Quality Education Through Technology

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Research Questions, Motivation and Methodology
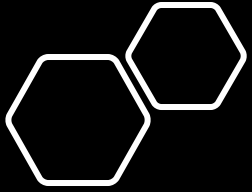
Research Questions

How accessible is blended learning to school students in 9th to 12th standard belonging to the lower middle class?

If unavailable, what are the alternatives that students seek to obtain this blended learning?

In a constrained environment with limited resources how do families take decisions regarding education of their children?

Motivation

- Blended education has proven to improve learning outcomes and the quality of education amongst the students. [1]

Blended learning should be incorporated in all courses of higher education

- Strongly Agree
- Agree
- Neutral
- Disagree
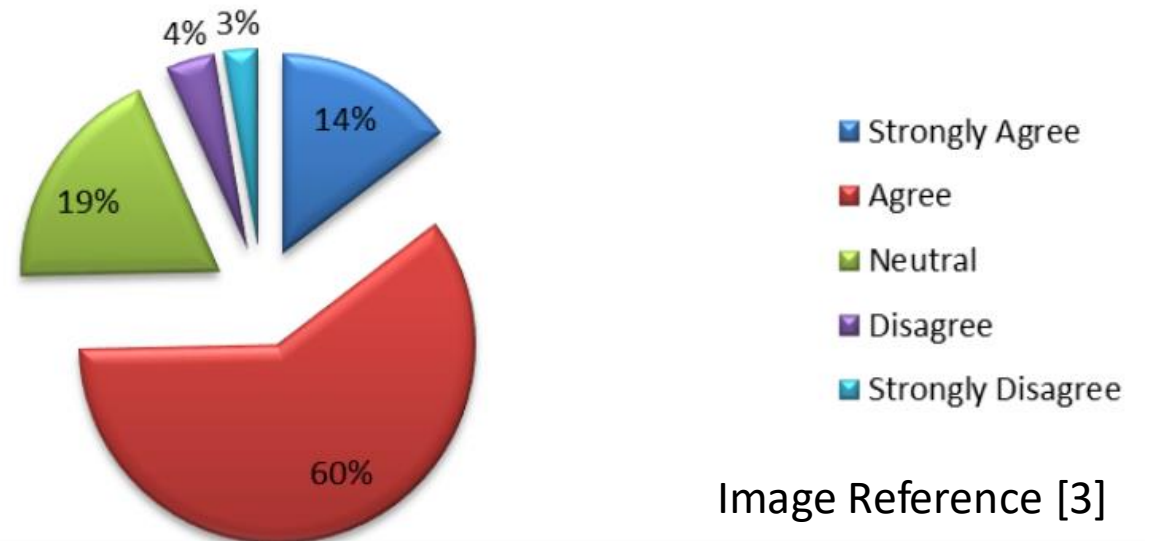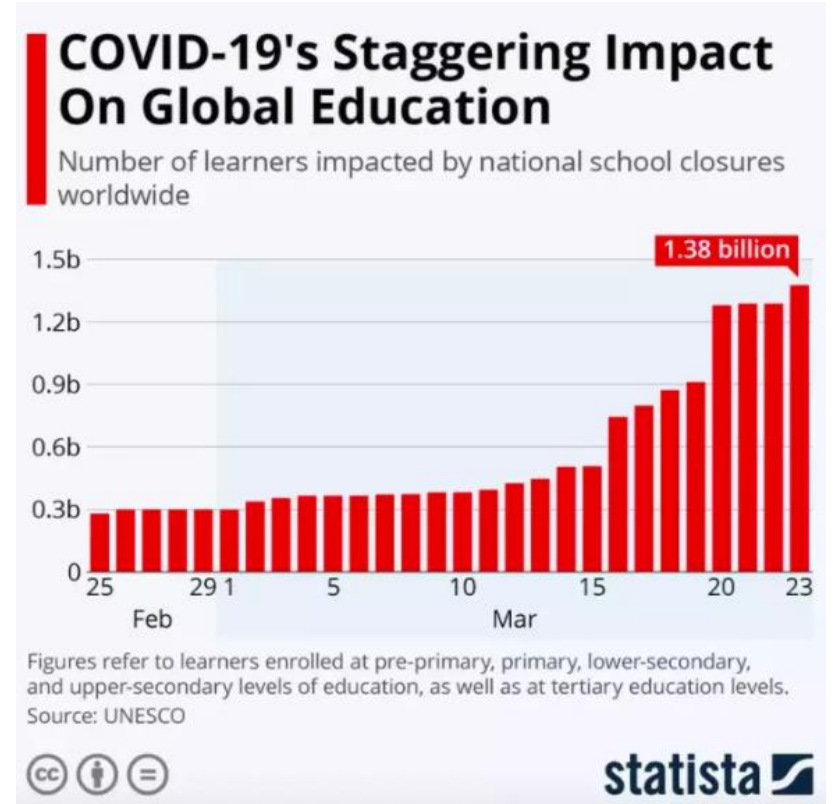- Strongly Disagree

14% — 4% — 3% — 19% — 60%

Image Reference [3]

Motivation [4]

- Even before COVID-19, there was already high growth and adoption in education technology, with global edtech investments reaching US$18.66 billion in 2019 and the overall market for online education projected to reach $350 Billion by 2025.

- "I believe that the integration of information technology in education will be further accelerated and that online education will eventually become an integral component of school education."-Wang Tao, Vice President of Tencent Cloud

COVID-19's Staggering Impact On Global Education

Number of learners impacted by national school closures worldwide

1.38 billion

Figures refer to learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education, as well as at tertiary education levels.
Source: UNESCO

statista

Importance[2][6]

- Increased student engagement in learning.

- Enhanced teacher and student interaction.

- Responsibility for learning.

- Time management and flexibility

- Improved student learning outcomes

- Enhanced institutional reputation.

- More flexible teaching and learning environment

- More amenable for self and continuous learning

- Better opportunities for experiential learning

Educational Transformations !

Pick Teachers & Timings	Flexibility & Quality
Frame your Courses	Needs & Interests
Design your Degrees	Student Centricity
Study through any mode	Real World
Learning or Exams on Demand	When Ready

Research Methodology

Literature Review of Articles, blogs and Research Papers

Interviewing 7 families over telephone

Analyzing the information collected from articles, blogs, research paper and these interviews to gain insights

Research Methodology

- Only the families satisfying the following conditions were interviewed:
  - The family must be lower middle class
  - At least one of the children are currently in 9-12th standard
  - The family has at least 1 smartphone
  - The family is somewhat serious about their child's education.
- The link to the Questionnaire is provided here: https://docs.google.com/document/d/1H5aTCbBQ5pw0AurJKTt6ctDhrhDZzEmTLedqyehmst0/edit?usp=sharing
- Note: One of the biases in the interviews is that all these families are North Indian and Hindi speaking.

References / Reading Materials

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- [8] Definition Article https://en.wikipedia.org/wiki/Blended_learning

Definitions

Blended Learning

- Blended learning is the term given to the educational practice of combining digital learning tools with more traditional classroom face to face teaching. [3][7]
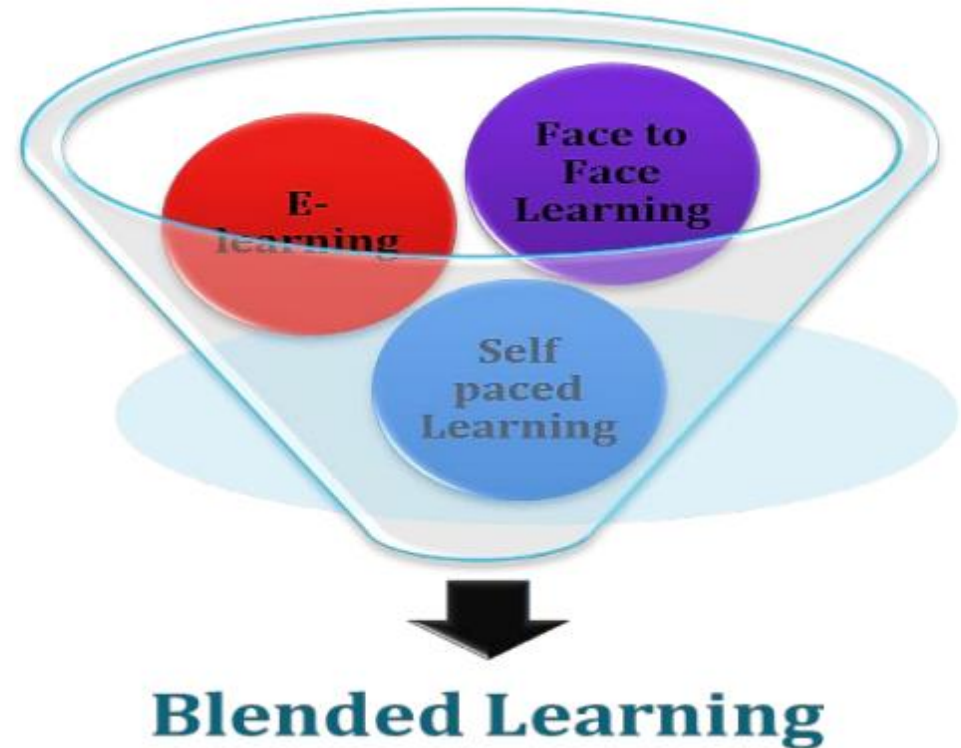
Blended Learning

Models of Blended Learning [2][8]

The models for blended learning are neither universally agreed upon nor exclusive of each other. A blended learning environment can be a mix of these models:

- Face-to-face driver – where the teacher drives the instruction and augments with digital tools.

- Rotation – students cycle through a schedule of independent online study and face-to-face classroom time.

- Flexible – Most of the curriculum is delivered via a digital platform and teachers are available for face-to-face consultation and support.

Models of Blended Learning[2][8]

- Labs – All of the curriculum is delivered via a digital platform but in a consistent physical location. Students usually take traditional classes in this model as well.

- Self-blend – Students choose to augment their traditional learning with online course work.

- Online driver – Students complete an entire course through an online platform with possible teacher check-ins. All curriculum and teaching is delivered via a digital platform and face-to-face meetings are scheduled or made available if necessary.

Why so many models?

- We are enquiring about students in an already constrained environment and adding further constraints on the model of blended learning will make the research infeasible.

- We want to look at blended learning as a proxy of how parents think about and approach quality education, so having some diversity in the models is helpful.
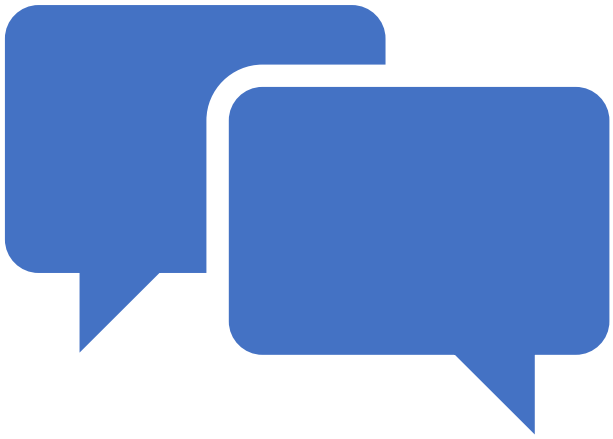
Personal Interviews*

Discussion and Analysis

*Not used original names in Cases described ahead

Family 1 - Aman

- Based in Varanasi

- Parents:
    - Father : Graduate Level, Age: 50
    - Mother : Graduate Level, Age: 47

- Children: 3
    - 2 elder sisters: post graduate level with BA in Geography (not the focus)
    - 1 younger brother: currently in class 12th

Family 1 - Aman

- The younger sibling Aman will be appearing for the class 12 board exam as well as JEE this year.

- The parents place big importance on the education of the children but have limited knowledge in the field. But they do have relatives whose children have cleared the JEE and performed well in CBSE board examinations from whom they seek advice and guidance.

- While the presence of such relatives is a saving grace for the family, it also creates pressure on the Aman to perform on par with his cousins.

Family 1 - Aman

- Aman himself is very active and tried to apply for several scholarships offered by several coaching institutions as well as by the government. Unfortunately, he was not able to clear the examinations and the amount of rebate in fees given by coaching and other educational institutions was still not enough for the family to afford it.

- Thus, Aman studied in a low tier private school that placed bare minimum weightage on blended learning and attended a small and cheaper coaching institute to help with the competitive preparation. The school had only a few limited smart classes that students got to use once every week.
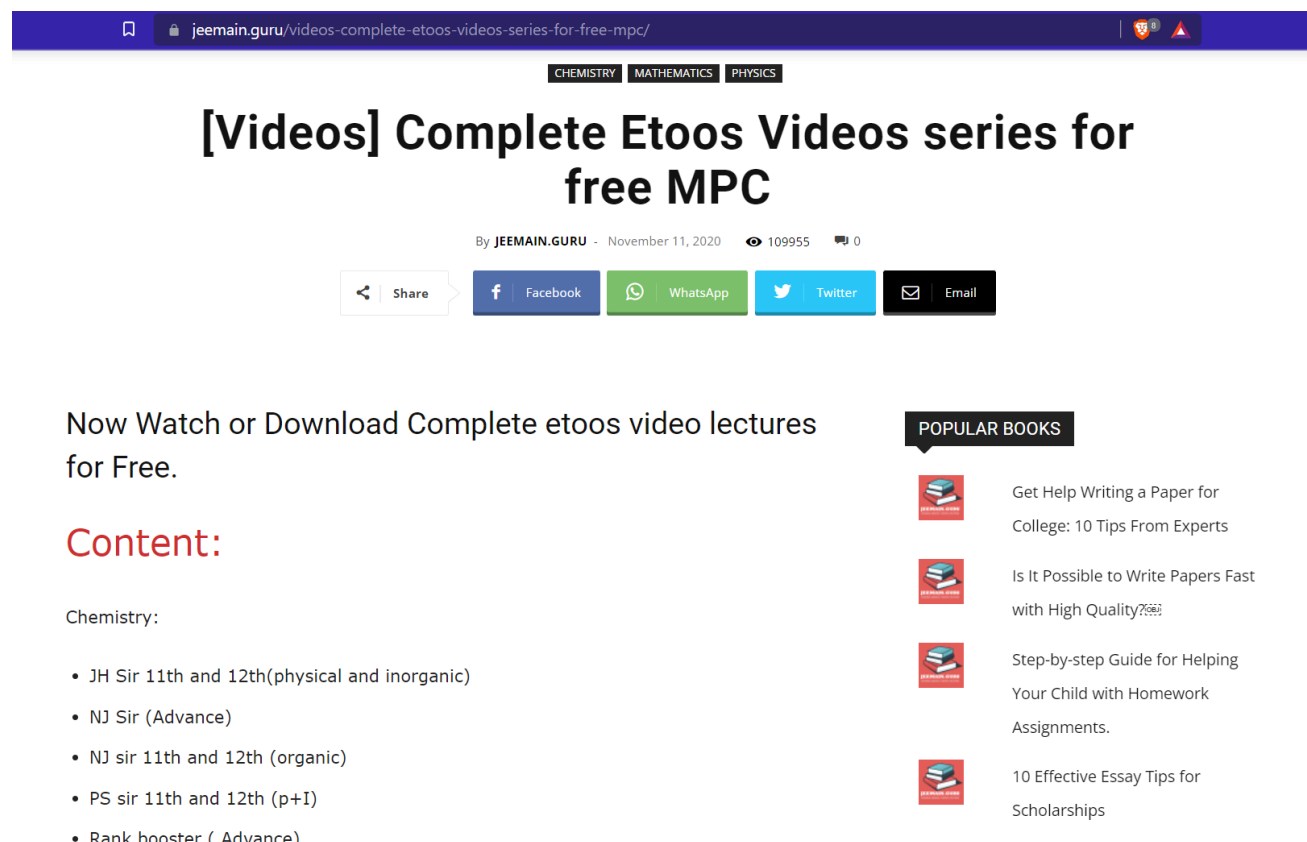
Family 1 - Aman

- Aman was not satisfied with this alone and looked for other means to enhance his knowledge and understanding of the subjects. Understanding the need, Aman's family bought their first smartphone.

- The parents were slightly concerned that Aman might use the smartphone for other activities and waste his time. But since his mother is a housewife, she was able to keep an eye on him.

- Having a smartphone opened several opportunities for him.

Pirated Content

- Coaching institutions that are famous for giving good results in competitive as well as board examinations also release distance learning packages. These materials have been pirated and are available online.

- With these institutions moving online in covid, piracy has become easier.

Pirated Content

- Similar pirated content exists for the "famous" courses on online platforms like Unacademy, Byju's etc.

- The pirated content contains video lectures and problem-solving exercises but might additionally have lecture notes and smaller quizzes to be taken after every lecture.

- Pirated copies of famous books and their solution manual are also easily available for downloading.
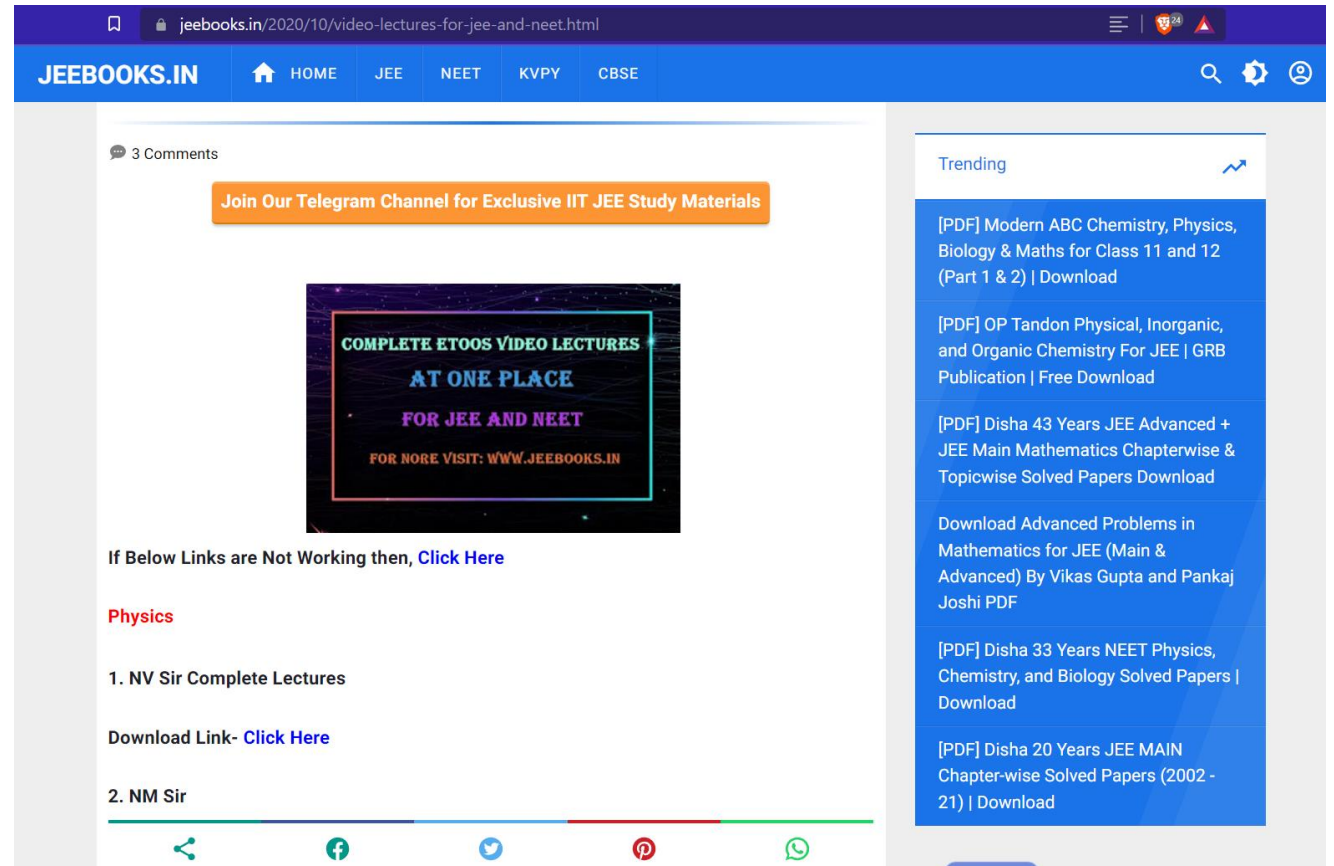
YouTube Videos

- There are YouTube channels that have detailed videos on difficult to understand topics. These videos use computer generated visualizations to better explain the concepts.

- There are also lecture series on YouTube that cover the whole chapter or even the whole syllabus.

- These videos allow the student to choose the instructor and the pacing of the learning.
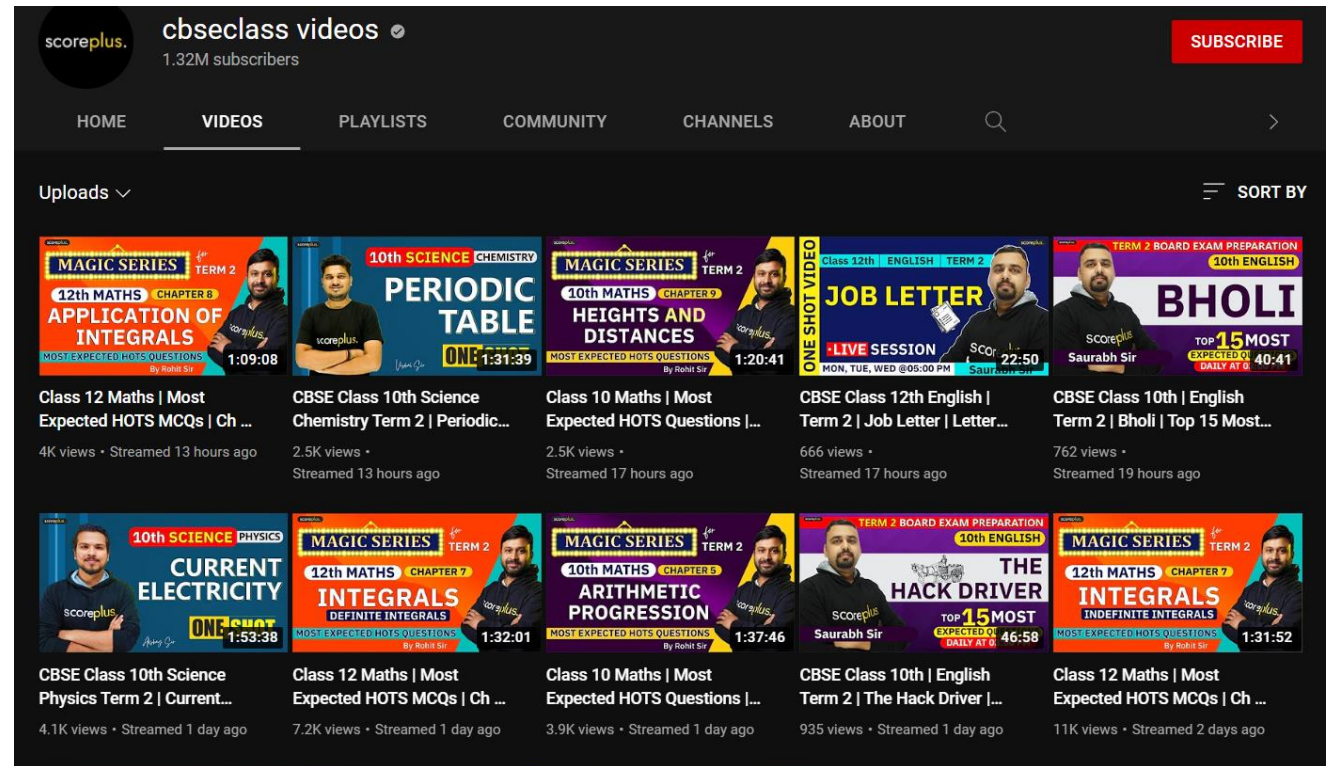
YouTube Videos

- There are also channels that perform all the experiments to be done in classes.

- Low tier school may not have excellent lab facilities and they might not even be used too often. Even if they are being used an experiment is conducted at most once. The student can thus forget an experiment by the end of the term.

- Such channels allow students to study these experiments. They do certainly help but will never be the substitute of the real experience.
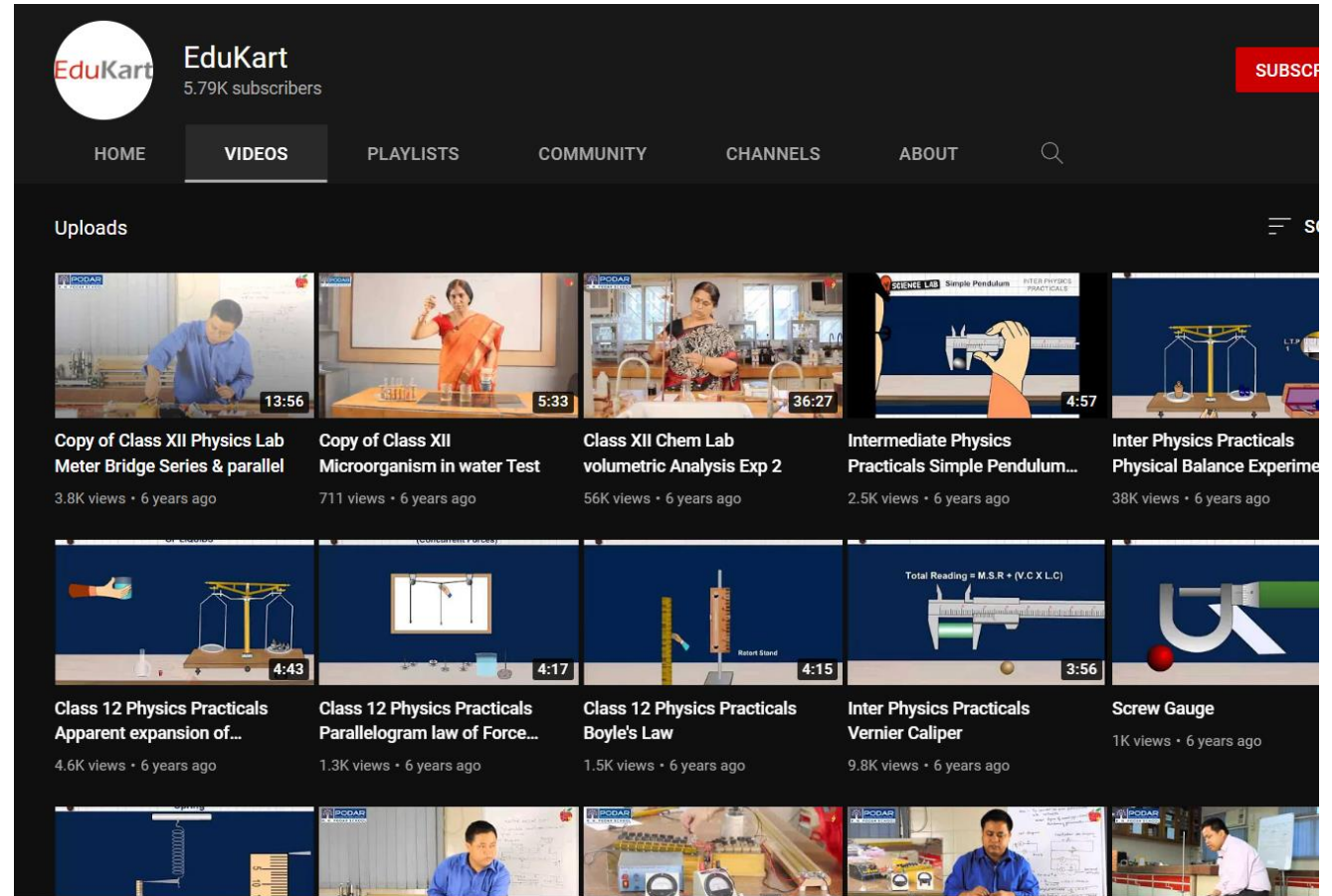
Online Solution Search

The number of ways to represent a natural number as the sum different natural numbers

- Complex problems from popular books have well explained solutions on online forums like:
  - Brilliant.org
  - Math Stack Exchange
  - Math Overflow

12

Prove that the number of ways to represent a natural number n as the sum of three different natural numbers is equal to

$$\left[\frac{n^2 - 6n + 12}{12}\right].$$

It was in our meeting a year ago, but I forgot, how I proved it.

Let the needed number be a_n, where $n \geq 6$ and let b_n be number of ways to represent a natural number n as the sum of two different natural numbers.

Thus, $a_n = b_{n-3} + b_{n-6} + \ldots$ because we can go from (a, b), where $a < b$, to $(1, a+1, b+1)$, $(2, a+2, b+2)\ldots$

Thank you for your help!

combinatorics   contest-math   ceiling-and-floor-functions   natural-numbers   telescopic-series

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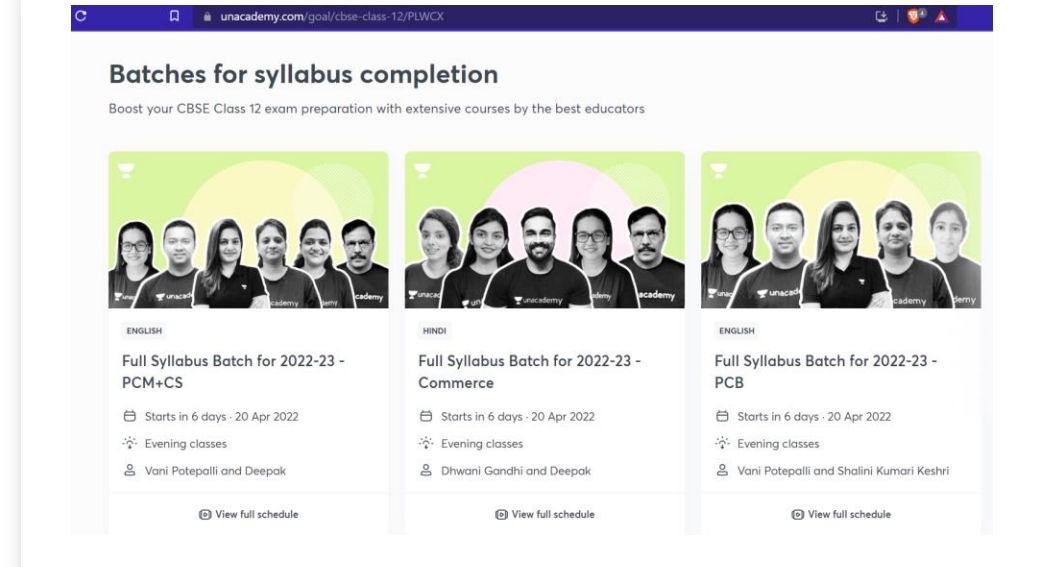   Michael Rozenberg
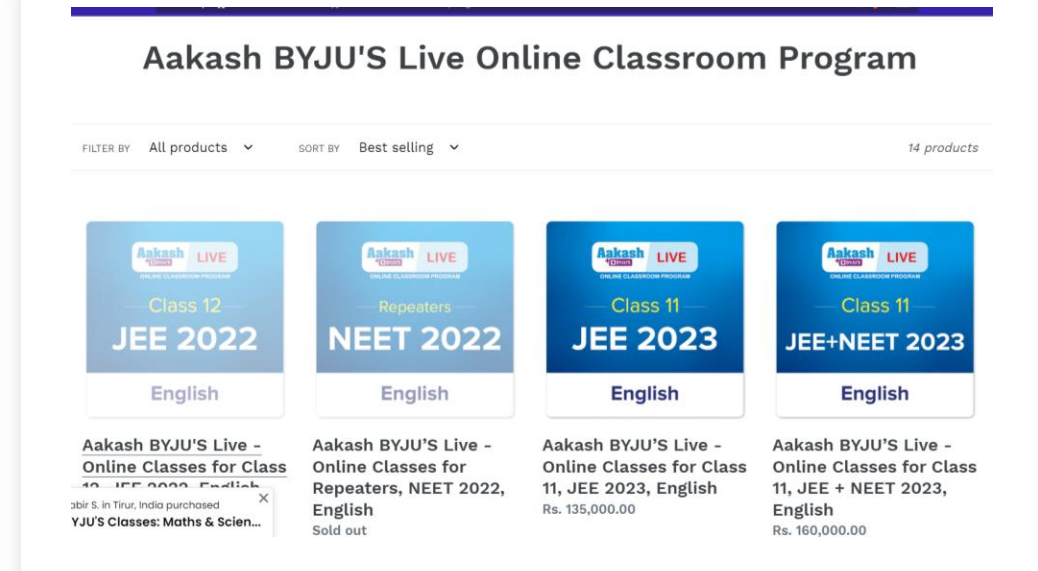
Online Courses

- Online Edtech platforms like Unacademy, Byju's, etc. offer complete courses for a year covering all the topics along with a quiz after every lecture. But these are relatively expensive and cost around Rs. 50,000 per year and are out of consideration for lower-middle-class families.

Online Courses

- There are also cheaper alternatives like:

- ATP Star costing around Rs. 15,000.

- Vedantu costing around Rs 15,000.

- YouTube channels like PhysicsWallah also have their own online EdTech platform that costs around Rs. 4200.
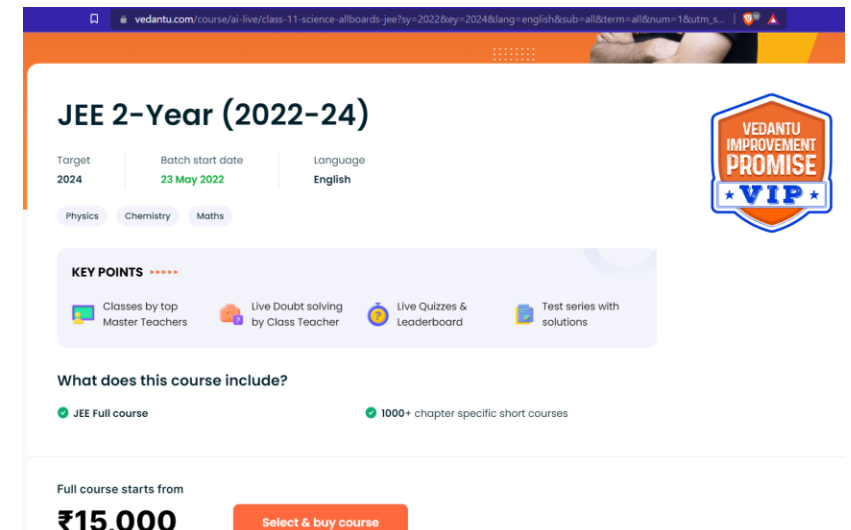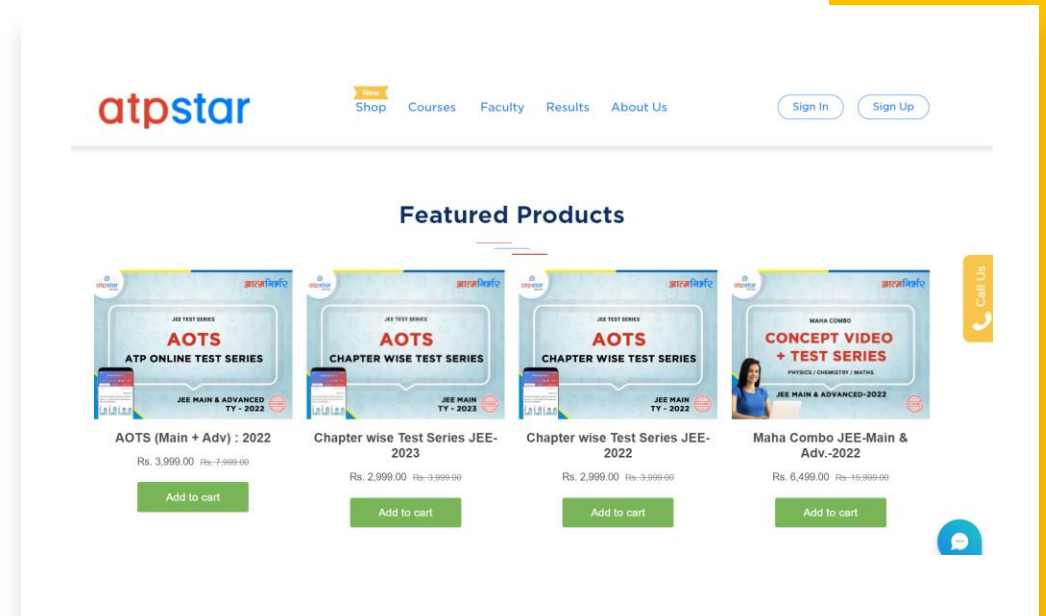
Online Courses

- PhysicsWallah, in specific has free content on YouTube but also gives specialized structured content for the fee.

- The lectures might be recorded or live and the doubt clearance during lectures is done through chat.

- These courses also have dedicated sessions for doubt clarification.
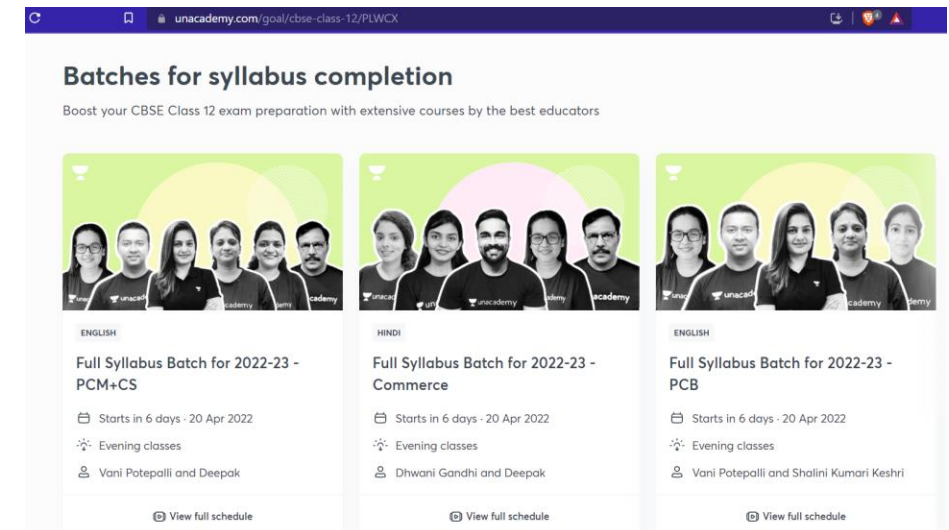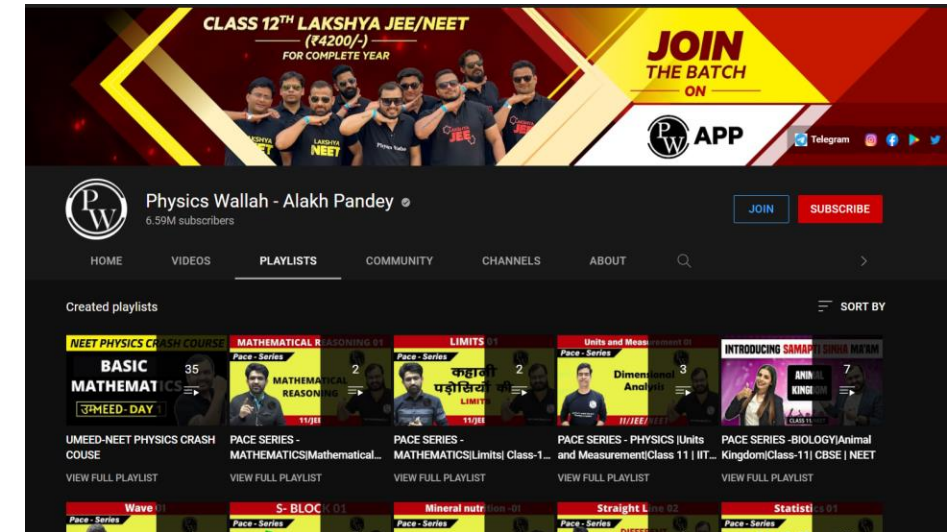
Family 1 - Aman

- In specific Aman used:
  - Pirated Lectures from Motion/Etoos
  - Materials and books used by his elder cousin
  - YouTube videos to understand complex topics and experiments
  - Online forums to look up solutions to difficult problems.
- Not very satisfied with his local coaching Aman moved on to enroll in JEE Preparation course by PhysicsWallah.
- While it is difficult to measure the effect all this will have on the final result, Aman seems to be satisfied with his current arrangement.

Family 2 - Piyush

Family Description

- Based in Bareilly
- Parents:
  - Father : Graduate
  - Mother : Intermediate
- Children: 2
  - 1 elder sister Currently doing MBBS
  - 1 young brother Currently in class 11th and preparing for NEET

Family 2 - Piyush

- The elder sister faced much more struggles when she was preparing for NEET because the parents were inexperienced and ignorant of the opportunities. Through her effort she was able to clear the scholarship examination of Aakash that allowed her free schooling and coaching for 11th and 12th std. This allowed her to study in a better learning environment that she could not afford earlier.

- Piyush now follows in her footsteps. He was able to clear the scholarship examination in class 9th itself. He also uses technology to enhance his learning. The coaching institute has given him an Aakash tablet that allows students to browse lectures of the best faculty that the institute could offer in the whole country, not just the city.

Family 2 - Piyush

- The school that he studies in has Extramarks Smartboards in every class. It is of interest to note that in the beginning not all teachers were keen on using it. The students that enjoyed these video lessons had to ask the teachers to play it.

- Now with time usage of Extramarks has become a regular occurrence.

- The additional visualization offered by the smartboards when studying subjects like Geography, or for understanding experiments in physics, molecular structures in chemistry and cellular and body structure in biology make it much easier for him to understand the subjects.

Family 2 - Piyush

- He also uses YouTube to help him with the difficult topics, searches solutions online.

- Piyush is not enrolled in any separate online courses - other than Aakash iTutor.

- While Piyush's sister got to know about pirated content later, this information has helped him now and he uses pirated materials from various sources.

- Piyush performed well in the 10th board exams and is also very satisfied with his present arrangement.

Family 3 - Pooja

Family Description

- Based in Jaipur
- Parents:
  - Father : Graduate (Bachelor of Arts)
  - Mother: Intermediate
- Children: Lone child

Family 3 - Pooja

- Pooja is currently studying in class 12th and has board exams this year. The family has bare minimum understanding of competitive examinations and firstly want their child to focus on class 12th boards.

- Pooja goes to a private school. The school has projector and screens, but the boards are not interactive. The school was slightly more expensive but the parents wanted a better learning environment for her.

- Pooja does not have any relative which she can idolize or follow but takes guidance from her school seniors for future planning as parents do not have much idea regarding opportunities and technology.

Family 3 - Pooja

- Family has provided Pooja with a smartphone and send her to a local tuition. She uses smartphone for seeking solutions to the chapter exercises, access YouTube content and practicing previous years papers.

- She does not have any subscription to online coaching and relies on pirated lectures or YouTube content for further concept clarification.

- The family is not completely satisfied with the current arrangement but is limited by their income.

Family 4 - Rohit

Family Description

- Based in Dehradun
- Parents:
  - Father: Graduate
  - Mother: Graduate
- Children: Lone Child

Family 4 - Rohit

- Rohit is currently in class 11th studying PCM and wants to crack the NDA examination.

- He attends a local tuition that specifically aims to crack the NDA examination.

- He has been frustrated with the online schooling situation for the past 2 years. He is not able to pay attention to online classes and gets distracted.

- He feels that the natural discussions he could have in offline classes do not happen in online ones.

Family 4 - Rohit

- Rohit also uses pirated questionnaires, books and YouTube videos to understand topics. He also uses the smartphone to solve previous year papers and give mock examinations.

- Rohit believes that he better understands topics when taught in person and the online materials are excellent supplement to build on the offline class.

- Rohit's family was not satisfied with fully online mode, but things have been better since the reopening of schools.

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NDA?	Cadet	NDA

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Other Families

- We only present detailed information about 4 families due to time constraints.

- But the inferences have been drawn by taking into account all of them.

Findings, Inferences and Conclusion[Self-Analysis]

Accessibility to Blended Learning

- Through the interviews we note that face to face driver, self-blend and online driver are the most popular models in blended learning.

- Face to Face Driver:
  - Not very accessible to the lower middle class. Limited schools have smartboards in every class. This was the case with Aman (Family 1).
  - As was the case with Piyush(Family 2), teachers may not be very keen on using the available technology and need to be trained to use these smartboards effectively.
  - Regional competition affects accessibility. If a school tries to adopt this model, other competitive schools also begin using it. Slowly over the years, this technology is becoming more commonplace and affordable.

Accessibility to Blended Learning

- Online Driver:
  - The model being followed in the Covid Lockdown times.
  - Parents and some students like Rohit(Family 4) are not satisfied with this model as the sole education framework.
  - The students feel that their learning has reduced.
  - Some parents feel that this model gives students opportunity to slack off.
  - The model still has potential to be used as an augmentation tool.

Accessibility to Blended Learning

- Self-Blend
  - The most accessible blended learning model, thus it is used by almost all families in some shape or form.
  - Can be a mix of a lot of online resources used to augment student's education.
  - Easily available if you have a smartphone and internet connection.
  - The free materials available may not be structured or standardized.

More Findings

- Active parents, if not knowledgeable ask around relatives to make better decisions regarding children's education. (Aman - Family 1)

- Active students take help from seniors and the internet to get to know about opportunities. (Pooja - Family 3)

- The family also learns from the experience of the elder children. The elder siblings may also become stories that the younger siblings want to follow. (Piyush - Family 2)

More Findings

- Clearing scholarship exams is the best way for lower middle-class families to access quality education. (Piyush - Family 2)

- If a formal system is out of reach of the student, parents try to provide them with a smartphone to access online resources mentioned before.

Decisions

- Parents try their best to get their children the best learning environment that they can. But a limit of family resources means that the parents and children need to come to a decision[5][Self-Analysis]:
  - Some prefer to invest on competitive online or offline coaching institutes and go to smaller schools.
  - Some prefer to send to a better school with a good reputation and technology-aided learning.
  - Some prefer their children to focus solely on competitive exams and attend dummy schools.

Conclusion

- Blended learning is a divergent and subjective concept. No single person can decide on its model.

- It is something that varies for each person and each person decides how to put together their blended learning environment themselves depending on their socioeconomic status, interests, availability of resources and infrastructure.

- The huge diversity that India has in terms of resource availability and socioeconomic statuses means that having 1 blended learning model will never be enough.

Conclusion

- This diversity in the blended learning environment is made clear through the interviews. Every family has their own way of looking at it.

- Accessibility to smartphones and the internet have been the major factors that have neutralized some of the difficulties families with limited resources face to access blended learning.

- Through this project we have looked at the different scenarios of blended learning in different situations and the decision making that goes behind it.

We would want to thank Nimmi Rangaswamy Ma'am for providing us her valuable time in form of in-person meetings and guiding us in the steps on how to proceed.

Thank You!

We are open for Questions !