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Evaluating the Effectiveness of PM e-Vidya ISL (DTH Channel 31) on Academic Performance and Learning Outcomes of Hearing-Impaired Students: A Survey Study in Rajasthan

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Abstract

The impact of PM e-Vidya ISL (DTH Channel 31) on the learning outcomes and academic achievement of Rajasthan hearing-impaired students was assessed in this study. Data were gathered from 80 hearing-impaired students (grades 6–10), 35 teachers, and 72 parents in 12 schools using a descriptive survey design. Channel access, usage patterns, academic performance, instructional quality, and broader learning outcomes were evaluated using three validated instruments. The findings showed that 52.5% of students regularly watched DTH, and 80% of students had access to it. The academic gains of regular viewers were significantly higher ($M=9.4$ points) than those of non-viewers ($M=1.1$ points; $t=4.12$, $p<0.001$). Regular viewers' communication skills, classroom participation, and concept mastery all significantly improved, according to teacher assessments (all $p<0.001$). Even after adjusting for socioeconomic status and school type, multiple regression analysis confirmed that weekly viewing hours significantly predicted academic gains ($\beta=0.487$, $p<0.001$). Lack of interactive features, inconvenient broadcast timing, and low awareness (52.8%) were the main obstacles. The study confirmed that PM e-Vidya ISL is a successful intervention for raising hearing-impaired students' academic performance.

Keywords: Hearing-impaired students, Indian Sign Language (ISL), PM e-Vidya, educational television, inclusive education.

Introduction

All children have the fundamental right to an education, but historically, hearing-impaired students have had a difficult time getting access to high-quality educational opportunities. Comparing hearing and non-hearing peers, the communication gap caused by hearing loss frequently leads to delayed language development, limited

classroom participation, and lower academic achievement (Marschark & Hauser, 2012). It is even more difficult to provide inclusive and accessible education in India, where 5–6% of the population has some form of hearing impairment (WHO, 2021).

In order to provide multimodal access to education both during and after the COVID-19 pandemic, the Indian government recognised these issues and in 2020 launched the PM e-Vidya initiative as part of the Atmanirbhar Bharat Abhiyaan (Ministry of Education, 2020). The creation of specialised DTH (Direct-to-Home) TV channels, such as Channel 31, which is devoted to teaching Indian Sign Language (ISL), was a key element of this program. By providing curriculum-aligned content in their primary communication method, this channel represented a groundbreaking attempt to close the educational gap for students with hearing impairments.

Vygotsky's sociocultural theory of learning, which highlights the significance of language and social interaction in cognitive development, serves as the theoretical foundation for this investigation (Vygotsky, 1978). Sign language is the main language used by deaf and hard-of-hearing students to interact with their surroundings and build knowledge. Students can concentrate on conceptual understanding instead of battling language barriers when instructional content is presented in ISL, which lowers cognitive load (Marschark et al., 2015).

There is still a dearth of empirical data on PM e-Vidya ISL Channel 31's actual influence on student learning outcomes, despite its encouraging potential. Although a number of studies have shown the advantages of teaching sign language in a classroom (Kushalnagar et al., 2010), there hasn't been a systematic assessment of the efficacy of televised ISL educational programming in India. Given the sizeable public investment in the project and the requirement to support evidence-based policy decisions, this knowledge gap became especially important.

Rajasthan offered the perfect setting for analysing the reach and influence of the PM e-Vidya ISL channel because of its vast geographic area and varied socioeconomic landscape. Despite the state's significant efforts to support inclusive education, issues with ISL teacher preparation, resource accessibility, and parental awareness have persisted in influencing the academic performance of students with hearing impairments (Singal et al., 2015).

Therefore, the main goal of this study was to thoroughly assess how well PM e-Vidya ISL (DTH Channel 31) affected the learning outcomes and academic performance of Rajasthani hearing-impaired students. By looking at real usage patterns, perceived instruction quality, changes in quantifiable academic performance, and learning outcomes that went beyond test scores, the study aimed to go beyond straightforward access metrics. The study sought to provide a comprehensive understanding of the advantages and challenges related to the channel's implementation by integrating the perspectives of several stakeholders, including parents, teachers, and students.

Research Objectives

The study was guided by six specific research objectives designed to capture different dimensions of the PM e-Vidya ISL channel's effectiveness:

1. To measure access and usage of PM e-Vidya ISL among hearing-impaired students, including frequency of viewing, duration of sessions, and device/TV access patterns.
2. To evaluate the perceived instructional quality and relevance of ISL channel content, particularly regarding alignment with school curriculum and clarity of ISL presentation.
3. To examine changes in academic performance, as reflected in class tests and term scores, associated with channel usage.
4. To assess changes in learning outcomes beyond test scores, including communication skills, classroom participation, and concept mastery, as reported by teachers and parents.
5. To explore teacher and parent perceptions of barriers and facilitators to effective use of the ISL channel.
6. To test whether higher usage was associated with better learning outcomes after controlling for potential confounding variables such as socio-economic status, school type, and access to additional support services.

Research Design

A descriptive survey research design comprising both quantitative and qualitative elements was used in this study. Since the PM e-Vidya ISL channel had been up and running for about 18 months at the time of data collection, the study used a post-intervention assessment methodology. Participants were asked retrospective questions to consider changes since the channel's launch, and a cross-sectional survey method was used to record usage patterns, perceptions, and results at a particular moment in time.

In order to triangulate data sources, the mixed-methods approach combined quantitative assessments of academic performance, usage, and access with in-depth qualitative information from parents and teachers about observed shifts in student engagement and learning. Given the exploratory nature of the study and the requirement to comprehend the "what" (measurable results) and the "why" (factors influencing effectiveness) of the intervention, this design was especially suitable.

Research Methodology

Population and Sampling

Students with hearing impairments enrolled in grades 6–10 in Rajasthani government, assisted, and special schools for the hearing impaired made up the study's target population. In order to offer focused insights from the implementation experience of a single state, the research was specifically carried out in Rajasthan.

To find schools with enrolled hearing-impaired students who might have access to the PM e-Vidya ISL channel, a purposive sampling technique was used. Eighty hearing-impaired students (n=80) from twelve schools in Rajasthan's urban and rural districts—Jaipur, Jodhpur, Udaipur, and Kota—made up the final sample. To guarantee representation of the general population, the sample comprised students with a range of socioeconomic backgrounds and hearing loss levels (profound, severe, and moderate).

Along with students, the study included 72 parents/guardians who reported changes in their children's learning and 35 teachers who worked closely with students who were hard of hearing.

Research Instruments

Three primary instruments were developed and validated for this study: (1) **Student Usage and Perception Questionnaire** captured demographic data, DTH access, viewing patterns, content preferences, and perceived instructional usefulness through closed-ended (Likert scales, multiple choice) and open-ended items; (2) **Teacher Assessment Form** documented academic performance indicators, classroom participation, communication skills, concept mastery, and behavioral changes, along with qualitative feedback on channel strengths and limitations; (3) **Parent Interview Schedule** employed semi-structured interviews to explore home viewing contexts, family support, observed learning changes, and access barriers. Additionally, academic performance data comprising class test and term examination marks in core subjects (Mathematics, Science, Social Studies, and Language) were extracted from school records for two consecutive terms.

Data Collection Procedure

Over the course of four months, from April to July 2025, the research process was carried out in methodical stages. The Rajasthan State Education Department and school principals first granted formal permissions, and parents' and guardians' informed consent was obtained via Hindi and ISL video formats. While teachers were orientated through training workshops, baseline demographic and academic performance data were gathered from school records. Teachers filled out assessment forms based on current observations, parent interviews were done at schools or through home visits in rural areas, and student questionnaires were given out in small groups with the help of an ISL interpreter. Ten percent of the questionnaires were randomly rechecked for data entry accuracy after all the data had been compiled, coded, and entered into SPSS version 26.0.

Results

Access and Usage Patterns

The analysis revealed considerable variation in access to and usage of the PM e-Vidya ISL channel among the 80 participating students.

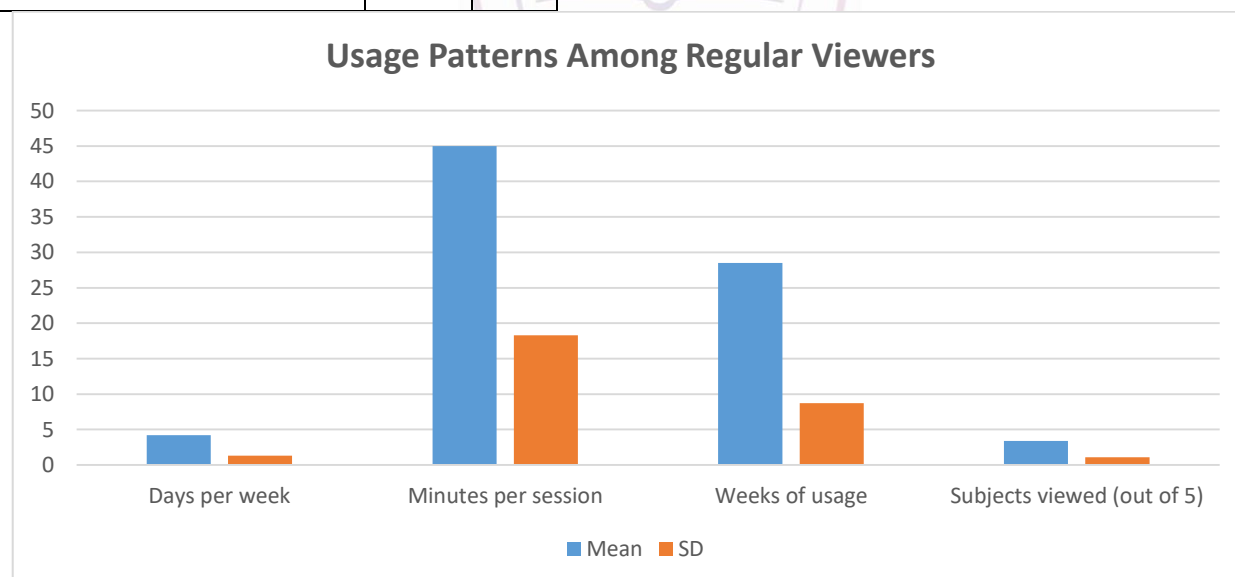
Table 1: Access to DTH Television and PM e-Vidya ISL Channel

Access Indicator	Frequency	Percentage
DTH connection at home	64	80.0%
Awareness of Channel 31	58	72.5%
Regular viewers (≥ 3 times/week)	42	52.5%
Occasional viewers (1-2 times/week)	23	28.8%
Non-viewers	15	18.7%

While 80% of families had DTH television access, only 72.5% were aware of the specialized ISL channel, indicating a gap in awareness-raising efforts. Among aware students, regular viewership stood at 52.5%, with an average viewing duration of 45 minutes per session (SD = 18.3 minutes).

Table 2: Usage Patterns Among Regular Viewers (n=42)

Usage Characteristic	Mean	SD
Days per week	4.2	1.3
Minutes per session	45.0	18.3
Weeks of usage	28.5	8.7
Subjects viewed (out of 5)	3.4	1.1



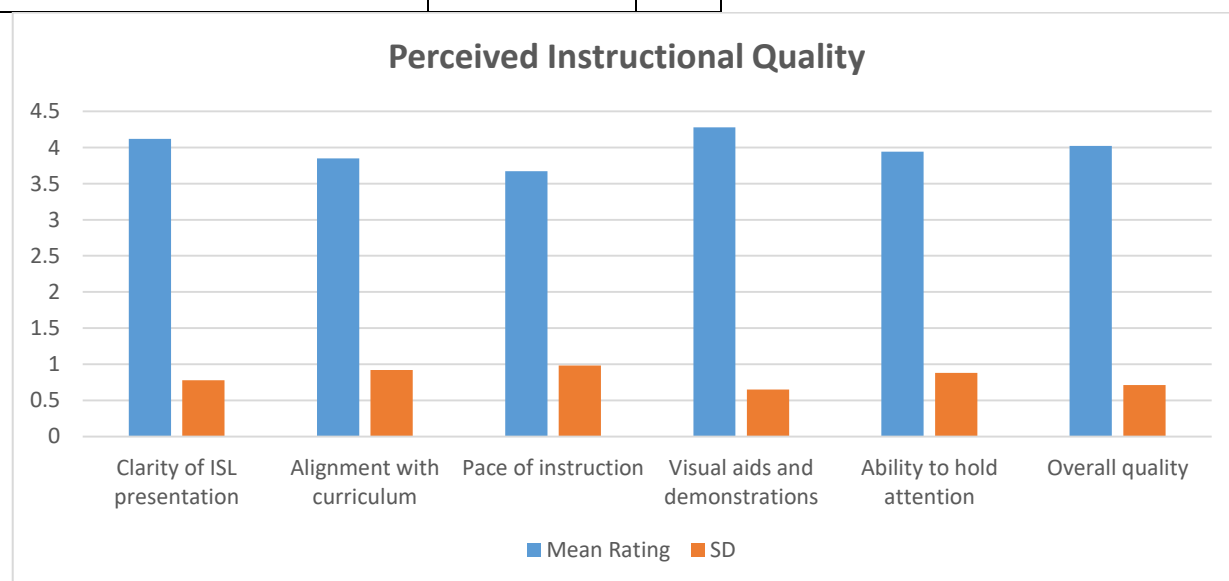
The most frequently viewed subjects were Mathematics (78.6% of regular viewers) and Science (69.0%), followed by Social Studies (52.4%), Hindi (47.6%), and English (33.3%). Students reported preferring subjects where visual demonstrations and sign language explanations provided clear advantages over textbook learning.

Perceived Instructional Quality

Students, teachers, and parents evaluated the instructional quality of the channel content using a 5-point Likert scale (1 = Very Poor, 5 = Excellent).

Table 3: Perceived Instructional Quality (n=65 aware students)

Quality Dimension	Mean Rating	SD
Clarity of ISL presentation	4.12	0.78
Alignment with curriculum	3.85	0.92
Pace of instruction	3.67	0.98
Visual aids and demonstrations	4.28	0.65
Ability to hold attention	3.94	0.88
Overall quality	4.02	0.71



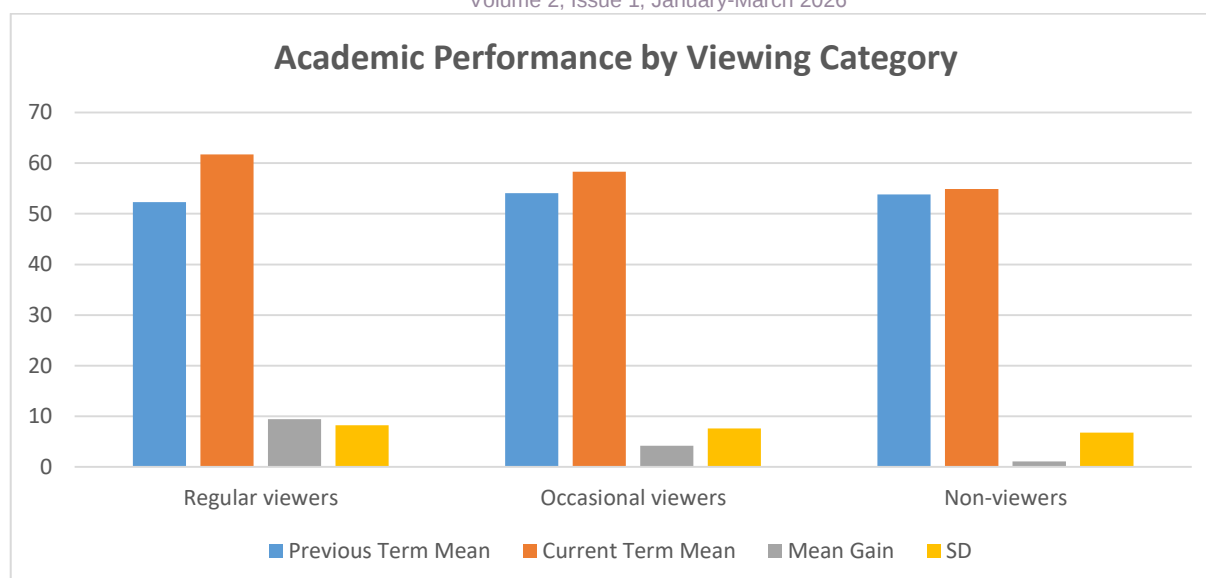
The ratings indicated generally favorable perceptions of instructional quality, with visual aids receiving the highest ratings ($M = 4.28$). However, the pace of instruction received relatively lower ratings ($M = 3.67$), with several students and teachers noting that some topics were covered too quickly for students with limited prior knowledge.

Academic Performance Outcomes

To examine the third objective, academic performance was compared between regular viewers ($n=42$), occasional viewers ($n=23$), and non-viewers ($n=15$) using term examination scores.

Table 4: Academic Performance by Viewing Category

Category	Previous Term Mean	Current Term Mean	Mean Gain	SD
Regular viewers	52.3	61.7	+9.4	8.2
Occasional viewers	54.1	58.3	+4.2	7.6
Non-viewers	53.8	54.9	+1.1	6.8



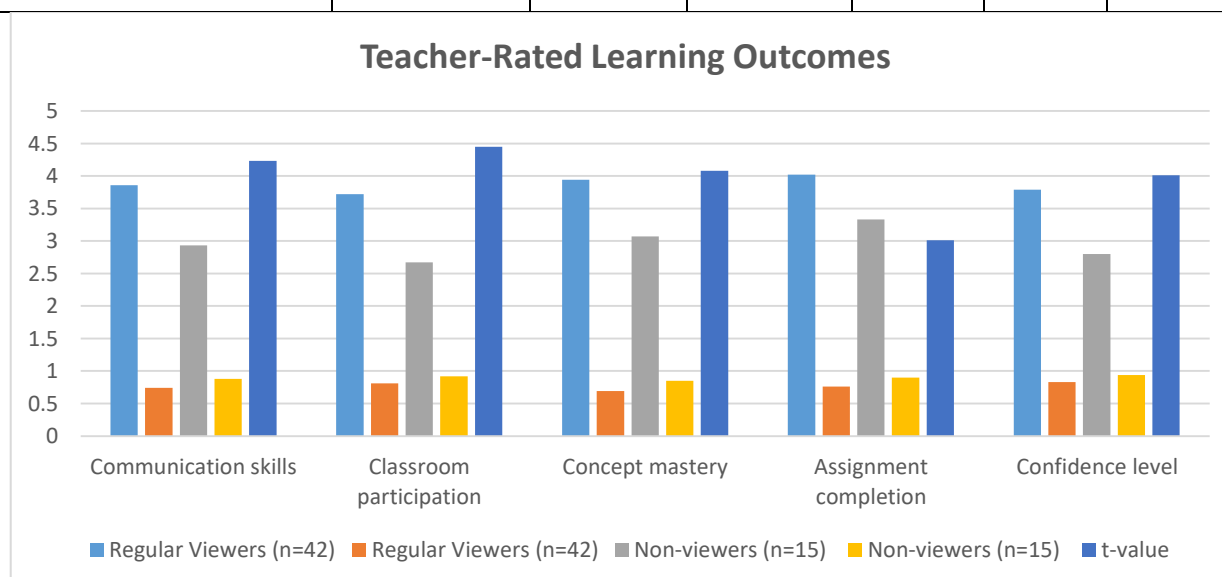
An independent samples t-test revealed a statistically significant difference in academic performance gains between regular viewers and non-viewers ($t = 4.12$, $df = 55$, $p < 0.001$), with regular viewers showing substantially greater improvement (Cohen's $d = 1.08$, indicating a large effect size). The difference between occasional viewers and non-viewers was not statistically significant ($t = 1.43$, $df = 36$, $p = 0.162$).

Learning Outcomes beyond Test Scores

Teachers assessed broader learning outcomes using standardized rating scales. Comparisons were made between students who were regular channel viewers versus those who were not.

Table 5: Teacher-Rated Learning Outcomes

Learning Outcome	Regular Viewers (n=42)		Non-viewers (n=15)		t-value	p-value
	Mean	SD	Mean	SD		
Communication skills	3.86	0.74	2.93	0.88	4.23	<0.001
Classroom participation	3.72	0.81	2.67	0.92	4.45	<0.001
Concept mastery	3.94	0.69	3.07	0.85	4.08	<0.001
Assignment completion	4.02	0.76	3.33	0.90	3.01	0.004
Confidence level	3.79	0.83	2.80	0.94	4.01	<0.001



All comparisons revealed statistically significant differences favoring regular channel viewers, with the largest effects observed for classroom participation (Cohen's $d = 1.24$). Teachers noted that students who regularly watched the channel showed increased willingness to answer questions, participate in discussions using ISL, and demonstrate concepts to peers.

Parent interviews corroborated these findings, with 81% of parents of regular viewers reporting noticeable improvements in their child's enthusiasm for learning, compared to 40% of parents of non-viewers ($\chi^2 = 11.73$, $p < 0.001$).

Barriers and Facilitators

Qualitative analysis of teacher and parent responses identified several key barriers and facilitators influencing effective channel usage.

Table 6: Barriers to Effective Channel Usage (Multiple responses allowed)

Barrier	Teachers (n=35)	Parents (n=72)
Limited awareness of channel existence	17 (48.6%)	38 (52.8%)
Inconvenient broadcast timing	12 (34.3%)	41 (56.9%)
Lack of recording capability	9 (25.7%)	33 (45.8%)
Competing household TV usage	-	28 (38.9%)
Electricity availability issues	4 (11.4%)	19 (26.4%)
Insufficient curriculum alignment	18 (51.4%)	-
No mechanism for doubt clarification	21 (60.0%)	24 (33.3%)

The most frequently cited barriers included limited awareness, inconvenient timing of broadcasts (often conflicting with school hours or meal times), and the absence of mechanisms for students to ask questions or clarify doubts about content.

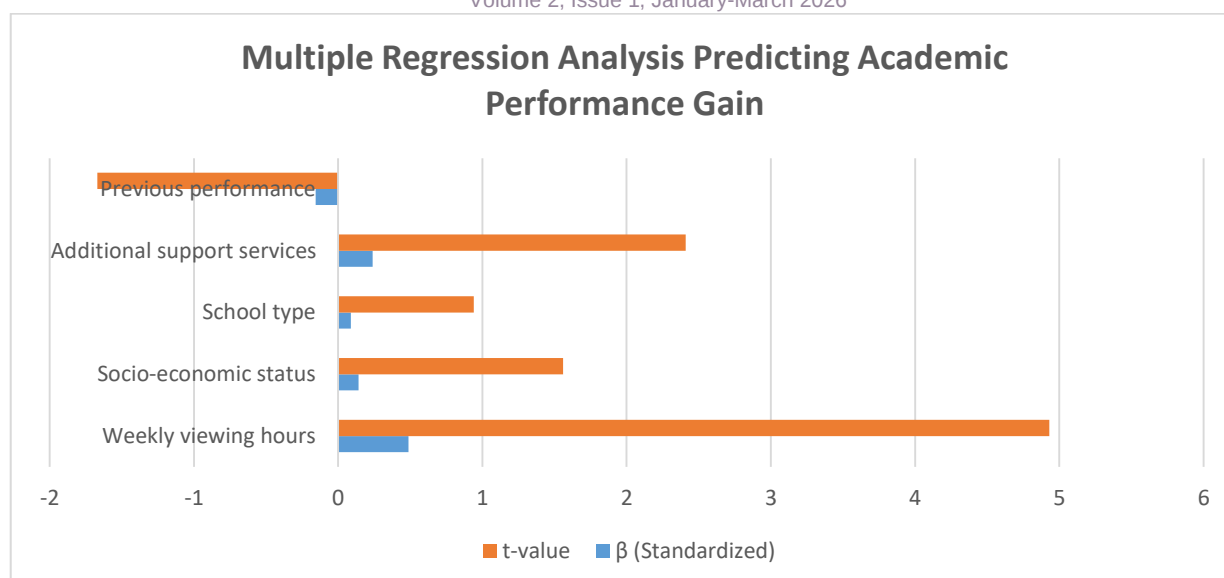
Key facilitators identified included: family support and encouragement (mentioned by 89% of regular viewers' parents), availability of a dedicated TV or smartphone for the child's educational use (67%), teacher reinforcement of channel content in classroom instruction (71%), and the inherent appeal of visual-ISL learning for deaf students (94%).

Multivariate Analysis

To address the sixth objective, a multiple regression analysis was conducted with academic performance gain as the dependent variable and several predictors: hours of weekly channel viewing, socio-economic status (measured by family income quintile), school type (special vs. mainstream), availability of additional support services (resource room, ISL interpreter in school), and previous academic performance.

Table 7: Multiple Regression Analysis Predicting Academic Performance Gain

Predictor Variable	β (Standardized)	t-value	p-value
Weekly viewing hours	0.487	4.93	<0.001
Socio-economic status	0.142	1.56	0.124
School type	0.089	0.94	0.352
Additional support services	0.238	2.41	0.019
Previous performance	-0.156	-1.67	0.100



The overall model was significant ($F = 11.34$, $p < 0.001$, $R^2 = 0.436$), explaining 43.6% of variance in academic performance gains. Weekly viewing hours emerged as the strongest predictor ($\beta = 0.487$, $p < 0.001$), even after controlling for socio-economic status, school type, and other confounding variables. The availability of additional support services also contributed significantly ($\beta = 0.238$, $p = 0.019$), suggesting a complementary effect between the channel and school-based interventions.

Discussion

The results of this study offered solid proof that the PM e-Vidya ISL (DTH Channel 31) significantly improved the academic achievement and general learning outcomes of Rajasthan's hearing-impaired students. Frequent viewers showed noticeably higher academic gains than their peers who did not watch the channel, with gains in communication skills, classroom participation, and conceptual understanding in addition to test scores.

Even after adjusting for potential confounders, there was still a strong correlation between viewing frequency and academic outcomes, indicating that the channel itself was a causal factor in enhancing learning. This result was consistent with studies on multimedia learning theory, which holds that information is better understood and retained when presented in multiple modalities, in this case visual demonstrations and ISL (Mayer, 2009). Receiving curriculum content in their natural language (ISL) probably helped hearing-impaired students focus their mental energies on comprehending ideas rather than decoding language.

The channel's content was generally well-designed and easily accessible, as evidenced by the high ratings for instructional quality, especially with regard to ISL clarity and visual aids. Regular viewers' increased classroom participation, as reported by teachers, raised the possibility that the channel helped students become more confident in their knowledge and more eager to participate fully in class discussions. Self-efficacy theory, which highlights the importance of mastery experiences in fostering motivation and confidence, was in line with this finding (Bandura, 1997).

But the study also found that there were major implementation issues. Nearly 28% of students with DTH access were not aware of the channel, indicating a lack of proper promotion and information sharing. One of the biggest obstacles was the broadcasts' timing, especially for students whose family or school schedules clashed with the live broadcast. The flexibility and usefulness of the channel were restricted by the lack of recorded or on-demand access.

One of the main drawbacks of the one-way broadcast model was the absence of interactive elements, like a way for students to ask questions or get tailored feedback. Although the channel made ISL instruction accessible, it was unable to duplicate the dynamic, adaptable style of successful classroom instruction. For students who struggled with particular concepts, this restriction was especially detrimental because their only option was to wait for their next class period.

The channel performed best when incorporated into a comprehensive support system rather than operating as a stand-alone intervention, according to the complementary relationship found between channel usage and school-based support services. Student engagement and benefits were higher in schools where teachers actively promoted channel content, linked it to lessons, and encouraged viewing.

The study showed both advancements and enduring difficulties from the standpoint of equity. The most marginalised students occasionally benefited the least from the channel, despite the fact that it gave students in remote areas who did not have access to qualified ISL teachers unprecedented access to ISL instruction. These obstacles included DTH access, electricity availability, and conflicting household demands. This trend demonstrated how digital interventions run the risk of unintentionally increasing achievement gaps if access barriers are not actively addressed during implementation (Warschauer, 2003).

Conclusion

This survey study offered strong proof that hearing-impaired students in Rajasthan who frequently watched PM e-Vidya ISL (DTH Channel 31) saw improvements in their learning outcomes and academic performance. Comparing students who watched the channel at least three times a week to their peers who did not, the former showed statistically significant improvements in test scores, communication abilities, classroom engagement, and concept mastery. Even after controlling for socioeconomic status, type of school, and availability of extra support services, these advantages remained.

The results of the study confirmed that funding sign language educational broadcasting is a practical way to increase deaf and hard-of-hearing students' access to high-quality instruction. By offering curriculum-aligned content presented by fluent ISL speakers, the channel filled a crucial void that many schools were unable to provide because of a teacher shortage.

However, resolving a number of implementation issues was necessary to fully utilise the channel. The following were among the recommendations: (1) extensive awareness campaigns using a variety of channels to reach schools and families; (2) modifying broadcast schedules or offering on-demand access to accommodate a range of viewing contexts; (3) creating supplementary online or mobile platforms that allow for teacher-mediated interaction and student questions; (4) educating teachers on how to incorporate channel content into classroom instruction; and (5) providing targeted assistance to ensure that marginalised families could access the electricity and technology they need.

Future studies should use longitudinal designs that monitor students' progress over a number of years, look at how the channel affects various student subgroups and geographical areas, and assess how cost-effective it is in comparison to other interventions. Furthermore, a thorough analysis of the implementation process may reveal the most effective ways to incorporate televised ISL instruction into various educational settings.

PM e-Vidya ISL Channel 31 was a significant innovation in inclusive education policy, despite its limitations as a broadcast medium. This study showed that deaf students could make significant academic progress and gain the self-assurance and abilities needed for lifelong learning when they were taught in their native tongue using accessible media.

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