

## User-Centered Design of Assistive Educational Technology for Specially Abled Students: A Case Study of 'The Special School' Application

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### Abstract

This research focuses on understanding and integrating user experiences to enhance the inclusive design of assistive technology for specially able students through "The Special School" application. With the increasing importance of accessible digital education, designing tools that cater to diverse disabilities is vital. Our study leveraged observational data, one-on-one interviews, and caregiver/teacher surveys conducted at the Dr. Ambedkar Institute of Technology for Divyangjan in Kanpur, India. The insights derived have shaped unique features in the app, tailored to the behavioral, emotional, and usability needs of users. This study presents the impact of these features and the positive response from both students and educators, highlighting a strong case for inclusive Ed-tech design.

### Keywords

Assistive Technology, Inclusive Education, User Experience (UX), Inclusive Design

### Introduction

Inclusive education and assistive technology are leading the way in developing new ideas that will help people with disabilities (PwDs) get the education they need. However, many current educational apps are not very inclusive and do not always work for people with different cognitive, sensory, or physical disabilities. The "Special School" app was developed to fill this gap by using universal design principles and changing the content based on what users said in real time. The app has mind maps, quizzes that are like games, interactive podcasts, and content that works for people with different disabilities. This study seeks to elucidate the influence of user experience research on app development and demonstrate how this model can be replicated in assistive technology solutions.

### Research Context and Methodology

Our research was conducted using a mixed-methods approach that integrated qualitative and quantitative data collection. We worked with 240 specially abled students and 12 teachers from

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the Dr. Ambedkar Institute of Technology for Divyangjan, Kanpur. Data were collected using the following methods:

- **Observational Studies:** Facilitators observed students utilizing the app and documented their ease of use, emotional responses, and interactions with peers.
- **Individual Interviews:** Students took part in structured interviews to talk about their favorite ways to learn (video, audio, or text) and give feedback on some parts of the app.
- **Caregiver/Teacher Surveys:** Teachers filled out surveys about what their students needed, what problems they had with current educational apps, and how useful they thought "The Special School" would be.
- We were able to see how different disabilities, like blindness, deafness, dyslexia, cerebral palsy, and multiple disabilities, worked together, gave each other feedback, and changed to fit each other because of this layered approach.

### Literature Review

**Table 1: Table depicting the studies conducted on the particular topic**

Author(s)	Title	Key Focus	Finding / Contribution
Peters (2004)	Inclusive education for all	Disability-inclusive education policy	Framework for inclusive systems
Carl et al. (2018)	Accessible materials in IEP	Educational accessibility tools	Improves individualized learning access
Akcil (2018)	Mobile learning for visually impaired	Mobile accessibility in education	Enhances learning engagement
European Agency (2022)	Inclusive digital education	ICT in inclusive learning	Promotes digital inclusion strategies
Abd Khalid et al. (2023)	Assistive tech for disabilities	Review of assistive tools	Identifies effective AT solutions
Pradeep (2023)	UX design in special education	User experience for disabilities	Improves usability and accessibility
Yenduri et al. (2023)	Assistive tech to metaverse	Emerging inclusive technologies	Expands accessibility via metaverse
European School Platform (2024)	Assistive tech in education	Technology for accessibility	Supports inclusive classrooms
Schmermbeck et al. (2024)	Co-design assistive technologies	Community-driven design approach	Enhances inclusive innovation
Ministry of Education (2025)	Inclusive education policy India	Equity in education systems	Promotes inclusive national framework
Ramineni et al. (2025)	Digital accessibility innovations	AR/VR in healthcare access	Advances inclusive health tech
Yang & Tael (2025)	AI for accessible learning	AI-based assistive education	Personalized learning for visually impaired

The field of inclusive design in assistive technology (AT) is changing quickly, especially in schools where students with disabilities have different needs. They say that all students should be able to learn from audio, visual, and written materials. This includes students who can't see or hear. This goes well with the need for educational technology that is adaptable and makes learning more fun and easier. Abd Khalid et al. (2023) also looked at a lot of AT tools for students with dyslexia, ADHD, and autism. Their results show how important it is to customize things like text-to-speech, audiobooks, and visual organizers to fit the needs of the user so they can better understand and remember what they read. However, these tools work best when used with user-centered design and interfaces that can be changed.

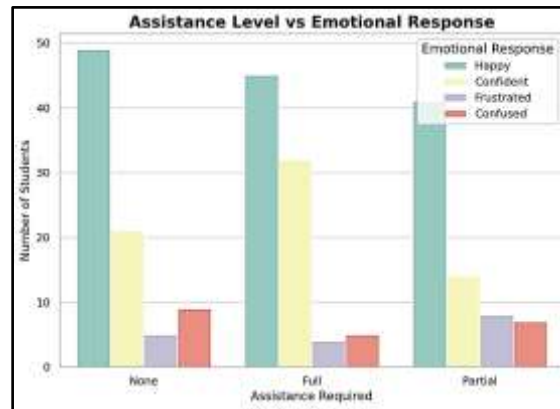
Mobile learning has also been said to make things easier to access. (Akcil, 2018) examined smartphone apps designed for students who are blind or have low vision. They showed how voice-guided navigation, screen reader compatibility, and haptic feedback can help children perform tasks independently. However, they said that things can be harder when one cannot speak the language well or see well.

The efficacy of special education apps worked for people in India is thoroughly examined. It has been discovered that there is a substantial disparity between developers' perceptions of user requirements and the actual needs of users. There were a lot of platforms that weren't available because they didn't support regional languages, were too hard to use, or needed a lot of Internet access. Their results show how important it is to think about culture and the environment when making something. This study expands upon previous research and employs a mixed-methods approach to ascertain the direct impact of user experience on the design and implementation of universally accessible assistive technology. This study shows that users must be involved at every stage, from coming up with ideas and designing the interface to deploying it and providing feedback, for inclusive design to work. A total of 240 children with special needs and 12 teachers looked at the "The Special School" app in a planned way. Our results show the importance of having features such as multimodal content, offline capabilities, and easy-to-use navigation that work for a wide range of disabilities.

### **Key UX Insights and Feature-Based Adaptations**

Based on the data collected:

- More than 70% of the students said they felt happy or confident when they used the app.
- More than 65% of students said the mind map feature helped them understand ideas better.
- More than 75% of users, especially those with cognitive disabilities, liked games because they were fun and interactive.
- Podcasts helped students with vision problems learn on their own.
- Navigation analysis showed that 60% of users could use the app without any problems, while others needed help with some or all of it. This led to the addition of voice guidance and simpler icons.
- These ideas helped shape the app's interface in a number of ways. The interface now has buttons that are easy to reach, text that isn't too dense, and learning tools that are fun and help people with cognitive and motor problems.



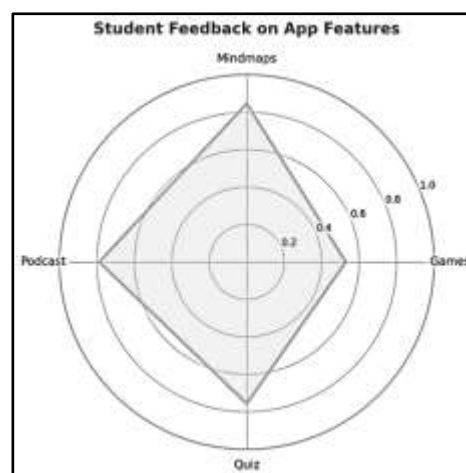
**Figure 1:** Frequency of emotional responses (happy, confused, frustrated) categorized by the level of assistance required during tasks, revealing emotional trends related to support needs.

### Emotional and Behavioral Outcomes

User emotional engagement is very important for figuring out how well a platform is working. When doing observational studies:

- 72% of the students showed positive emotions, like happiness or confidence.
- Students who couldn't speak or had cerebral palsy were able to express themselves better through app interactions than in other settings.
- When students used the game's or group's features in the app, their interactions with other students went up by 40%.

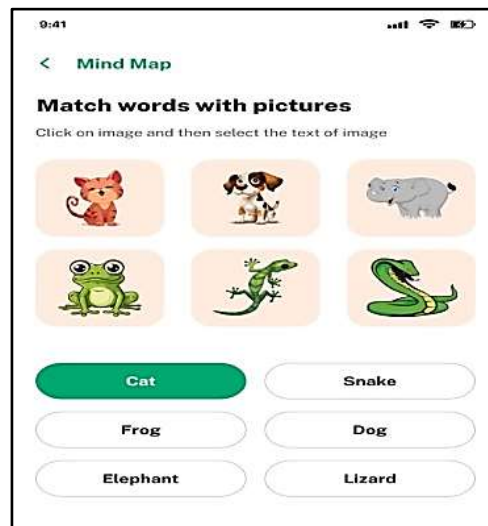
The change in behavior toward more excitement and less hesitation when using technology was a big sign that specially able-bodied learners were more confident, independent, and included in the digital world.



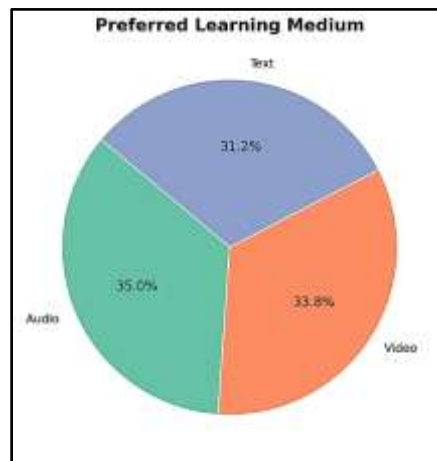
**Figure 2:** Average student ratings for features in the special school app (games, mind maps, podcasts, quizzes), highlighting strong engagement with interactive elements.



**Figure 3.** Gamified puzzle activity enhances emotional engagement and memory through color-coded interactive elements.



**Figure 4.** Mind map-based picture-word matching game to support visual learners and reinforce vocabulary.



**Figure 5.** Graphical depiction of the data used for our app

## Results & Discussion

The triangulated data points from observations, interviews, and teacher surveys suggest the following:

- The application met the accessibility expectations of over 70% of the users.
- 10 out of 12 teachers acknowledged that the application would help overcome limitations of other EdTech platforms.
- Feature preference trends: 68% preferred mind maps, 75% games, and 58% podcasts.

The results support the idea behind "The Special School" that real user feedback should be the most important part of designing assistive technology. These data-driven changes to the UI/UX interface made users happier and more likely to participate. This study also shows how important it is to have ongoing feedback loops and always be looking for ways to improve to meet changing user needs.

### Conclusion

“Research has shown that including User Experience (UX) within both design and deployment of Assistive Technology will be key to developing successful assistive applications.”The "Special School", illustrates the effectiveness of Participatory Design as a means of developing inclusive Educational Apps through a focus on Student's behavior and Emotional Response. Inclusive Digital Education Tools are also likely to have positive Adoption Rates into the future. Therefore, with increasing relevance of Assistive Technology, it is critical to institutionalize User Feedback as an inherent part of a Development Methodology. However, due to the relatively Small Sample Size and Localized sample population; this study is limited in regards to Generalizability. A subsequent Research Study involving Larger & More Diverse Samples, examining Long Term Impact, Scalability, & Integration with Emerging Technologies would provide additional evidence.”

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