of miniaturization. I believe when child was disturbing the woman who was cooking might have offered smaller flour dove for attention diversion allowing child to imitate the cooking .Later on toy was designed to copy kitchen system and we noticed child learning a lot by imitating in miniature form .We designed better quality toys for learning and curing diseases. The design of electric bulb is representing sun or moon or stars in miniature form? Man has in build character to see everything in the miniature form and always attempt to know the system is worth or whenever he encounters such situations feels helpless. When he could not produce vast jungle, he designed garden. When he could not produce rivers he created canals. Is miniaturization not responsible for birth of nanotechnology? Miniaturization of devices to nano-meter scale presents even greater challenges to engineers in design and manufacture. Manufacturing of nano-scaled devices and components involves isolation, transportation and re-assembly of atoms and molecules. Sphere is gift of nature to us. Bubble is perfect example for holding maximization of energy with minimizes shape. Is nature guiding us to move for miniaturization?

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The first generation of Industrial revolution was when James watt's steam engine, boring machines, factory system has come into existence. We can say electricity, scientific management led to second wave of industrial revolution. But third wave is solely on one factor that is miniaturization and birth of digital computer and nanotechnology are live examples. It is my forecast that fourth wave will hit when something invisible would work for the betterment of mankind like applications of Wi-Fi, mobile, internet etc. It is my appeal to the designers that they should be scientifically trained and understands the effect of latest technologies that work on principle of invisible. Imagining the invisible for developments of applications will make everyone to stay more competitive. Researchers have developed a new innovative "air writing" system that allows users to write texts and emails in air with the hand. When users writes letters in the air with the hand the system can identify which letters are being drawn. The developer of this technology Mr. Christoph Amma of Karlsruhe Institute of Technology, Germany now hopes to miniaturize the sensors to the point that the device could replace by something less complicated to everyday use.

What we call reengineering or restructuring is nothing but attempt to reduce the processing time, cost or service in the shadow of optimization of profit is nothing but miniaturization of organization. When an artist design something on a canvas it is actually act of depicting the trees, plants, river, sun or moon etc. into miniature . It is centuries old practice of miniature art of writing or drawing arts on a grain of rice/ wheat/ ivory. It was the curiosity of man to know 'what is the smallest particle that constitutes our earth and cosmos' and it is responsible for birth of quantum mechanics. Even scientists are trying to know the nature of our cosmos through this quantum models. Is it not man's effort to know beyond by miniaturization? What is model or simulation? Is it not attempt to use the real parameters to define uncertain state by miniaturization?

It is great honor for us that Head & Prof. (Dr.) Debkumar Chakrabarti, Department of Design, Indian Institute of Guwahti, India accepted our invitation to bring out special issue with us for showcasing the works of their students and he immediately appointed Guest Editor Mr. Aditya Ponnada , student of Final Year of B. Design . It is wonderful issue and philosophy of Prof DebKumar is clearly reflecting in this special issue and the way he is grooming his students is admirable.

***"Remembering that man is indeed the microcosm, the universe in miniature, the Divine Dance of the future should be able to convey with its slightest gestures some significance of the universe."*** - Ruth St. Denis

With regards

**Dr. Sunil Bhatia**

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## Student Guest Editor

We are sincerely thankful to Design For All Institute of India for giving us this opportunity to present some of the research work done by undergraduate students of Department of Design, Indian Institute of Technology Guwahati. The issue March 2013 vol.8 no.3 is essentially focusing on the work done in the field of user-centered design with a special concentration on ICTs (Information and Communication Technologies).

We are presenting five research papers based on the term projects of junior and senior year students of the department. These papers have addressed wide applications of ICTs and Information systems ranging from daily life activities such as Cab sharing to relatively untapped domains like sex education. Two of the research papers put forward novel approaches of imparting education and learning through ICT. Moreover, we also have a research paper addressing analytical methods of Quality function deployment – an essential stage in Design and development.

The most remarkable point of these papers is the rigorousness of the research that has been carried out. Each of the research work has gone through an extensive process of need finding, churning out valuable information from users, translating these needs into design interventions and finally validating the designs. It is this rigor of the work that makes them highly contributing to design practice and theory.

We once again thank Design For All Institute of India for this golden opportunity of featuring our work in the March 2013 vol.3. We hope for such collaborations in future as well.

Regards,

**Aditya Ponnada**

B.Des Final Year,  
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## Head Of Department

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### **BDes of IIT Guwahati: an experience in design directions**

Department of Design offers Bachelor of Design (BDes) degree, the first of its kind initiated in 1998 where entry is through IIT-JEE. The department has also been the first to initiate in 1999 PhD programme in Design in India covering varied specialisations. Its Master's degree (MDes) is a single stream discipline where students take specific elective subjects and projects to become specialized in individual interest area.

Since inception of the programme the department offered BDes in Industrial Design and Communication Design, which later was combined into a single stream. It has been experiencing many face lifts with faculty of heterogeneous expertise joining who have enriched the programme with specific interest and aspirations that makes the programme a unique existence.

BDes students at their final year level show intellectual capability of handling system oriented ICT and interaction design issues and they are found to be doing very well.

With the decision of making an issue with students' papers on their perception of design, department of design IIT Guwahati selected a final year BDes student to handle the issue content as guest editor and compile students' works to give a base level understanding of the department's functioning.

This March 2013 volume 8, issue No. 3 consists of 5 papers which are part of class assignments and term projects by BDes students. These can be said to represent the recent trend our BDes students intend to follow. The content and layout is entirely the students' product and reflects their understanding of the subject.

The issue with ideas conceived, papers written, layout and editing done by a team of BDes students is expected to server the purpose of putting forth the current thinking of the Bachelor of design students of IIT Guwahati.

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# Design Intervention for Sex Education for University Students in India

Mannu Amrit, Anvay Meshram, Minal Jain, Keyur Sorathia  
(m.amrit@iitg.ac.in, minal@iitg.ac.in, anvay@iitg.ac.in, keyur@iitg.ac.in)

IIT Guwahati.

**Abstract**— This paper presents a new designed cross platform digital game application to provide sex education among university students in India. It aimed to fill the information gaps and clear myths / misconceptions in the areas of Sexually Transmitted Infections (STIs) and Sexually Transmitted Diseases (STDs), bodily changes in the adolescents and prevention techniques. It also tested the knowledge of Indian university students who have some information about sex education through prior exposure.

Extensive literature research on the work in this and related fields is presented here. A survey was conducted across 96 students (48 male, 48 female) in the age group of 18-22 years to analyze their knowledge levels. One-to-one interviews were conducted with a doctor and a students' counselor to understand their perspective into the problem and the critical areas in this field. A digital game which can run on multiple platforms was designed, implemented and evaluated with students of Indian Institute of Technology (IIT) Guwahati.

**Keywords**— *digital games, HCI, sex education, sexually transmitted infections/diseases, contraceptive methods and human anatomy.*

## INTRODUCTION

The paper is based on a combination of the themes – 'health and wellness' and 'education'. It focuses on the area of lack of awareness and misconceptions in the mind of university students about critical topics like STIs/STDs, bodily changes in the adolescents and prevention techniques. Government statistics [1] indicate that 40% of new sexually transmitted infections are in the age groups 15-29. More than 31% of all reported AIDS cases occur in this age group, which indicates that young Indians are a high-risk demographic. According to the National Family Health Survey (NFHS) conducted by the International Institute for Population Sciences (IIPS) and Macro International in 2005-06, 12% women aged between 15-19 years are mothers. According to Guidelines for Comprehensive Sexuality Education [2], young people need to have information on all the following topics like Sexual development & reproduction - the physical and emotional changes associated with puberty and sexual reproduction, including fertilization and conception, as well as sexually transmitted diseases and HIV, contraception & birth control – what kind of contraceptives there are, how they work, how people use them, how they decide what to use or not, and how they can be obtained and relationships - what kinds of relationships there are, love and commitment, marriage and partnership and the law relating to sexual behaviour and relationships as well as the range of religious and cultural views on sex, sexuality and sexual diversity.

Additionally, young people should be provided with information about abortion, sexuality and confidentiality, as well as about the range of sources of advice and support that is available in the community and nationally.

A few existing papers on this issue were studied and discussed and the following points elicited –

- N.M.Noor et. al [3] proposes a courseware on Islamic sex education specifically designed for parents to educate their children. It portrays the importance of parents in educating their children about sex education. However, it is found that parents are both unaware of the subject and hesitant in discussing such matters. It gave insights into the parental contribution to a child's sex education.
- A cross-cultural study among the university students [4] in Greece and Scotland on sexual behavior showed that Scottish students feel more confident about knowledge and maturity levels in terms of sexual lifestyle while Greeks are more confident in family imparting sex education, Greeks are more in favor of moral principles being a part of relationship, youth demands more utilitarian education rather than ethical, family, friends and media have maximum influence on students in this aspect. This paper indicates a need to provide utilitarian sex education among youth.
- E. Sutinen, et. al [5] designed an interactive story telling module providing sex educational contents for children to gain accurate sex related knowledge. The studies indicate that average age of first sexual encounter in Tanzania is less than 17 for women and 18 for men. average age of first sexual encounter in Tanzania is less than 17 for women and 18 for men. parents firmly believe that they must not discuss sex related issues with children for they are considered to be indirect

# Design Intervention for Sex Education for University Students in India

encouragement to experiment. As a result, young people get pieces of information in false and exaggerated form from internet, media and gossip.

- C.S. Lee et. al [6] pointed that sex education can help in treating sexuality in its proper perspective and also help in total personality adjustment. It helps in giving a true perspective which can disillusion the distorted view of life gained through the mass media thus reducing many misconceptions. The components of sex education are human development, relationships, marriage and family, interpersonal Skills, sexual health / behavior, society/culture.

- N. Sambasivan et. al [7], in their paper about urban sex workers, chose two areas, microfinance and healthcare reminders, among the many factors that affect the daily lives of urban sex workers, as the focal points and a phone based broadcasting system was developed for the USWs in collaboration with Pragati, an NGO that helps sex workers manage their lives and profession in a better way.

- Susan Hamre-Nietupski et. al [8] in their paper describe a series of programs to teach sex education and related skills to severely handicapped students. The students involved in several years of training in sex education and related skills learnt to explain the reproductive process, perform self-care tasks, participate in discussions about families and relationships, use sanitary equipment independently, engage in social interactions, and use appropriate social manners.

The related work highlights a strong necessity of imparting sex education among teenagers to avoid unwanted teenage pregnancies. It makes them aware of the repercussions of teenage pregnancy on their health, education, future, as well as that of the foetus. Such an education stresses on self-restraint. And even if they do indulge in sexual intercourse, the awareness of contraceptive methods, including the use of condoms, helps to decrease the incidence of sexually transmitted diseases such as gonorrhea, non-gonococcal urethritis, pelvic inflammatory disease and syphilis and teenage pregnancies. It can also help to prevent, control or decrease HIV/AIDS.

It was observed that none of the interventions were in the form of digital games, which, we thought would be an enjoyable and engaging platform. In this paper, we present the user-centered methodology adopted to design a sex education platform through a digital game. We also present the details of conducted survey, one-to-one interview, designed digital game and performed usability testing.

## RESEARCH

### A. Primary Research

We began with a couple of subject matter expert (SME) interviews to get in depth knowledge of our field and validate presumptions made through literature research.



Fig. 1. Subject Matter Interviews

The first interview was that with the student counselor of Indian Institute of Technology, Guwahati – Dr. Lakshmi Haobam. She expressed major concerns towards issues like mental repercussions on the students due to lack of knowledge, their misconceptions about masturbation and menstruation, self esteem issues amongst teenagers, influence from the west, excessive exposure to pornography, increasing rates of violence and sex crimes. She also highlighted other issues of hesitation in providing sex education amongst teachers in class and the fact that knowledge was majorly spreading through word of mouth through friends leading to misconceptions.

Dr. Mala Borthakur, Chief Medical Officer of IIT Guwahati hospital was also interviewed. She talked about the NCERT's initiative to include sex education at a very basic level in its curriculum. She described family's financial, social and cultural background, environment at home (e.g. how the evenings are spent, whether there is restricted internet usage etc.), hobbies an individual pursues as factors that affect a child's mentality. She expressed concern over the rise rape cases, gang rapes and the increasing need for sufficient knowledge about the self-defence techniques and preventive measures. Knowledge about the helpline numbers and safe practices is required. Teenagers must attain a particular maturity level at the time they have intercourse. Also, the communication gap between children and parents on these topics need to be brought down.

A questionnaire (Appendix I) was then prepared that consisted of a total of 20 questions. 15 of these were factual to test the knowledge of the student filling the survey. These questions helped us understand existing knowledge of teenagers. These questions were prepared based on the inferences drawn from the SME interviews and listed guidelines for comprehensive sexuality education [2]. The remaining 5 questions were about mobile phone usage. To maintain anonymity and ensure fairness, students were not asked to write their names on the questionnaire. These questions helped us understand technology literacy and mobile phone usage of targeted user group. Folded sheets were then collected in a box so as to assure them of their privacy. The survey was conducted amongst 96 university students (48 male, 48 female) in the age group of 18-22 and their knowledge of sex education was analyzed.



# Design Intervention for Sex Education for University Students in India

## RESEARCH ANALYSIS

### A. Consolidation and Analysis

The statistics drawn from the questionnaire were compiled and analyzed. Following inferences were drawn through the survey-

- 62.5% students did not receive sex education at school.
- Only 35.41% girls are confident in their knowledge about sex education.
- Major source of knowledge was friends followed by media, school and parents.
- 50% of the population did not know that masturbation does not have unhealthy consequences.
- 91.67% of the students did not know that a girl could get pregnant before her first period, 60% of which were girls.
- 76.05% students knew that birth pills are not meant to prevent STIs.
- 50% of the students did not know that STIs could also occur without intercourse.
- 90% of them knew that a healthy looking person could be carrying an STI.
- 74% said that AIDS is not curable.
- 83% boys agreed that contraception is not a girls' responsibility.
- 76.04% did not know that oral pills can cause breast cancer.
- 82% of the students had no idea as to whom to contact at the time of emergency. For those who said yes, majority looked upto friends for help.
- 69.7% students said that they would feel free to talk to their children about sex education and 26% were not sure.
- 66.67% boys said that no method of contraception was 100% effective while only 10% of the girls said so.

their knowledge about the same.

- There were information gaps in knowledge of masturbation, STIs, contraception methods, emergency helpline numbers.
- Crime rate among teenagers including rape is increasing.
- Misconceptions are there due to exposure to pornography, influence of western culture, unreliable sources like media/friends.

### B. Design Objective

University students of the age group of 18-22 years are exposed to unreliable sources of knowledge like media, internet and friends, which lead to several misconceptions and information gaps in the field of sex education.

### C. Vision Statement

We propose a design intervention that can help in filling the information gaps about sex education in the minds of university students of the age group of 18-22 years who have been exposed to unreliable sources of knowledge like media, internet and friends.

### D. Primary Personas

From the analysis of user research, we arrived at two user profiles which are as follows:

1. Name – Ranvijay Khurana Age – 20 years  
Hobbies - programming, hacking, web designing

Ranvijay belongs to a small village in Uttar Pradesh. He is very shy and doesn't talk much to girls. He spends his entire day learning hacking and watching movies. He is an avid user of web. He is also exposed to a lot of pornographic stuff in college. His parents are not very educated and felt hesitant in discussing any such topic at home. His school did not offer any course on sex education. He gained some information on this through a few of his friends and through media. He believes that condoms can protect him from all STIs and they are 100% effective. He has never cared to authenticate his knowledge in this domain and is complacent. He feels very confident about his knowledge and hopes to be able to share the same with his kids.

2. Name – Meera Munjal Age – 19 years  
Hobbies - shopping, movies, hanging out with friends

Meera belongs to a posh locality in Delhi. She likes to hang out with friends. Both her parents were working and hence were not able to spend time with her. Currently in her 3rd year at college, she spends her entire day studying and spends time with friends later in the evening. She does not have much knowledge about sex education. There were sessions on menstruation held in her school separately for girls. She has a very vague idea about everything else through media. She finds watching pornography ethically wrong. She has no idea about any helpline numbers. Her first port of contact would be her friends should an emergency pop-up. She uses a Samsung galaxy S3 and frequently downloads applications.

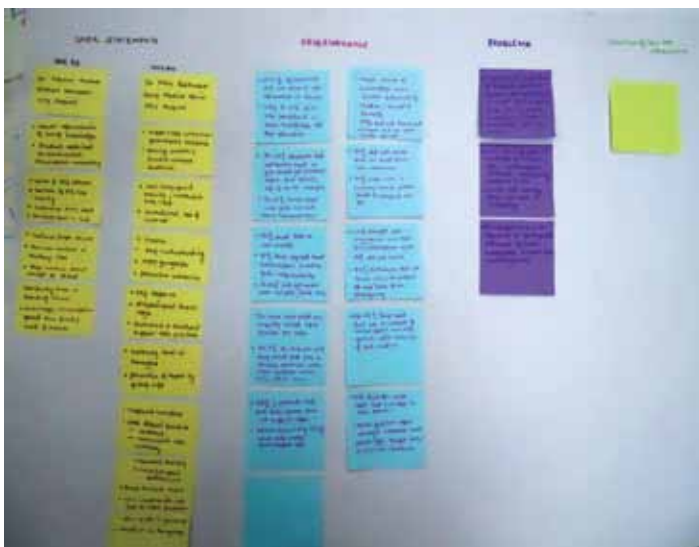


Fig.2. Affinity Analysis

We drew inferences based on these statistics and listed down specific problem areas. Figure 2 shows the affinity diagram, where we listed down user statements, observations, problems identified and design solutions through sticky notes on a large sheet. The following are the major problems identified –

- A significant proportion of students did not receive sex education in school but surprisingly 43.7% were confident in their knowledge about the same.

# Design Intervention for Sex Education for University Students in India

## BRAINSTORMING/ CONCEPT GENERATION

Based on the research analysis, different solutions were brainstormed upon –

- Information based mobile application – a comprehensive mobile app that gives all information about different segments of sex education.
- Information based website/chrome extension - A website that comprehensively displays all the information of this field.
- An information kiosk installed at all hostels/hospitals/any waiting area that gives information on all aspects of sex education. It can be accessed whenever students are waiting and have spare time.
- A series of posters on the topic displayed all across the campus to impart information.
- A series of videos creating awareness about the issue that can be screened or shared amongst the student community.
- An IVRS/Spoken web based system through which students can clear their doubts/misconceptions and also gain information regarding issues they are ignorant about while maintaining their anonymity.
- A game based solution running on any platform which through fun elements imparts all the information that is essential for that particular age group to know.
- An interactive installation in the hostels/any waiting areas using elements of physical computing.
- A radio programme broadcast in the campus which could also involve the students clearing their doubts about the issue maintaining their anonymity.
- Interactive brochures.

This series of ideas brought out through brainstorming were then further analyzed based on their pros and cons.

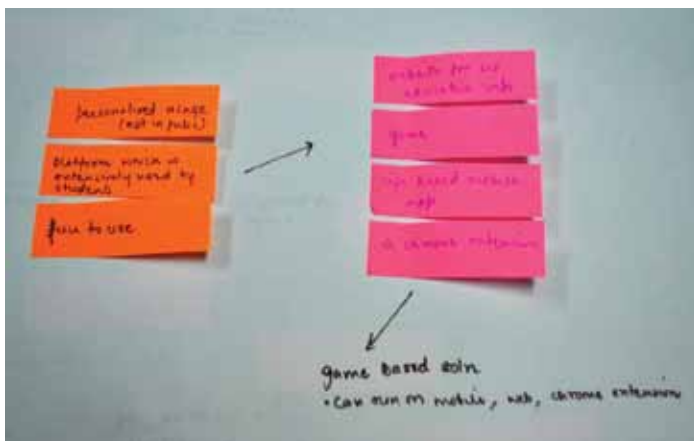


Fig.3 A small portion of brainstorming

Through that basic key points in the solution were identified. Privacy is a major concern as students might be reluctant or hesitant in using it in public and should be on a platform that is easily and readily available to students. It should be fun to use and not be a boring exercise and should be motivating enough for the students to use it. A final concept was derived by clubbing the ideas.

## PROPOSED DESIGN SOLUTION

Research, research analysis, brainstorming, concept generation exercise and keywords helped us arrive on following final concept.

Snibble – Sex Education the nibbles' way - It is a cross platform digital game deriving its inspiration from the age-old snake/nibbles game that provides sex education to the university students through a fun and playful way. The game is on the lines of a traditional game of snake/snibble that is familiar to almost everyone since their childhood. It is a cross platform digital game that runs on a mobile, tablet or PC (web application) and takes care of the issue's sensitivity and privacy matters.

### A. Information Architecture

The game is divided into three levels with each level conveying information about different topics i.e. sexually transmitted diseases, knowing yourself and prevention. Each of these levels has further sub-levels.

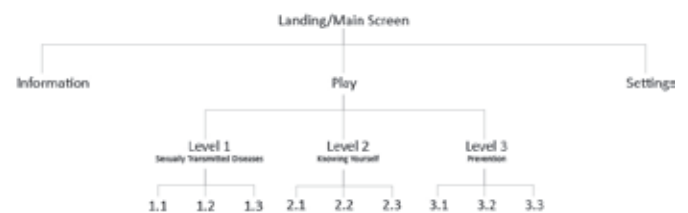


Fig.4 Information architecture of the proposed digital game

### B. Working of the App and Screens

The game begins with a landing page with options of play, information and settings. Sound can be put off or on through this screen.

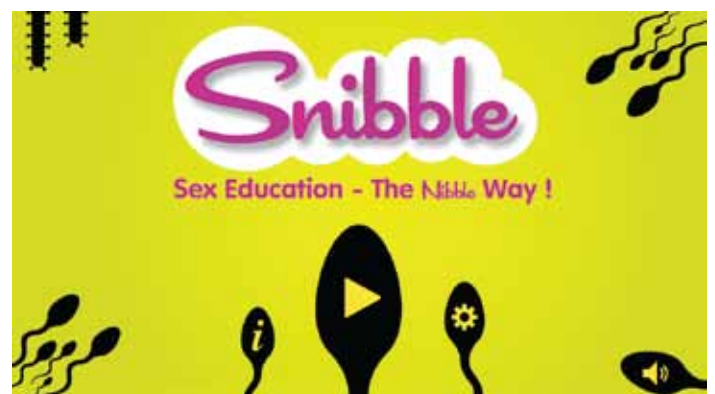


Fig.5. Landing screen of the game.

Fig 6 shows a few screens of the first level. Selecting play shows the screen that shows the levels. Initially only the first level is unlocked. Selecting level 1 takes one to the sub-levels of the level. Initially only sub-level 1 is active.

# Design Intervention for Sex Education for University Students in India

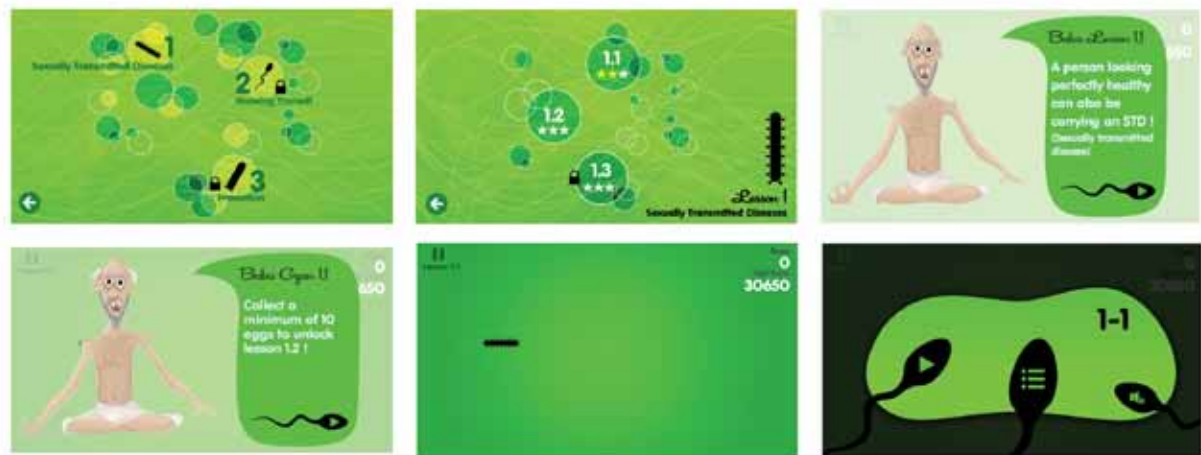


Fig.6. All screens for Level 1 – Sexually Transmitted Diseases

Other sub-levels get unlocked as one proceeds with the game and clear the sub-levels. Baba Lesson 1.1 gives a lesson/information about sexually transmitted diseases. The user then taps on the arrow button. The goal/aim of the next level is explained through the Baba Gyan. The user then taps on the arrow to continue. The game screen appears. The user has to control the STI and collect eggs. He can use the gestures of sliding up/down, right/left. Pausing the game leads to the screen shown last in the figure. The user can choose to play, go to the menu and turn the sound on/off.. Subsequent sub-levels also give information/facts related to sexually transmitted diseases. The difficulty level increases in these levels with the number of eggs to be collected increasing to 15 and 18 in the 2 sub-levels respectively. Clearing all the sub-levels takes the user to the 2nd level where the sperm moves at a faster speed. The corresponding screens for that level are as follows –

Similarly, the corresponding screens for level 3 are as follows –

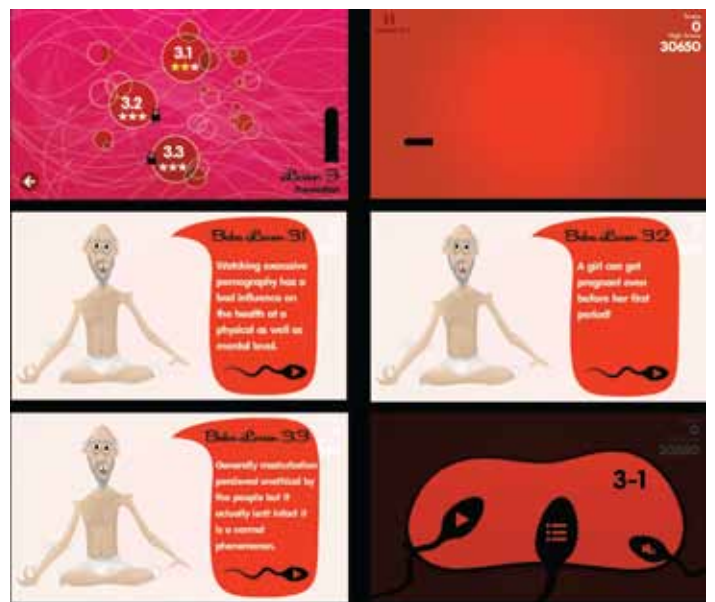


Fig.8. All screens for level 3- Prevention.



Fig.7. All screens for level 2- Knowing Yourself

## PROTOTYPING

A high-fidelity video prototype of one level of the game was made using Adobe After effects. All the screens of the game were included explaining the detailed gameplay.



Fig.9. Usability evaluation being conducted with university students



# Design Intervention for Sex Education for University Students in India

Usability testing was conducted with six users in the hostel (the place they spend most of their time and a possible place of use of the game). Video prototype was presented to users to gather feedback from them. Following that, the screens of the game application were shown on a touch screen phone to give the users an experience of the game on phone.

Suggestions from the users -

- Creation of a story with the baba - instead of saying collect 10 eggs to unlock lesson 1.2, one can write, collect 10 eggs for me to be pleased to give you more gyaan - it will create more suspense for user to go till the end.
- The shape of the condom needs to be improved. It looks more like a test-tube currently.
- The insect having a connection with the STI is not self-evident.
- Apart from giving the user something to collect via the snake, something which he should NOT collect, and conveys a meaning as well can be added. ( Collect what is good for him, not collect what is bad for him )
- After 5 eggs, throwing in a bonus for extra points ( exists in majority of snake games )
- Options to share scores on social media websites can be provided.
- Snake movement (turns ) - Software constraint.
- The connection between the baba and the game needs to be further established.

Positive points as pointed out by the users include that the game is bright, vibrant and catches the eye, using gestures on a touch screen for movement of snake is engrossing, just like temple run, the interface is simplistic, clean and easy to understand and game play sounds are soothing and pleasant to hear. It was pointed out that movement of the snake through arrow keys in a keyboard for a web application would be convenient.

## CONCLUSION

### A. Summary and Learning

We began with the problem of misconceptions and information gaps in the minds of university students in the field of sex education. Research led to several possible solutions but their further analysis narrowed down the solution to a game based application that is generally played by the students and conveys information in a fun way. Inspiration was taken from the game nibbles

and an application - Snibble was designed. After prototyping, usability evaluation was done that brought out new insights into the solution.

### B. Limitations and future work

The solution thus developed in this project, through a fun way imparts sex education to university students. There were a few limitations such as small sample size for testing. The future work for this application would be to incorporate changes based on the usability evaluation and develop the game so that it can be launched through several application stores.

## ACKNOWLEDGEMENT

We would like to thank all the students and staff of Indian Institute of Technology, Guwahati for their help in the brainstorming process, user research and usability evaluation.

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# This is not just a Questionnaire!

It means more than just a set of 20 Questions to us. Trust us when we say that just a couple of mins of yours would go down long way in making a big impact on the world. Yes, that's precisely what we want to do and is only possible, with your help. Here's a set of instructions to get started :-

- This questionnaire consists of 20 questions, 15 on this side and 5 at the back.
- Simply circle / tick the appropriate answer at the end of each question.
- You are not required to write your name anywhere on this sheet.
- Due to the sensitivity of the topic, we request you to kindly fold the sheet in the form of a chit and submit, so as to ensure that your identity remains a secret.
- Please be truthful and honest - we aren't testing you!

- 1a. Was Sex Education a part your school curriculum? YES / NO  
b. Were you confident about having adequate amount of knowledge in this regard after graduating from school? YES / NO / CANT REALLY SAY
2. From where did you get to know about facts / info in this regards? (Multiple answers allowed)  
PARENTS / FRIENDS / SCHOOL / MEDIA
- 3a. Do you think that masturbation is ethically wrong / sinful? YES / NO  
b. Masturbation has serious health consequences. TRUE / FALSE / I DONT KNOW
4. Girls can get pregnant before their first period. TRUE / FALSE / I DONT KNOW
5. Birth Pills can be effectively used as means for preventing Sexually Transmitted Infections (STI's)  
TRUE / FALSE / I DONT KNOW
6. As long as you don't engage in sexual intercourse, you are free from STI's. TRUE / FALSE / I DONT KNOW
7. Which of these is a 100% effective contraceptive method – CONDOM / PILL / DIAPHRAGM / NONE OF THESE
8. A person looks perfectly healthy. He can still be carrying a STI. TRUE / FALSE / I DONT KNOW
9. Aids is curable. TRUE / FALSE / I DONT KNOW
10. Contraception is a girl's responsibility. TRUE / FALSE / CANT SAY
11. Oral Contraception can cause cancer. TRUE / FALSE / I DONT KNOW
12. A doctor's prescription is required for purchasing contraceptives. YES / NO / I DONT KNOW
13. In case there is a sexually threatening situation / emergency, do u know whom to contact?  
YES / NO (If yes, \_\_\_\_\_ is the number I'll dial)
14. Rate your knowledge about sexual diseases and their causes on a scale of 1 – 5, where 1 denotes low and 5 denotes high.  
1 / 2 / 3 / 4 / 5
15. Would you feel free to discuss and educate your children about sex? YES / NO / CANT SAY

### Just 5 more to go! Thank you for being patient

1. What are your reasons for using a mobile phone? (Multiple answers allowed)

- a) Just talk on it
- b) Browsing web for information
- c) Receive email and SMS
- d) Gaming

2. How often do you download apps from the online application store? DAILY / ONCE A WEEK / ONCE A MONTH / VERY RARELY / MY PHONE DOESN'T SUPPORT APPS

3. Currently, how many apps do you have on your phone which did not come pre-installed?  
a. less than 5   b. from 5-10   c. from 10-15   d. more than 15   e. My phone does not support apps

4. Please mention the apps you use the most on your mobile phone. If your phone does not support apps, mention popular apps you might have heard / used / seen on your friend's mobile.

a)\_\_\_\_\_ b)\_\_\_\_\_ c)\_\_\_\_\_ d)\_\_\_\_\_

5. Select the average times per week of using your mobile phone for doing the following tasks [Write the corresponding alphabet {as explained in the key} against each task]

- (1) Chatting with friends;
- (2) Communications;
- (3) Receiving service information (e.g. news, weather broadcast, etc.);
- (4) Shopping and business

Key:-

- a) Uncertain
- b) <5 times/week
- c) 5-10 times/week
- d) 11-15 times/week
- e) 16-20 times/week
- f) 21-25 times/week
- g) >25 times/week

# ClassPal :

## An interactive Doubt Clearance portal

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**Abstract**— In this paper we describe the process and outcome of our work developing an Interactive doubt posting/clearance portal to enhance the learning experience for a lecture based classroom. During the project we have learned about the various forces playing part in effective learning ranging from discussions in the class to effect of personality traits on the participatory activities.

**Keywords**— Classroom learning; Interactive portals; Doubt Clearance; introverts learning.

### INTRODUCTION

With rapid increase in technology, its application in the field of education is a great boon for learning community. We worked on an application which assists students to learn with dynamic content, rather than passively listening to teacher lectures or answering questions at the end of a textbook chapter. The area we focussed on was to allow students to share ideas and ask doubts within a classroom using an interactive portal. Student engagement is important for learning, but it's not always easy to activate, especially in large classrooms. Students may limit participation because they're intimidated, unprepared, shy, scared or inherently **introverts**.

[1]. Although the concept requires a classroom with state of the art facilities, with each student possessing an interaction device like a tablet, the system control for the instructor/ teacher and the parent software system (to manage the content), we believe it is very much feasible in large institutions. In many ways, the portal mirrors students' lives outside of school, where they communicate with friends via their cell phones or computers that interconnect with a slew of gadgets, participate in online social networks, enjoy gaming devices that respond instantaneously to their physical movements. The observations and primary user research/analysis were done within the premises of our institute, IIT Guwahati. Our methodology was to divide and focus on three major phases of the project, Research, Analysis and Prototyping.

### RESEARCH PHASE

The project demanded a lot of research to be done since our areas of interest were too wide and had to be connected logically. Since we as students have been through the situation of learning in the classrooms, there were many decisions where we were tempted to use our own discretion and act as the user. However that would not be the way a designer works to solve such a problem. Thus there was extensive literature study done to get the concepts related to personality types and their effects on learning right.

#### A. Literature Study

Reading research papers cleared our assumptions about the factors playing role in learning in a classroom for

different individuals. We chose to concentrate on four topics mainly. First, the learning activity for a classroom based environment. Secondly, the types of personality traits that exist and their behavior towards an activity like learning. Third, the different researches that have been done to support demarcations in learning styles of extroverts and introverts. Fourth, the various interactive platforms that exist to enhance the classroom learning experience.



Fig.. 1:Kandy is one device helps students attempt True/false and multiple choice questions within classroom in a responsive way.

#### B. Primary Research

The User research was done within the premises of our campus, IIT Guwahati. The students and teachers can serve as a reflection of many higher education institutes and universities in our country. The strategies followed for research were divided into two phases. First to get a wide range of general opinion on the context, we carried out surveys for a large group of people. Second phase was done to get the in depth knowledge of the matter and included activities like observations, user interviews and expert interviews and focus group study.

##### 1) Classroom Observation

We conducted observation sessions in two types of classrooms to see the activities of students and teachers. There were many interesting findings from this method. Techniques like

# ClassPal : An interactive Doubt Clearance portal

Shadowing and Fly on the wall were used to observe and record behavior of students without interfering in their activities. A time lapse video and our own notes recorded the useful observations which were used in further analysis.



Fig.2 Classroom observation and survey of EE-101 lecture

## 2) Survey

The first step was to identify the range of personality traits in a typical classroom in the college. The questionnaire was carefully designed to serve two main purposes. One, to identify the personality trait of a student and secondly a few opinion questions to know about their problems with the existing methods of teaching and interaction in class.

The survey research was done with 94 freshmen in the lecture theatre after the class. The method followed was to modify an approved personality test, to suit our purpose. Items were drawn from the Eysenck's personality questionnaire which is a simple test with 15 multiple choice questions to help determine the person's traits on a fair range of introversion.

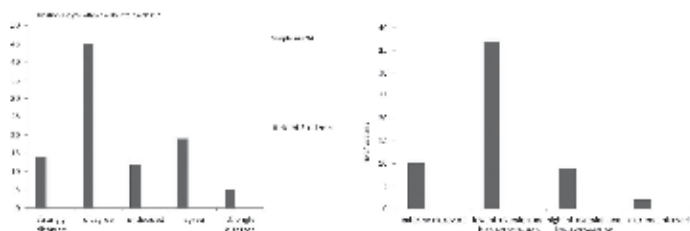


Fig 3: The graph on the left shows a general opinion of students towards doubt asking. And one on the right shows the distribution of Introvert and extroverts amongst the IITG freshmen community (sample Size 94)

## 3) Subject Matter Expert (SME) Interview

The matter of classroom learning required knowledge of knowing different social factors influencing a participatory activity like doubt asking. We consulted Dr. Naveen Kashyap a professor of Psychology department at IIT Guwahati. We asked him about the experience a student goes through in the class and the problems they might face in interaction sessions or doubt clearance. The knowledge gained by this consultation made us realize why it was important not to change the components of the system (student and instructor) but the interactions between them which were equally important.

## 4) User Interviews

We have till now interviewed 8 students as a part of the research. We chose these people from the result of their surveys. Having done the analysis of the scores in the personality questionnaire, we picked a sample size of 8 people who reflected the extreme and moderate personality types for getting to know the different perspectives and experience. Questions were asked in a friendly manner to make the students as comfortable as possible (so as to get the natural responses). Their responses for having more interactive classes were quite apparent however a few insights were more of findings.



Fig 4: User interviews of the students

## 5) Focus Group/ Discussions

Without much analysis, one may infer that teachers/instructors are an essential part of learning in the classroom. As a part of carrying the research, we interviewed a few of the very experienced professors at IITG to know their side of the context with interactivity in a classroom. An informal session carried out in a relaxed environment helped ignite many sparks of ideas for the concept and motivated us to the right path.



Fig 5: Group Discussions with IITG Professors

## RESEARCH ANALYSIS

### A. Literature Study

After the research done at secondary level (mostly reading research papers), it was implied that the introvert students face problems in a gathering of people to share their ideas or ask doubts. Where many findings from secondary research also



## ClassPal : An interactive Doubt Clearance portal

indicated that a quiet personality[2] [3] may not be the only restriction for an individual get his/her idea through the social barrier.

A few very crude conclusions and ideas that came after secondary research were :

- The establishment of a fruitful collaborative and co-operative atmosphere is an essential part of school learning at any level.[4] [5].
- It is essential to create circumstances for students to interact with each other, to express their opinions and to evaluate other students' arguments.
- Where a platform for sharing of ideas and opinions /asking doubt may be advantageous for the students who like to be in their shell, it is not going to hamper the learning style of an extrovert student[6].
- Social networking and blogging was an activity the student section of society is very active in, this can be incorporated within the classroom scenario too.

### B. Classroom Observation

The student and instructor activities were recorded, a few essential inferences which were later deployed in the design. A few interesting observations to note were

- Students, out of boredom were actively involved in texting on cellphones, reflecting that using social media platform is prevalent even in the middle of a gathering.
- The instructor keeps on looking for the feedback from the student side constantly and attempts to make interesting remarks to keep the environment alive.
- Instructor is limited to make eye contact only with the front row crowd. The amount of feedback an instructor is able to get is very much limited due to a huge crowd, decreasing the so called one on one interaction with the students.
- When asked a question, and students are expected to reply, they do it but in a mumbling voice and with a little in the background. This supports the fact that even though students are ready to participate, they may prefer doing it in an anonymous way. This could be one of the features for the application.

#### observations and inferences



Fig..6 observation and inference chart for classroom activity

### C. User Interviews

#### 1) Flow Model

After the intimation of all the different factors involved in the activity of doubt clearance within the class, we developed a flow model to reflect the system.

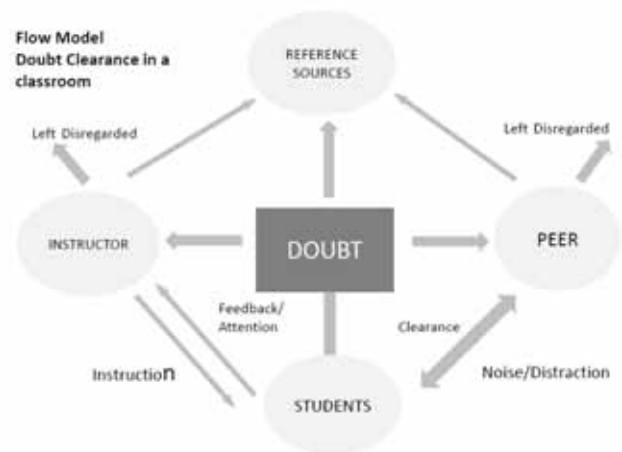


Fig..7 Flow Model

#### 2) Affinity analysis

We gathered a lot of insights from the user interviews taken over a course of 4 weeks. Discussions were promoted and hence a lot of points were made by the student interviewed. While we noted and recorded each interview separately, there were many similar expectations about the matter which got conformed only after actually listening to them from the actual students. We sorted the main observations, inferences and possible opportunities in the form of an affinity diagram. This table (see Table I) helped us as a guide in the further process and was consulted at design decisions for the system.

### D. Focus Group and Discussion session

As mentioned earlier, a group session with three very experienced teachers at IITG was done to get their take on our idea and an insight on their side of problem. They expressed concern over the diminishing trend of discussions and idea sharing within the class.

Through the discussion, we were intimate about the following important issues :

- The class hours have been shrinking over the years, because of which discussions and doubt clearance within the class is not promoted. However the doubts are entertained via email after the class.
- Their might be issues of breaching the discipline through the portal if it supported anonymity, also students may not concentrate on the instruction.

## ClassPal : An interactive Doubt Clearance portal

| Observation  | Inference   | Opportunity   |
|--|---|---|
| Instructor assumes that the concept taught has been grasped well by the students but not sure. | There is a feedback in some form from the students but lacks assurity.  | A system for better feedback from the students can be made.   |
| Students prefer a concept, repeated multiple number of times.                                  | The learning of a new concept strengthens on repetition.  | The student may have an option of going back and repeating the concept for himself.                           |
| Teacher seemed the most interested during the class regarding the topic.                       | Doubt clearance is most likely to be entertained well by the instructor during the class.   | Need of an instant system with the features of having doubts cleared within the class.                        |
| Verbal Interaction during a class is always appreciated by students.                           | A sudden break/change in the course of a monotonous lecture is good to bring back interest.   | A change in the media of instruction, a dialogue with the instructor, an idea shared.                         |
| Majority of students have many times not asked a doubt due to the fear of public speaking.     | Speaking in a gathering is mainly not welcome, with personality type playing a small role.  | A platform to share the doubt and have less influence of speaking in public.                                  |
| Doubt asking was not entertained within the class due to lack of time with the teacher.        | If not very important or supported well, asking the doubt may cause a break in the class flow and waste precious class time.                  | A discussion platform where all the doubts get accumulated and entertained by the instructor after the class. |
| Students do express their opinions and ideas on platforms like social networks and blogs.      | It is easier for all the individuals to have discussions on the internet which if not equally, is very effective to an interaction in person. | A platform where students can post their ideas, opinion in public or communities and initiate a discussion.   |

TABLE : Affinity analysis

### IDEATION AND PROTOTYPING

#### A. Problem Statement

Interaction and doubt asking in classrooms has been on a decline over the past years. This is supposed to increase interest in the class and have participatory learning. A medium can be provided in the classroom and tutorial sessions for the

college students (IITG students here) which allow them to ask doubts and share ideas within the class without any hesitation or fear which is ubiquitous amongst a large audience.

#### B. Vision Statement

To Design an interactive networking portal for the students of IITG which allows Idea sharing and Doubt clearance within the class such that the students get actively involved in the existing topic and build interest in class.

#### C. Brainstorming

After an intensive research analysis we sat down to join the parts of the problem that we knew. The Brainstorming session was purely done to draw relations and associations between the concepts we were working on. As the associations were made, we derived what and where the problem can be solved via design intervention. We decided to consolidate our problem here to build an in class portal for the students at IITG which shall assist in class interaction in particularly doubt asking. This will cater the needs of the shy and the introverts while build in an interactive and interesting lecture which brings back the lost excitement of a lecture class.

#### D. Concept for the Proposed System

There are four main components, individual devices for students, the central control for instructor, the main operating system or the host and the web. The system shows interactions that would occur in a classroom equipped with the proposed concept. Each individual device is a part of the larger host system with a governing Operating System. On the larger display is the feedback from this operating system. Communications can occur between any of the devices within the confines of the host and the display is a flexible media to be set by the instructor. Information to and fro the web can be transferred too.

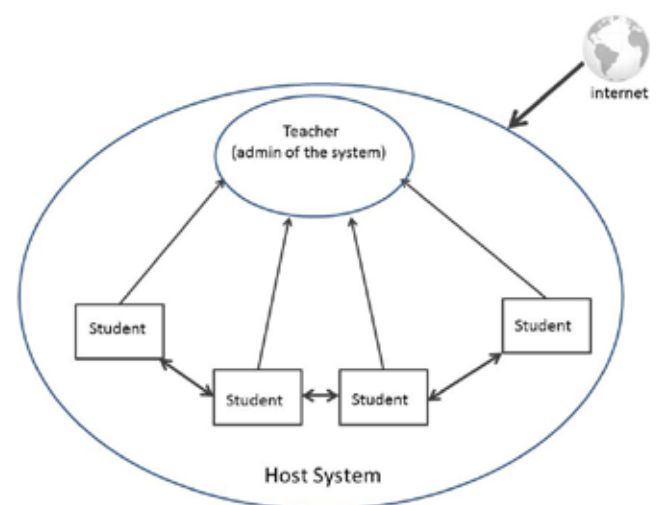


Fig..8. Interaction Model of the proposed system

# ClassPal : An interactive Doubt Clearance portal

## E. Interaction framework for application

A new system for an interactive classroom experience with the assumption that each individual will have a handheld device (Aakash Tablet in our case which is provided at minimal price to all students). The student can use it for a rich experience of learning by accessing various features like :

- Doubt clearance among peers during a live classroom or lecture
- Doubt clearance by professors of the doubt popping on his screen (admin of the system) during a lecture or in the end of a lecture
- Promotion of doubt on the basis of no. of students having the same doubt (liking a doubt)
- Answers provided for a doubt by the portal from the content provided by professor in form of E-books, previous lecture slides etc
- Question-bank/quizzes, Student feedback of the professors, Lecture notes ,E-books ,Discussions forums etc would also be part of this portal.

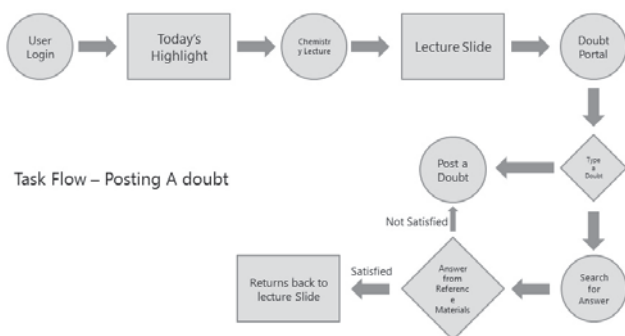


Fig..9. Task flow diagram for posting a doubt

## F. Prototypes



## CONCLUSION

The project done is a part of generic problem solving. As students faced the problem of not having their doubts cleared within the class or have a fruitful discussion. The matter is required to be addressed and we explored it and made an attempt at its solution via design intervention. The problem was treated to provide an interactive portal which was truly a job of an interaction designer.

During the project we learned to apply different Interaction design methods and techniques. The framework of our project had research as its important component. We learned about field studies, how to carry out observation, how to conduct user research and make sure it is useful in the end solution. The analysis of data gathered by research was an interesting stage where many insights started to develop and we were able to picturize a solution in our head.

There is still a lot of scope for development of this initial concept and many features need to be consolidated with more research. However, our next step will be to test the solution proposed till a satisfactory result is gathered about the system loopholes and usability of the interface.

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**DoD Workshop**



**Exhibition Room,DOD**



# Translating Cab Sharing to Information System

## Technical report on design intervention

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**Abstract**— The following paper outlines a web-based application/platform to facilitate efficient and effective cab-sharing. The application serves as a platform for seeking or creating cab-shares. It, like any other social networking website, enables you to create your profile and lets you create a share if you have already booked a cab or lets you join others who are seeking passengers. This paper talks in detail about the methodology followed to achieve the installation of such an application. We started off with user research, followed by defining user requirements and the information architecture and through repetitive feedback from stakeholders and potential users, ended up with the final User Interface (UI) designs of the application. The application acts as an interface to connect two people in search of the people to share the cab and thus fare.

**Keywords**— *Cab Sharing; User Centered Design; Information System;*

### INTRODUCTION

The project was taken up to solve the problems faced by the fraternity of students and other in the campus of Indian Institute of Technology, Guwahati, while travelling to and fro from the campus to airport/railway station.

We travel everyday to our workplaces, markets, airports etc. The same route is traversed by hundreds at the same time. Similarly, during vacations, in general, in all the colleges, students travel from the campus to airport/railway station. Most of them book cabs. There are many people who travel the same destination starting from the same place yet, since we are unknown to that fact we lose a chance to share the cab and save some money. We surveyed in the campus, and we found this increases during festive holidays where only a handful of us travel to airports or railway stations. So we planned to come up with a solution that could help college student (and others) to effectively form pools to share cab which could save money and fuel as well as bring home the idea of green travelling.

The work was based on user-centric design methodology and followed the design process to reach the conclusion or make design decisions. We studied [5] and [6] and combined their process and followed the modified rule of D's: Define->Discover->Design->Deliver, working in iterative loops until we were satisfied with the output. We started by studying the problems in the domain of travel and utility and condensed our research to the problems faced by the fraternity of IITG. We worked towards the specific problem of cab-sharing during vacations or otherwise faced by students while travelling to and fro to the airport/railway station. Located at the north bank of the river Brahmaputra, commuters have to travel a distance of about 20km to go to the other side of the city, thus paying heavily. Also, since many travel by the same route, there is cumulative

wastage of resources, both natural and monetary.

Thus, a research was done to evaluate the solution which could be implemented. Qualitative research was done to understand the behavior, expectations and motivations of users. Existing applications were studied for their information architecture, design elements and usability. After the research, we worked towards defining the solution asking the following questions.

- What would the application be about?
- Who would use the application?
- How will the user use it?
- Why will the user use it?
- When could the user use it?

We then moved ahead to work upon the structure and improvise on the design of the application, keeping ourselves focused on the ultimate goal- helping the members of the IITG community to interact with others, going to the same destination as they, and sharing a taxi with them, thereby providing a social, economic and eco-friendly way of transportation.

### DISCOVER

The first step of the design process involved formulating the design brief and getting a detailed idea about the concept. Once the idea was finalized upon, the next step was doing a market research to get a brief overview about existing products. A literature research followed to understand and analyze works done in the area, accompanied by a qualitative user research in order to understand user goals and requirements.

#### A. Existing Scenario

A competitive analysis was done studying the existing application in the field of interest. Observations from this step provided

valuable insights in designing the solution.

We browsed different existing solutions to study their.

- Pros and cons.
- Data flow and information architecture.
- Design Elements.
- Usability of Solution.

We looked at various android, iPhone, web-based applications like Cab-corner, Ridejoy and Fare/Share.

- Ridejoy is a community-driven marketplace for sharing rides. They make it easy to share rides with friendly people. If someone is going on a trip, they can list extra seat space in their car, and if they need to get somewhere, they can find a ride, using the site.
- CabCorner.com is a global, mobile web-based, cab-sharing platform that connects commuters headed in the same direction. They turn city's private taxi fleet into a luxurious, affordable, mass transit experience.
- Fare/Share is an iPhone app that helps share taxis on the go. It features one-click ride requests, fare calculations, identification by photo or apparel, PayPal integration and a comprehensive feedback/rating system.

Major problems identified in the existing solution are as follows.

- Cluster: In some of the solutions the information cluster made it hard to find information.
- Authenticity: Some of the applications did not ensure authenticity of the users.
- Registration: In some application registration was the first step of using the application which discourages users from using application. Instead engaging users by displaying some relevant information a better solution.
- Navigation: Some had to complex navigation.

The primary purpose of doing a market research was to have a clear understanding about the existence of similar products in the given field. Such products not only gave us a brief idea about the kind of information that needs to be managed but it also helped us get a brief overview of customer needs before actually conducting a user research.

## B. Literature Research

With rising transportation cost and low flexibility of public transport there was a need for cab sharing medium. When travelling by cab, cab-sharing is a way to reduce travel cost. There are various factors that affect this decision to share cab while travelling via cab. So the literature study was done to understand the motivation factors behind cab sharing. Habib[1] listed the following factors for cab sharing.

- Finding potential partner: When it comes to finding a partner, age and office hours play a vital role in carpooling.
- Carpooling as an occasional choice: The main factors which could motivate people for carpooling are-cost, safety and congestion.
- Having the option of driving alone if necessary: Driving alone is not preferred by people who do not drive at all or who

do not know how to drive.

- Availability of convenient parking for carpooling: The option of parking comes into the picture when individuals combine carpooling with local modes of transport.
- Guaranteed ride home if necessary: This is generally preferred by people living in the same neighborhood and having scheduled work hours.
- Not having personal vehicle available for work all the time: Vehicle availability and auto ownership have a direct influence on carpool formations.
- Working more regular hours: People having office hours starting before 7 am in the morning generally go for carpooling
- Already carpooling as much as possible: This option is exercised by people who find it feasible and generally use it to go to work.

Tischer and Dobson [2] found flexibility, cost, safety, and increased congestion and waiting time as the primary factors for choosing carpooling. Collura [3] added environmental awareness and poor transit service between suburbs as the motivations for choosing carpooling as an option.

Buliung and Soltys[4] divided the factor into 4 categories Demographics, Spatial Variables, Motivation for Carpooling and Household Auto-mobility. In demographics gender and age played major role in affecting cab-sharing in respective order of significance. Also they suggest that location of carpoolers within 1km range increases the chance of carpooling. So this will prove a useful point since we are considering community of IITG so most of the people living in this community are within the range of 1km to each other. When considering the fourth factor that is, Household Auto-mobility, since IIT Guwahati does not allow the students to keep a motorized vehicle, therefore the availability of privately owned vehicles is very less and thus leading to increased rate of carpooling potential.

From the points stated in the research papers the following were the major factors affecting our design.

- 1) *Demographics*: Most of the users would involve students between age 18-26.
- 2) *Spatial*: IITG is located nearly 20 km from the main city. Travelling to/from the airport/railway station takes nearly 45-60 min on an average.
- 3) *Motivation for carpooling*: The prime factors motivating people for carpooling are- Expense, Fuel and Company. Most people don't prefer paying Don't have access to car, cost saving, environment.
- 4) *Work schedule*: Travel during holidays/vacations.
- 5) *Role preference*: Prefer friends to acquaintances followed by reliable sources.
- 6) *Commute pattern*: Mostly when students travel to Guwahati city they use public transport like bus or ferry. But this would not be a good option while traveling to airport due to lack of availability of direct transport from college to airport other than the cab.

7) *Commute distance*: The distance to airport is approximately 22km.

## C. Qualitative Research

To get better understanding of users, 10 students from the IITG student community were interviewed and the results analyzed. The main objective of the user survey was to define the keywords - When? Where? Why? What? How? , i.e. WHEN was the last time users shared a cab, if ever? WHERE did they start from and WHERE was the destination? WHY did they share a cab? WHAT process did they follow to do so? HOW was the experience? The data obtained was then analyzed by developing an affinity diagram and drawn. The results were as follows.

- 1) Almost all the users have shared cab at least once.
- 2) 77.7% of the users have shared with a friend, 22.2% with an acquaintance and the rest with a stranger.
- 3) 88.8% of the users shared because the fare is high, 55.5% because of safety issues, 55.5% because they didn't want to travel alone and 11.1% because it was more eco-friendly.
- 4) 33.3% of the users prefer travelling with a known person whereas 22.2% are willing to travel with a stranger if he/she is reliable.
- 5) 55.5% of the users have a smartphone; 77.7% use apps.
- 6) All the users access the internet through their laptops/computer systems whereas 77.7% use their phones as well.
- 7) All the users use the internet for at least 5 hours a day.
- 8) 66.6% of the users use their laptops for more than 10 hours a day whereas the rest use it for at least 5 hours.

Since a majority of the users use laptops as well as the internet for prolonged hours, it was decided to develop a web application.

## DEFINE

We moved on to the next stage, wherein user needs and the skeleton of the product needed to be defined. We then defined the user persona and then moved on to elaborate the needs and requirements of the user. Once we had a clear definition of the user, we started forming the blueprint of our web app. Scenarios were formed followed by the information architecture.

## A. Persona

The user persona was defined as follows.

Jack is a 21 years old male student in the department of Computer Science at IITG. He uses internet for more than 5 hours a day. He has a smart-phone as well but prefers using his laptop for connecting to the web. He is very particular about authenticity, be it people or things. He dislikes travelling alone and long waits. As far as travelling is concerned, his key goals are to.

- 1) save money.
- 2) reach his destination on time.

- 3) travel safely.

Even while travelling, he is very particular about the cabbie not letting random strangers share the journey. Not only that, he prefers travelling with people who have similar flight/train timings. Having defined the persona, we listed out the requirements of the user. In other words, we finalized upon the decision points that are taken into consideration by the user before sharing a cab. User requirements are as follows.

- Authentic source.
- Good company.
- No waiting.
- Less expenditure.
- Safe journey.

## B. Scenario

Once user needs were defined, the next step was to form the skeleton of the web app. Scenarios were formed to help users understand when and how the app could be used to achieve their goals and fulfill their requirements. One of them is mentioned below:

Jack is flying back home via flight to catch and needs to book a cab. Since the cab is very expensive, he tries to find alternate travelling options like taking public transport or sharing the cab with a friend. Since, none of the above works out, CABAGE(cab-sharing web application) offers a unique solution of cab-sharing through its web application. Thus, using the app, Jack finds another person who wants to share the ride, makes a new friend, saves money and helps improve the environment, of course. The scenario has been used to form the storyline of the promotional video of CABAGE.

We next moved on to managing the huge chunk of information collected through our research by developing the information architecture.

## C. Information Architecture

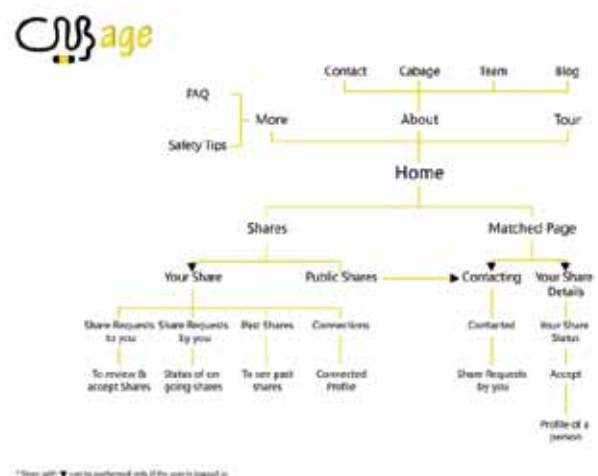


Fig. 1. Information Architecture

# Translating Cab Sharing to Information System

Through the information architecture, we aimed to organize and manage the information collected to aid easy interpretation of the same. The hierarchical structure so formed further helped design the task-wise interfaces of the application.

## DESIGN

Having developed the skeleton for the web app, we proceeded to the next step of our methodology. Here, a prototype was developed for the web app and was tested for flaws and possible alterations. Once the information flow was finalized, the graphics of the app were improvised and worked upon. The product was again tested and this process was repeated till the users were satisfied with the content flow and display.

### A. Prototype

Digital prototyping was done and wireframes were made in Balsamiq software. Since the ideation phase kept changing based on feedbacks, the wireframes were made so as to facilitate easy and quick interaction, based on the feedback from users, designers and stakeholders. It also helped decide the flow of interaction. While making wireframes the following points were kept in mind based on the initial research and analysis.

- 1) Simple and fast.
- 2) Easy to understand and learn.
- 3) Should work without need of a human intervention.
- 4) Should ensure authenticity.



Fig. 2. Prototype

### B. UI Designs

After the basic structure of the app was finalized upon and the wireframes were made, attempts were made to refine the visual appeal of the app. The colors of the logo were incorporated into the design of the app for it to go in sync with the branding and publicity. The interfaces were designed keeping in mind the basic tasks that the user can perform with the application.

## DEVELOP AND DELIVER

Once the UI designs were ready, they were given over to the development team for the development of the final product. The deliverable is still in the process of development and is expected to be launched in the campus soon.



Fig. 3. UI (Home)



Fig. 4. UI (Contacting)

### A. Branding and advertising

Creating a Product's identity is equally important as building the product itself. The brand of any product explicitly creates a place for the product. Branding has been a very powerful tool in any marketing strategy for any product or service. It is a means by which a company effectively communicates with its customers about its work, competitiveness and loyalty differentiating itself from its competitors by establishing a relationship with the customers. It largely affects the consumers' purchasing decisions. Thus branding and advertising of the product or service plays a major role in its launching or marketing strategy. It could be print based or digital based depending upon the target audience or the customers.

Our target audience was the college going students. We found out during research that most of them accessed internet for long hours using their laptops. Thus, we realized it would be a great place to pitch our application. Moreover, with 35% of the world population online and the number still growing, viral online advertising is the next big thing. Promotional, teasers, viral videos published online not only provide with a strong audience but also they simplify the product what it is and what it does. The task flow of the application, its usage scenario can be very well depicted. Also, it makes the idea simple to understand. Not only this, but videos have a longer life. Visual aids are provided to help people understand the information being presented to them. Also, print media on a magazine or a hoarding could stay in place for at max a month; it's useless



## Translating Cab Sharing to Information System

thereafter. But a video could be made viral again without losing its significance. There are many big names in the market that are doing this- Google, Windows, Adobe, etc. They have some viral concept-cum-advertisement video onto their websites or video hosting websites like YouTube and Vimeo to promote their products.

We browsed and analyzed the data and concluded that publishing a concept video would be a smart move in not only advertising the video but also making its concept and working clear to the customer. Also, since our target audiences were college students, we also decided to design some posters which could be put up on notice boards or various locations at the institute.

For the posters we used the underlying keywords of Save money, Make friends, Protect environment as design elements and moved ahead. We kept colour of the poster similar to those we connect with taxi: a shade of ochre and black.



Fig. 5. Poster

For the video, we tried to add a little entertainment to it so that the viewers remain engaged throughout. Thus, before working on the storyline, first a concept and style of the video was brainstormed. References were taken from the viral animated videos of products and services like Google, etc. The inspiration of choosing the style of basic animation combined with motion graphics was taken from the works of "Epipheo Studio", which produces viral product videos. We decided to make the video using simple 2D animations and motion graphics and add a voiceover to aid better understanding along with the background score.

Next we worked on a storyline. We wanted to show the concept as a story so that it maintains a flow. So we brainstormed the following storyline:

A guy going home via flight needs to book a cab. Since the cab is very expensive, he tries to find travelling options like taking some public transport or sharing the cab with a friend. Since, none of the above works out, CABBAGE offers a unique solution of cab-sharing through its web application. Thus, using the app, the guy finds another person who wants to share the ride, makes a new friend, saves money and helps the environment, of course.

We moved on to create the characters for the video. Characters form an integral form of any video. They represent not only the video but the essence of the video itself. The characters, in this context, had to be simple, elegant yet comic.

Inspiration was derived from the characters of SOUTH PARK, an American animated sitcom created by Trey Parker and Matt Stone. The following insights were drawn.

- 1) Animated head.
- 2) Simple and static body.

We did some doodling to come up with the basic form of the character. This was followed by final rendering of the character. Other side-elements used in the video were also treated so that all become harmonious with each other.

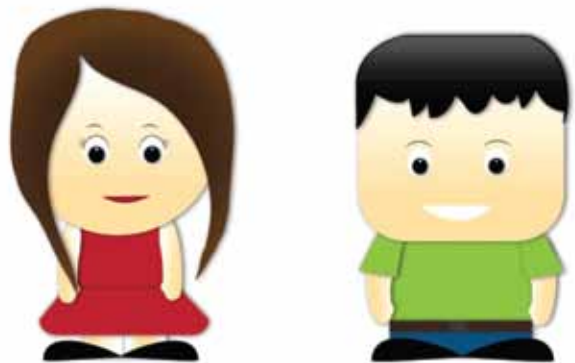


Fig. 6. Characters

Once we had our characters and other elements ready, we put them together in the form of a storyboard for better understanding and visualization of movements to be made in the final video. After making the storyboard, we sat down to compose each shot and render the video.



Fig. 7. Storyboard 1

# Translating Cab Sharing to Information System

Therefore, en route in developing the video, we followed the following methodology. While making wireframes the following points were kept in mind based on the initial research and analysis.

- Research and study of different concepts and video styles.
- Formulating a storyline for the video.
- Storyboards and animatics including soundtracks and voice-overs.
- Render of the final output.



Fig. 8. Storyboard 2

Final output was delivered in following format.

- Duration: 1:01:12.
- Frames per second: 24 fps.
- Resolution: 1920 X 1080 HD.

## CONCLUSION

In this paper, we have presented the interface of a web-based app for the fraternity of IITG community that enables them to interact with fellow members, who have the same destination, and share a taxi with them instead of travelling alone, thereby

providing an economical, social and eco-friendly system of cab-sharing. We have followed an extensive design process extending over a period of nearly 150 hours, starting with market research and literature research, followed by user research. We then analyzed the results of the user research and proceeded to define user needs and requirements before developing the information architecture and wireframes. We then worked upon the graphic of the wireframes to develop a prototype and then designed a promotional video and posters to go with the branding.

Through this project, we were able to understand and analyze the different modes of carpooling practiced in various parts of the world. We were also able to study the behavior of students of IITG fraternity and analyze the factors that they take into consideration when they need to book a cab. We intend to launch the app soon in collaboration with the development team and then, work upon it and improvise it further depending on the response received from the target audience.

## ACKNOWLEDGMENT

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# A Card Game based on Participatory Learning Approach (PLA) for Health Education

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**Abstract**—Health has been an issue of concern in many developing countries of the world, including India. The situation is especially worse in rural areas, where both public awareness and healthcare facilities are limited. In such an environment, educating children about healthcare, sanitation and nutrition early can go a long way in improving present situation. Healthcare education, though incorporated in school curriculum, is often perceived as bland and boring. We propose an alternative method of teaching healthcare to kids – through participatory learning activities. We also propose a game based on participatory approach which helps the children learn about diseases, their symptoms, precautions and causes, and also about nutrition. The methodology followed which helped us arrive at the game is also described, and can be taken forward to design more of such activities.

**Keywords**—Health education, participatory learning, game design, card game

## INTRODUCTION

A number of indicators of health, namely prevalence of certain diseases, years of life lost to diseases and fatalities due to diseases are worse in India than most other countries in the world [14]. This is especially worse in rural areas. Add to it the fact that around 70% of Indian population is Rural against the global average of 50%, importance of rural healthcare becomes paramount [14]. There also appears to be strong urban-rural differences in several health behaviors. According to 'India: Health Profile 2009' by WHO [14], population using improved water and sanitation facilities is far less in rural area than urban area. The resources and infrastructure in rural area is also much limited in comparison to urban. Therefore, tackling the issue of healthcare in villages is not only a topic of great concern, but also a challenge.

In order to fulfil our aim, we selected the specific area of health education in schools. Health education was selected because preventive healthcare is more relevant and shall have greater reach and impact than curative. In addition, healthy habits can be more easily incorporated into young children than in adults [1]. School education also has greater reach, and using it as a vehicle, a large portion of the community can be reached.

To ensure engaging, effective and relevant learning, the approach selected was that of participatory learning. Participatory learning, that is, learning through participation in activities has greater chances of engagement, retention and implementation. Moreover, PLA (participatory learning activities) have been used and found to be more effective in rural communities in the developing world [12].

We intend to use similar pedagogy in the context of Indian rural community to effectuate learning among school going children. Furthermore, we want the learning and awareness to propagate beyond the children, and bring about participation and benefit of the community. The stakeholders identified were the children, the school, doctor(s) present in the vicinity, parents (and families) of the children and ultimately the community as a whole.

## BACKGROUND STUDY

There are two dimensions to healthcare – prevention and cure. It was decided that through this project, preventive healthcare is targeted. For prevention, healthy practices and behaviors need to be inculcated among people of the community. Promoting and establishing healthy behaviors for younger people is more effective, and often easier, than efforts to change unhealthy behaviors already established in adults [13]. Health education provides young people with the knowledge and skills they need to become successful learners and healthy and productive adults [1].

Schools are regarded as constituting a very important arena for health education among children and young persons. Apparently factual, objective and unquestionable potentials of schools are often put forward, such as the ability to reach young persons on a large scale [9, 13]. Schools can play a vital role in establishing healthy behavior patterns among young people that carry over into adulthood [13]. Schools help the children know their health status, identify health problems

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and injuries. It also acquaints them with first-aid measures about common sickness and injuries [9].

There are a few projects and frameworks which are active in various parts of the world today. But the issue is that they are either targeted for a different context, which does not suit the context of rural India, e.g. web based e-learning modules [4]; or the suggested framework does not have sufficient emphasis on practice, e.g. theory courses in science and biology; or the framework has not been implemented properly, e.g. the NCERT physical education curriculum [9].

It becomes clear that an alternate pedagogy/approach is needed to facilitate effective learning as envisioned by the project. The approach of participatory learning was explored in this project. Participatory learning aims at learning through participation in activities. It is opposed to the usual top down approach of learning. There is greater engagement in this approach. And the more the participants are engaged and stimulated mentally, emotionally, and physically, the more likely they are to learn and to retain what they have learned [PLA]. The approach has been used, traditionally, with rural communities in the developing world. There it has been found extremely effective in tapping into the unique perspectives of the rural poor [12]. Participatory approach has been used in design, problem solving, and even issues of health like spreading awareness for HIV AIDS and other STDs. The association of Education International (EI) and WHO have published a manual, enlisting activities which use participatory learning approach to spread awareness about HIV AIDS and other STDs in Africa [6]. There is another project, implementing participatory learning methods to spread awareness about AIDS among adults in Kenya [10]. But in these cases, either the context, or the learner age group, or the content has been different. Through our project, we aimed to implement participatory learning methods in the context of rural India, which targets school going children as learners and health education as content, and see if it is able to fulfill our primary aim.

### DESIGNING THE INTERVENTION

#### A. Target community

We based our project in a girls' school in Guwahati, India, namely, North Guwahati Girls Higher Education School. We worked with students of age group 12-14 years and corresponding grade of 6th. All were comfortable with the local language, Assamese; some additionally spoke Hindi. All the subjects volunteered to participate in the design process.

#### B. Activity Design

Our aim was to design an engaging activity, based on participatory approach, for health education. We decided to design a game for the same, as a game embodies the participatory approach as well as provides high degree of engagement. To design the game, we conducted study on two aspects:

##### 1) Identification of content

The content which we intended to communicate through

the game should be relevant to the students, and should be comprehensible at their age group. To identify content in health education relevant and apt for the age group, we consulted the curriculum in health education proposed by NCERT. To ensure immediate relevance of the content to the children, we consulted the Doctor of local health center:

##### a) Analysis of curriculum:

NCERT suggests a comprehensive syllabus for impart health education to students, designed according to grade level of the students. This was a good place to start as experts have already identified the level of health education according to age and grade of students.

Expert Interviews: Interviews were carried out with local Doctor. NCERT syllabus is meant for schools across country, but in order to ensure relevance to the students, local health concerns had to be identified, and for this goal; we conducted personal interview with the doctor of local healthcare center. Through it, we identified common diseases and important health concerns in the area. We also identified issues of sanitation and hygiene responsible for diseases in the area.



Fig 1: Interview in progress

Inspiration from traditional games: We decided to take inspiration from popular traditional games in India in general, and in this community in particular. To identify games popular in this community, we conducted a short study with the students, in which they were asked to outline their schedule, and common games they played in the evening. Following the activity, we conducted an interactive session where we tried to find out more about the games they played and liked and how they liked to spend their spare time. We identified a wide range of games which the children like to play:

- Kinesthetic games, e.g. teesti, pansti, kabbaddi, kho-kho
- Team based games, e.g. dumb charades, antakshari
- Indoor games, e.g. ludo, chess, cross and naughts, card games
- Video games



## A Card Game based on Participatory Learning Approach (PLA) for Health Education

We tried to study each game and the characteristics which make them interesting. In particular, we studied the following:

### Dumb charades:

Dumb charades is a very popular game in many parts of India, including the community where we conducted our study, although it is known by different names at different places. The basic gameplay remains the same. There are two teams. One of them has to propose the name of a movie to a member of the other team, and he or she has to try to explain the name to his or her team members through acting. Some of the characteristics which make it really interesting and popular are:

- Importance of teamwork for winning – Team plays a very important role in this. In order to win, both the acting and the guessing sides have to play their parts.
- Spirit of competition – This game is highly competitive in nature. Scores are kept, and every round counts.
- Importance of skill – In order to win, strategies and skills have to be used, viz. coming up with difficult movie names, creative acting, and smart guessing.

### Card games:

Card games have also been really popular throughout India for a very long time. Though some card games are seen with a negative attitude in many parts of India, it does not affect their popularity among adults and kids alike. Newer variations of card games, namely trump cards with images and information of cricketers or professional wrestlers have especially become popular with the younger generation. Some characteristics which make them popular are:

#### a. Element of chance –

Contrary to the earlier game of dumb charades, this game has a fairly high element of chance. Skill is of course necessary, but it is the element of chance which adds to the surprise and randomness.

#### b. Spirit of competition –

Card games are also really competitive in nature, and a mix of chance and skill is usually required to ensure winning.

### C. Proposed Game

The game designed is basically a card game with elements of dumb charades for promoting teamwork, and use of skill to win. The basic aim of the game was to help children gain relevant information about various diseases and nutritious food. They should be able to learn about diseases, their symptoms and prevention, and also about nutritious food items, and their benefit for our body.

#### 1) Gameplay:

The game is to be played between two teams of 4 each. There are 24 cards in a deck. 11 of them are green, 5 yellow and 7 red.



Fig 2: Red, Green and Yellow cards

Each of the green cards has the name of an item, which is good for our health, mostly one from nutritious food items. There is also a line stating why that item is good for our body. Each of these cards has a score of +1 on them. The information on these cards is primarily meant to be read by the person who draws the card. It can also be read aloud for others to listen. The red cards, on the other hand, have the name of a disease, along with two lines - one stating a symptom, and the other, a preventive measure. These cards inherently have a score of -5, which can be converted to +5 subject to use of skill. On drawing a red card, the player has to enact the symptom and the prevention to his/her teammates (the name of the disease can be communicated verbally). On guessing the pieces of information right, the team earns a score of +5. Else, the team gets a -5 score. The yellow cards have a funny graphic and a random score. The intent behind yellow cards is to add an extra element of randomness and surprise in the game.

The game begins with the deck at the center and two teams sitting facing each other. The players draw a card each, one from each team, till all the players draw a card each. A total of 3 rounds are conducted in a typical game. Cards which add to the score, and the cards with -5 score are stacked in two different decks for each team. In the end, the points gained by each team are tallied and points lost are subtracted to give final score. The team with the higher score is the winner.

#### 2) Characteristics:

- Team game/group activity – The game relies a lot on team work and anyone acting needs the support of his/her teammates for guessing.
- Competitiveness – The game has high amount of competitiveness. There is also explicit scoring scheme to enforce the competitiveness.
- Element of chance – As in the case of normal card games, there is an element of chance. It adds an element of surprise and randomness.
- Scope of use of skill to gain advantage – An important differentiating factor for this game is that it also provides high

opportunity of use of skill to gain advantage. A team which is able to guess correctly can turn a possible -5 into a +5 score.

e. Elements of learning – This game is designed to have greater reception and retention of knowledge. The game has elements of fun and engagement, so it facilitates greater involvement and attention of children. Guessing while others act elicits greater use of cognition. There is also a possibility of association of the knowledge received with the experience. Hence there is increased retention of knowledge.

### D. Findings

The activity was performed by 30 students. Video recording of the activity was transcribed and analyzed. Various observations were also noted during the activity.

Initially, students were asked to enact all three - cause, symptom and prevention. In the pilot round it was found that students were having trouble in enacting causes as they were more technical. Important point to be noted here is that the information in the cards should be relevant and not too technical. Not only to avoid diluting the game, but also due to the fact that there is greater chance of retention of relevant knowledge in participatory learning than scientific or technical information. In later rounds, only precautions and preventions were enacted as they were more relevant and important, and also simple enough to act.



Fig 3: Students playing Card game

### Going into second round

The response to first game was so overwhelming, that we were compelled to start another round. And as they already had exposure to all the diseases, their symptoms and their precautions once, we decided to increase the difficulty level by concealing the name of the disease as well, and after the actor acted out the precaution and the symptom of the disease, the disease had to be identified by the team for full points. The strategy was not only successful in stimulating engagement in the second round of the game, but also improved the relevance of the activity as the precaution and prevention were linked with the disease in the minds of the children.

### Concept of scoring and competition:

Scoring and the spirit of competitiveness increased engagement and made the game more interesting. While calculating the scores everyone was so involved and eagerly waiting for the results. Even the students not playing that round become very excited. During gameplay, occurrence of a red card was observed to generate most excitement, followed by high scoring yellow cards. Every time red card showed up, there was a cry of excitement from both sides.

### High degree of engagement:

Children were engrossed in the game (they were not even distracted by their friends calling them from outside). The engagement was maximum when the members of a team were guessing. There was visible excitement among the participants - students were laughing and giggling throughout the game. The overall response was so overwhelming that we had to conduct another round for them. Each student played on an average 3 rounds. They also expressed a desire to play this or similar games in future.

### Learning with fun:

We also checked if they acquired useful information from it, and did not just play it for fun. And we found out that they were able to identify and remember facts and information as given in the activity. This was also established from the fact that guessing got easier as subsequent rounds were played. It was easy to guess when student knows about the disease.

Also the element of game facilitated greater reception and retention of knowledge. Guessing while others act elicits greater cognitive load. This was also supported by the fact that students were found to remember more about diseases than normal facts written in the green card (green card was just said out aloud while red card information was acted).

### Group dynamics:

There is always a group of children which is the most active and interested in the activities. It is a good idea to begin an activity with them, as their response increases interest among rest of the class.

### Encouragement of creativity:

This game was also found to encourage creativity, as different students were observed acting the same thing in different ways.

## CONCLUSIONS

The primary conclusion which we can derive from the activity and the response we got after it, is that participatory learning works for health education. Especially for content such as prevention of diseases, nutrition and sanitation, participatory learning can be used effectively to provide pertinent information to children.

Participatory activities, especially games also allow for greater engagement. And clubbed with learning, they can greatly boost both attention of children and retention of learning. As we found in our project, not only the children enjoyed the activities, they could explain in their own words what they

learnt from them. They could identify useful information and recollect it.

### FURTHER WORK

This game was just an example of implementation of participatory learning approach. As further work, more activities can be designed for the same aim employing different participatory learning techniques. A step further can be a framework which can be used across communities to develop such activities. Digital and web based activities and games can also be designed with the primary aim of providing health education.

### ACKNOWLEDGMENT

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# Ergonomics Lab,DOD





# Generating and evaluating design attributes for service design

A case study for a product and service review portal

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**Abstract**— In this paper we try to outline the service design process deployed to design and develop an online portal for providing reviews to users regarding different products and services. The process revolves around balancing the design requirements and the user requirements using quality functional deployment. We focus on the design process followed in Quality Function Deployment, especially House of Quality matrix and its role in evaluating and weighing the various design characteristics of the service. To analyse the user needs, we conducted focus group interview preceded by task analysis. The paper presents a case study of using the House of Quality matrix and a suitable user need analysis technique to compliment it.

**Keywords**— *Quality Function Deployment, service design, focus group interview.*

## INTRODUCTION

Online communities have been increasing at a very fast rate in today's world. In the context of E-commerce, this has been observed as an increase in the amount of online shopping, number of people depending on online shopping and also the domain of online shopping in terms of products offered. Online buying/ shopping has been related to the reviews people read and a direct dependency is observed. Results indicate that subjects who consulted product recommendations selected recommended products twice as often as subjects who did not consult recommendations [1]. Because of the extraordinary, popularity, growth and influence of such communities, emerging WOM (Word-of-mouth) communication behavior has been observed which affects the popularity and sales of a particular product/ service. Consumption related online communities essentially represent WOM networks, where individuals within an interest in a product category interact for information such as purchase advice, to affiliate with other like-minded individuals or to participate in complaint or complement interactions [8].

Several online communities that exist in this context range from household goods, FMCG products to various restaurants and other services. Overlapping of information, redundancy and contrasting views leading to confusion, information overload and other such problems have been identified. Such issues have a direct effect on the amount of trust and reliability a reader has on the reviews he reads for a product. Enhancement of trust is very important for the reviews to be read and consumed at the same time.

Thus a need for a better, standard and reliable platform in the online medium for giving and consuming of product and service reviews is observed. Such a platform is planned to be designed through the Quality function deployment (QFD) methodology [4], a structured and quality focused approach

for service design. As a part of this methodology 'focus group' technique is employed to obtain inputs from the people. These inputs are further analyzed in the process to come up with a set of design attributes and features to be employed for the design of such a portal.

The people have to be motivated not only for reading reviews but also to give their reviews for various products and services through the online medium. 'Gamification' is the technique employed here to create an online system that is more engaging, supporting and satisfying at the same time [3]. It is known that simulators designed as games or explorations to provide users with new surroundings, usually through images, sound create experiences that can lead to attitude and behavior change [2]. Some of the tools of gamification that can be used here are real time feedback, competition, ranking, levels, mastery, teams and user profiles. In the context of online reviews, such a technique can be employed for persuading the users for reading and giving reviews. Motivation here is achieved through the 'engagement' factor that is enhanced by the gamification technique.

## FOCUS GROUP INTERVIEWS

As a first step to QFD methodology for service design, House of quality matrix is created. Room 1 of this matrix consists of the 'voice of the customer' or the user needs. This room is essential for the formulation of design attributes to be listed out in room 3. For the collection of inputs from the people, focus group interview was conducted with a group of five members. The main objectives of the focus group interview were to identify user needs and problems faced by them and understanding user's tasks and behaviors in the context of giving and taking of online reviews for products and services.[5]

The participants of the interview were selected on the basis of a 'random sampling method' with the consideration to include people from varied domains and interests. An important factor to be considered was that the participants had to be fluent in using the internet and also have had some experience in online shopping. After the selection of candidates, a consent form was sent to them for their confirmation of participation. As a first step to planning of the focus group interview, a moderator guideline is prepared as a guideline for the moderation of the discussion. This guideline outlines the main questions and tasks to be discussed and conducted along with the time allotted to each of them. It is a plan to be followed by the moderator controlling the flow of the interview.

The focus group interview was preceded with a task analysis wherein the members were given a simple task of selecting a particular service with the given constraints. The users were free to take reviews from any source and come up with a decision within a limited time. The user's actions here were video-recorded using screen recording software. This task provided a base for the discussion in the interview allowing them to open up further. It also provided an idea of the mediums used by the people for collection of reviews, problems encountered and their needs and requirements through retrospective analysis of their actions.

A visual questionnaire was created to be projected during the discussion. The participants were provided with different types of reviews for example textual, video, statistical, star rating etc. They were then asked to rate the type of reviews based on their needs and preferences. An activity was also conducting as a part of the focus group discussion. The participants were divided into groups and given a small activity to come up with the best possible decision in a particular situation within a given timeframe. The type of reviews considered for different contexts and the important factors affecting their decision-making process and analyzed through this activity.

The whole discussion of the focus group interview is recorded using microphones and cameras. Field notes are taken by a team member noting down all the user statements and inputs. These recordings and notes are useful in the analysis of the interview.

### FOCUS GROUP ANALYSIS

Before From the focus group interview we collected three different types of data; video-recording of the session, field-notes and task analysis sheets filled by the participants. The video recorded were transcribed to create verbatim transcript to compliment the field-notes. These were used to perform a

qualitative analysis of the focus group to generate user needs for room 1 of the House of Quality (HOQ) Matrix. The aim of the qualitative analysis was to generate themes that will be later categorized into three different level of user needs.

The three level of needs are described below:

*First-level Needs:* These are the needs that can be used to broadly represent the various second-level needs. First level needs are used to categorize different needs and are not represented in the room 1 of HOQ.

*Second-level Needs:* These are extracted after the analysis from the verbatim notes and elaborate upon different factors of the first level needs.

*Third-level Needs:* After finding themes from the verbatim notes, we process them using cutting and sorting technique to come up with the third level needs as described below.

To generate these three types of needs we used the method of repetition followed by cutting and sorting to generate and classify themes [9]. Repetition involves, as the name suggests, analyzing the transcript for certain keywords, quotes and expressions that were repeated during the interview and listing them out in cards along with the number of times the keyword was mentioned. The process resulted in a list of themes that were later processed to generate the three different levels of needs. To process the list of themes we used the method of cutting and sorting. The method begins with writing all the themes on cards and then merging them to create piles of themes. There are two different types of sorting: splitting and lumping. In splitting, we try to create as many different piles as possible to generate a large level of needs. These needs can be categorized as the third level of needs. These needs are directly input into the Room 1 of HOQ matrix. Lumping involves dividing the themes into as few piles as possible. The result are the first level needs which help to categorize the various third level of needs.

### NEEDS, ATTRIBUTES AND RELATION MATRIX

The primary planning tool used in QFD is the house of quality. The house of quality translates the voice of the customer into design requirements that meet specific target values and matches that against how an organization will meet those requirements. The parts of house of quality (HOQ) are described as follows. The HOQ consists of 8 rooms that are created through a step-wise procedure. Room 1 consisting of user needs is created as a first step. It consists of voice of customers and their needs and requirements which are collected through focus group interviews. [6]

## Generating and evaluating design attributes for service design

| Correlation Variables |  |  |  |  |  |  |  |  |  |  |  |
|-----------------------|--|--|--|--|--|--|--|--|--|--|--|
| Strongly Conflicting  |  |  |  |  |  |  |  |  |  |  |  |
| Mildly Conflicting    |  |  |  |  |  |  |  |  |  |  |  |
| No Conflict           |  |  |  |  |  |  |  |  |  |  |  |

|  | Validating Reviews/ Specifications | Gamification (Profile, Rewards, Badges) | Friends, Interests, Followers and Subscribers | Reviews from Similar People | Create a Product Page | User Uploaded images and videos | Multiple Star Ratings and Highlighted keywords | Extensive details and specs | Periodic Reviews | Better Mobile Integration | Integrated Maps and Vendor locations |
|--|------------------------------------|---|---|-----------------------------|-----------------------|---------------------------------|--|-----------------------------|------------------|---------------------------|--------------------------------------|
| Validating Reviews/ Specifications             |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Gamification (Profile, Rewards, Badges)        |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Friends, Interests, Followers and Subscribers  |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Reviews from Similar People                    |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Create a Product Page                          |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| User Uploaded images and videos                |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Multiple Star Ratings and Highlighted keywords |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Extensive details and specs                    |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Periodic Reviews                               |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Better Mobile Integration                      |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |
| Integrated Maps and Vendor locations           |                                    |   |   |                             |                       |                                 |  |                             |                  |                           |                                      |

Table 1: Requirements Matrix showing Room 1, 2 and 3

The focus group interview is analyzed to come up with the user needs and requirements that form the room 1 of the HOQ. After creating the room 1 with the customer needs and their ranking, the design team comes up with the design attributes and features which form the room 2 of HOQ. Needs, requirements of the users and stakeholders, problems faced by them and possible solutions to these are taken into consideration. These attributes can be design concepts

envisioned by the design team, possible solutions to the user needs of room 1 or requirements specified by the design team, clients and other stakeholders.

A relation matrix mapping user needs from room 1 with the design attributes from room 2 is created next. This relation matrix forms the room 3 of the HOQ. The relation matrix is a mapping that relates the design attributes with the user needs

| Correlation Variables |   |  |  |  |  |  |  |  |  |  |  |
|-----------------------|---|--|--|--|--|--|--|--|--|--|--|
| Strongly Related      | ● |  |  |  |  |  |  |  |  |  |  |
| Mildly Related        | ○ |  |  |  |  |  |  |  |  |  |  |
| Weakly Related        | ◇ |  |  |  |  |  |  |  |  |  |  |

|  |          | Design requirements                |   |   |                             |                       |                                 |  |                             |                  |                                      |
|--|----------|------------------------------------|---|---|-----------------------------|-----------------------|---------------------------------|--|-----------------------------|------------------|--------------------------------------|
|  |          | Validating Reviews/ Specifications | Gamification (Profile, Rewards, Badges) | Friends, Interests, Followers and Subscribers | Reviews from Similar People | Create a Product Page | User Uploaded images and videos | Multiple Star Ratings and Highlighted keywords | Extensive details and specs | Periodic Reviews | Integrated Maps and Vendor locations |
| Customer Needs   | Priority |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Search for keywords  | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Need more details  | 3.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Warranty and Customer Service information                    | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Other incurring cost/running charges/power consumption       | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Photos and Videos of the product/service                     | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Tabular comparison   | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Negative Reviews   | 3.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Customised review (demographics, interests etc.)             | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Conclusive and Statistical Reviews                           | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Vendor Seller Information                                    | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Prioritising Better(helpful) reviews                         | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Interesting/useful Websites                                  | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Convenience in giving reviews                                | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Mobile interfaces unavaialbe/complex/sluggish                | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Reliable and Updated Content                                 | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Informative and consice Video Review                         | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Periodical or updated reviews                                | 2.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Individual Star Rating for each property of product          | 3.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Link to Manufacturer Website                                 | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Better filtering options (price, manufacturer, reviews etc.) | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Hnads on Experince information                               | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| All products/ services at one place                          | 1.00     |                                    |   |   |                             |                       |                                 |  |                             |                  |                                      |
| Total Rating   |          | 88                                 | 52                                      | 29  | 17                          | 16                    | 25                              | 85   | 58                          | 30               | 16                                   |

Table 2: Room 6 showing possible conflicts and correlation between design attributes

using a standard grading scale namely weakly related, mildly related and strongly related with points 1, 3 and 9 respectively. The relation specifies how much a design attribute helps in solving a particular user need. The points when multiplied with their ranking obtained from room 1 are summed up for each of the design attributes from room 2. Thus priority based list of attributes is formed as a result of the relation matrix. This final ranking obtained here forms the room 7 of the HOQ.

In addition, a conflict analysis of the design attribute were done in the Room 6 of the HOQ matrix. The attributes were weighed against each other on three characteristics; positive correlation, negative correlation and no correlation. Negative correlation implied that the two design attributes are hard to include simultaneously in a design solution whereas positive correlation meant that the two attributes can be combined together very easily as a single design feature. This led to a list of conflicting and supportive attributes to be considered while proposing design solutions.

The analysis of needs and attributes using the HOQ matrix of Quality Function Deployment led to a list of attributes and the internal conflicts between those design attributes that the designer should consider while creating and proposing design solutions.

### CONCLUSION AND FUTURE WORK

With this paper we focus on providing a framework to implement quality function deployment in designing service websites. The authors present a method to create design attributes guidelines and evaluating and weighing their performance, impact and possible conflicts in the final design. Although the case presented here is of designing an online product and service review portal, the authors believe that the user-centered design methodology followed can be effectively used in a different scenario of service design.

We began with generating three different levels of user needs by conducting a focus group interview with 6 participants. The focus group was preceded by a task analysis which was discussed during the session itself. Besides taking field notes we also recorded and transcribed the interview. The interviews were qualitatively analysed to user needs which were then input into the matrix along with relative measure of importance exhibited by the participants.

The House of Quality matrix, which is a unit of Quality Function Deployment, was then created using the needs and attributes generated earlier. We focussed specifically on the relation between needs and attributes, conflicting design

attributes and competitive analysis of existing solutions. The final outcome was a weighted list of the design attributes for the website which were then used to generate different design solutions.

The authors will be using focus group to generate and evaluate further concepts and proceeding with the design of the portal.

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