
Co ed: A Classroom Setup for Enhancing Cooperative Learning and Digital Literacy

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ABSTRACT

The current Indian education system promotes competition among students, emphasizing highly on ranks and marks scored. As a consequence, students tend to drift away from a collaborative mindset to a competitive one. The learning gap is even larger in schools catering to lower income groups due to the absence of digital infrastructure and digital knowledge. As a result, a large section of Indian students is cut off from a major source of knowledge, the internet, causing the gap to increase between students in the society. With co ed, we attempt to bridge these gaps by providing a platform to foster mutual learning as well as combining digital mediums and the long-established pen and paper in a seamless manner.

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CHI'19 Extended Abstracts, May 4–9, 2019, Glasgow, Scotland UK.

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ACM ISBN 978-1-4503-5970-2/19/05.

<https://doi.org/10.1145/3290607.3309691>

Keywords: Cooperative Classroom; Education; Digital Literacy; Social Interaction; Peer-to-Peer Learning

4. With whom are you more comfortable to ask anything?

30 responses

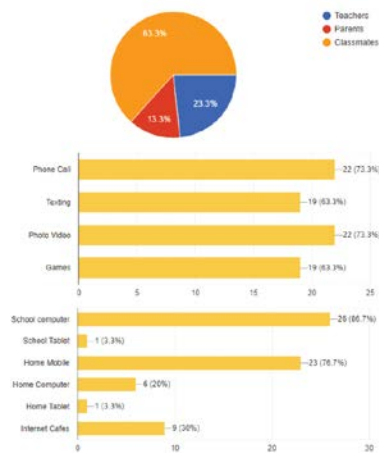


Figure 1 : Survey analysis

"We do not have a lot of group assignments in class, so it will be fun to work with friends."
– P1

"Sometimes, I want to know more about the topics taught in class, but I don't know how to." –P2

"I am scared to ask doubts to my teachers and I get stuck." – P3

Figure 2: Quotes from interviews

INTRODUCTION

The competitive setup of the education structure in our society increases anxiety levels in students. In India every hour a student commits suicide [1]. Moreover, students tend to be self-centric in a competitive setup. Cooperative classrooms tend to be more inclusive and doesn't pressurize students to outperform their peers.

Digital media presents a strong case for promoting cooperative learning but India has low levels of digital literacy. Studies show that 950 Million Indians are digitally illiterate. [2]

DESIGN RESEARCH

Secondary research

As part of secondary research, we mainly focused on contents related to collaborative learning and digital literacy. Literature reviews of articles and books discussing about cooperative classrooms vs competitive classrooms were performed to analyze the pros and cons of both the classrooms. We also looked into government and non-governmental data indicating the level of digital literacy present in India and also analyzed the level and mode of internet penetration in Indian society.

Surveys

By means of questionnaires for students we assessed learning techniques, classroom cooperation, student interests and preferences. The data also helped us analyze the digital infrastructure the student had access to and student's proficiency in using it for educational purposes. The survey was responded by 63 students from Alliance Public School, Bihar and Swami Vivekananda School, Gujarat. The students belonged to standard 6th to 10th.

A questionnaire for teachers focusing on the teaching techniques, student behavior, gaps in teaching, collaborative teaching methods and use of digital mediums for teaching was responded by a total of 11 teachers.

We also surveyed 14 students undergoing their post-graduation studies who didn't have access to internet during their school time and tried to understand how the presence of internet/digital mediums of study is helping them.



Figure 3 : Affinity mapping

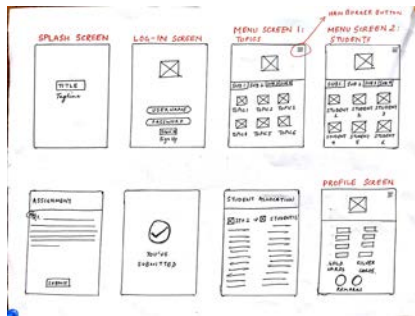


Figure 4 : Wireframes

School Visits

We visited Alliance Public School in Bihar and Swami Vivekananda school in Gujarat to see how the digital infrastructure was being used. Both the schools cater to students from lower income groups and have very little digital infrastructure present on their campuses. Alliance Public school had a functional computer lab where basic hands on experience was provided to students whereas Swami Vivekananda Public School had projectors and computers sponsored to them by corporate company as part of their CSR initiative. Through AEOUT (Activities, Environments, Objects, Users, Time) Observation method we looked at how the students and teachers were using the existing digital infrastructure and the factors that are affecting their non-usage.

Contextual Enquiry

12 students and 7 teachers participated in contextual interviews. These contextual interviews helped get valuable insights into how comfortable the teachers and students were in using various gadgets for educational needs. Their efficiency in using traditional tools of education was analyzed.

Competitive analysis

We studied interventions that are already in the market for educating students using the digital medium. Apps and gadgets involved in the education sector were examined to observe the various steps taken to make digital learning/teaching simpler and engaging. We also reviewed data and structure of Government's National digital Literacy Program. We also reviewed competitive and cooperative classroom models to understand how students act in these 2 setups.

IDEA GENERATION

Based on the observations and insights collected during the research phase we started with the idea generation phase. We primarily opted for 'me we us' model [7] of brainstorming wherein each member first writes down the ideas sticky notes and then each member discusses his/her idea in depth with their neighbor. Post the pair discussions an affinity map was created and the ideas were revisited by brainstorming with the entire group. Each solution is critically examined for flaws and eventually a final draft solution was proposed by combining multiple ideas from the group.

KEY OBSERVATIONS

- Youth are more interested in using digital gadgets as compared to adults. As per the national digital literacy report, 83.50% of the beneficiaries of the digital literacy program belonged to the age group of 14-25. [3]
- Cooperative learning environment promotes integrating behavior. In a cooperative classroom setup student get to know the names of their peers faster than that in a competitive setup. Whereas a competitive setup tends to be self-defensive and oppositional. [4]
- Competition puts pupils in stress. Competitively structured subjects tend to increase anxiety levels in students. [5] Cooperatively structured discussions are less tense and more task oriented. [6]
- Student surveys conducted by us reveal that 76.2% of the 63 students felt approaching their friends more comfortable when they had doubts in assignments. This data was consistent over the teacher survey as well wherein almost half of the teachers said that less than 10% of the class approach them for doubt clarification.
- Main medium of internet consumption for surveyed and interviewed students were smartphones. Around 71% of the students had a smartphone owned by their parents. Whereas households with a computer was only 19%.
- Contextual interviews with teachers revealed that only a small fraction of digital infrastructure in the schools was being used and the major chunk was not operational.
- High cost of digital infrastructure makes it difficult for schools operating for low income groups to afford them.

Design Requirements

A set of design requirements was arrived at after discussions.

- The solution should use a mix of traditional and digital media for the purpose of easy transition for students.
- The cost of implementing the solution should be minimal
- The solution should be able to blend into the school curriculum.
- The solution should foster a cooperative environment.

Usability testing

We analyzed the scenarios of use of multiple design ideas from the viewpoint of the stakeholders. Storyboarding of various scenarios helped us to get a fresh perspective. We developed low fidelity paper prototypes and conducted think aloud usability tests which helped us to notice the shortcomings and improve the usability of the solution. Finally, we came up with a digital prototype, a platform that promotes cooperative learning and digital literacy.

FINAL DESIGN SOLUTION

Our final design solution is *co ed.*, an application that integrates traditional pen and paper platform with digital mediums to create a cooperative study environment in the classroom through collaborative assignments

App Features

Extra references: Teachers collect extra references from the internet about the topics being taught and then feed the links to these extra references into *co ed.* *Co ed* transforms these links into QR codes. Now the teacher distributes these QR codes in printed form that can be stuck by students in their notebooks or primary reference books. Additionally, the links are shared with students over the app as well. The use of printed QR codes makes distribution of references physical but the consumption digital [8]. Also using a point-to-use technology as QR codes appealed to students with low levels of digital literacy.



Figure 5: Co Ed App Screens



Figure 6: Cooperative classroom assignments



Figure 7 : Demonstrating co ed

Quiz/Assignment: Once a topic of study is completed students are provided with a MCQ (Multiple Choice Question) based Assignment sheet whose answers have to be marked in the accompanying OMR style answer sheet with pencil/pen. Once the student has finished answering they are asked to scan and upload their answer sheets in *co ed*. The students perform this task with the help of Tablets. Two tablets cater to a class of 30 students. The number of Tablets can be increased depending upon the financial status of the school.

Evaluation and rewards: Once all the answers sheets have been uploaded, *co ed* evaluates them keeping the teacher uploaded answer sheet as reference. Before the start of each assignment *co ed* adds a set number of Silver cards to each student account. Post evaluation *co ed* converts as many silver cards to gold cards as the number of correct answers.

Reattempt: *co ed* prepares pairs of students based on the questions answered wrongly. Suppose student A answered questions 4,6 and 7 wrongly then he will be assigned to student B who got questions 4,6 and 7 correctly. Now student B explains student A how to correctly attempt the question and at the same time let student A know where he went wrong. Post this discussion student A is allowed to reattempt questions 4,6 and 7 but in the reattempt the question is framed differently. Suppose Student A manages to answer questions 4 and 7 correctly but gets question 6 wrong then student A is rewarded with 2 gold cards ,1 each for correctly reattempted question. Student B also receives 2 gold cards for helping Student A.

Reward: The total gold cards earned at the end of the term can be used by students to get perks such as scholarships, books, art supplies, sports equipment, musical instruments etc. through an e-commerce styled section within *co ed*

Report: *Co ed* analyses performance of each student and presents teachers with a detailed interactive report on each student. This report can be accessed by teachers through teacher dashboard. Students can also see their assessment report by logging into their personal accounts.

KEY DESIGN DECISIONS AND ADVANTAGES

- Stickable Printed QR codes as reference material helps in controlled and structured distribution of contents available on the internet
- Using a point-to-use technology such as QR codes appealed to students with low levels of digital literacy due to its ease of access.
- Allowing students to use pen and paper to submit responses by scanning helped students with low digital literacy to adjust to digital medium better. Once proficient, students can directly use digital mediums too.
- Very less initial investment in hardware as only 2 basic tablets are required for a class of 30.
- Incentivizing reattempts encourages students to improve their understanding of the subject.
- Incentivizing peer assistance increases the understanding of the subject as students learn by teaching their peers and at the same time it increases interpersonal relation among students.
- Through *co ed* students get hands on experience in doing some basic functions on digital media like Login/Logout, upload/download, scanning codes, browsing, searching, account management and e-shopping.

EVALUATION

We conducted feasibility evaluation involving 6 students. The process of evaluation consisted of asking students to perform the following tasks (a) Extracting data from QR code reference sheet. (b)scanning responses (c) e-shopping (d)browsing *co ed*. It was observed that only 1 student was able to perform all the tasks and 3 students were able to perform tasks (a) and (b). This observation was expected as the students had low level of digital literacy. The same task evaluation was conducted after a brief demonstration and it was observed that 1 student did all the tasks,4 students performed tasks (a) and (b) and 1 student could perform task (d).

The incentivized cooperative model was evaluated with 8 students. The students were organized into random pairs and asked to help and seek help with regards to assignment. They were rewarded with chocolates for every help extended and for every improvement made in the assignment. Post the task students were asked to fill out a small survey. 75% of the students said that they preferred this model of doing assignments.

CONCLUSION

With *co ed* we aim to bring classroom peers together to help each other and at the same time blending digital mediums into class curriculum in a non-obtrusive manner to promote digital literacy and collaborative learning.

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