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EVALUATION OF METACOGNITIVE SKILLS AND REFLECTIVE PRACTICES AMONG STUDENTS WITH HEARING IMPAIRMENT AT THE ELEMENTARY LEVEL

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ABSTRACT

Metacognitive skills and reflective practices enable students to plan, monitor, and evaluate their learning and to learn from experience. Despite their educational importance, limited baseline evidence is available concerning these abilities among school-age students with hearing impairment in Pakistan. This quantitative descriptive-comparative study examined metacognitive skills and reflective practices among 112 Grade 8 students enrolled in public-sector special education institutions in the four districts of Dera Ghazi Khan Division. The entire accessible population was included through census sampling. Data were collected using the 40-item Metacognitive Skills Scale for Hearing Impaired and the 30-item Reflective Practices Questionnaire. Means and standard deviations were calculated to describe baseline levels, while independent-samples t tests and one-way analysis of variance were used to examine differences based on gender and severity of hearing impairment. Overall metacognitive skills were low (M = 2.36, SD = .20). Planning recorded the highest component mean (M = 2.40), followed by evaluating (M = 2.37) and monitoring (M = 2.31). Overall reflective practices were also low (M = 2.40, SD = .22); reflection-in-action was moderate (M = 2.56), whereas reflection-on-action was low (M = 2.25). No statistically significant differences were observed by gender or severity of hearing impairment. The findings indicate a shared need for explicit, classroom support that helps students plan, monitor, evaluate, and reflect on their learning.

Keywords: *metacognitive skills; reflective practices; students with hearing impairment; elementary education; special education*

INTRODUCTION

Background of the Study

Hearing loss varies in degree, type, and age of onset. It may be mild, moderate, severe, or profound and may occur before or after a child develops spoken language. A student's educational experience is therefore influenced not only by the measured degree of hearing loss but also by language access, communication mode, family support, hearing technology, prior learning, and the quality of classroom instruction. Globally, more than 1.5 billion people live with some degree of hearing loss, and approximately 430 million require rehabilitation. This number includes about 34 million children, and the global need for hearing rehabilitation is expected to increase

substantially by 2050 (World Health Organization [WHO], 2026).

For school-age students, hearing impairment may restrict access to spoken explanations, informal classroom discussion, peer interaction, and incidental learning. Students may need to divide their visual attention among the teacher, sign language, written material, the board, and other classroom cues. When information is presented quickly or through a single communication mode, parts of an explanation may be missed. These conditions can make it more difficult to follow a sequence of ideas, connect new information with prior knowledge, and judge whether a task has been understood. Marschark and Knoors (2012) argued that the educational outcomes of deaf and hard-of-hearing learners cannot be explained by hearing status alone; language access, prior knowledge, cognitive demands, and instructional conditions also play important roles.

These challenges should not be viewed as evidence of limited learning potential. Rather, they highlight the importance of instruction that is visually clear, linguistically accessible, and deliberately structured. Sign-supported explanations, written directions, visual examples, guided questioning, peer discussion, and adequate time for review can improve access to learning. Students also need practical ways to recognize what they already know, identify what remains unclear, select an appropriate strategy, and review the results of their efforts. Metacognitive skills and reflective practices are particularly relevant because they enable learners to take a more active role in these processes.

Metacognitive Skills and Reflective Practices

Metacognition refers to a learner's awareness and regulation of thinking and learning. Flavell (1979) described it as knowledge of one's cognitive processes together with the ability to monitor and regulate them. In classroom learning, metacognition is commonly expressed through planning, monitoring, and evaluating. Planning involves understanding the task, setting a goal, selecting a strategy, and organizing available resources. Monitoring occurs while the learner is working and includes checking comprehension, noticing confusion, and deciding whether the present strategy is effective. Evaluating takes place during or after task completion and involves judging the quality of the outcome and considering what could be improved.

These processes are closely connected. A plan provides direction, monitoring shows whether the plan is working, and evaluation helps the learner use the experience in a later task. When students are able to move through these stages purposefully, they are better placed to work independently, solve problems, and make informed adjustments. Research has shown that metacognition is positively associated with academic performance beyond the contribution of general intellectual ability (Ohtani & Hisasaka, 2018). However, such skills do not always develop automatically. They are strengthened when teachers model their thinking, ask purposeful questions, provide guided practice, and gradually transfer responsibility to the learner (Fogarty & Pete, 2020; Quigley et al., 2018).

Reflective practice complements metacognition by helping students learn from their actions and experiences. Schön (1983) distinguished reflection-in-action from reflection-on-action. Reflection-in-action occurs while an activity is taking place: a learner notices a problem, reconsiders the current approach, and makes an adjustment. Reflection-on-action occurs after the experience and involves revisiting what happened, identifying strengths and errors, and deciding how future performance may be improved. Guided prompts, short reflective writing, visual organizers, and structured discussion can make these processes clearer and more manageable for students (Markkanen et al., 2020).

For students with hearing impairment, metacognition and reflection may provide a useful means of managing communication and learning demands. A student who has missed part of an instruction needs to recognize the gap, seek clarification, use a visual or written source, or change the approach to the task. After completing the activity, the same student may need support to explain what worked, what caused difficulty, and what should be done differently next time. These actions depend on more than content knowledge; they require awareness of one's own learning and

opportunities to express that awareness through an accessible mode of communication.

Although metacognitive skills and reflective practices have received considerable attention in general education, relatively little baseline evidence is available for students with hearing impairment in Pakistani special education settings. Without such evidence, it is difficult to determine which aspects of learning require the greatest support or whether needs differ across student groups. The present study therefore assessed the existing levels of metacognitive skills and reflective practices among Grade 8 students with hearing impairment and examined whether scores differed according to gender and severity of hearing impairment.

Rationale of the Study

Routine participation in classroom activities does not necessarily ensure that students learn how to plan, monitor, evaluate, or reflect on their work. Learners may complete an assignment without setting a clear goal, checking their understanding, analyzing an error, or considering a more effective approach for a similar task. This concern is particularly important for students whose access to classroom learning depends on visual, written, signed, or other supported forms of instruction. Although metacognitive skills and reflective practices are widely discussed in general education, they have received comparatively limited attention in research involving students with hearing impairment in Pakistan. A baseline assessment was therefore needed to identify students' existing strengths and areas of need and to determine whether scores differed according to gender or severity of hearing impairment. The findings also provided an empirical basis for the later development of structured instructional support suited to students' communication and learning needs.

Statement of the Problem

Metacognitive skills and reflective practices are important for independent and purposeful learning, yet limited empirical evidence is available about these abilities among elementary-level students with hearing impairment in Pakistan. In particular, it was unclear whether students' baseline levels differed according to gender or severity of hearing impairment. Without such evidence, instructional support may be planned without a clear understanding of students' actual learning needs. The problem addressed in this study was therefore the limited baseline information concerning the metacognitive skills and reflective practices of students with hearing impairment at elementary level.

Objectives of the Study

1. To assess the current level of metacognitive skills of students with hearing impairment at the elementary level.
2. To assess the current level of reflective practices of students with hearing impairment at the elementary level.
3. To compare students' metacognitive skills and reflective practices on the basis of gender.
4. To compare students' metacognitive skills and reflective practices across mild, moderate, severe, and profound levels of hearing impairment.

Hypotheses

Ho1: There is no significant difference in the metacognitive skills of students with hearing impairment on the basis of gender.

Ho2: There is no significant difference in the reflective practices of students with hearing impairment on the basis of gender.

Ho3: There is no significant difference in the metacognitive skills of students with hearing impairment on the basis of severity of hearing impairment.

Ho4: There is no significant difference in the reflective practices of students with hearing impairment on the basis of severity of hearing impairment.

Significance of the Study

This study provides baseline evidence about the metacognitive skills and reflective practices of students with hearing impairment at elementary level in a Pakistani special education context. The component-level findings identify areas requiring attention in planning, monitoring, evaluating, reflection-in-action and reflection-on-action. Teachers may use this evidence to incorporate goal

setting, self-checking, error analysis, and post-task reflection into regular lessons through accessible communication and visual support. School administrators and teacher educators may also use the findings when planning professional development and classroom resources. The absence of significant differences based on gender and severity of hearing impairment suggests that support should be made broadly available rather than limited to a particular group. For researchers and curriculum developers, the findings offer a foundation for designing and evaluating structured interventions intended to strengthen students' metacognitive and reflective learning.

Methodology

Research Design

A quantitative descriptive-comparative design was employed. The descriptive component established the baseline levels of metacognitive skills and reflective practices, while the comparative component examined differences according to gender and severity of hearing impairment. The analysis reported in this article represents the baseline phase of a broader developmental and quasi-experimental doctoral study.

Participants and Sampling

The accessible population consisted of 112 Grade 8 students with hearing impairment enrolled in public-sector special education institutions in Dera Ghazi Khan, Muzaffargarh, Layyah, and Rajanpur districts. Because the accessible population was manageable and the study sought a complete baseline picture, all 112 students were included through census sampling. The sample comprised 50 male and 62 female students. Six students had mild hearing impairment, 15 had moderate hearing impairment, 30 had severe hearing impairment, and 61 had profound hearing impairment.

Table 1 *Demographic characteristics of the participants (N = 112)*

Variable	Category	n	%
Gender	Male	50	44.6
	Female	62	55.4
Severity of hearing impairment	Mild	6	5.4
	Moderate	15	13.4
	Severe	30	26.8
	Profound	61	54.5
District	Dera Ghazi Khan	32	28.6
	Muzaffargarh	27	24.1
	Layyah	30	26.8
	Rajanpur	23	20.5

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Instruments

Metacognitive skills were assessed using the 40-item Metacognitive Skills Scale for Hearing Impaired (MSSHI). The scale measured planning, monitoring, and evaluating through a five-point agreement response format. Reflective practices were assessed using the 30-item Reflective Practices Questionnaire (RPQ), which included reflection-in-action and reflection-on-action items rated on a five-point frequency scale. Higher scores indicated stronger metacognitive skills or more frequent engagement in reflective practices.

Internal consistency was examined in a pilot sample of 10 students. Cronbach's alpha was .85

for the MSSHI and .82 for the RPQ, indicating good internal consistency for both instruments. Because these estimates were based on a small pilot sample, they were interpreted as preliminary evidence of reliability.

Table 2 *Internal consistency reliability of the student scales (pilot n = 10)*

Scale	Items	Response range	Cronbach's alpha	Level
Metacognitive Skills Scale for Hearing Impaired	40	1-5	.85	Good
Reflective Practices Questionnaire	30	1-5	.82	Good

Data Collection Procedure

During the baseline phase, the MSSHI and RPQ were administered to all 112 participants in their respective institutions. Completed responses were checked for completeness, coded, and entered into the Statistical Package for the Social Sciences (SPSS) for analysis.

Scoring and Data Analysis

Mean scores were interpreted as low (1.00-2.40), moderate (2.41-3.50), or high (3.51-5.00). Frequencies and percentages were used to describe the participants. Means and standard deviations summarized the baseline scores. Independent-samples t tests examined gender-based differences, while one-way analysis of variance compared the four severity groups. Statistical significance was assessed at alpha = .05.

Results

Baseline Levels

Table 3 *Baseline levels of metacognitive skills and reflective practices (N = 112)*

Construct	Component	M	SD	Level
Metacognitive skills	Planning	2.40	.24	Low
	Monitoring	2.31	.17	Low
	Evaluating	2.37	.21	Low
	Overall metacognitive skills	2.36	.20	Low
Reflective practices	Reflection-in-action	2.56	.21	Moderate
	Reflection-on-action	2.25	.23	Low
	Overall reflective practices	2.40	.22	Low

Note. Mean-score criteria: 1.00-2.40 = low; 2.41-3.50 = moderate; 3.51-5.00 = high.

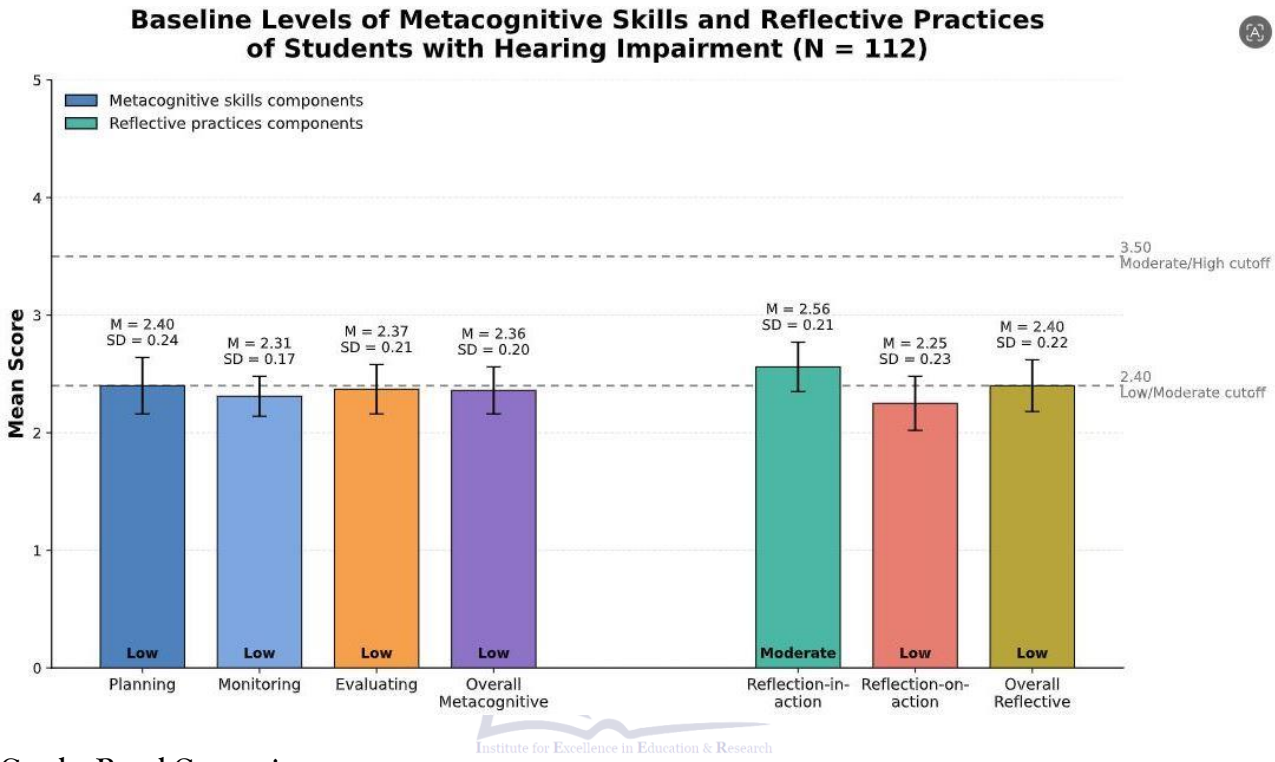
The overall mean for metacognitive skills was 2.36 (SD = .20), which placed the participants in the low range. Planning produced the highest component mean (M = 2.40, SD = .24), although it remained at the upper boundary of the low category. Evaluating (M = 2.37, SD = .21) and monitoring (M = 2.31, SD = .17) were also low. The pattern indicates limited baseline use of strategies for preparing for learning tasks, checking understanding during learning, and judging performance after task completion.

Overall reflective practices were low (M = 2.40, SD = .22). Reflection-in-action reached the moderate range (M = 2.56, SD = .21), indicating a comparatively stronger tendency to notice and respond to difficulties while engaged in a task.

Reflection-on-action was low (M = 2.25, SD = .23), suggesting less frequent review of completed work and limited use of past learning to inform future improvement.

Figure 1

Baseline levels of metacognitive skills and reflective practices among students with hearing impairment



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Gender-Based Comparisons

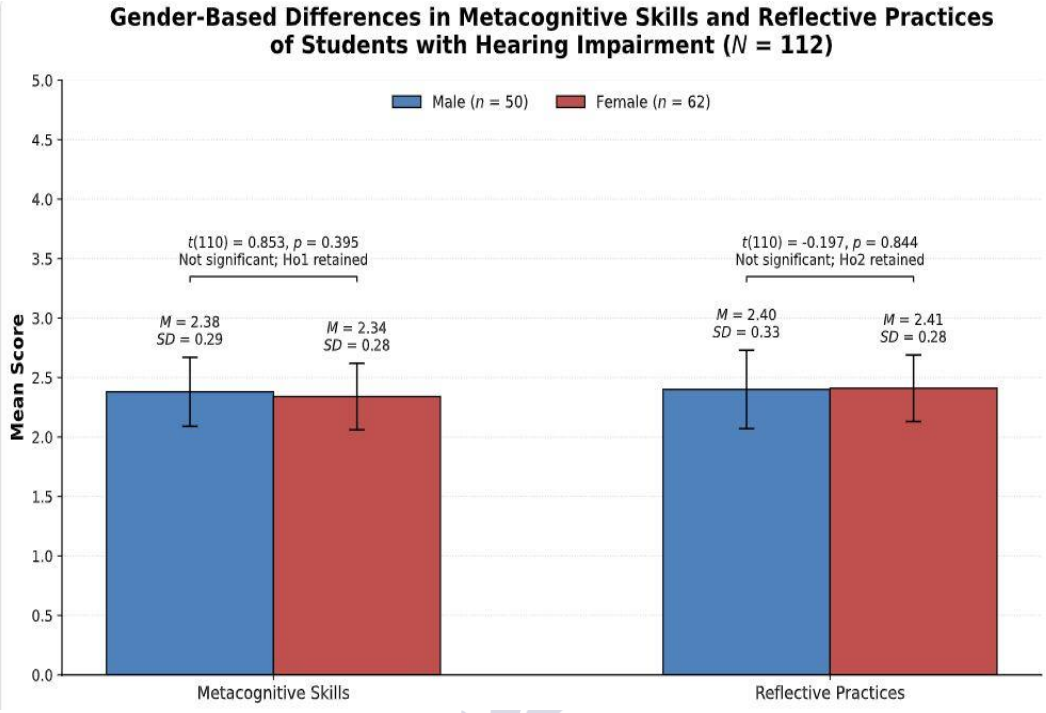
Table 4 *Gender-based comparison of metacognitive skills and reflective practices*

Variable	Gender	n	M	SD	t(110)	p	Decision
Metacognitive skills	Male	50	2.38	.29	.853	.395	Ho1 retained
	Female	62	2.34	.28			
Reflective practices	Male	50	2.40	.33	-.197	.844	Ho2 retained
	Female	62	2.41	.28			

Male students obtained a slightly higher mean score for metacognitive skills than female students; however, the difference was not statistically significant, t(110) = .853, p = .395. Male and female students also obtained almost identical mean scores for reflective practices, and this difference was not statistically significant, t(110) = -.197, p = .844. Ho1 and Ho2 were therefore retained.

Figure 2

Gender-based differences in metacognitive skills and reflective practices among students with hearing impairment



Severity-Based Comparisons

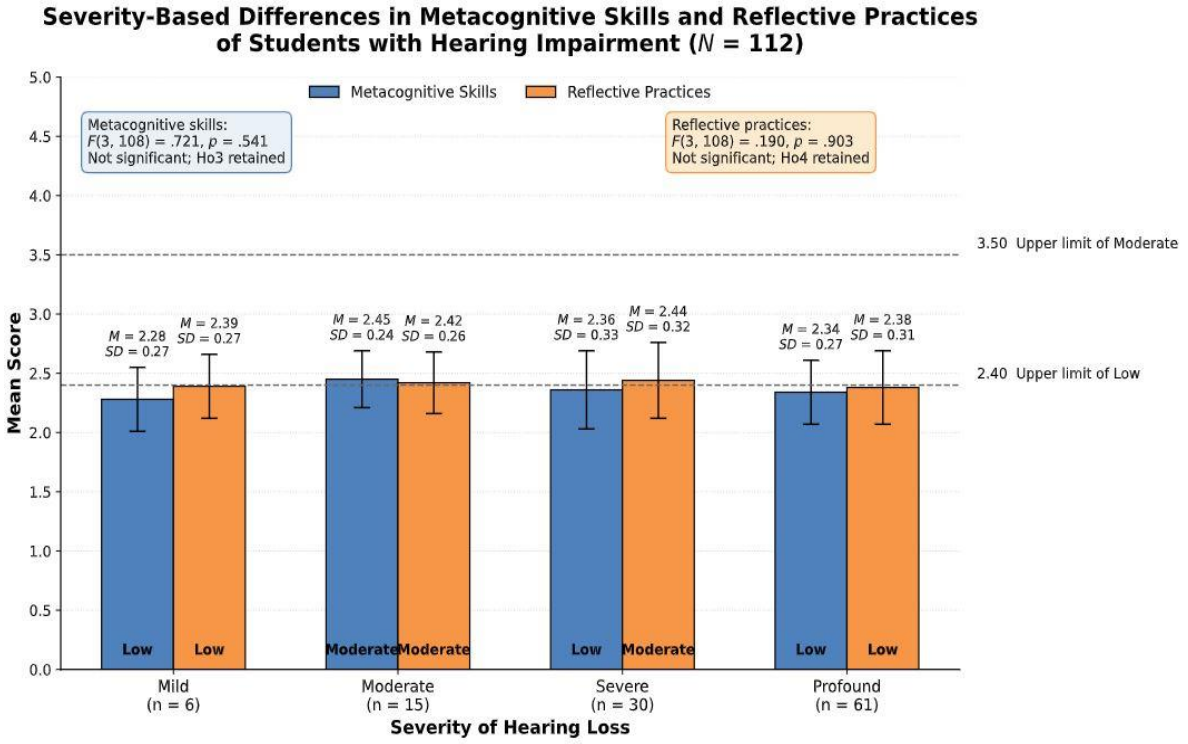
Table 5

Means, standard deviations, and ANOVA results by severity of hearing impairment

Outcome	Mild (n = 6)	Moderate (n = 15)	Severe (n = 30)	Profound (n = 61)	F (3, 108)	p
Metacognitive skills	2.28 (.27)	2.45 (.24)	2.36 (.33)	2.34 (.27)	.721	.541
Reflective practices	2.39 (.27)	2.42 (.26)	2.44 (.32)	2.38 (.31)	.190	.903

Metacognitive mean scores varied modestly across the severity groups, with the moderate group recording the highest mean and the mild group the lowest. However, the one-way analysis of variance showed that these differences were not statistically significant, F(3, 108) = .721, p = .541. Mean scores for reflective practices were also similar across the four groups, F(3, 108) = .190, p = .903. Ho3 and Ho4 were retained. The small descriptive variations should therefore not be interpreted as reliable differences between severity groups.

Figure 3



Discussion

The baseline assessment showed that the participating students had limited metacognitive skills. Planning, monitoring, evaluating, and the overall score all remained within the low range. This pattern suggests that students may not have had sufficient structured opportunities to make their thinking visible, check their understanding, or review whether a chosen strategy was working. Fogarty and Pete (2020) described planning, monitoring, and evaluating as interconnected domains of metacognitive regulation. The particularly low monitoring mean is important because monitoring enables learners to recognize confusion and decide whether an approach should be continued or changed. When monitoring is weak, a learner may persist with an ineffective strategy or assume that a task has been understood when important gaps remain. The findings therefore support explicit teacher modelling, guided questions, visual prompts, repeated practice, and the gradual transfer of responsibility to the learner (Quigley et al., 2018).

Reflective practices showed a more varied pattern. Reflection-in-action reached the moderate range, whereas reflection-on-action remained low. Students may find it easier to respond to an immediate cue during a task than to revisit a completed experience, explain why an outcome occurred, and connect that explanation with future planning. Schön's (1983) distinction is helpful in interpreting this result because reflection-on-action is a deliberate retrospective process that requires time, language, and a structured opportunity to analyze experience. Markkanen et al. (2020) similarly emphasized the value of guided frameworks and discussion in supporting reflection. In classrooms for students with hearing impairment, these opportunities should be communication-accessible and supported through sign language, written prompts, visual examples, and peer interaction.

The absence of statistically significant gender differences indicates that male and female students had broadly similar needs within this sample. This result does not mean that gender can

never be associated with metacognition or reflection; rather, gender did not account for meaningful variation under the conditions examined here. The same caution applies to severity of hearing impairment. Hearing loss severity alone did not differentiate students' scores. This finding is consistent with the view that educational outcomes among students with hearing impairment are influenced by a combination of language access, prior experience, communication conditions, and instructional support rather than by hearing level in isolation (Marschark & Knoors, 2012). The shared low baseline pattern therefore supports the provision of broad classroom assistance rather than support restricted to a particular gender or severity category.

Conclusion

The elementary students with hearing impairment who participated in the study demonstrated low metacognitive skills and reflective practices at baseline. No statistically significant differences were identified on the basis of gender or severity of hearing impairment. The findings indicate that the need for structured instructions, communication-accessible support was widely shared across the sample and was not confined to a single student group.

Educational Implications and Recommendations

- Teachers should explicitly model how to set learning goals, select strategies, check understanding, identify errors, and evaluate completed work.
- Visual prompts, sign-supported questioning, learning checklists, peer discussion, brief reflective writing, and post-task review should be incorporated into regular lessons.
- Metacognitive and reflective support should be provided across gender and severity groups because the baseline need was broadly shared by the participants.
- Teacher professional development should address both the meaning of metacognition and practical ways of making thinking and reflection accessible to students with hearing impairment.
- Future research should include broader geographical samples and examine factors such as communication mode, age of identification, language proficiency, and use of hearing technology, family support, and access to classroom communication.

Limitations

The study relied on self-report measures, which may have been influenced by students' interpretation of the items and response tendencies. The severity groups were unequal, particularly the mild group, which reduced the precision of group comparisons. In addition, the reliability coefficients were estimated from a small pilot sample of 10 students and should therefore be regarded as preliminary. The cross-sectional baseline design also describes students' existing levels but does not explain how those levels developed. These limitations should be considered when interpreting and generalizing the findings.

Delimitations

The study was delimited to Grade 8 students with hearing impairment enrolled in public-sector special education institutions in the four districts of Dera Ghazi Khan Division. It focused on metacognitive skills and reflective practices and examined comparisons based only on gender and severity of hearing impairment. Students from other grade levels, private institutions, and other regions of Punjab were not included.

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