

A Comparison Between the Impact of Online and Offline Education for Neurodivergent Children in India

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Abstract: Neurodivergent children can face challenges, especially when they attend mainstream schools. The learning pace of neurodivergent children differs significantly from that of neurotypical children, often leading to social and mental conflicts. Special institutions with trained educators and mentors have been established to support these children, catering to their specific needs in terms of learning pace and style. With the shift to online education, various websites and mobile applications now offer support for neurodivergent children. This paper aims to examine and compare the impact of online and offline education for neurodivergent children in India. The research involved data collection through surveys with parents to understand the impact of different modes of education on the children. Additionally, interviews were conducted with special educators and parents to gain insight into teaching processes, learning experiences, and the overall impact of the chosen mode of education.

The research findings suggest that offline education has a greater impact compared to online education. The data shows that offline education provides more inclusivity and support to the child. The hybrid education system is even more impactful than offline education alone, as it combines offline fun activities with online gamified study materials, leading to improved engagement in studies.

Keywords- Neurodiversity, Neurodivergent, Online and Offline, Children, Students, Special educators, Inclusivity

I. INTRODUCTION

Neurodiversity is a term coined in the early 1990s by journalist Harvey Blume and Australian autism activist Judy Singer, whose sole purpose was to understand, respect, and celebrate neurological differences including many human variations such as diversity in race, ethnicity, religion, and so on. (Armstrong, 2017) (Armstrong, 2012) SEND (Special Education Needs and Disabilities) was termed in 2001,

after the introduction of SEN (Special Education Needs) in the Education Act 1996 in the United Kingdom. This term is used to identify children who need special assistance in education because of special education needs and or disabilities.

There are numerous neurological differences under neurodiversity, including Autism, Dyslexia, ADHD, Dyspraxia, Dyscalculia, Tourette Syndrome, and Intellectual disabilities. Enrolling students with neurodivergence in mainstream schools can be challenging. Not every child face difficulty, but those who do require special education needs may struggle to keep up. Autism Education Trust UK reports that 40% of students with autism have been bullied, and many are illegally excluded from mainstream schools (Aspris Children Services, 2013) (Acevedo, 2020). In India, multiple cases have been discovered where the mainstream schools are not accepting special ones. According to a 2019 UNESCO report (UNESCO, 2019) a fourth of neurodivergent children who are aged five years are not going to any educational institution. Many mainstream education institutions deny providing special attention and needs to students, as it can be harsh to hear but the reality is that mainstream schools are not concerned about giving special needs to special children because they have to follow the principle of academic year, where they have to complete a certain syllabus within a year. The syllabus of mainstream school can also be overburden for neurodivergent children because it might be too much to learn for them. They might not like studying from a book instead they will prefer learning it visually or with an interactive or physical activity. (Reddy, 2022) (Armstrong, 2017)

Special Schools (Offline)

Special schools provide an environment where neurodivergent children learn at their own pace without rigid age-based levels. Each child's abilities are assessed, and they are grouped accordingly into proficiency-based levels with 2 to 3 sub-classes. The curriculum minimizes book use, emphasizing interactive education and activities, including field trips to explore and discover individual interests. Everything that we study in mainstream schools is simplified and made entertaining. One example that can be seen is from a scene from an Indian movie, "Taare Zameen Par", where the protagonist of the movie is a child of age between eight and nine is having dyslexia and used to solve a mathematical problem by imaging pictures in his mind where he uses planets as a number and applying different mental strategies to solve the question. (Reddy, 2022) (Chakravarty, 2009) (Brown, 2010)

Online Application and Website

Online education for neurodivergent students includes online tutoring, websites, and mobile applications that assign tasks and monitor performance using algorithms or AI. These platforms simplify learning through gamification, breaking courses into levels of varying difficulty. This approach makes concepts easier to understand and more engaging. Key benefits include familiarity, flexibility, individualized education, evidence-based interventions, access to specialized services, lower costs, and enhanced parental involvement. Online learning allows students to interact with the digital world, which is beneficial in today's tech-driven environment. Moreover, online education is cost-efficient as it eliminates the need for physical materials like books and notes, making it more comfortable for students and economical for parents. By providing a digital interface, it caters to diverse learning needs, offering personalized support through AI and human mentors who receive performance reports. This method supports neurodivergent students by adapting to their learning styles and needs, fostering independence and confidence in their educational journey. (Anne-Laure Le Cunff, 2022) (Hennessey, 2022)

Aim

The aim is to compare between the impact of the two different modes of education which are online (apps

and websites such as Otismo, Dlearners, Cognitii, etc) and offline (special schools, personal tutoring) in India. It aims to understand which mode of education makes a difference out of a neurodivergent child, the interaction, the behaviour towards that particular mode of education, the outcome, and also the viewpoint of parents by understanding the education system.

Objectives

The purpose of this paper is to compare the two modes of special education and then come to a conclusion based on it which one is better for neurodivergent children in India.

- The first objective is to understand the difference between the learning and teaching criteria of a mainstream school and a special school, this research data is gathered with the help of interviews conducted with special educators and guardians of neurodivergent children and also with secondary research via literature review and web browsing facts from multiple articles.
- The second objective is to understand the environment of online offline mode of education for neurodivergent children. Understanding the different methods of inclusivity used by educational platforms for neurodivergent students. The research data is gathered via interviews.
- The third objective is to find out about the different methods of gamification and simplification of study materials, which help neurodivergent student to learn at their own pace.
- The fourth objective is all about the results of the special educational platforms. These include the students' test results, mentors' reactions to the results, which determine their future curricula, and a comparison of the student's personalities, behaviours, and communication when they first join the platform and after a reasonable amount of time.
- The final objective is to compare the data gathered for two different modes of education, which are online and offline via qualitative and quantitative methods. The final data is collected by comparing the syllabus, mentors, the way of teaching, the feedback system, assessments, extracurricular activities, and the behaviour and point viewpoint of parents, guardians, and special educators.

II. LITERATURE REVIEW

1. When considering the education of neurodivergent children, the questions raised and the discussion are always around the mainstream school. Special schools are often ignored or disintegrated. (Brown, 2010)
2. The special education system faces challenges such as resource shortages, low student achievement, insufficient teacher training, and rigid teaching methods. These issues contribute to teacher burnout, behavioural and emotional challenges for students, and higher rates of expulsion, suspension, school dropouts, and involvement with the juvenile justice and healthcare systems. (Anderson, 2022)
3. The challenges faced by neurodivergent students in online education are difficulties in maintaining attention, managing an overload of information, communicating effectively, and building confidence in managing online learning. The inadequate evaluation studies exploring neurodiversity in online education make it difficult to identify, which intervention would be most effective to improve the educational outcomes and learning experience of neurodivergent students. (Anne-Laure Le Cunff, 2022)
4. This study has shown that when designing educational programs for all students, including those with challenges and impairments, it might be challenging to strike a balance between various and common factors. This necessitates expanding on the idea of a continuum of services. It could be preferable to define continuum in terms of multiple distinct dimensions as opposed to the conventional uni-dimensional approach to placement—a "flexible interacting continua of provision." (Norwich, 2008)

III. RESEARCH GAP

Although there are lot of literature available, there are still research gaps and areas of gaps need further attention and investigation.

1. The main essential gap is the limited research done on the online educational apps or websites that are developed specially for neurodivergent children in India and in a global context too.

2. In addition, the research for the online mode of education is mainly based on the behaviour of neurodivergent students during the pandemic COVID-19, when online classes were conducted in traditional methods.
3. Another main research gap is about the behaviour of neurodivergent children in offline special schools. Discussion questions are often moving around the mainstream schools, where the special schools are ignored or disintegrated.
4. Maximum numbers of data and literature for this subject are collected from multiple sources in the UK (United Kingdom). Indian audience responses are very few for this subject, where the research regarding traditional face-to-face or offline education is merely covered.

IV. RESEARCH QUESTIONS

The elements listed below were helpful in comprehending both the impact of special education in India as well as the two distinct modes of special school instruction in India: online and offline.

1. Understanding the base of the education system is important to carry on the research, which starts with the main question where we will understand about the steps that differentiate between a mainstream educational institution and a special educational institution in India.
2. Secondly, we focused on the environment of the special educational institution in two different modes (online and offline), where we will explore, how the education system is making their environment comfortable and inclusive for the neurodivergent children.
3. Special schools use simplification and gamification of the learning material to make its easy and inclusive to understand for neurodivergent students. In this section, we discussed, how simplification and gamification of learning play a major role in enhancing the study.
4. The fourth question focuses on the outcome of the special education system, which will focus on communication skills, problem or situation analysis and solving, and creativity before and after joining the special school. Based on the overall data collected from the mentioned above factors on both the education system, there is a comparison which will conclude our topic that

which mode of the special education system (online and offline) is more impactful in creating a better environment and also provide good education for neurodivergent students.

V. HYPOTHESIS

Many factors make online education stand but still, there are some points that counter the features and factors of online mode and give a positive stand to the offline mode of education, which points to this hypothesis that the impact of offline education is more compared to that of online education for neurodivergent children

VI. METHODOLOGY

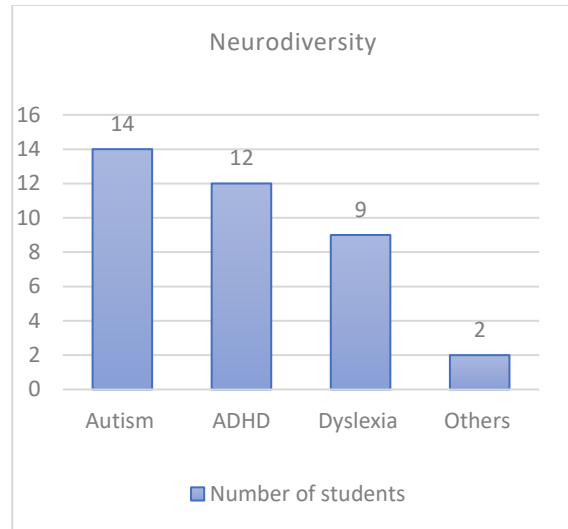
This research, conducted among neurodiverse students in India aged 8-16, who attend offline special schools or use online platforms as their primary mode of education, employed both quantitative and qualitative methods to assess which mode is more impactful. Data was gathered through a survey questionnaire answered by 36 respondents and two interviews: one with a special educator and another with a guardian of a neurodiverse child, who is also an entrepreneur in online mobile educational applications. The study aimed to determine the most effective mode of special education.

VII. DATA ANALYSIS

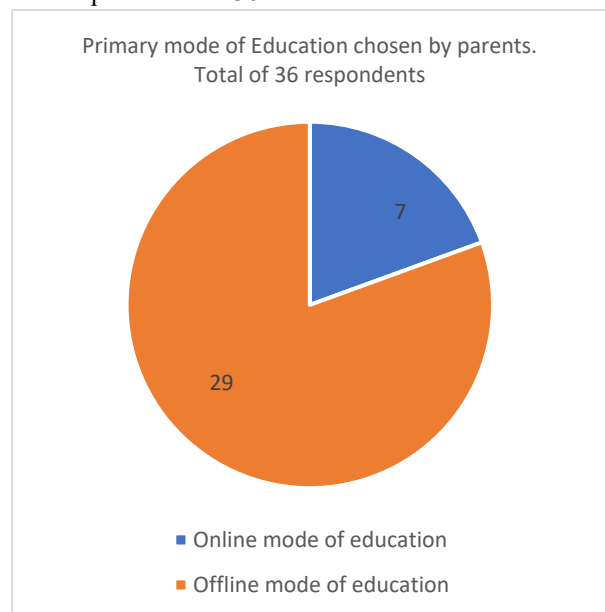
VII.1 Survey

This first set of data is collected from the survey questionnaire which was conducted among the parents or the guardians or the carers of neurodivergent children ages between 8 to 16 who go to special schools. The data was collected on the basis of what the parents or the guardian or the carers have noticed about the education platform they have provided for their special ones.

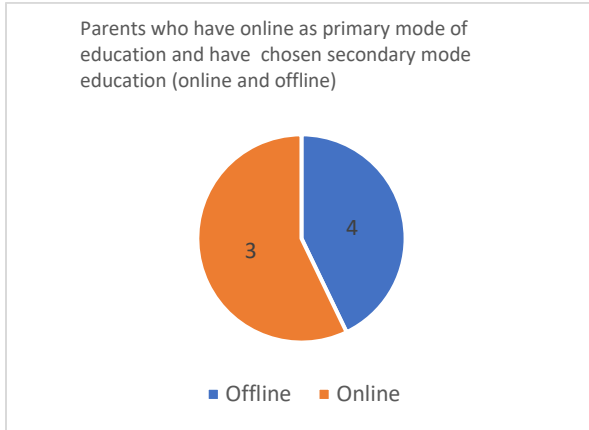
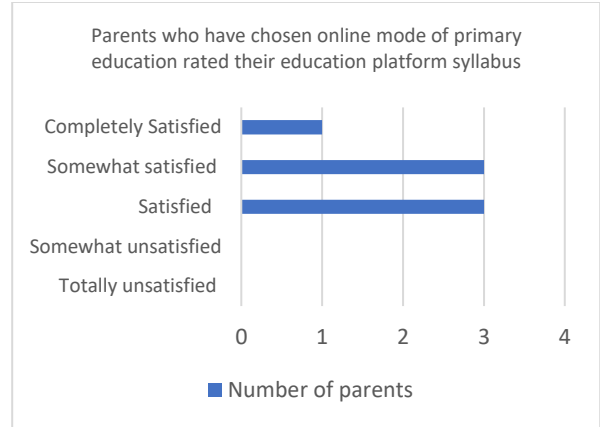
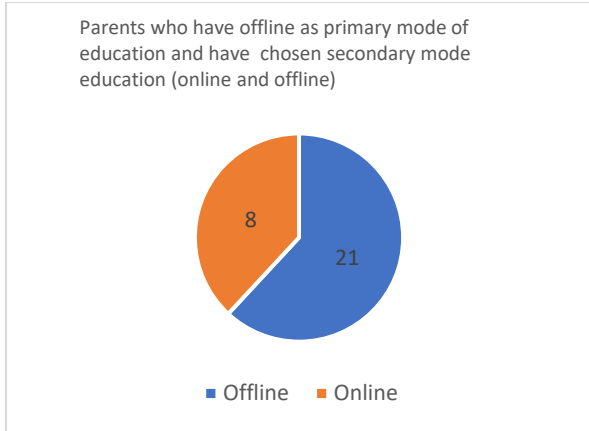
- The preliminary analysis of 36 respondent shows which neurodivergent groups prefer special schools or online education. The study highlights distinct educational preferences among neurodivergent students, emphasizing the need for tailored educational approached to address their specific needs effectively.



- Which mode of primary educational platform is very much preferred by the parents and neurodivergent children? The total number of respondents are 36.

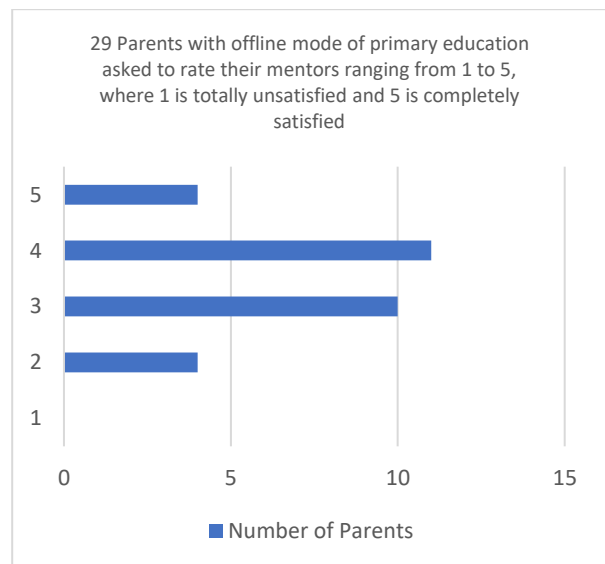
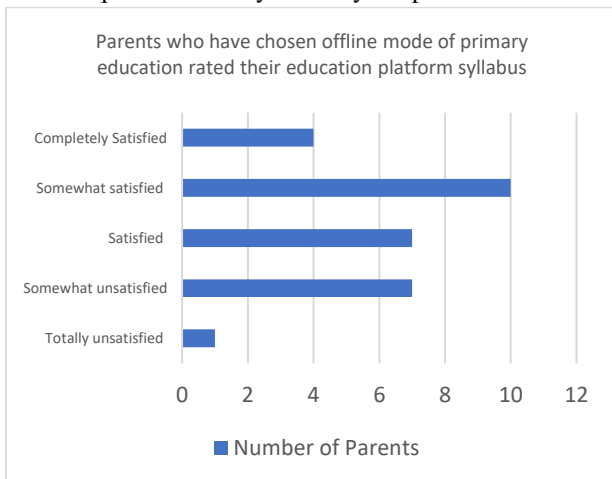


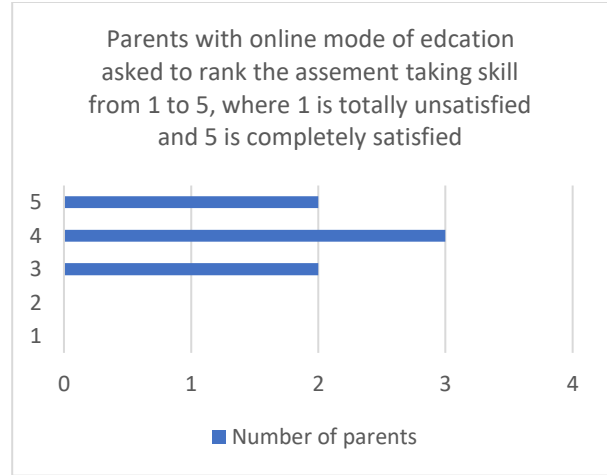
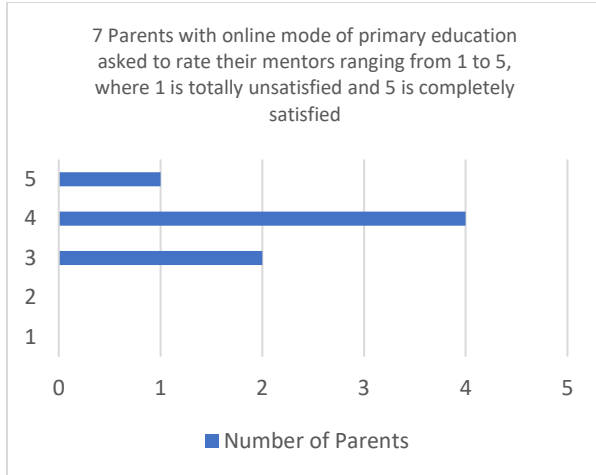
- Inference-
 - a) Here, the most preferable mode of educational platform is offline with a count of twenty-nine out of thirty-six respondents.
- The third analysis is about the number of parents who chose to have a secondary mode of education to support their child apart from primary education, which shows the need for extra education which fills certain gaps that the primary mode of education has.



- Inference-
 - In offline education, 72% of parents are satisfied with the syllabus, while 28% are somewhat unsatisfied to totally unsatisfied. In contrast, in online education, no one reported being unsatisfied with the syllabus.
- This section will analyse the professionalism of mentors in both handling and also in teaching skills. For the online mode of education, mentors are there to analyse the data collected by the application from the performance of the child and give a valuable response or feedback with solutions and steps to parents to identify and improve the challenges their child is facing.

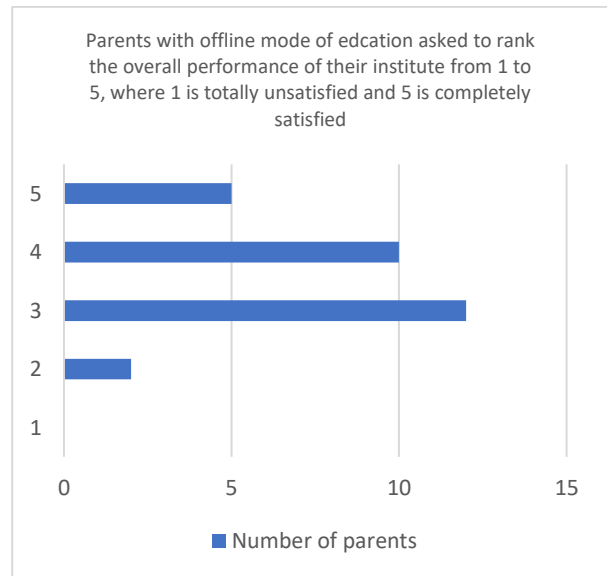
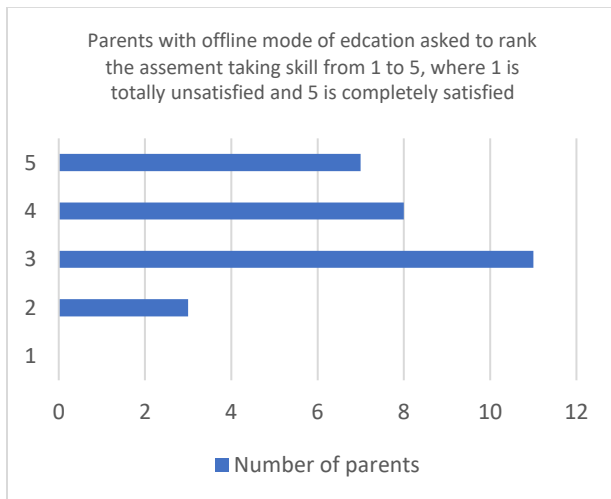
- Inference-
 - From the above two data sets, parents and children prefer offline mode of education as secondary education, there is a clear difference in the overall respondents, but when compared to individuals, offline mode has a winning side.
- Analysis based on the point of view of parents on the syllabus of their primary education system, which will describe the understanding and acceptance of the syllabus by the parents.

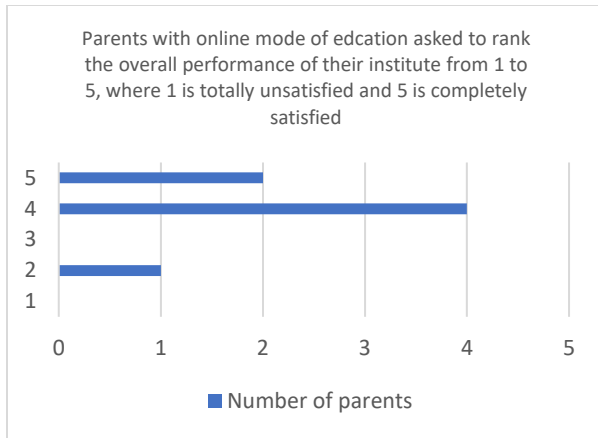




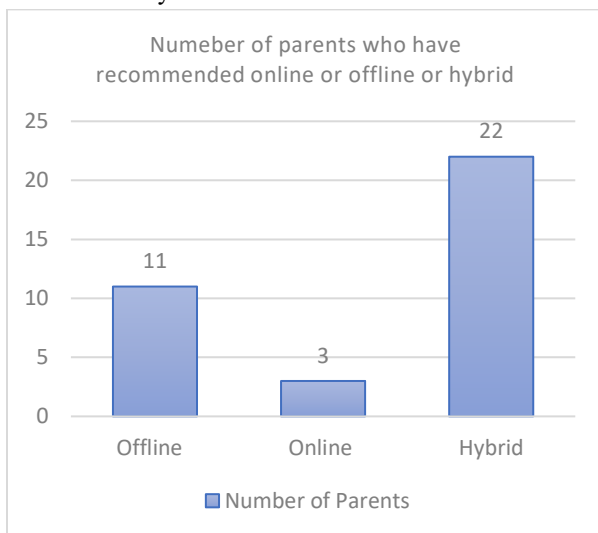
- Inference-
 - The conclusions are tied together by the striking similarity of the replies for both educational modalities. Though there isn't much of a distinction between the two types of education platforms, if an analysis is conducted between AI and human mentors, there may be a difference, or there may not be one.
- Analysis based on the assessment-taking process of the education platform where the process will be judged based on difficulty, user accessibility, and also on how the outcome of the assessment of the child is processed and appropriate steps are taken to improve all the points where the child is lagging.

- Inference-
 - Assessment accuracy is challenging due to close responses; AI proctors strictly enforce rules, unlike forgiving human proctors, affecting neurodivergent students emotionally.
- The last analysis of this quantitative set of data is by summing the total viewpoints of parents into one by rating the overall performance of the educational platform which will somewhat conclude the title too.





- Lastly parents were asked one question when they meet another parent with a neurodivergent child to which mode of education they will recommend? There are total of 36 respondents in this survey



- Inference-
 - a) The data indicates that offline education has a stronger impact on neurodivergent children. However, when asked, most parents recommend a hybrid education model combining both online and offline methods, with human mentors and AI applications working together to support their children's learning and development.

VII.2 Interviews

The second set of data was collected using qualitative methods, conducting interviews with special educators and parents or guardians of neurodivergent students. These interviews, conducted via Zoom meetings, provided in-depth insights that complemented and

expanded upon the quantitative survey data, revealing nuances and perspectives that surveys alone could not capture.

1. First interview was conducted with Neelanjasa Mukherjee, who is a special educator. She is a special educator in a special school in London, UK. She was inspired by her mother who runs an NGO in India, for students and people with disability, where she used to visit the centres and meet up with many people and students with neurodiversity, through which she was influenced in helping people with special needs. She flawlessly helps the student who needs special attention, where she understands, feels, and loves all the students, and contributes a lot to this ignored community.

- The first conversation that we had was about, how neurodivergent students are treated in mainstream schools and how they feel in mainstream schools. *“Neelanjasa explained that neurodivergent children are classified on a spectrum. Those on the lower end are often sent to special schools due to communication and study challenges, while those on the higher end stay in mainstream schools but face difficulties. Many transitioning students were traumatized, with some becoming non-verbal or fearful of school.”*

- Then we moved the conversation about the use of online applications and online websites for the education of neurodivergent students. *“Neelanjasa strongly opposed online education for neurodivergent children, emphasizing that they need in-person attention. She explained that during online sessions, many children cannot sit still for long, become frustrated, and may act out destructively. They also get easily distracted, making traditional online learning unsuitable for them.”*

- The third question is to discuss about, what are her thoughts on using an online mobile application or website for neurodivergent students. *“Neelanjasa noted that educational apps are improving by using short games to teach concepts and keep children engaged. They set small targets and provide constant praise. However, he pointed out*

a significant drawback: the lack of a teacher for emotional support, which these apps cannot offer despite their benefits.”

- Technology is emerging, especially AI is emerging drastically, where everything is replaced by AI and other techs. So, before closing the interview discussed on the fact that, online applications and website when integrated with AI take over the offline mode of education.

“Neelanjasa emphasized that education for neurodivergent students should be integrated. While students enjoy interactive game applications on mobile devices for their visuals and storytelling, these can also become addictive and hinder communication skills. Thus, mentors are essential. She believes AI cannot replace special educators despite its advantages in data collection and analysis.” (N.Mukherjee, Personal Communication, April 24, 2024)

2. Jhillika Om Trisal, an entrepreneur and co-founder of the online learning platform "Cognitii," talked about her path in a follow-up interview. Due to special schools' limited availability and exorbitant fees, her brother, who was diagnosed with ADHD and reading difficulties, attended standard school. Jhillika, who has a background in biotechnology, studied neurodiversity and engaged with people who were neurodiverse, concentrating on the medical and human elements. As she became aware of the implementation's practical difficulties, she turned to entrepreneurship. Inspired by her brother's challenges and her parents' attempts to locate appropriate schools, she started Cognitii to close the achievement gap and support kids with neurodivergent learning styles by offering an online learning environment.

- When asked why she didn't create an offline educational platform or special school for neurodivergent children, *“Jhillika explained the scarcity of special educators in India, with one educator for 200-300 students. Many are unqualified, being psychologists or counsellors. She noted that special schools are mostly in urban areas, neglecting tier 2 and tier 3 regions. Jhillika and her co-founders, Falguni and Shouvik,*

believe AI can bridge this gap, providing affordable online education and supplementing the limited number of human special educators.”

- *“Jhillika highlighted the limitations of current AI applications and websites for neurodivergent students, which prioritize technology over education. She advocates for a feedback loop with human educators to maintain a personal touch, emphasizing the necessity of human interaction alongside AI-driven personalized learning.”*

- What is a fear of an online special education application which is also a point for Jhillika to worry too. *“Jhillika emphasized that special schools are preferred due to the personalized feedback provided by special educators, which current educational technology for neurodivergent children fails to deliver. She highlighted that their main competition is with special schools, emphasizing the need for a one-to-one learning experience.”*

- *“Jhillika stresses the importance of including special educators in online platforms for emotional support. She advocates for a hybrid education model integrating online and AI technologies with traditional offline institutions. Collaborating with special schools, she aims to enhance education quality, addressing shortcomings in both current edtech and traditional schools.”* (J.O.Trisal, Personal Communication, May 5, 2024)

VIII. CONCLUSION

Based on the data and discussions, the research concludes that offline education has a greater impact on neurodivergent students in India. Parents prefer offline education because it offers personalized feedback and solutions from special educators, which are seen as more authentic and trustworthy compared to online platforms. Although online education excels in data collection and analysis, this information often lacks the human touch needed for parents to trust and understand it fully. A hybrid education system, combining both online and offline methods, appears most promising. This approach mitigates the

drawbacks of each mode, enhancing inclusivity and creativity through digital tools like moving visuals and faster data analysis. Offline education fosters physical interaction and communication skills, while online platforms aid in understanding the digital world and provide quick, personalized feedback.

Technological advancements like AR and VR could revolutionize neurodivergent education, enabling immersive learning without physical attendance, while a hybrid model integrates both technology and human interaction for optimal outcomes.

In conclusion, while offline education currently holds a stronger position, the evolving nature of online education suggests it could surpass offline methods by addressing current shortcomings. A hybrid approach aligns with the preferences of parents and experts, offering a comprehensive solution for the diverse needs of neurodivergent students.

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