



Syntax Ability of Hearing Impaired Children at Special Schools in Vietnam

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ABSTRACT: This research aimed to investigate the Vietnamese syntax knowledge of 140 hearing impaired children (HIC) at six special primary schools in comparison with 403 hearing children (HC) at two regular primary schools in Vietnam. Tests were developed using syntax structures of the curriculum for the Vietnamese language subject of primary school. The characteristics of syntax comprehension, development of syntax knowledge and relationships between syntax and hearing levels, reading comprehension of HIC were analyzed and discussed.

KEY WORDS: Hearing impaired children, Syntax knowledge, Special school, Primary level.

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I. INTRODUCTION

Among the approximately 120,000 hearing impaired children currently living in Vietnam, around 40,000 HIC have access to education through inclusive schools and approximately 50 specialized schools nationwide [1]. Of these, an estimated 3,000 students are enrolled in specialized schools. As increasing attention is being paid to the quality of both inclusive and special education, the development of language competence among HIC has become a critical educational priority.

Language serves not only as a means of communication but also as the foundation for thinking, learning, independent living, and social inclusion. Within language competence, grammatical competence constitutes a core component that enables individuals to organize and express meaning accurately and effectively [2]. Grammar comprises the system of rules governing word formation and inflection, the combination of words into sentences, and the structural organization of paragraphs and texts. However, because of limitations in auditory perception, HIC often experience substantial difficulties in acquiring and using grammatical structures. Limited understanding of grammar frequently results in incomplete or inaccurate comprehension of written texts and the author's intended meaning [3].

At the primary school level, particularly during the final years, HIC are expected to achieve specific language proficiency standards, including the ability to use grammar appropriately for academic learning and everyday communication. For students attending specialized schools, assessing grammatical competence not only helps determine their level of language development but also provides an empirical basis for designing effective intervention programs and appropriate instructional approaches.

Although several studies have examined the language development of Vietnamese hearing impaired children [4], [5], [6], [7], [8], research focusing specifically on the grammatical competence of HIC in the final years of primary education at specialized schools remains limited, particularly within the Vietnamese educational context. In response to this research gap, the present study aims to investigate and analyze the grammatical competence of HIC in the final years of primary education attending specialized schools, and to propose recommendations for improving the effectiveness of language instruction for this population.

II. METHODOLOGY

The primary participants in this study consisted of 33 fifth-grade hearing impaired children enrolled in six specialized schools and 128 fifth-grade hearing children from two mainstream primary schools serving as the comparison group. To examine the developmental trajectory of grammatical competence, the study also included 52 fourth-grade hearing impaired children, 55 third-grade hearing impaired children, 135 fourth-grade hearing children, and 140 third-grade hearing children.

The grammar test was developed based on the core grammatical structures specified in the Vietnamese Language curriculum for primary education. The test consisted of two sections. The first section assessed grammatical structures introduced in Grade 5, while the second section assessed grammatical structures taught in the lower grades. All test items were presented in a four-option multiple-choice format, with one correct answer for each question. The test was designed to minimize the influence of vocabulary difficulty on the performance of hearing impaired children, and its reliability was evaluated using Cronbach's alpha.

Before the test, students received standardized instructions on how to complete the assessment and then completed it independently in their classrooms. The testing time was 40 minutes.

Test performance was calculated as a percentage score by dividing the number of correct responses by the total number of test items and multiplying the result by 100. Statistical analyses included the Mann-Whitney U test, interquartile range (IQR), analysis of variance (ANOVA), and Pearson's correlation coefficient. These analyses were used to examine differences in grammar scores, the development of grammatical competence, and the relationships between grammatical competence and hearing ability, reading comprehension, and comparisons between hearing impaired children and hearing children.

III. RESULTS

3.1. Syntax test results

Table 1. Syntax test scores

Grade 5	HIC	HC
Mean percentage score	34.4	77.4**
SD	25.2	18.0
Percentage score range	2.6 – 82.1	10.5 – 100

(** $p < .01$)

The syntax test results revealed that the scores of HIC were much lower than HC. Specifically, the mean percentage score of HIC was approximately 34.4, whereas the mean percentage score of HC was 77.7 on average. The Mann-Whitney's U tests showed significant differences between the scores of HIC and HC: $U = 356.0$, $Z = 7.4$, $P = .00$.

Table 2. Comparing the syntax scores of HIC and HC using the Interquartile Range

		% (Number)	% (Number)	% (Number)	% (Number)	Total
Grade 5	HC	25% (32)	25% (32)	25% (32)	25% (32)	100% (128)
	HIC	82% (27)	15% (5)	3% (1)		100% (33)

The Interquartile Range was used to closely examine the differences of syntax score between HIC and HC. Firstly, the scores of HC in the 5th grade were arranged in ascending order and divided into four equal parts (25%) by the median, the lower quartile and the upper quartile. Accordingly, the first 25% of HC was the group had lowest scores, next were the second and the third 25% of HC, the fourth 25% of HC was the group which had highest scores. After that, the number of HIC who had equivalent scores in each quarter of HC by grades was figured out.

The results revealed that 82% of HIC had scores equivalent to the lowest-score group of HC. 15% of HIC had scores equivalent to the second group of HC. 3% of HIC had scores equivalent to the third group of HC. No HIC had scores equivalent to the fourth group of HC.

Table 3. Scores on syntax structures of grade 5

Syntax structures	Mean percentage score	
	HIC	HC
Compound sentence having two independent clauses	18.2	70.3**

connected by a punctuation mark		
Compound sentence having two independent clauses connected by a conjunction	15.2	60.9**
Independent clauses of a compound sentence	27.3	77.3**
Independent clauses connected by a conjunction “Because”	9.1	51.6**
Independent clauses connected by a set of conjunction “Although... but...”	9.1	53.9**
Full stop	39.4	69.5**
Question mark	42.4	69.5**
Exclamation mark	39.4	77.3**
Comma	54.5	81.3**
Colon	42.4	77.3**
Hyphen	69.7	84.4
Quotation mark	75.8	85.2

(** $p < .01$)

In grade 5, the Mann-Whitney U test showed that the HIC scored significantly lower than HC on most of the syntax structures except “Hyphen” and “Quotation mark”. In other word, the only syntax structures that HIC used well like HC were “Hyphen” and “Quotation mark”. HIC had high scores on: “Quotation mark”, “Hyphen”, “Comma” than other syntax structures. HIC had low scores on: “Independent clauses connected by a conjunction [Because]”, “Independent clauses connected by a set of conjunction [Although... but...]”...

The results also revealed a distinctive characteristic of HIC: they generally demonstrated better comprehension and use of certain punctuation marks than of other grammatical structures. HC also tended to achieve higher and lower scores on grammatical structures similar to those observed among HIC. However, the advantage in understanding punctuation marks over other grammatical structures was not as pronounced among HIC.

3.2. Development of syntax knowledge

To examine the development of syntax knowledge, the tests of higher grades were designed to include some syntactic structures of lower grades. Because the grade 2 and grade 3 have almost the same syntactic structures, we did not include grade 2 in the analysis of syntax development.

Table 4. Scores on syntactic structures of grade 3

Syntax structures of grade 3	Mean percentage scores of HIC			Mean percentage scores of HC		
	Grade 3	Grade 4	Grade 5	Grade 3	Grade 4	Grade 5
Recognizing a sentence	38.2	38.5	39.4	83.2**	60.0	87.5**
Someone is what	36.4	50.0	39.4	81.1	89.2	82.0
Someone does what	27.3	38.5	27.3	74.1	91.5**	79.7
Someone is how	16.4	30.8	33.3	79.0	91.5*	84.4
Who	40.0	44.2	33.3	72.7	76.9	81.3
When	25.5	34.6	42.4	73.4	78.5	78.1
Where	30.9	34.6	42.4	78.3	76.9	81.3
How	12.7	26.9	39.4*	51.7	58.5	62.5
Why	58.2	55.8	42.4	83.9	84.6	82.0
In order to do what	49.1	53.8	51.5	84.6**	90.0**	73.4
By what	56.4	59.6	48.5	89.5	95.4**	82.0
Full stop	40.0	61.5	39.4	76.9	81.5	69.5

Question mark	14.5	57.7**	42.4**	72.0	83.8*	69.5
Exclamation mark	38.2	44.2	39.4	70.6	73.8	77.3
Comma	61.8	63.5	54.5	82.5	90.0	81.3
Colon	45.5	55.8	42.4	78.3	68.5	77.3
<i>Average</i>	<i>36.9</i>	<i>46.2</i>	<i>41.1</i>	<i>77.0</i>	<i>80.7</i>	<i>78.1</i>

(** $p < .01$; * $p < .05$)

For HIC group, the one way ANOVA showed that there were significant differences of scores between grades on 2 out of 16 syntax structures. Specifically, for the question “How”, the mean percentage score of grade 5 ($M = 39.4$) was significantly higher than grade 3 ($M = 12.7$). For the “Question mark”, the mean percentage scores of grade 4 ($M = 57.7$) and grade 5 ($M = 42.4$) were significantly higher than grade 3 ($M = 14.5$). However, no significant differences between grades on the other syntax structures as well as on total scores were found.

For HC group, the one way ANOVA showed that there were significant differences of scores between grades on 6 out of 16 syntax structures: "Recognizing a sentence", "Someone does what", "Someone is how", "In order to do what", "By what", "Question mark". However, these differences were often in the opposite direction, with no grammatical structure for which HC in grade 5 actually achieved higher scores than HC in grade 3. At the same time, the overall mean score of HC in grade 4 and grade 5 was not higher than that of HC in grade 3.

Table 5. Scores on syntactic structures of grade 4

Syntax structures of grade 4	Mean percentage scores of HIC		Mean percentage scores of HC	
	Grade 4	Grade 5	Grade 4	Grade 5
Single sentence	7.7	18.2	51.2	52.2
Subject	32.7	36.4	70.8	77.3
Predicate	30.8	39.4	56.2	86.7**
Adverb	25.0	36.4	54.6	80.5**
Adverb of time	23.1	27.3	78.5	86.7
Adverb of purpose	13.5	36.4*	80.0	88.3
Declarative sentence	23.1	27.3	70.8	79.7
Interrogative sentence	40.4	45.5	90.8	86.7
Imperative sentence	7.7	12.1	53.9	84.4**
Exclamatory sentence	25.0	27.3	63.1	71.1
Quotation mark	53.8	75.8*	73.1	85.2*
Hyphen	55.8	69.7	71.5	84.4*
<i>Average</i>	<i>28.2</i>	<i>37.6*</i>	<i>67.9</i>	<i>80.3**</i>

(** $p < .01$; * $p < .05$)

For HIC group, the Mann-Whitney U test showed that the mean percentage score of all syntax structures of HIC in grade 5 ($M = 37.6$) was significantly higher than HIC in grade 4 ($M = 28.2$), $U = 636.0$, $Z = 2.1$, $P = .04$. Analysis on separate structures showed that the score on “Adverb of purpose” of HIC in grade 5 ($M = 36.4$) was significantly higher than HIC in grade 4 ($M = 13.5$), $U = 661.5$, $Z = 2.4$, $P = .01$. The score on “Quotation mark” of HIC in grade 5 ($M = 75.8$) was significantly higher than HIC in grade 4 ($M = 53.8$), $U =$

670.0, $Z = 2.0$, $P = .04$. The scores of other syntax structures of HIC in grade 5 were also higher than HIC in grade 4, however they were not statistically different.

For HC group, the Mann-Whitney U test showed that the mean percentage score of all syntax structures of HC in grade 5 ($M = 80.3$) was significantly higher than HC in grade 4 ($M = 67.9$), $U = 5497.5$, $Z = 4.8$, $P = .00$. Analysis on separate structures showed that HC in grade 5 scored significantly higher than HC in grade 4 on five grammatical structures: "Predicate" ($U = 5777.0$, $Z = 5.4$, $P = .00$), "Adverb" ($U = 6169.0$, $Z = 4.4$, $P = .00$), "Imperative sentence" ($U = 5204.0$, $Z = 6.3$, $P = .00$), "Quotation mark" ($U = 7315.0$, $Z = 2.4$, $P = .02$), and "Hyphen" ($U = 7252.0$, $Z = 2.5$, $P = .01$).

3.3. Relationship between syntax knowledge and hearing levels, reading comprehension

The Pearson correlation coefficient was used to examine the relationship between syntax knowledge and hearing levels among HIC. However, the results showed no significant relationship between these two abilities in HIC. This means that having better listening ability does not necessarily imply that HIC have better grammatical ability than others in the same grade.

To investigate the relationship between syntax knowledge and reading comprehension, we used the results of previous study on reading comprehension of HIC in special schools. We found that the syntax scores and reading comprehension scores of HIC were moderately correlated in grade 3 ($r = .59$, $p < .01$), grade 5 ($r = .65$, $p < .01$), and strongly correlated in grade 4 ($r = .72$, $p < .01$). For HC, the two scores were weakly correlated in grade 4 ($r = .39$, $p < .01$), grade 5 ($r = .31$, $p < .01$), and moderately correlated in grade 3 ($r = .44$, $p < .01$).

These findings suggest that the syntax knowledge of HIC and HC was correlated with their reading comprehension. Especially for HIC, the correlation is strong enough for syntax knowledge to appear to be an important predictor of reading comprehension.

IV. CONCLUSIONS AND RECOMMENDATIONS

This study aimed to investigate the syntax comprehension of HIC in the final year of primary education at special schools in Vietnam. The results revealed that HIC in grade 5 not only had lower syntax knowledge than grade-matched HC, but also HC in the lower grades. Previous studies in the world also reported the similar low results or variance of syntactic structures of HIC. Quigley, Wilbur, Power, Montanelli, Steinkamp [9] assessed the comprehension of the major syntactic structures of English of 450 HIC between the ages of 10 and 18 years, and 20 HC at the ages of 8, 9, and 10 years who attended the third, fourth, and fifth grades. They found that the average 8 year-old hearing child scored higher on the various tasks than the average 18 year old hearing impaired child. They also investigated the extent to which the syntactic rules are established in the language of HIC. They found that there is a large gap of syntactic structures between HIC and HC with most of the structures were not well established even among the 18 year-old HIC, whereas virtually all of the structures had been mastered by the 10 year old HC. Also, there is a gap between the age when HIC comprehend various syntactic structures in single sentences and the typical age level when the same structures appear in the reading series. Herreweghe [10] investigated the syntactic competence of 146 deaf pupils at the ages of 9 to 17 years old, and 34 second grade hearing pupils with an average age of 8 years. Results showed that HIC scored significantly lower than HC for most of the syntax structures.

Second, this study revealed that there were some similar syntax structures that both HIC and HC comprehended or did not comprehend well. This means that except for the reduced scores, HIC have the characteristic of comprehending syntax structures in a pattern relatively similar to HC. This findings support the results of Quigley et al [9] on the difficulty of syntactic structures that the order of difficulty of the various syntactic structures was similar, but not identical, for both deaf and hearing children. Concerning the syntax of HIC, Berent [11] reported that the clauses and sentences in deaf children tend to be strung together with "and" or "then", and complex embedded structures are usually missing or malformed in their language production and also are poorly comprehended. Thus the spoken, signed, or written narratives of HIC can often be characterized as a list of sentences each describing an event, but with little cohesion or coherence because the characters and events are not linguistically linked together by referential, causal, and temporal cohesion markers.

Third, the current study's results revealed another characteristic of HIC that they generally understand some punctuation marks better than other syntax structures. The structures having high scores in HIC mainly are on punctuation marks. HC however do not show clearly the trend of understanding punctuation marks better than other syntax structures. Possible explanations for HIC's better comprehension of punctuation marks than other syntax structures are that many of the punctuation marks have particular characteristics, and if the children notice these characteristics, they can make the correct choice even if they do not fully understand the meaning of the sentence. For example, in this test, the "Colon" is used to introduce direct speech and is usually preceded by words such as "said" or "asked." Similarly, a "Hyphen" is typically preceded by the words "said" or "asked" and

a colon, while the sentence following the hyphen is usually placed on the next line. However, for other syntax structures, children have to understand the meaning of the sentences in order to answer correctly.

Fourth, we examined the syntax development by testing children of higher grades with the syntactic structures of lower grades. Results revealed that for the syntactic structures of grade 3, both HIC and HC did not show development on the total scores. For the syntactic structures of grade 4, HIC showed development for the total scores and for two syntax structures; HC showed development for the total scores and for six syntax structures. This can be explained in terms of the difficulty level of the syntax test. The syntax structures of grade 3 were supposed to be quite easy, so both HC and HIC in grade 3 achieved quite high scores (77.0 and 36.9 respectively). Therefore, although the scores of HC and HIC in grades 4, 5 were higher, the difference was not significant enough to show a development. However, the syntax structures of grade 4 were supposed to be somewhat difficult, both HC and HIC in grade 4 achieved not very high scores (67.9 and 28.2 respectively). This time, the scores of HC and HIC in grade 5 were higher enough to show a development (80.3 and 37.6 respectively). The findings of the present study differ to some extent from those of Quigley, Smith, and Wilbur [12] and Quigley et al. [13], both of which reported developmental progress among HIC between the ages of 10 and 19 years on tests of comprehension of various syntactic structures presented singly in sentences. This discrepancy may be explained by several factors, most notably differences in the age range of the participants included in the respective studies.

The fifth finding of this study indicated that there was no significant association between grammatical ability and hearing ability among HIC. This finding may be explained by the fact that most of the participants had severe to profound hearing loss. Moreover, none of the HIC had used hearing aids consistently for many years. This reflects the situation of many HIC attending specialized schools in Vietnam. These children often either do not have hearing aids or discontinue using them after a period of time because they are unable to receive adequate support for their effective use [1]. In addition, early intervention and early educational services for HIC remain limited in Vietnam, particularly for children from low-income families living in rural areas.

The final finding of this study indicates that grammatical ability and reading comprehension are more closely related among HIC than among HC. In other words, grammatical ability is a particularly important indicator for predicting the reading comprehension ability of HIC. If HIC have strong grammatical ability, they also tend to demonstrate good reading comprehension, and vice versa. This finding appears to contrast with the pattern observed among HC, for whom vocabulary knowledge is often an important factor in predicting reading comprehension [6]. This result is consistent with the findings of Jones and Quigley [14] and Wilbur and Quigley [15], which indicate a close relationship between grammatical knowledge and reading comprehension among HIC and suggest that underdeveloped grammatical knowledge is a major cause of poor reading comprehension in this population.

A closer analysis of the relationship between grammatical ability and reading comprehension among hearing impaired children suggests that these students often have difficulty understanding the grammatical conventions that govern the use of words and sentences in written texts. Consequently, HIC often struggle to combine individual words into higher-level grammatical structures. The combination of words also forms meaningful phrases, which are easier to retain and process in memory. Without this skill, HIC often experience considerable difficulty retaining information in short-term memory [16].

The nature of these grammatical deficits among HIC has not yet been fully explained. One existing hypothesis suggests that the poor grammatical ability of HIC stems from their reliance on a limited and rigid set of grammatical rules for interpreting the meaning of texts. As a result, inaccurate and incomplete comprehension of texts is almost inevitable [17]. A second hypothesis proposes that poor grammatical ability among HIC may result from deficits in encoding strategies [18]. These authors argue that, unlike hearing children, who rely on phonological coding to process written texts, HIC tend to use an encoding strategy that is more heavily dependent on the visual characteristics of written words. This visual encoding strategy may be less effective than phonological encoding in retaining the order of words and phrases in memory—an aspect that conveys important grammatical information.

In summary, this study assessed the current state of hearing impaired children's ability to understand several key grammatical structures in written language at the end of primary school in specialized schools in Vietnam. Based on the findings of this study, further research is needed to develop more in-depth, technically oriented interventions for improving the grammatical abilities of HIC, particularly with regard to the grammatical structures that pose the greatest difficulties for them. Teachers in specialized schools should also adopt a more accurate and positive view of the grammatical abilities of HIC and pay greater attention to teaching and practicing grammatical structures, rather than focusing solely on vocabulary development or reading comprehension skills in general. Teachers should also be provided with greater opportunities to participate in specialized training courses and professional development activities focusing on grammar, reading comprehension, and other language-related issues among HIC, so that they can acquire a stronger understanding of appropriate knowledge and instructional methods. Teacher-training institutions responsible for preparing

teachers of HIC should likewise update their curricula by incorporating more in-depth courses on key areas of deaf education, particularly the development of grammatical ability, vocabulary, reading comprehension, and other essential language skills.

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