RESEARCH ARTICLE

Planning and validating a writing skill curriculum for hearing-impaired students in primary school system of Iran

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Abstract

Background and Aim: Academic achievement, especially in hard-of-hearing students, is hinged on their writing skills, and writing skill deficiency can adversely affect their cross-disciplinary skills. The purpose of this study was to explore and delineate the writing skill curriculum for hearing-impaired students in primary school system of Iran and to develop an exploratory model.

Methods: In the exploratory research, based on grounded theory, semi-structured interviews were conducted with 39 active members in the field of hearing loss with experience of working in special schools. The themes and sub-themes of the writing skill curriculum and the associations between them were explored within three steps of open, axial, and selective coding. In order to generalize the results of the qualitative phase and validate the resulting model, a questionnaire was designed and completed by 231 teachers of hearing-impaired students in special schools.

Results: The analysis process in the qualitative phase included eight themes of attention to achieving an optimal situation, content determination, teacher's actions, individual differences, organizational factors, time of teaching, place, and positive consequences. In the quantitative phase, the hypotheses derived from the qualitative analysis were confirmed.

Conclusion: For hearing-impaired students who lack sufficient language skill, the mainstay of writing skill curriculum should be considering all aspects and factors affecting the improvement of this skill.

Keywords: Validation; curriculum; writing skill; primary school; sample designing; hearing-impaired

Introduction

Hearing loss affects academic skills of students, and it has a major negative impact on cross-disciplinary skills such as reading and writing, which are closely related to language skills [1]. Since one of the modes of communication, especially in today's world, is the use of written language, evaluation of the use of syntactic indexes in written language among hearing-impaired individuals with great linguistics deficiency is considered significant [2]. Low writing skill in hearing-impaired individuals is notable even in adulthood, such that writing complexity in these people is weaker in comparison with their peers with normal hearing, and more than half of the hearing-impaired students educated from Deaf/Hearing-impaired Education colleges point out to their grammatical ability as their

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main weakness in writing [3].

Crosson and Ceers concluded that there is a direct relationship between the ability of writing a sentence and sentence comprehension [4]. Moores and Miller stated that the writings of hearing-impaired students contain short sentences with very simple forms of verbs and few subordinate clauses, which are disconnected and there is no coherence between them [5].

Hearing-impaired students have problems using pronouns, conjunctions, passive structures, and conditional verbs such as could, should, or may [6]. These students should be trained to be able to write coherently, and although their syntactic language improves over time, they will rarely achieve the level of their hearing peers [7].

Numerous studies have been performed in the fields of phonology, vocalization, syntax, establishment of language communication, semantics, pragmatics, and written language in hearing-impaired children, all of which proposed that language development is slower and weaker in hard-of-hearing students as compared to their normal hearing peers [8].

Given the ostensible weakness of hearing-impaired students in writing as mentioned by former studies, improving this skill is of great importance. Thus, this study was conducted to address the following questions:

1. What are the features of an appropriate writing skill curriculum according to point of views of exceptional children psychologists, teachers, educational supervisors, and rehabilitation personnel (speech therapists and audiologists)?

2. How the sample is validated from the point of view of hearing-impaired teachers of primary special schools?

Methods

In this mixed-methods study, in order to explore the structure of writing skill curriculum, the qualitative method was firstly employed; in the next step, to confirm the structure in a larger sample size and to improve generalizability of the derived model, the quantitative stage was performed using teachers' opinions.

The qualitative data was gathered through personal interview with experienced experts in the field of hearing loss including exceptional children psychologists (6 persons), teachers (13 persons), educational supervisors (10 persons), and rehabilitation personnel (speech therapist [5 persons] and audiologist [5 persons]). After analyzing the data, the conceptual model and themes were extracted. Based on the data obtained from the qualitative phase, a questionnaire was prepared. The reliability and validity of the questionnaire were confirmed, and in the quantitative phase, it was given to teachers for validation and evaluation of the model.

A semi-structured interview was carried out in order for the experts to state what they believe and have experienced about the issues without any orientation and attitude. In addition, in order to make the interviewees mentally prepared and regulate the interview process, the framework of the subject to be interviewed was already designed and provided to interviewees.

For the purpose of the interview, it was tried to choose knowledgeable and experienced interviewees to help the researcher to form his/her theoretical model; in this phase, data collection was continued until classification of data and information reached saturation and the theory is precisely and completely explained [9]. Since the purpose of this study was to explore the dimensions of writing skill curriculum for hearing-impaired students, the researcher tried to choose experts in the research subject so that they could effectively and reliably cooperate with this project. In this regard, purposive and snowball sampling methods were used to gain a deep understanding of the subject to develop a theory.

To evaluate the subject from different aspects, the participants of the interview were classified into four groups of teachers, educational supervisors, exceptional children psychologists, and rehabilitation personnel. In so doing, first experts in the field of the study subject in these four groups were chosen. The guide and framework of the subject were sent to them prior to the interview to let them have the opportunity to deliberate on the subject and the method of the interview.

The researcher provided further details about the

subject, goal, and method of the study at the beginning of the interview. The interviewees were identified through snowball sampling; semi-structured interviews were carried out with prior coordination in order for the participants to be able to think about the effective dimensions and components of writing skill curriculum. All the interviews with the members of each group were conducted face-to-face, individually, and during working time of the participants in a quiet place, such as classes or offices, between 8 a.m. and 1 p.m. during five months. Maximum and minimum interview durations were 45 and 120 minutes, respectively.

After conducting the interviews, the researcher evaluated the recorded interviews and began to identify the themes and sub-themes. After interviewing the 11th teacher, 5th exceptional children psychologist, 8th educational supervisor, 4th speech therapist, and 4th audiologist, theoretical data saturation was achieved and the researcher did not encounter any new ideas, but to promote credibility of data saturation, the researcher interviewed two more teachers, an exceptional children psychologist, two educational supervisors, a speech therapist, and an audiologist. The recorded interviews with the exact same words, phrases, and sentences of the participants were transcribed as a valid basis for data analysis.

In order to ensure the validity of the mixed method and confirm the accuracy of our findings from the perspective of researchers, participants, or readers of the report, the following actions were conducted [10]:

• Revision by members: four participants (one person from each group) revised the final report of the first stage, the analysis process, and the obtained themes.

• Evaluation by colleagues: three PhD candidates of Curriculum Studies with working experience in special schools evaluated the axial coding and their suggestions were used to develop the model.

• Cooperation of the participants: concurrently, the participants contributed with data interprettation and analysis.

In the quantitative phase, a questionnaire was prepared, items of which were directly derived from the transcribed interviews to have consistency between the items and the results of the qualitative phase. To reduce the risk of bias by the researcher and for the participants' better understanding, the items were extracted by the participants.

The content validity (credit) of the questionnaire was confirmed by the supervisor and advisor professors, two hearing-impaired teachers with PhD and MA degrees in the field of Curriculum Studies, two hearing-impaired literature teachers with PhD degree, three teachers with MSc in Exceptional Children Psychology, and two MA audiologists and speech therapists working in special schools. The final questionnaire was developed after collecting the ideas of the above-mentioned individuals and applying the suggested revisions. The questionnaire consisted of 82 items rated using a 6-point Likert scale as: 1) I strongly disagree, 2) I disagree, 3) I somewhat disagree, 4) I somewhat agree, 5) I agree, and 6) I strongly agree.

In order to establish the reliability of the questionnaire and the internal consistency of the items, Cronbach's alpha coefficient was used. The designed questionnaire was distributed among a group of 30, who were excluded from the sample but were included in the statistical population; Cronbach's alpha coefficient was calculated to be 0.72, indicating reliability of the questionnaire and internal consistency of its items [11].

Statistical population of this study in the quantitative stage included teachers of hearing-impaired students in special schools of Iran; due to limited financial resources and research possibilities the samples were only selected from the nearby cities. In total, 263 questionnaires were distributed among special schools of cities including Shahriyar, Qods, Robat Karim, Rey, Baharestan, Varamin, Pakdasht, Malard, from Tehran Province. Karaj from Alborz Province. Parsian from Bushehr Province .Qaemshahr from Mazandaran Province. Iran. Some of those who participated in the interview completed the questionnaire. After several follow-ups, 231 questionnaires (87% completion rate) were

collected and analyzed.

In the qualitative phase, data were analyzed through open, selective, and axial coding according to instructions offered by Strauss and Corbin [12]. Data gathered in the quantitative stage were analyzed by using descriptive and multivariate correlation methods. Correlation analysis was performed in four steps of confirmatory factor analysis of the first order, confirmatory factor analysis of the second order, structural equation modeling, and further [13]. Data analysis was conducted using SPSS 20 and Lisrel version 8.5.

Lisrel software is applied for testing and structural equations and uses correlation and covariance among the measured variables to estimate or infer the load factor values, variances, and the latent variable errors. The software can be used for exploratory factor, second order factor, confirmatory factor, and path analysis [13].

Results

Qualitative analysis is the result of 39 interviews with special school employees, including teachers, exceptional children psychologists as advisors, audiologists, speech therapists, and educational supervisors.

Among 13 teachers (11 females and 2 males), there were four teachers (3 females and 1 male) with less than 20 years and nine teachers (8 females and 1 male) with more than 20 years of professional experience; also one female teacher had PhD, two female teachers had BSc, and the rest of them had MSc degrees.

From the six exceptional children psychologists (4 females and 2 males), there were three females with less than 20 years and three (1 and 2 males) experts with more than 20 years of professional experience, and except for a female PhD student, the rest of the experts had MSc degree.

There were five audiologists (3 females and 2 males) who had less than 20 years of professional experience, one of whom (1 male) had MSc and the others had BSc degree.

Among the five speech therapists (3 females and 2 males), there was one male with MSc degree with more than 20 years, and the others had BSc

degree and less than 20 years of professional experience.

From 10 educational supervisors (9 females and 1 male), seven supervisors (6 females and 1 male) had more than 20 years and two females had less than 20 years of professional experience; two females were educational sciences PhD students, one female had BSc degree, and the others had MSc.

Analysis of the results of the qualitative step indicated 8 themes and 18 sub-themes. Writing skill curriculum is formed by achieving optimal situation (major and minor goals), content determination (principles of content selection and organization), teacher's actions (teaching method, evaluation, and teacher-student interaction including individual and cooperative), time of teaching (direct teaching during Persian lesson and indirect teaching during other lessons), place (appropriate environment as a resource of learning, appropriate environment as the performance place), organizational factors (supportive atmosphere and educational facilities of the school), individual differences between hearing-impaired students (rehabilitation and psychological differences), and positive consequences.

Achieving optimal situation is effective in determining the content of the program. The total time of teaching and the place provide a special foundation for determining the content of the program. The content is learnt based on teacher's strategies and methods, meanwhile teacher's actions are affected by differences between hearing-impaired students and organizational factors and the teacher adjusts her/his action to these factors. Teacher's actions can have positive consequences such as of language skills, academic achievement in all curricular areas, and advancement in social relationships. Conceptual model of the relations between writing skill curriculum components and its consequences for hearing-impaired students in primary schools is exhibited in Fig. 1.

Quantitative analysis was performed on 231 questionnaires all of which were fully completed. The questionnaire consisted of eight (82), including consideration of achieving optimal situation (17), content determination (12),
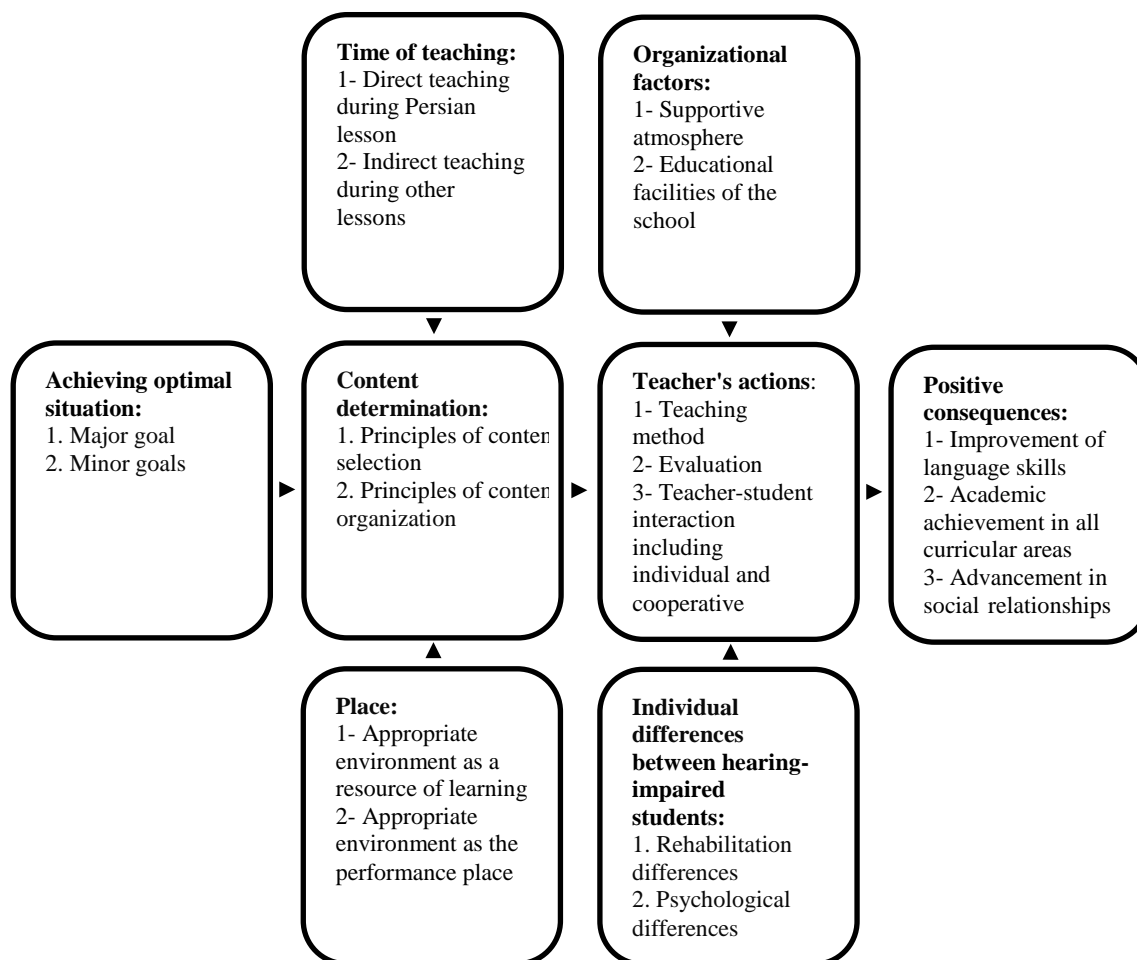
| Time of teaching:
1- Direct teaching during Persian lesson
2- Indirect teaching during other lessons | Organizational factors:
1- Supportive atmosphere
2- Educational facilities of the school |

| Achieving optimal situation:
1. Major goal
2. Minor goals | Content determination:
1. Principles of content selection
2. Principles of content organization | Teacher's actions:
1- Teaching method
2- Evaluation
3- Teacher-student interaction including individual and cooperative | Positive consequences:
1- Improvement of language skills
2- Academic achievement in all curricular areas
3- Advancement in social relationships |

| Place:
1- Appropriate environment as a resource of learning
2- Appropriate environment as the performance place | Individual differences between hearing-impaired students:
1. Rehabilitation differences
2. Psychological differences |

Fig. 1. Conceptual model of writing skill curriculum for hearing impaired students in primary schools.

teacher's actions (28), individual differences (7), organizational factors (5), place (3), time of teaching (4), and positive consequences (6).

The frequency distribution of the participants in terms of gender, professional experience, and educational degrees revealed that 66.7% of the participants were females, 19.5% of them had less than 11 years, 39.8% between 11 and 21 years, and 40.7% between 21 and 30 years of professional experience, also 22.5% of the participants had associate degree, 67.5% BSc, 8.7% MSc, and 1.3% PhD.

Results of the quantitative phase of structural equation modeling, using Lisrel software shows the confirmed the structures and good fit of the data with the conceptual model (Table1).

The hypothesis derived from the conceptual model in the qualitative analysis was tested by the structural equation modeling. The results confirmed the effect of achieving optimal situation and teaching time on content determination, the impact of content on teacher's actions, the influence of place on content determination, and the role of individual differences and organizational factors in teacher's actions (Table 2).

Discussion

Hearing-impaired students encounter several problems in producing written language [16]. Writing and reading are the basis of students' academic achievement and are the main tools of human communication. Learning these skills, especially in primary levels, should be considered more than before [17]. When deep and long-term learning of writing skill occurs in hearing-impaired students, they will be able to

Table 1. Fitting indices of the structural equation modeling of conceptual model

Fit index			Measure
Absolute fit indices	**Chi - square (x^2)**	p<0.05	187.01
	Relative x^2 (x^2/df)	between 2,3 (acceptable) and less (is better)	2.07
	Root mean square error of approximation (RMSEA)	≤0.05(complete) ≤0.08(acceptable) ≤ 0.10(weak)	0.07
	Goodness of fit index	≥0.95 Nearly to 0.95 is acceptable	0.92
Incremental fit indices	**Normed – fit index (NFI)**	≥0.95 Nearly to 0.95 is acceptable	0.93
	Comparative fit index (CFI)	≥0.95 Nearly to 0.95 is acceptable	0.94

df; degree of freedom, Criteria for x^2, GFI, NFI, and CFI are adopted from Schumacker and Lomax [13], for relative x^2 from Kline [14], and for RMSEA from Brown [15]

convey their written message to the audience. According to the qualitative results, in hearing-impaired students, acquiring this skill depends upon range of vocabularies and familiarity with syntax.

Sarchet et al. evaluated 15 vocabulary resources of high school students to investigate the relationship between reading and writing skills and academic improvement. Their results showed that vocabulary knowledge of the students depends directly on oral language ability and writing and reading skills and that improvement of vocabulary resources can promote oral communication, as well as writing and reading skills, and in turn, lead to academic improvement in hearing-impaired students. Accordingly, thereis a positive and mutual relationship between vocabulary knowledge and the mentioned skills [18].

Hearing-impaired writers in comparison with receptive ones use less noun phrases and omit conjunctions from their writings. This feature causes the writings of these students to be in cohesive and disconnected [19]. In this study, the interviewees indicated that the content used for learning writing skill should not only be useful and diverse, but also it must be suitable for students' level of understanding, daily needs, and interests; furthermore, the content of lessons

in each level should be related and consistent. McNaughton also indicated that writing skill of hearing-impaired students should have real audiences to encourage them in writing activities [20].

Hearing-impaired students learn better through visual method and providing mediated learning conditions using models, graphics, and computers; use of this strategy should be considered in curriculum framework [21]. According to the qualitative analysis, content determination is performed for a specific time and place; accordingly, considering an appropriate academic environment as the place of performance and learning resource and the compatibility of the content and time of teaching are important. Learning the writing skill happens directly during Persian lesson and indirectly in other lessons, which differentiates the content feature. In content development, appropriate and good atmosphere for learning should be considered and places related to students' real-life experiences should be selected as it can improve visual aid.

Teachers who encourage their hearing-impaired students to participate in conversations, in fact make them think more, which turns these students into more skilled writers [22]. The derived conceptual model shows that content

Table 2. Coefficients and meaningfulness of issues effects on each other based on hypothesis derived from the model

Predictor variable	Criteria variable	Standardized β	t-value	p
Achieving optimal situation	Content determination	0.54	6.35	<0.001
Content determination	Teacher's actions	0.85	3.17	0.019
Place	Content determination	0.48	3.53	0.008
Time of teaching	Content determination	0.35	3.89	<0.001
Teacher's actions	Positive consequences	0.57	3.63	<0.001
Individual differences between hearing-impaired students	Teacher's actions	0.47	4.41	<0.001
Organizational factors	Teacher's actions	0.95	2.71	0.038

learning depends on teacher's actions, teaching and evaluation methods, and individual and group interactions of the teacher with students. Selection of teaching method is one of the main and effective factors in the curriculum of hearing-impaired students. It should be considered that we not only cannot offer the same teaching method for all students, but also each student should be evaluated separately based on his/her abilities and needs. As the teacher analyzes students interactively, more development opportunity will be provided for them because the conversation that hearing-impaired students' teachers use as the teaching method causes the learning subject to be broadly evaluated.

Teachers who use discursive strategies encourage students to promote their cognitive and linguistic efforts. Teachers respond indirectly to comments and questions of students and meaningful questions are asked to help stimulate intellectual growth of students. The age at which hearing loss occurs is of great significance to experts since hearing disabilities in the first years of life in which language communication and speech has not been learnt poses the greatest problem.

Linguistic and conceptual development in hearing-impaired children will be hampered due to the lack of hearing skills and this damage becomes more evident when diagnosis, use of hearing aids, and access to rehabilitation services are considerably delayed [23].

Students with the equal hearing loss do not have the same language skills, particularly in writing. Collecting information regarding student's history of using hearing aids and rehabilitation services by the teacher is very important, and teacher's actions to teach the contents should be based on these differences. In addition to rehabilitation differences, psychological differences of hearing-impaired students in terms of motivation, confidence, curiosity, and interest in individual and group works should be considered by the teacher, and to consider these differences, some methods should be taken. Also, if the school principal can provide desirable conditions to promote motivation in teachers and establish interaction and cooperation between physiotherapy and executive staff and the teacher, create a friendly atmosphere in the educational environment, and provide the teacher with enough training facilities, teacher's actions in teaching writing skill to students will be performed in a more desirable manner.

Analysis indicates that writing skill curriculum for hearing-impaired students is hinged on other language skills and that promoting this skill leads to improvement of communicational and educational skills of hearing-impaired students; our findings are in line with those of previous studies [1,7].

Conclusion

In the process of language development, writing is the last acquired skill through which ideas and experiences resulting from listening, speaking, and reading are integrated. In writing, only words and sentences are used to express ideas, and for hard-of-hearing students lacking enough linguistic knowledge, writing skill curriculum should be designed in such a way that all the aspects and effective factors associated with this skill are considered.

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