

**RESEARCH PAPER****Academic Performance of Students with Hearing Impairments: A Study in Post-Primary Special Education****¹Dr. Asma Kanwal* ²Dr. Rukhsana Bashir and ³Sana Qaisar**

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Corresponding Author asma.kanwal@ue.edu.pk**ABSTRACT**

The study investigates the academic achievement of students with hearing impairments in English, Urdu, and Mathematics after completing a five-year primary special education program in Punjab's public sector. Students with hearing impairments often face academic challenges, highlighting the need for evaluations to guide targeted educational interventions. A descriptive cross-sectional design with a quantitative approach was used. A sample of 56 students, selected through simple random sampling, was assessed using curriculum-aligned tests in English, Urdu, and Mathematics. Data were analyzed using descriptive and inferential techniques, with scores categorized into below average, average, and above-average levels. Most students scored below average in reading, writing, and numeracy. A significant gender difference was found in the Urdu Written Test ($p = .013$). No significant differences were noted for other demographic variables. Educational institutions should implement tailored interventions to address the specific needs of students with hearing impairments to improve their academic outcomes.

Keywords: Academic Performance, Assessment, Post-Primary Special Education, Students with Hearing Impairment**Introduction**

This study undertakes a critical evaluation of product of primary special education program for students with hearing impairments. By analyzing the academic achievement levels of these students post-program completion, the study seeks to deliver valued intuitions about the potentials and needs of existing educational mediations. Such comprehensions are crucial for enlightening research-based practices & policies geared towards enhancing educational outcomes for students with hearing impairments. Eventually, the findings of this study hold significant implications for driving positive change in the provision of educational services to facilitate the academic success and holistic development of students with hearing impairments

Literature Review

The global demand for education as a test of one's competence and ability to perform fully in the current highly innovative society has compelled a quest for the highest levels of learning anywhere. Nevertheless, within academic circles, deaf students tend to underperform academically more often than not. This trend is influenced by various factors. In Kenya, for example; there are negative community attitudes towards the deaf; learners with special educational needs have not been properly catered for in the curriculum; while teachers are incompetent in sign language. Lack of adequate teaching and learning resources is another big challenge in many special education schools (Mwanyuma, 2016).

In academic success, motivation is crucial. In order for students to achieve their academic goals, they must be motivated and actively involved in classroom activities. Deaf and hard of hearing students generally exhibit lower motivation and poorer academic achievement compared to their hearing counterparts. With high demands from the parents and teachers who are also involved in teaching process; deaf students can be motivated to learn better which may result into better academic performance (Mahmutovic et al., 2020).

In the past, reports have been given of how deaf students do not make reading progress commensurate with their age, getting stuck at “fourth-grade ceiling” frequently. Nevertheless, there are certain developments like newborn hearing screenings done on large scale and advancements in hearing technology that may imply reflection upon this yardstick. It was found out that some deaf students now score average points in standardized reading tests thereby exceeding the so-called fourth-grade level (Mayer et al., 2021).

Language skills and literacy in deaf children can be improved through early identification and intervention, which usually occurs through the use of hearing devices and sign language (Ching et al., 2017; Ganek et al., 2012; Ruben, 2017). Literacy is essential for success in education and employment. Reading and writing skills start at an early age and continue to develop with formal school learning, social interactions as well as recreational activities (Lederberg et al., 2013; Luckner et al., 2005). Lack of these skills can result in academic failure, job seeking difficulties, and social maladjustment (Moats, 2000).

During the last forty years or so several studies have shown that deaf children generally perform much worse than their hearing peers in reading comprehension, literacy skills, overall educational achievements hence diminishing their opportunities for postsecondary education enrollment (Qi & Mitchell, 2012; Garberoglio et al., 2014). There are reports indicating that many deaf students in America read below the level of fourth grade even at the time of their graduation completing high school while only a few manage to go beyond seventh grade performance levels (Cawthon, 2004). In comparison with other subjects such as math Deaf students perform at a fifth or sixth-grade level in high school (Pagliaro & Ansell, 2002; Traxler, 2000).

However, there are positive developments. Some studies have shown that many deaf students achieve levels of average / above-average in mainstream classrooms, especially those using cochlear implants, who often perform comparably to their hearing peers (Antia et al., 2009; Spencer et al., 2004). Additionally, in deaf children English literacy with their sign language skills is progressively correlated. Proficiency in American Sign Language (ASL) supports reading skills, indicating that knowledge of any language can facilitate the learning to read with skillfully, even if it is different from the printed language (Goldin-Meadow & Mayberry, 2001).

Early acquisition and high proficiency in ASL with enhanced reading expertise are strongly interrelated in children and adults with deafness (Chamberlain & Mayberry, 2008; Freel et al., 2011). Despite some debates over the best early intervention methods, evidence suggests that bilingual approaches incorporating sign language support literacy development in deaf children (Fitzpatrick et al., 2013; Hermans et al., 2008).

The achievement gap between deaf and hearing students remains significant, often due to differences in opportunities to learn and delays in language acquisition (Schick et al., 2007). Deaf students frequently receive instruction in sign language or other visual communication modes, making standardized testing in English challenging (Mitchell, 2004). Full participation in classroom activities, leading to academic and social challenges can be hindered by the lack of age-appropriate literacy skills (Kelly et al., 2003; Pagliaro & Kritzer, 2005). An exemplar change in education of deaf is necessary to address these issues via concentrating on the features shared by efficacious readers with deafness mainly on sign

language fluency. Evidence-based practices can improve educational outcomes for deaf children with the collaborative provisions among parents, educators, and professionals (Hrastinski & Wilbur, 2016). To ensure practicality of this shift is crucial that deaf and hard-of-hearing students can achieve their full potential and succeed in academic and professional environments.

Material and Methods

The researchers followed quantitative research design with descriptive in nature to conduct the investigation of phenomenon.

SWHIs who completed a five-year primary special education program in Punjab, Pakistan were constitute the population of the study.

A group of sixth-grade SWHIs ($n = 56$) were selected by using simple random sampling technique from public special education institutes.

Tests of English, Urdu, and Mathematics were designed by following Punjab's educational standards. Objective and subjective items were included to assess literacy skills. The penal of field experts was contacted to ensure rigorous validation of the tools.

Tests were administered in a conducive environment to ensure appropriate arrangements for seating, lighting, and materials. Total communication methods were used to provide instructions. Tests were conducted during a scheduled time, and accommodations were made for students who required additional time.

Descriptive statistics were used to summarize the academic performance of SWHIs across different tests. Inferential techniques, such as t-tests and ANOVA, were employed to analyze differences in performance based on demographic variables.

Consent was obtained from institute heads/principals prior to test administration. Students were informed about the tests in advance, and efforts were made to build rapport with them. The test environment was free from distractions, and measures were taken to prevent cheating. Ethical guidelines were strictly followed at each step of the study.

Results and Discussion

Table 1
Demographic Variables of SWHIs

Variable	Description	Frequency (n)	Percentage (%)
Institute	Special Education School	$n = 32$	57.1 %
	Special Education Centre	$n = 24$	42.9 %
Zone of Punjab Province	Zone No. I	$n = 14$	25.0 %
	Zone No. II	$n = 18$	32.1 %
	Zone No. III	$n = 11$	19.6 %
	Zone No. IV	$n = 13$	23.2 %
Gender	Male	$n = 37$	66.1 %
	Female	$n = 19$	33.9 %
Age	Below than 11 years	$n = 06$	10.7 %
	Among 11-12 years	$n = 15$	26.8 %
	Above than 12 years	$n = 35$	62.5 %
Degree of HL	Mild Degree of Hearing Loss	$n = 05$	8.9 %
	Moderate Degree of Hearing Loss	$n = 12$	21.4 %
	Severe Degree of Hearing Loss	$n = 19$	33.9 %

	Profound Degree of Hearing Loss	<i>n</i> = 20	35.7 %
Onset of HL	Before Language Acquisition	<i>n</i> = 38	67.9 %
	After Language Acquisition	<i>n</i> = 18	32.1%
Listening Device in Use of Students with HL	Hearing-Aid	<i>n</i> = 31	55.4 %
	Implantation in Cochlea	<i>n</i> = 03	5.4 %
Socio-Economic Background	None	<i>n</i> = 22	39.3 %
	Low	<i>n</i> = 16	28.6 %
	Middle	<i>n</i> = 26	46.4 %
	Upper	<i>n</i> = 14	25.0 %
	Overall	<i>n</i> = 56	100.0 %

Table 1 represents that the study included 56 participants, all representing different demographic aspects of severe to profoundly deaf students. Among them, 57.1% attended special schools, and 42.9% attended special centers. Their distribution across zones was: 25.0% in Zone I, 32.1% in Zone II, 19.6% in Zone III, and 23.2% in Zone IV. Gender distribution was 66.1% male and 33.9% female. Regarding age, 10.7% were below 11, 26.8% between 11 and 12, and 62.5% above 12. Hearing loss severity varied, with 8.9% mild, 21.4% moderate, 33.9% severe, and 35.7% profound. Most (67.9%) had pre-lingual hearing loss, and 32.1% post-lingual. Hearing aids were used by 55.4%, cochlear implants by 5.4%, and 39.3% used no listening device. Socio-economic status was split: 28.6% low, 46.4% middle, and 25.0% high.

Table 2
Grading Criteria for Performance Tests

Grading Criteria to Performance in All Tests	
Below Average	41% - 69%
Average	0% - 40%
Above Average	70% - 100%

Table 2 outlines the grading criteria for performance tests used to evaluate students' achievement. Scores falling between 0% and 40% are categorized as "Below Average," while scores ranging from 41% to 69% are deemed "Average." Scores from 70% to 100% fall under the category of "Above Average."

Table 3
SWHIs' Post-Primary Academic Achievement

Variable	Description	Frequency (<i>n</i>)	Percentage (%)
English written Test	Below Average	45	80.4
	Average	09	16.1
	High	02	3.6
English Reading Comprehension Test	Below Average	54	96.4
	Average	02	3.6
Urdu Written Test	Below Average	49	87.5
	Average	07	12.5
Urdu Reading Comprehension Test	Below Average	56	100.0
Mathematical Test	Below Average	45	80.4
	Average	09	16.1
	High	02	3.6
	Overall	56	100.0

Table 3 displays the academic achievement scores of 56 SWHIs who completed their primary special school education. In written test of English, 80.4% students achieved below average, students (16.1%) achieved average level, and other (3.6%) scored high. For English reading comprehension, 96.4% students' achieved levels were below average, while only students (3.6%) achieved average level. In the Urdu written examination, 87.5% students

stood at below average, while 12.5% students achieved average scores. In Urdu reading comprehension examination, all students' (100%) achieved levels were below average. In the mathematical assessment, 80.4% students' achieved levels were below average, students (16.1%) stood at average level, while 3.6% students achieved high.

Table 4
Gender-Based T-Tests on SWHIs' Achievement Scores after Primary School

Independent Samples Test	F	Sig.	t	df	Sig. (two-tailed)	M Difference	Std. Error	95% CI of the discrepancy	
								Lower Bound	Upper Bound
English-Written Test	2.889	.095	.787	54	.435	.11238	.14280	-.17392	.39867
			.892	50.064	.377	.11238	.12597	-.14063	.36538
English-Reading Comprehension Test	4.711	.034	1.023	54	.311	.05405	.05283	-.05186	.15997
			1.434	36.000	.160	.05405	.03769	-.02238	.13049
Urdu Written-Test	6.569	.013	1.167	54	.248	.10953	.09388	-.07868	.29775
			1.354	52.103	.182	.10953	.08090	-.05279	.27185
Mathematical-Test	2.889	.095	.787	54	.435	.11238	.14280	-.17392	.39867
			.892	50.064	.377	.11238	.12597	-.14063	.36538

a. t cannot be computed because the SDs of both groups are 0.

Table 4 presents the results of gender-based t-tests on SWHIs' post-primary school performance test scores show no significant gender differences in English Written, Reading Comprehension, and Mathematical tests ($p > .5$). However, a significant difference emerges in the Urdu Written Test ($p = .013$), indicating varying performance between genders.

Table 5
T-Test on SWHIs' Achievement by Institute Type in Basic Academic Skills

Independent Samples Test	F	Sig.	t	Df	Sig. (two-tailed)	M Difference	Standard error of the mean difference	95% CI of the discrepancy	
								Lower Bound	Upper Bound
English-Written Test	.712	.402	.303	54	.763	.04167	.13729	-.23358	.31691
			.317	53.977	.752	.04167	.13135	-.22167	.30500
English-Reading Comprehension Test	7.085	.010	1.242	54	.220	.06250	.05032	-.03838	.16338
			1.438	31.000	.161	.06250	.04348	-.02617	.15117
Urdu-Written Test	.000	1.000	.000	54	1.000	.00000	.09094	-.18233	.18233
			.000	49.552	1.000	.00000	.09101	-.18285	.18285
Mathematical Test	1.799	.185	-.762	54	.449	-.10417	.13667	-.37818	.16984
			-.745	45.123	.460	-.10417	.13977	-.38566	.17733

Table 5 summarizes t-tests comparing SWHIs' academic performance in basic skills between schools and centers. For English Written, Reading Comprehension, Urdu Written, and Mathematical tests, no significant differences were found between the two types of institutes (all $p > .05$).

Table 6
T-Test on SWHIs' Academic Achievement by Onset of Hearing Loss in Basic Skills

Independent Samples Test	F	Sig.	t	df	Sig. (two-tailed)	M Difference	Standard error of the mean difference	95% CI of the discrepancy	
								Lower Bound	Upper Bound
English-Written Test	.001	.971	.100	54	.920	.01462	.14558	-.27726	.30650
			.096	30.280	.924	.01462	.15169	-.29506	.32430
English-Reading Comprehension Test	1.174	.283	-.542	54	.590	-.02924	.05393	-.13736	.07888
			-.476	24.909	.638	-.02924	.06147	-.15587	.09739

Urdu-Written Test	.185	.669	.212	54	.833	.02047	.09633	-.17265	.21359
			.217	35.295	.829	.02047	.09433	-.17097	.21191
Mathematical Test	7.192	.010	1.242	54	.219	.17836	.14356	-.10946	.46618
			1.496	51.878	.141	.17836	.11922	-.06088	.41761

Table 6 displays results from independent t-tests on the basis of onset of hearing impairment in SWHIs, assessing their academic achievement in basic skills post-primary education. Findings reveal no significant differences between pre-lingual and post-lingual groups in English and Urdu Written as well as in Reading Comprehension tests (all $p > .05$). Though, a notable difference was witnessed in Mathematical Test ($p = .219$), although there is some uncertainty representing by the confidence interval.

Table 7
Zone-Wise (ANOVA) on SWHIs' Academic Achievement in Basic Skills

ANOVA (Zone)		Sum of squared differences	df	M Square	F	Sig.
English Written Test	Intergroup	0.545	03	0.182	0.704	0.554
	Intragroup	13.437	52	0.258		
	Overall	13.982	55			
English Reading Comprehension Test	Intergroup	0.075	03	0.025	0.702	0.555
	Intragroup	1.854	52	0.036		
	Overall	1.929	55			
Urdu Written Test	Intergroup	0.314	03	0.105	0.936	0.430
	Intragroup	5.811	52	0.112		
	Overall	6.125	55			
Mathematical Test	Intergroup	0.597	03	0.199	0.774	0.514
	Intragroup	13.385	52	0.257		
	Overall	13.982	55			

Table 7 presents the results from Zone-based (ANOVA) conducted on SWHIs in terms of evaluation of their academic accomplishment in basic skills post-primary education. Findings indicate no significant differences were prevalent among zones for all basic literacy and numeracy tests (all $p > .05$).

Table 8
Age-Wise ANOVA on SWHIs' Academic Achievement in Basic Skills

ANOVA (Age)		Sum of squared differences	df	M Square	F	Sig.
English-Written Test	Intergroup	0.273	02	0.136	0.527	0.593
	Intragroup	13.710	53	0.259		
	Overall	13.982	55			
English-Reading Comprehension Test	Intergroup	0.043	02	0.021	0.602	0.551
	Intragroup	1.886	53	0.036		
	Overall	1.929	55			
Urdu-Written Test	Intergroup	0.106	02	0.053	0.466	0.630
	Intragroup	6.019	53	0.114		
	Overall	6.125	55			
Mathematical Test	Intergroup	0.439	02	0.220	0.860	0.429
	Intragroup	13.543	53	0.256		
	Overall	13.982	55			

Table 8 displays results from the Age-wise ANOVA conducted on SWHIs' basic Skills. Findings indicate non-significant variances were found in basic skills levels for all tested skills on the basis of age (all $p > .05$).

Table 9
ANOVA on SWHIs' Academic Achievement by Level of Hearing Loss in Basic Skills

ANOVA (Level of Hearing Loss)		Sum of squared differences	df	M Square	F	Sig.
English-Written Test	Intergroup	0.824	03	0.275	1.086	0.363
	Intragroup	13.158	52	0.253		
	Overall	13.982	55			

English-Reading Comprehension Test	Intergroup	0.181	03	0.060	1.797	0.159
	Intragroup	1.747	52	0.034		
	Overall	1.929	55			
Urdu-Written Test	Intergroup	0.419	03	0.140	1.272	0.294
	Intragroup	5.706	52	0.110		
	Overall	6.125	55			
Mathematical Test	Intergroup	0.806	03	0.269	1.060	0.374
	Intragroup	13.176	52	0.253		
	Overall	13.982	55			

Table 9 summarizes the ANOVA conducted on SWHIs' levels of academic achievement on the basis of their hearing loss level. Results indicate no significant differences in achievement levels across all tested skills: English Written, Reading Comprehension, Urdu Written, and Mathematical tests (all $p > .05$).

Table 10
ANOVA on SWHIs' Academic Achievement by Type of Assistive Listening Device

ANOVA (Assistive Auditory/Listening Device Used by SWHIs)		Sum of squared differences	df	M Square	F	Sig.
English-Written Test	Intergroup	0.371	02	0.185	0.722	0.491
	Intragroup	13.611	53	0.257		
	Overall	13.982	55			
English-Reading Comprehension Test	Intergroup	0.006	02	0.003	0.087	0.917
	Intragroup	1.922	53	0.036		
	Overall	1.929	55			
Urdu-Written Test	Intergroup	0.143	02	0.071	0.632	0.536
	Intragroup	5.982	53	0.113		
	Overall	6.125	55			
Mathematical Test	Intergroup	0.698	02	0.349	1.392	0.258
	Intragroup	13.284	53	0.251		
	Overall	13.982	55			

Table 10 displays ANOVA results examining the impact of assistive auditory/listening device type on SWHIs' levels of basic skills achievements. Findings suggest no significant differences in achievement levels across all tested skills: English Written, Reading Comprehension, Urdu Written, and Mathematical tests (all $p > .05$).

Table 11
ANOVA on SWHIs' Academic Achievement by Socio-Economic Status in Basic Skills

Socio-Economic Background		ANOVA Sum of squared differences	df	M Square	F	Sig.
English-Written Test	Intergroup	0.260	02	0.130	0.501	0.609
	Intragroup	13.723	53	0.259		
	Overall	13.982	55			
English-Reading Comprehension Test	Intergroup	0.082	02	0.041	1.183	0.314
	Intragroup	1.846	53	0.035		
	Overall	1.929	55			
Urdu-Written Test	Intergroup	0.372	02	0.186	1.715	0.190
	Intragroup	5.753	53	0.109		
	Overall	6.125	55			
Mathematical Test	Intergroup	0.215	02	0.107	0.414	0.663
	Intragroup	13.767	53	0.260		
	Overall	13.982	55			

Table 11 illustrates the ANOVA test conducted to assess how the socio-economic status influence SWHIs' academic accomplishment levels in basic skills. Findings indicate no significant differences in achievement levels across all tested skills: English Written, Reading Comprehension, Urdu Written, and Mathematical tests (all $p > .05$).

Discussion

The researchers evaluated the academic achievement of students with hearing impairments (SWHIs) after the completion of primary special education. The results of the

study revealed that a majority of the participants scored below average in all basic skills. These findings are also signified with previous research of Qi and Mitchell (2012) that deaf students generally perform below their hearing peers in academic assessments.

Several factors may contribute to these outcomes such as the proficiency in sign language among teachers and students is crucial for effective communication and learning. Mwanyuma (2016) noted in his study that in Kenya, the deficiency in the use of fluent sign language among teachers hampers the education of deaf students. Similar situation in Pakistan is prevailing, where inadequate teacher training in sign language adversely affecting deaf students' performance (Ali et al., 2023).

The significant gender difference observed in the Urdu written test with boys beating girls ($p = .013$) which contrasts with the studies conducted by Antia et al. (2009) resulted in no significant gender differences in the academic performance of deaf students. This discrepancy could be due to the contextual differences such as cultural and socio-economic factors are different in Punjab-Pakistan (Kanwal et al., 2022).

It is notable that no significant differences in academic performance were found on other demographic variables such as type of educational institution (schools vs. centers) and the onset of hearing loss (pre-lingual vs. post-lingual). It indicates the inadequate quality of education for SWHIs might be uniform across different settings. Marschark et al. (2015) reported that deaf students often receive an education that does not meet their specific needs and this poor performance uniform regardless of the educational environment.

Non-significant differences were found in academic achievements in other demographic variables such as age, socio-economic status, or the type of assistive listening device deaf use. This indicates that the issue with the overall quality and accessibility of education for SWHIs is systematic. This finding is consistent with the studies of Kelly et al. (2003) and Pagliaro & Kritzer (2005) in which they emphasized the inadequacy of curricula and instructional methods used in deaf education programs.

The necessity of early identification and intervention is crucial which is also emphasized by Ching et al. (2017) and Kanwal et al., (2024). Effective early interventions improve language development and academic outcomes for deaf students. However, the results of the current study indicate that even the potential early interventions are present but SWHIs still struggle academically. It highlights the gaps in ongoing support and educational strategies being provided to these students.

It is crucial to adopt a bilingual approach incorporating both sign language and spoken/written language instruction to increase the proficiency levels in basic skills. Research has shown that proficiency in a signed language supports the development of reading and writing skills (Hermans et al., 2008; Hoffmeister & Caldwell-Harris, 2014). Implementation of such approaches could enhance the educational outcomes for SWHIs.

Conclusion

The purpose of the research was to assess proficiency levels and identify any disparities in academic performance among students with hearing impairment based on various factors. as per the grading criteria provided, majority of students scored below average in basic reading, writing, and mathematical skills. Notably, there were no significant differences found in academic achievement levels across demographic variables such as gender, age, type of institute, onset of hearing loss, type of assistive listening device used by these students, or socio-economic status. However, a significant difference was found in Urdu Written Test which indicates varied performance between male and female. Overall, this study contributes to give the clear picture of outcome of primary special education

program implemented in public sector by providing the understanding of academic achievement levels among students with hearing impairments. It highlights the importance of quality educational practices in promoting their academic success and overall well-being of these students.

Recommendations

- The incorporation of interactive teaching methods, visual aids, and assistive technologies to facilitate learning of students with hearing impairment is a dire need to enhance language proficiency in fundamental skills at primary school level.
- There should be the provision of quality training and support for teachers and educational staff to effectively accommodate the diverse learning needs of students with hearing impairments.
- School administration should ensure that teaching learning materials and resources are accessible to teachers and students with hearing impairments.
- There should be a mechanism to encourage active involvement of parents and the broader community in supporting the educational needs of students with hearing impairments.
- School administration should implement regular monitoring and assessment procedures to track the academic progress of students with hearing impairments and identify areas where additional support may be needed.

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