

## A Comparative Analysis of Mathematics Curriculum for Students with and Without Hearing Impairment

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### ABSTRACT

*The substantive purpose of this paper was to analyze Mathematics curriculum for students with hearing impairment from grade 6 to 10 and to compare it with National Curriculum of Mathematics in order to find out similarities and differences between the two. Document analysis method was used for the study. In order to compare both of the curricula, National Curriculum of Mathematics was obtained from the official web site of Ministry of Education, Government of Pakistan and Curriculum for students with hearing impairment was obtained from Directorate of Special Education, Government of the Punjab, Pakistan. The results of analysis showed that no standards, benchmarks, students learning outcomes and their relevant topics were included in the curriculum of students with hearing impairment. Very limited portion of the contents of national curriculum was adopted in the curriculum of students with hearing impairment. As a consequence the students with hearing impairment had been deprived of a great deal of knowledge regarding Mathematics which would hinder their inclusion in hearing community. So it is recommended that all contents from the National Curriculum should be included in the curriculum of students with hearing impairment with necessary adaptations in its implementation.*

**Keywords:** Students with hearing impairment, National Curriculum, Curriculum for students with hearing impairment

### INTRODUCTION

Curriculum occupies the position of backbone in every system of education. As, the whole world is changing rapidly, it is the dire need of hour to update and restructure curriculum on regular basis to keep pace with the ever changing national and international scenario. Curriculum analysis and change has been a burning issue in Pakistan during the last few decades. As far as the curriculum of Mathematics is concerned it should enable the students to think rationally and critically about multifaceted issues, to solve different kind of problems and to communicate their thoughts effectively. Through study of Mathematics Students get knowledge, skills and attitudes essential to be successful in such kind of a society.

Students with hearing impairment lag behind their normal counterparts in communication, socialization and academics due to their hearing disability. Results of the research studies (Frostad, 1998; Magne, 1991; Moores, 2000) show that students with hearing impairment performed lower on exams in Mathematics than their hearing counterparts. Contrary to this, no research evidence is available reflecting that students with hearing impairment lack in cognitive potential as compared to that of other students without hearing impairment (Martin, 1991). Based on this substantiation, it was a matter of great concern to review the mathematics curriculum being taught to them to look into the reasons of their under achievement in mathematics. It was also imperative to analyze the adapted curriculum being implemented in schools of children with hearing impairment and to find alternative ways of teaching Mathematics to them.

Curriculum for hearing impaired children was revised in 2006 under the Chief Minister's (Punjab) programme for Educational reforms. In 2006, it was felt by governmental authorities that curriculum being implemented in Government Deaf & Defective Hearing Schools was not meeting the requirements of children with hearing impairment. Moreover, National curriculum had got revised in 2006, so it was crucial to revise the curriculum of students with hearing impairment. After seeking the guidance and instruction from Minister for special Education, and Director of Special Education, Directorate of Special Education formulated a committee comprising highly qualified and experienced teachers working in the field of hearing impairment to revise curriculum in the light of National curriculum 2006. The curriculum prepared by this committee was revised by another committee consisting of eminent and highly qualified teachers (Directorate of Special Education, 2007). The revised curriculum of Mathematics for hearing impaired children from Grade 1 to 10 was analyzed in accordance with the parameters set by National curriculum.

In the National curriculum for Mathematics introduction, importance of Mathematics, a comprehensive introduction to the curriculum of Mathematics encompassing objectives of teaching Mathematics, teachers role in teaching Mathematics, specific strategies of assessment and evaluation which lead to the improvement of student learning and an effective learning outcomes oriented quality assurance system, that is based on constant monitoring and effective feedback loops, has been given. Moreover textbook, teaching and learning resources including teacher's manual, workbook and electronic resources and guidelines to develop these resources are elaborated. All these things seem to be lacking in Mathematics curriculum for students with hearing impairment.

### **OBJECTIVES OF THE STUDY**

The study was conducted to achieve the following objectives:

1. To analyze adapted/ modified curriculum of Mathematics for students with hearing impairment from Grade 6 to 10.
2. To compare adapted/ modified curriculum of Mathematics for students with hearing impairment from Grade 6 to 10 with National Curriculum of Mathematics (2006) from Grade 6 to 10.

### **QUESTIONS OF THE STUDY**

The study was conducted to answer the following questions:

1. What content does the adapted/ modified curriculum of Mathematics for students with hearing impairment from Grade 6 to 10 possess?
2. What are the similarities and differences between adapted/ modified curriculum of Mathematics for students with hearing impairment from Grade 6 to 10 and National Curriculum of Mathematics from Grade 6 to 10?

### **RESEARCH METHODOLOGY**

In order to compare both of the curricula, National Curriculum of Mathematics was obtained from the official web site of Ministry of Education, Government of Pakistan and Curriculum for students with hearing impairment was obtained from Directorate of Special Education, Government of the Punjab, Pakistan. Both of the curricula were studied intensively. Chapters on similar and different topics were identified. Similarities and differences were compiled in a structured format. The details are given below:

### **Analysis and Comparison of Mathematics Curriculum (Hearing Impairment) Grade VI with National Curriculum for Mathematics**

1. Unit No. (1) includes “*Sets*” in National Curriculum for Mathematics which are not included in the Mathematics Curriculum of grade 6 for hearing impaired students. The whole unit has been skipped by the curriculum developers.
2. Unit No. (2) comprises “*Whole Numbers*”. Only exercise N0. (3.2) with Q. N0.(i),(ii),(iii), (iv),and( v) have been included in curriculum of hearing impaired students. One exercise is not sufficient for hearing impaired 6<sup>th</sup> graders.
3. Unit No. (3) is on “*Factors and Multiples*” which has been totally overlooked in Mathematics curriculum for hearing impaired students.
4. Unit No. (4) on “*Integers*” has not been included in curriculum of hearing impaired students. Curriculum developers overlooked the importance of Integers for 6<sup>th</sup> class Mathematics curriculum for hearing impaired students.
5. Unit No. (5) on “*Simplification*” has not been included in curriculum of hearing impaired students.
6. In Unit No. (6) “*Ratio and Proportion*”, Exercise No. ( 2.2) with Q. No. 1, part (i),(ii),(iii),(iv),(v) and Exercise No. (2.3) with Q. No. (1), (3), (5) has been included but other important topics have been skipped.
7. In Unit No.( 7) “*Financial Arithmetic*” Curriculum developers have included only one topic on “Percentage” in curriculum of hearing impaired students, whereas topics of “Profit”, “Loss” and “Discount” have been missed.
8. In Unit No. (8) “*Introduction to Algebra*”, Algebra has been included but Algebraic Expression has been skipped in curriculum of hearing impaired students.
9. In Unit No. (9), from “*Algebraic Equations*” Exercise No. (6.2), (6.3), (6.4), (6.5), (6.7) with some questions have been included, but linear equations have been skipped.
10. In Unit No. (10), from “*Geometry*”, topic on Linear Segments with some range of exercises have been incorporated, but topics of “Construction of Angles” and “Construction of Triangles” have not been included in mathematics curriculum of 6<sup>th</sup> graders with hearing impairment.
11. Unit No. (11), from “*Parameter and Area*”, Exercise No. 7.9, 7.11, 7.13 and 7.14 with some questions have been included.
12. Unit No. (12) has been included with some exercises.
13. In Unit No. (13) “*Three Dimensional Solids*” has been included with topic of “Type of Data”, whereas Bar graph and Pie graph have been omitted.

Chapters on “*Average*” and “*Fractions*” are included in curriculum for hearing impaired children but not in National curriculum. Moreover, in the curriculum for children with hearing impairment, only Exercise N0s., part N0s. and headings of units have been given, but there is no description about the sub headings. It seems that curriculum committee members did consult a specific book of Mathematics and they just wrote down names of units, topics of units and page Nos. of that very book.

### **Grade VII**

1. In Unit No. (1) only one topic “*Sets*” with one exercise has been included in the Mathematics curriculum for 7<sup>th</sup> grade students with hearing impairment. Other topics have not been included.

2. In Unit No.( 2), only one topic “*Rational Numbers*” with one exercise has been incorporated whereas other topics have been skipped.
3. In Unit No. (3) “*Decimals*” one topic “*Conversion of Decimals to Rational Numbers*” with one exercise has been included whereas topics “*Terminating and Non-terminating Decimals*” and “*Approximate Value*” have not been included.
4. In Unit No. (4) “*Exponents*” some topics of “*Exponents/Indices*” and “*Laws of exponents/ Indices*” have been included with little consideration.
5. In Unit No. (5) “*Square Root of Positive numbers*”, including Perfect Squares with few questions has been included but topic of Square Root is missing.
6. Unit No. (6) “*Direct and inverse Variation*” has not been included in the curriculum of students with hearing impairment.
7. Unit No. (7) “*Financial Arithmetic*” has not been included in the Mathematics curriculum for students with hearing impairment for class 7<sup>th</sup>.
8. From Unit No. (8) “*Algebraic expressions*” two exercises with some questions have been included and other topics have been skipped.
9. Unit No. (9) “*Linear Equation*” has not been included.
10. In Unit No. (10) “*Fundamentals of Geometry*”, the topic “*Properties of Angles*” consisting only two exercises with a few questions has been included. On the other hand, Congruent and Similar Figures, Congruent Triangles and Circle have been skipped.
11. Unit No. (11) “*Practical Geometry*” has not been included in class 7th Mathematics curriculum for students with hearing impairment.
12. Unit No. (12) “*Circumference, Area and Volume*” has been totally skipped from class 7th Mathematics curriculum for students with hearing impairment.
13. Unit No. (13) “*Information Handling*” has not been included.

### **Grade VIII**

1. Unit No. (1) “*Operations on Sets*” has been included with one exercise in class 8th Mathematics curriculum for students with hearing impairment. All of other topics have been skipped.
2. Unit No. (2) “*Real numbers*” has been included with little consideration. The topic of “*Cubes and Cube Roots*” consisting Exercise No. 5.1, 5.2 and 5.5 with a few questions has been included. The topic of “*Square Roots of Natural Numbers through Division*” has been included, but details are missing.
3. Unit No. (3) “*Number Systems*” has been totally skipped in class 8th Mathematics curriculum for students with hearing impairment.
4. Unit No. (4) “*Financial Arithmetic*” has been included with few topics. The topics of “*Compound Proportion*”, “*Percentage*” and “*Income Tax*” have been included with few exercises and questions. The topics of “*Banking*”, “*Conversion of Currencies*”, “*Profit/Mark up*”, “*Insurance*” have been skipped.
5. From Unit No. (5) “*Polynomials*” only one topic “*Algebraic Expressions*” with Exercise No. 7.1 and 7.4 with a few questions has been included. The other topics have been skipped.
6. Unit No. (6) “*Factorization, Simultaneous Equations*” has been totally skipped.

7. Unit No. (7) “*Fundamentals of geometry*” has not been included.
8. Unit No. (8) “*Practical Geometry*” has not been included in class 8<sup>th</sup> Mathematics curriculum for students with hearing impairment.
9. Unit No. (9) “*Areas and Volumes*” is also missing.
10. Unit No. (10) “*Demonstrative Geometry*” has been skipped by curriculum developers.
11. Unit No. (11) “*Introduction to Trigonometry*” has not been included.
12. Unit No. (12) “*Information Handling*” has been completely skipped.

As far as curriculum for Grade 9 and 10 is concerned, it is noteworthy that the deaf students are being taught content which was selected from the curriculum developed twenty five years back. This curriculum and text books which were developed on the basis of the said curriculum have got obsolete long ago. The teachers teaching Mathematics to Grade 9 and 10 have expressed their reservations in interview which was conducted to elicit their responses on the implemented curriculum for children with hearing impairment.

## CONCLUSION

It is evident from the details that four out of thirteen chapters from grade 6 curriculum, six out of thirteen from grade 7, and seven out of twelve units from grade 8 curriculum were completely skipped. The units which were included in the curriculum of deaf students did not possess major portions of exercises. It reflects that deaf students were deprived of understanding a number of mathematical concepts. It will finally affect their performance in daily social life where they have to face the hearing community.

Moreover, In the National curriculum for Mathematics introduction, importance of Mathematics, a comprehensive introduction to the curriculum of Mathematics encompassing objectives of teaching Mathematics, teachers role in teaching Mathematics, specific strategies of assessment and evaluation which lead to the improvement of student learning and an effective learning outcomes oriented quality assurance system, that is based on constant monitoring and effective feedback loops, has been given. Moreover textbook, teaching and learning resources including teacher’s manual, workbook and electronic resources and guidelines to develop these resources are elaborated. All these things seem to be lacking in Mathematics curriculum for students with hearing impairment.

## RECOMMENDATIONS

The following recommendations are given on the basis of the study:

1. The modified curriculum for deaf students should be revised and proper adaptations should be made.
2. A comprehensive introduction to the curriculum of mathematics, its importance for the deaf students, special education teachers’ role in teaching mathematics to deaf students, methods of monitoring and assessment of students’ performance should be mentioned in the curriculum for the deaf.
3. Textbook, teaching and learning resources including teacher’s manual, workbook and electronic resources and guidelines to develop these resources should be mentioned.
4. Curriculum standards, bench marks, teaching learning strategies, methodologies and activities should be described.

5. Instead of skipping major portions from the National Curriculum, proper methods of teaching difficult concepts to deaf students should be incorporated for the guidance of teachers.
6. Teachers having expertise in mathematics should be imparted training in teaching mathematics to deaf children.

## **REFERENCES**

- [1] Frostad, P. (1996). Mathematical achievement of hearing impaired students in Norway. *European Journal of Special Needs Education*, 11(1), 66-80.
- [2] Government of the Punjab. *Curriculum for the hearing impaired children (2006)*. Directorate of Special Education. Ministry of Special Education.
- [3] Magne, O. (1991). *Dysmathematics. Facts and theories concerning mathematics learning for handicapped pupils*. (Educational and Psychological Interactions, 106). Malmo School of Education.
- [4] Martin, D. S. (1991). Introduction. In Martin, D.S. (Ed.). *Advances in Cognition, Education and Deafness*. Washington D.C.: Gallaudet University Press.
- [5] Moores, D.F. (2000). *Educating the Deaf. Psychology, principles and practices*. Boston: Houghton Mifflin.