



Education for Visually Impaired Students in Bangladesh

Dr. Abdur Rahman

Lecturer

Teachers Training College for Special Education,
National Center for Special Education, Department of Social Services,
Ministry of Social Welfare, Mirpur-14, Dhaka-1206, Bangladesh

Abstract

The rate of education is increasing in Bangladesh. The people of Bangladesh are very much aware about the education of their children except some exceptional cases in the very poor people and very remote hilly areas in Bangladesh. The government is doing a lot of works for education of all the groups of people in Bangladesh. Government of Bangladesh is doing a lot of works for education of visually impaired students. Many schools have been built for the visually impaired students and the accommodations management has been done for the visually impaired students. Many visually impaired students have become educated and contributing in different field. A visually impaired child is defined, in terms of visual acuity, field of vision, and visual efficiency. "Visual Ability" of the eye to see distant objects clearly is assessed using the Snellen's chart, developed by Herbert Snellen, a Dutch doctor. The chart starts with a big 'E' which a normal eye can see at a distance of 200 ft. When vision of a person is so handicapped or impaired that to see the 'E' clearly he has to come within 20ft. of it or nearer, he is then considered legally blind. His vision is assessed as 20/200 in the better eye. It simply means a legally blind person sees something at 20 ft. distance which can be seen by a normal at 200 ft. easily. Special education a residential educational set up where visually impaired students admitted exclusively in order to cater their special needs accordingly to special curriculum by special teacher. Special education is an environment where particular types of disabled children are enrolled in educational setups. The total structure of such education along with teaching curriculum, methods, teaching and learning materials etc. are focused on addressing the needs and requirements of those particular types of disabled learners. In most cases, the special educations are being run with residential setups with total care of learners by the trained professionals. However the present study has conducted to compare education for the visually impaired students on special and integrated school of thought in Bangladesh, to assimilate the home area education for the visually impaired integrated and special school of thought in Bangladesh, to explore the comparison the school area education for the visually impaired students on special and integrated school of thought in Bangladesh and to compare the personal area education for the visually impaired students on special and integrated school of thought in Bangladesh. The study was conducted at Special school and integrated school area of Dhaka, Narsingdi, Gazipur, Chittagong, Bandarban, Rajshahi, Barisal and Khulna district in Bangladesh. Total 140 respondents from the stakeholders in selected areas. The respondents were 5 Head master, 5 Resource Teacher, 5 House Parent cum Teacher, 5 Assistant Teacher, 30 Special School Students, 30 Integrated School Students and 60 Guardians. Data were collected from primary and secondary sources. Primary data were collected from the respondents of the study area directly using different data collection techniques. Secondary Data were collected from books, journal articles, research reports, magazines and websites etc. Primary data were collected by face to face interview with the respondents. Secondary data were collected from reviewing of secondary sources. Questionnaire was used for data collection. Collected data were analyzed by using computer program Microsoft Excel. From the result it was found that Students in integrated school were found to be better adjusted as compared to that of special school. Students in integrated school were found to be better adjusted in home area compared to those of special school. Students in integrated school were found to be better adjusted in school area compared to those of special school. Students in integrated school were found to be better adjusted in personal area compared to those of special school. Background in Bangladesh of special education school and integrated education school advantage, disadvantage and according of research information individuating integrated education program system is advantageous. In the other words integrated education is better education system for the visually impaired students. Government should provide more facilities for the visually impaired students.

Key words: Education, Special Education, Visually impaired student, Special and Integrated School of Thought, Braille, Dot position, Braille cell, Abacus.

1. Background

Social welfare program start is too in this country from 1955 A.D visually impaired education start is in Bangladesh from 1957A.D.Helen Keller came to Dhaka one stage of Asia confers in 1955 A.D. Then comradery of East Pakistan beeping ovation. Her cognition depth beholds membership of Rotary Club swoon. Among them be born a new mind. Each and every visually impaired child of Bangladesh become one-one person Helen Keller, just this goal at attempt Rotary Club be inspired of Dhaka at Tajgaon industrial city by found a school named Rotary Visually Impaired School happy Introduce of Visually Impaired education in 1957. Named Islami Visually Impaired another nongovernment Visually Impaired School be founded in Dhaka in 1958 A.D. officially founded Visually Impaired School at Chittagong, Rajshahi, Khulna district city at 1962 A.D. Visually Impaired School be founded at Barishal district city in 1964 A.D. In 1964 A.D go up P.H.T center in Dhaka Asad gait, Rotary Visually Impaired School and Islamic Visually Impaired School by assumption directorates of social services be established Government Visually Impaired School. At present have been founded the five visually impaired school in Bangladesh. Where just would have been arrangement to methods of special education of study for visually impaired children. The Government visually impaired schools have been arrangement including residential amenities of study until class five. Special enterprise of related headmasters has been arrangement including residential amenities of study until SSC examination. In after time of freedom fighting, war-torn in country in mother belly children in respect of think and in various place of Bangladesh specify in Ralway Station, Bus Station, Lons Ghat, Ferry Ghat pathetic situation disabilities, officially be start integrated education program for the visually impaired children to the 47 subdivision and 17 district at town in 1974 A.D. In which next to be include the 47 district in town. Integrated education program for the visually impaired can't bring to taxiway any result until 1978A.D. When be abortive bring to taxiway result in integrated education program for the visually impaired then Mr. Munsur Ahammed Chowdury's special effort named A B C (Assistance for Blind Children) Non-Government Institute in 1979 A.D. due to constructs six hostel in integrated education program introduce one new of horizon of improvement. Hereupon prove that don't succeed improbable without hostel at poor countries in the integrated education program. Department of social services build the five hostels at integrated education program for the visually impaired In 1982 A.D. This program became succeed to start eleven hostels. Which this program may be told partial integrated program. Main objective was disable children will study to local school from respective environment. But socio-economic situation of Bangladesh, communication system, uneducated family and poor parents in favor not possible teach-in visually impaired children at normal school. Because of that family can't send on capable power of vision completed children to school. That family in favor of a visually impaired children send on to school have been need of another co-operator or sighted guide, in which not possible in favor of poor parents. Therefore is too admission at hostel devoid integrated education program to effort of related officer (Resource Teacher), next time for communication become deprive to education.

In 1978 A.D by vocational training of disabilities self- dependent for pre cultivate be start vocational training and rehabilitation center (ERCPH) at Tongi in Gazipur. Whither there is Braille Press for visually impaired educational equipment Braille Book Printing. In 1987 be founded National Center for Special Education (NCSE). Whither there is give every kind of disabilities education-training there is running Bachelor of Special Education (B. S. Ed) and Masters of Special Education (M. S. Ed) course for creating expert teacher. In 1995A.D be turn on remaining the17 district anew including hostel integrated education program for the visually impaired to taxiway come start advantage. That's all at integrated education program wasn't hostel, same all at the 37 program turn on officially hostel at the time to 2013 A.D until 2016 A.D. At present the 64 district have been hostel at integrated education program. The visually impaired children of these districts don't go to divisional cities. They desire can accept integrated education stay at own district hostel. Then many students from special education program until class five after accept education be admission in class six at integrated program caused by reading until SSC examination, then department of social services by courtesy somebody stay at integrated program until HSC examination and its accept higher education in university get instruction of direction.

2. Introduction

A visually impaired child is defined, in terms of visual acuity, field of vision, and visual efficiency. "Visual Ability" of the eye to see distant objects clearly is assessed using the Snellen's chart, developed by Herbart Snellen, a Dutch doctor. The chart starts with a big 'E' which a normal eye can see at a distance of 200 ft. When vision of a person is so handicapped or impaired that to see the 'E' clearly he has to come within 20ft. of it or nearer, he is then considered legally blind. His vision is assessed as 20/200 in the better eye. It simply means a legally blind person sees something at 20 ft. distance which can be seen by a normal at 200 ft. easily. Special education a residential educational set up where visually impaired students admitted exclusively in order to cater their special needs accordingly to special curriculum by special teacher. Integrated education a residential or non-residential educational set up where visually impaired students admitted with non-disabled counterparts with little or no modification in the existing curriculum for non-disabled students taught by general teacher while the resource teacher provides them curriculum.

3. Objective of the Study

The objectives of the study are as follow:

1. To compare education for the visually impaired students on special and integrated school of Thought in Bangladesh.
2. To assimilate the home area education for the visually impaired integrated and special school of thought in Bangladesh.
3. To explore the comparison the school area education for the visually impaired students on special and integrated school of thought in Bangladesh.
4. To compare the personal area education for the visually impaired students on special and integrated school of thought in Bangladesh.

4. Hypotheses

The following null hypotheses were tested during the proposed study.

1. There is no significant difference in adjustment of visually impaired students in integrated and special school of thought in Bangladesh.

2. There is no significant difference in home area adjustment of visually impaired students in integrated and special school of thought in Bangladesh.
3. There is no significant difference in school area adjustment of visually impaired students in integrated and special school of thought in Bangladesh.
4. There is no significant difference in personal area adjustment of visually impaired students in integrated and special school of thought in Bangladesh.

5. Research Questions

To achieve the stated objective, the following research questions were addressed:

1. What is the status of special education of primary and high school students with visual impairment in Bangladesh?
2. What is the status of integrated education of primary and high school students with visual impairment in Bangladesh?
3. Do the visual impaired students get any support from the special school and integrated school in Bangladesh?
4. What are the information needs of the visually impaired students on special and integrated school in Bangladesh?
5. Which type of special and integrated learning skills do they demand to access information in Bangladesh?
6. What strategies are required to improve information access by visually impaired students at Special school and integrated school in Bangladesh?

6. Methodology of the Study

6.1. Study Area: The study was conducted at Special school and integrated school area of Dhaka, Narsingdi, Gazipur, Chittagong, Bandarban, Rajshahi, Barisal and Khulna district in Bangladesh. In Bangladesh, there are eight district and six divisions. The selected study areas weighted for selection due to researcher working place in Dhaka and pre working place in Gazipur, Chittagong, Bandarban, Barisal district as well as by birth in Narsingdi. So it was easily access in the field, participate, observation and its interviews from the sample. However, in the field of Special school and integrated school, the study has tried to understand in depth of the problem Education for Visually Impaired Students and compare between Special school and integrated school as well.

6.2. Sample Size: 140 people from the stakeholders in selected areas. Break-up of sampling technique and sampling distribution have given in table 6.2(1) and table 6.2(2) The study area and sample of different stakeholders are proportionately distributed accept students, teachers and guardians.

[Table 6.2(1) and 6.2(2)]

Table 6.2(1): Selection of the areas

District	Number of Special and Integrated Schools		Total Schools
	Special School	Integrated School	
Special School (Dhaka, Chittagong, Rajshahi, Barisal and Khulna). Integrated School (Dhaka, Narsingdi, Gazipur, Chittagong, Bandarban.	5	5	10

Table 6.2(2): Sample distribution

Head master	Resource Teacher	House Parent cum Teacher	Assistant Teacher	Special School Students	Integrated School Students	Guardians	Total
5	5	5	5	30	30	60	140

6.3 Sources of Data: Data were collected from primary and secondary sources.

6.3.1. Sources of Primary Data: Primary data were collected from the respondents of the study area directly using different data collection techniques.

6.3.2. Sources of Secondary Data: Secondary Data were collected from books, journal articles, research reports, magazines and websites etc.

6.4 Method of Data Collection: Primary data were collected by face to face interview with the respondents. Secondary data were collected from reviewing of secondary sources.

6.5 Tools for Data Collection: Questionnaire was used for data collection.

7. Concept of Special Education

Special education a residential educational set up where visually impaired students admitted exclusively in order to cater their special needs accordingly to special curriculum by special teacher. Special Education Special education is an environment where particular types of disabled children are enrolled in educational setups. The total structure of such education along with teaching curriculum, methods, teaching and learning materials etc. are focused on addressing the needs and requirements of those particular types of disabled learners. In most cases, the special educations are being run with residential setups with total care of learners by the trained professionals.

8. Concept of Integrated Education

Integrated education a residential or non-residential educational set up where visually impaired students admitted with non-disabled counterparts with little or no modification in the existing curriculum for non-disabled students taught by general teacher while the resource teacher provides them curriculum. This approach refers to a system where opportunities are created for special care of disabled learners in a mainstream school. There are resource teachers who provide special care services for the disabled learners separately and facilitate the same learners to participate in the mainstream school. The school offers residential facilities for disabled learners along with other educational support material and other technical assistance. This approach refers to a system where opportunities are created for special care of disabled learners in a mainstream school. There are resource teachers who provide special care services for the disabled learners separately and facilitate the same learners to participate in the mainstream school. The school offers residential facilities for disabled learners along with other educational support material and other technical assistance.

9. Concepts of Braille

Braille is a system of reading and writing using raised dots. Braille is read by touch. People with sight loss can read the same books as everyone else.

9.1. Dot position

The name ‘Braille’ has been derived from the inventor of this six dot system- Mr. Louis Braille. Braille is the tactile approach to reading and writing. The basic Braille symbol is called a Braille cell. It consists of six dots arranged in the formation of a rectangle three dots high and two dots wide. Each Braille character or “cell” is made up of 6 dot positions, arranged in a rectangle comprising 2 columns of 3 dots each. A dot may be raised at any of the 6 positions, or any combination. Counting the space, in which no dots are raised, there are 64 such combinations (that is, $2^6 = 64$).

The six dots are arranged like

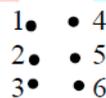


Figure -9.1: Braille Numbering

9.2. Braille cell

Braille is a system of reading and writing using raised dots. Braille is read by touch. People with sight loss can read the same books as everyone else. Braille is the system of embossed signs which are formed by using combination of six dots, arranging and numbered thus:

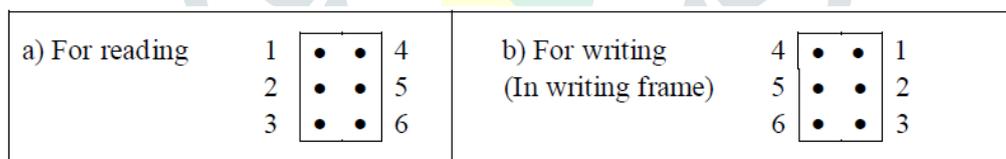


Figure -9.2: Braille Cell

9.3. Braille reading and writing system

9.3.1. Braille reading system: Left side to Right side.

1	1,2	1,4	1,4,5	1,5	1,2,4	1,2,4,5	1,2,5	2,4	2,4,5
a	b	c	d	e	f	g	h	i	j

Figure- 9.3.1: Braille reading system: Left side to Right side

9.3.2. Braille writing system: Right side to Left side.

2,4,5	2,4	1,2,5	1,2,4,5	1,2,5	1,5	1,4,5	1,4	1,2	1
j	i	h	g	f	e	d	c	b	a

Figure -9.3.2: Braille writing system: Right side to Left side

9.4 Easy Way of Braille Learning (First System)

Braille are formed by combination of six dots. These are decorating according by combination theory get sixty-four letters and symbols in six classes. Sixty-four letters or symbols have one hundred ninety-four dots.

9.4.1. 1st Class: Seven letters or symbols. One dot per room

1	2	3	4	5	6	6	6
a	,	Apostrophe	A. S	C.S	C.S	(E.W.C)	
		Mathematical Comma (M.C)			(O.L.C)/ M.S S		
অ	,		২বর্ণ যুক্ত	শব্দ প্রতীক	ঃ		

Figure -9.4.1: Seven letters or symbols. One dot per room

9.4.2. 2nd Class: Fifteen letters or symbols. Two dots per room.

1,2	1,3	1,4	1,5	1,6	2,3	2,4	2,5	2,6	3,4
b	k	c	e	ch	;bb	i	:	en	st /
ব	ক	চ	এ	ছ	;	ই	ঞ	য়	ঐ/

3,5	3,6	4,5	4,6	5,6
in	Hyphen (-)	C.S	Italic Sign (I.S)	Letter Sign (L.S)
ঈ	-	শব্দ প্রতীক	৩ বর্ণ যুক্ত	ং

Figure -9.4.2: Fifteen letters or symbols. Two dots per room.

9.4.3.3rd Class: Twenty letters or symbols. Three dots per room.

1,2,3	1,2,4	1,2,5	1,2,6	1,3,4	1,3,5	1,3,6	1,4,5	1,4,6	1,5,6
l	f	h	gh	m	o	u	d	sh	wh
ল	ফ	হ	ঘ	ম	ও	উ	দ	শ	জ

2,3,4	2,3,5	2,3,6	2,4,5	2,4,6	2,5,6	3,4,5	3,4,6	3,5,6	4,5,6
s	!	?"	j	ow	.	ar	ing	"	Contraction Sign (C.S)
স	!	?	জ	ঔ	।	আ	ং	"	শব্দ প্রতীক চিহ্ন

Figure -9.4.3: Twenty letters or symbols. Three dots per room

9.4.4. 4th Class: Fifteen letters or symbols. Four dots per room.

1,2,3,4	1,2,3,5	1,2,3,6	1,3,4,5	1,3,4,5	1,3,5,6	1,4,5,6	1,2,4,5	1,2,4,6	1,2,5,6
p	r	v	n	x	z	th	g	ed	ou
প	র	ভ	ন	খ	ঝ	থ	গ	ড	উ

2,4,5,6	2,3,4,5	2,3,4,6	2,3,5,6	3,4,5,6
w	t	The	()	Numeral Sign (N.S)
ঊ	ট	ধ	()	ণ

Figure -9.4.4: Fifteen letters or symbols. Four dots per room.

9.4.5. 5th Class: Six letters or symbols. Five dots per room.

1,2,3,4 ,5	1,2,3,4 ,6	1,2,3,5 6	1,2,4,5 ,6	1,3,4,5 6	2,3,4,5,6
q	and	of	er	y	with
ক্ষ	ষ	ঢ়	ড়	য	ট

Figure -9.4.5: Six letters or symbols. Five dots per room.

9.4.6. 6th Class: One letter or symbol. Six dots one room.

1,2,3,4,5,6
for
চ

Figure -9.4.6: One letter or symbol. Six dots one room.

In the above figures from figure 9.4.1 to figure 9.4.6 easy ways to learn Braille has shown. The above six figures describe seven letters or symbols by one dot per room, fifteen letters or symbols by two dots per room, twenty letters or symbols by three dots per room, fifteen letters or symbols by four dots per room, six letters or symbols by five dots per room and one letter or symbol by six dots one room respectively. This easy way of learning method is called first method. With the help of this method Bangla, English, Arabic etc. any language can be easily learnt by sixty four letters or symbols.

9.5 Easy Way Braille Learning (Second System)

Any language learns for education does classification seven line unto Braille.

9.5.1. 1stLine: Ten letters of the alphabet or cardinal numbers are formed by using the upper cell and middle cell not using the lower cell in the other words avoid lower dot 3, 6.

1	1,2	1,4	1,4,5	1,5	1,2,4	1,2,4,5	1,2,5	2,4	2,4,5
a	b	c	d	e	f	g	h	i	j
অ	ব	চ	দ	এ	ফ	গ	হ	ই	জ
1	2	3	4	5	6	7	8	9	0

Figure -9.5.1: Ten letters of the alphabet or cardinal numbers are formed by using the upper cell and middle cell not using the lower cell in the other words avoid lower dot 3, 6.

9.5.2. 2ndLine: Ten letters of the alphabet are formed by adding dot 3 to each of the first line.

1,3	1,2,3	1,3,4	1,3,4,5	1,3,5	1,2,3,4	1,2,3,4,5	1,2,3,5	2,3,4	2,3,4,5
k	l	m	n	o	p	q	r	s	t
ক	ল	ম	ন	ও	প	ক্ব	র	স	ত

Figure -9.5.2: Ten letters of the alphabet are formed by adding dot 3 to each of the first line

9.5.3. 3rdLine: Ten letters or symbols are formed by adding dot 3,6 to each of the first line.

1,3,6	1,2,3,6	1,3,4,6	1,3,4,5,6	1,3,5,6	1,2,3,4,6	1,2,3,4,5,6	1,2,3,5,6	2,3,4,6	2,3,4,5,6
u	v	x	y	z	and	for	of	the	with
উ	ভ	খ	য	ঝ	ষ	ঢ	ঢ়	ধ	ট

Figure -9.5.3: Ten letters or symbols are formed by adding dot 3,6 to each of the first line

9.5.4. 4thLine: Ten letters or symbols are formed by adding dot 6 to each of the first line.

1,6	1,2,6	1,4,6	1,4,5,6	1,5,6	1,2,4,6	1,2,4,5,6	1,2,5,6	2,4,6	2,4,5,6
ch	gh	sh	th	wh	ed	er	ou	ow	w
ছ	ঘ	শ	থ	ঝ	ড	ড়	উ	ঊ	ঋ

Figure -9.5.4. Ten letters or symbols are formed by adding dot 6 to each of the first line

9.5.5. 5thLine: Ten letters or symbols are formed by not using the upper cell dot 1,4of the first line but using the middle cell and lower cell.

2	2,3	2,5	2,5,6	2,6	2,3,5	2,3,5,6	2,3,6	3,5	3,5,6
, ea	; be	: con	. dis	en	!	()	? "	in	"
,	;	ঞ	।	য়	!	()	? "	ঈ	"

Figure -9.5.5. Ten letters or symbols are formed by not using the upper cell dot 1,4of the first line but using the middle cell and lower cell

9.5.6. 6thLine: Six letters or symbols are formed by not using dot 1,2 (formed by using other dots adding dot 3).

3,4	3,4,5	3,4,6	3,4,5,6	3	3,6
st /	ar	ing	ble	Apostrophe	Hyphen(-)
/	Poetry Sign (P.S)		Numeral Sign (N.S)	Mathematical Comma (M.C)	
ঐ/	আ	ঔ	ণ	,	-

Figure -9.5.6: Six letters or symbols are formed by not using dot 1,2 (formed by using other dots adding dot 3).

9.5.7. 7thLine: Eight letters or symbols are formed by not using dot 1,2,3.

4	4,5	4,6	4,5,6	5	5,6	6	6	6
Accent Sign (A.S)	C.S	Italic Sign (I.S)	C.S	C.S	Letter Sign (L.S)	C.S (O.L.C)/ M.S. S	(E.W.C)	
২ বর্ণ যুক্ত	শব্দ প্রতীক	৩ বর্ণ যুক্ত	শব্দ প্রতীক	শব্দ প্রতীক	ং	ঃ		

Figure -9.5.7. Eight letters or symbols are formed by not using dot 1, 2, 3

In the above figures from figure 9.5.1. to figure 9.5.7. easy waybraille learning system has shown. This learning system is called Second System.

9.6 Braille Alphabets (English)

9.6.1. [Braille codes for English Alphabets]

1	1,2	1,4	1,4,5	1,5	1,2,4	1,2,4,5	1,2,5	2,4	2,4,5
a	b	c	d	e	f	g	h	i	j

1,3	1,2,3	1,3,4	1,3,4,5	1,3,5	1,2,3,4	1,2,3,4,5	1,2,3,5	2,3,4	2,3,4,5
k	l	m	n	o	p	q	r	s	t

1,3,6	1,2,3,6	2,4,5,6	1,3,4,6	1,3,4,5,6	1,3,5,6
u	v	w	x	y	z

Figure -9.6.1: Braille codes for English Alphabets

9.6.2. Capital Letters in Braille

Braille does not have a separate alphabet of capital letters as there is in print. Capital letters are indicated by placing a dot in the 6th position of the Braille cell in front of the letter to be capitalized. Two capital signs mean the whole word is capitalized. Also a cell without any dots denotes the value for space.

6

Figure 9.6.2.1: One Letter Capitalized

6	6

Figure9.6.2.2:Entire Word Capitalized

9.6.2.3. For example: Raj MBA is represented by Braille in Figure 9.6.2.3

R	a	j	M B A

Figure 9.6.2.3: Example of Braille Capital Letter Representation

In the above example letter R is a Capital letter, so it starts with capital sign. Similarly two continuous capital signs denote before the value MBA, so it means that all letters are capital.

9.7. Braille Alphabets (Bangla)

[Braille Codes for Bangla Alphabets]

9.7.1. Bangla Vowels (Braille Codes for Bangla Vowels)

1	3,4,5	2,4	3,5	1,3,6	1,2,5,6	5	1,2,3,5	1,5	3,4	1,3,5	2,4,6
অ	আ	ই	ঈ	উ	ঊ	ঋ	ঌ	এ	ঐ	ও	ঔ
a	ar	i	in	u	ou	5	r	e	st	o	ow

Figure -9.7.1: Bangla Vowels (Braille Codes for Bangla Vowels)

In the figure above 9.7.1. describes Braille codes for Bangla Vowels.

9.7.2. Bangla Consonants (Braille codes for Bangla Consonants)

1,3	1,3,4,6	1,2,4,5	1,2,6	3,4,6	1,4	1,6	2,4,5	1,3,5,6	2,5
ক	খ	গ	ঘ	ঙ	চ	ছ	জ	ঝ	ঞ
k	x	g	gh	ing	c	ch	j	z	:

2,3,4,5,6	2,4,5,6	1,2,4,6	1,2,3,4,5,6	3,4,5,6	2,3,4,5	1,4,5,6	1,4,5	2,3,4,6	1,3,4,5
ট	ঠ	ড	ঢ	ণ	ত	থ	দ	ধ	ন
with	w	ed	for	N.S/ble	t	th	d	the	n

1,2,3,4	1,2,4	1,2	1,2,3,6	1,3,4	1,3,4,5,6	1,2,3,5	1,2,3	1,4,6	1,2,3,4,6
প	ফ	ব	ভ	ম	য	র	ল	শ	ষ
p	f	b	v	m	y	r	l	sh	and

2,3,4	1,2,5	1,2,4,5,6	1,2,3,5,6	2,6	5	2,3,4,5	5,6	6	3
স	হ	ড়	ঢ়	য়	ৎ	ৎ	ং	ঃ	ট
s	h	er	of	en	5	t	L.S	C.S	M.C

Figure -9.7.2: Bangla Consonants (Braille codes for Bangla Consonants)

In the above figure 9.7.2. describes Braille codes for Bangla Consonants.

1,2,3,4,5	1,5,6
ক	জ
q	wh

Figure -9.7.3: Colored

9.8.1. Used in forming Contractions

5	4,5	4,5,6	4,6	5,6	6
C.S	C.S	C.S	I.S	L.S/M. S	C.S/ M.S.S

Figure -9.8.1: Contractions Sign

9.8.2. Compound Sign

3,5	3,5	3,6	3,6	6	2,3,5, 6	2,3, 5,6	3	6	2,3, 6	3,5, 6	3
* Star		- Dash		[Square Brackets]			‘ Inner Inverted Commas ’				

Figure -9.8.2: Compound Sign

9.8.3. Special Symbols in Braille

The special symbols in Braille consist of various arrangements of raised dots within a six dots pattern as shown in figure 9.8.3.

2	2,3	2,3,5	2,3,5,6	2,3,6	2,5,6	3	3,4,5,6	3,5,6	3,6	6
Comm a	Semic olon	Excla matio n	Brack et	Openin g quotes	Full stop	Apostr ophe	Numer al Sign	Closing quotes	Hyphe n	Capit al sign

Figure 9.8.3: Special Symbols in Braille

9.8.4. Mathematical Sign

5,6	2,3,5	5,6	3,6	5,6	2,3,6	5,6	2,5,6	5,6	2,3,5,6
	+		-		×		÷		=

Figure -9.8.4: Mathematical Sign

9.9.1. Numbers in Braille

Numbers are made by placing the number sign # before the letters ‘a’ through ‘j’. For example the number sign placed before the Braille letter ‘a’ makes the number 1 and ‘b’ is 2. Similarly, ‘ab’ is 12, ‘aj’ is 10, ‘ajj’ is 100. The # sign value is indicated adot in the position 3, 4, 5 and 6 and it represented in Figure 9.9.1.

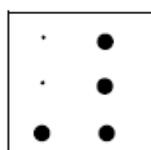


Figure 9.9.1: Braille Number

9.9.2. The Braille Numbers are represented

#	0		#	1		#	2		#	3
#	4		#	5		#	6		#	7
#	8		#	9		#	1	0		
#	1	1		#	1	5		#	2	5
#	3	5		#	4	5		#	9	5

Figure 9.9.2: Braille Numbers

9.9.3. The Number Sign and the Mathematical Comma

Larger numbers only need one number sign. The mathematical comma in braille is dot 3 and is used in numbers and with words, too.

#	3	1	1		#	9	9	7	7

Figure 9.9.3: The number sign and the mathematical comma

Note: A.S = Accent Sign, C.S = Contraction Sign, C.S = Capital Sign, C.S = Compound Sign, E.C.S = Entire Capital Sign, I.S = Italic Sign, L.S = Letter Sign, L.S = Line Sign, M.S = Mathematical Sign, M.S.S = Mathematical Separation Sign, M.C = Mathematical Comma, N.S = Numeral Sign, P.S = Poetry Sign, O.L.C = One Letter Capitalized, E.W.C = Entire Word Capitalized.

9.10. Concepts of Abacus

The visually impaired students usually use an instrument in mathematic which is called abacus. Abacus is made by plastic or wood exceptional rectangle frame, in the other words in the middle of narrow hard yarn or metallic needle compose stay some gutis like beads or small balls. There is a bar or barrio in the middle of the frame (Horizontally). There is a bead on the bar which is used as comma or decimal point. Generally an abacus contents 12 to 15 metallic needles. Upper side there is 4 beads or gutis and lower sides there is one bead or guti. 4 beads on the upper side of the bar each one's valuation is one. In the lower side of the bar one bead's valuation is five. Each and every needle composes by 5 beads cover with writing highest 9. In that case norms of the writing number in case of 0(empty) toward the bar will not stay any bead. A means Abundant, B means Beads, A means addition, C means Calculation, U means Utility, S means System.

An Abacus

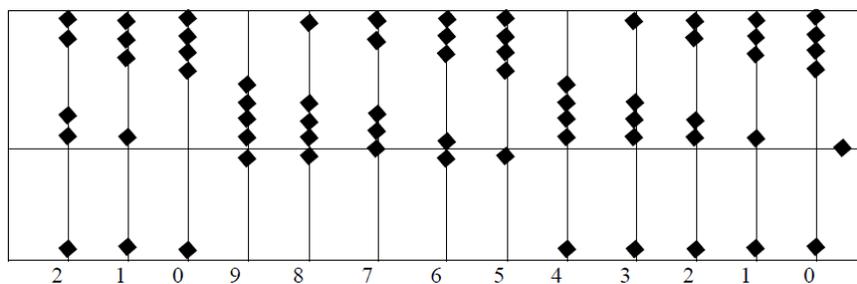


Figure 9.10: An Abacus method for learning mathematics for visual students

An Abacus: "An Abacus is a frame with beads or balls sliding on rods for teaching numbers to children (still in the east) or for calculating early form of digital computer" - oxford advanced dictionary, oxford University Press, 1974, 19th impression; 1984. [Sight savers & CDD].

Abacus Basics: This Abacus has thirteen vertical rods. On each rod are four moveable beads and a horizontal separation rod from the bottom five moveable beads (Single bead).

9.10.1. Setting and Clearing Numbers: Numbers are set when beads are recorded and cleared, when beads are removed or erased.

Zero Position: Clear the four beads and the fiver beads by moving them away from the bar.

- To set 1: Move the one bead on the unit rod toward the bar.
- To set 2: Move the two beads on the unit rod toward the bar.
- To set 3: Move the three beads on the unit rod toward the bar.
- To set 4: Move the four beads on the unit rod toward the bar.
- To set 5: Clear all four beads by moving them away from the bar and move the fiver beads on the unit rod toward the bar.
- To set 6: Move the one bead and the fiver beads on the unit rod toward the bar.
- To set 7: Move the two beads and the fiver beads on the unit rod toward the bar.
- To set 8: Move the three beads and the fiver beads on the unit rod toward the bar.
- To set 9: Move the four beads and the fiver beads on the unit rod toward the bar.
- To set 10: Clear all four beads and fiver beads by moving them away from the bar and move the one bead on the decade rod toward the bar.

[Teaching visually impaired.com updated June 9, 2019]

9.10.2 Rules for Addition and Subtraction in Abacus

If there is no bead at hard yarn or metal twine for calculation failing-

Room of decade use in the case of addition

- For 1 addition $-9, + 1$ decade
- For 2 addition $-8, + 1$ decade
- For 3 addition $-7, + 1$ decade
- For 4 addition $-6, + 1$ decade
- For 5 addition $-5, + 1$ decade
- For 6 addition $-4, + 1$ decade
- For 7 addition $-3, + 1$ decade
- For 8 addition $-2, + 1$ decade
- For 9 addition $-1, + 1$ decade

Use of 5 valuation beads in the case of addition:

If toward the bar doesn't have 5 valuation beads, there is a single valuation bead failing-

- For 1 addition $-4, + 5$ (Fiver beads)
- For 2 addition $-3, + 5$ (Fiver beads)
- For 3 addition $-2, + 5$ (Fiver beads)
- For 4 addition $-1, + 5$ (Fiver beads)

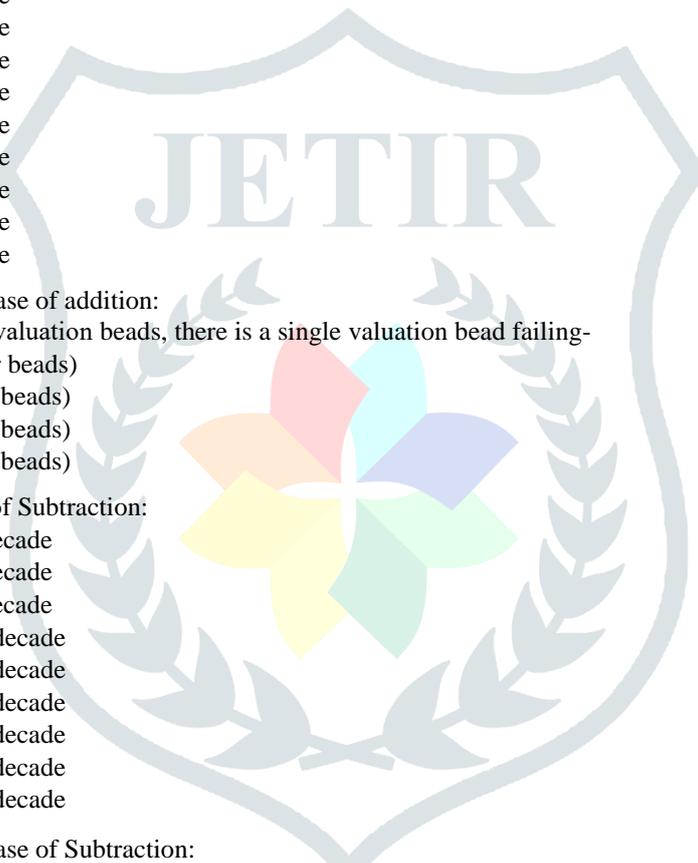
Room of decade use in the case of Subtraction:

- For 1 Subtraction $+ 9, - 1$ decade
- For 2 Subtraction $+ 8, - 1$ decade
- For 3 Subtraction $+ 7, - 1$ decade
- For 4 Subtraction $+ 6, - 1$ decade
- For 5 Subtraction $+ 5, - 1$ decade
- For 6 Subtraction $+ 4, - 1$ decade
- For 7 Subtraction $+ 3, - 1$ decade
- For 8 Subtraction $+ 2, - 1$ decade
- For 9 Subtraction $+ 1, - 1$ decade

Use of 5 valuation beads in the case of Subtraction:

If toward the bar have 5 valuation beads, there is not a single valuation bead failing-

- For 1 Subtraction $+ 4, - 5$ (Fiver beads)
- For 2 Subtraction $+ 3, - 5$ (Fiver beads)
- For 3 Subtraction $+ 2, - 5$ (Fiver beads)
- For 4 Subtraction $+ 1, - 5$ (Fiver beads)



9.10.3. Addition, Subtraction, Multiplication and Division by Abacus:**9.10.3.1 Addition:****Example (1): $670 + 319 = ?$**

We have to follow two steps in abacus in case of adding 319 with 670.

1st Step: (Setting numbers)

In that case on the last side of right of abacus first the number 670 and on the last side of left of abacus the number 319 in to be followed by the rule. 670 since there are three digits so first 0 in the other words set the position the number of single place then 7 in the other words set the position the number of decade place and last 6 in the other words set the position the number of hundred place. 319 since there are three digits so set the position the number first 3, second 1, and third 9 in the other words set the position the number of hundred, decade and single place.

2nd Step: (The process of addition)

<u>Draft</u>
$670 + 319 = ?$
$3+1+9$
<hr style="width: 50px; margin: 0 auto;"/>
670
989

After setting the number 670 and 319 in the room of a unit is to adding 9 with 0 in the other words ($0 + 9 = 9$). After adding in the room of a unit gets 9. Then in the room of decade is to adding 1 with 7 in the other words ($7 + 1 = 8$). After adding in the room of decade gets 8.

Lastly in the room of hundred is to add 3 with 6. After adding in the room of hundred get 9.

Thus adding the number 319 with the number 670 was added to 989.

So the determining addition result is 989.

Example (2): $673 + 438 = ?$

We have to follow two steps in abacus in case of adding 438 with 673.

1st Step: (Setting numbers)

In that case on the last side of right of abacus first the number 673 and on the last side of left of abacus the number 438 in to be followed by the rule. 673 since there are three digits so first 3 in the other words set the position the number of single place, then 7 in the other words set the position the number of decade place and last 6 in the other words set the position the number of hundred place. 438 since there are three digits so set the position the number first 4, second 3, and third 8 in the other words set the position the number of hundred, decade and single place.

2nd Step: (The process of addition)

<u>Draft</u>
$673 + 438 = ?$
$+1-6+0+0$
$+1-7+0$
$+1-2$
<hr style="width: 50px; margin: 0 auto;"/>
673
1111

After setting the number 673 and 438 in the room of a unit is to adding 8 with 3.

In that case whereas doesn't open 3 single valuable beads on side of bar, for this remove 2 single valuable beads to mentioned in the room of a unit from near the bar set the 1 single valuable bead in the room of decade in the other words 1 decade will to be add in the other words ($-2+1\text{decade} = +8$).

After adding in the room of a unit gets 1.

Then 3 will add in the room of decade. In that case whereas doesn't open 3 single beads on side of the bar, for this will remove 2 single valuable beads on side of the bar and 5 valuable beads from under side of the bar and will set the 1 single valuable bead in the room of hundred near the bar in the other words ($-2-5+1\text{decade} = +3$).

After adding in the room of decade gets 1.

Then 4 will add in the room of hundred. In that case whereas doesn't open 4 single valuable beads on side of bar, for this will remove 1 single valuable bead on side of the bar and 5 valuable beads from under side of the bar and will set the 1 single valuable bead in the room of thousand near the bar. In the other words ($-1-5+1\text{decade} = +4$).

After adding in the room of hundred get 1 and in the room of thousand get 1.

Thus adding the number 438 with the number 673 was added to 1111.

So the determining addition result is 1111.

9.10.3.2 Subtraction:**Example (1): 764 - 589 =?**

We have to follow two steps in abacus in case of subtraction 589 to 764.

1st Step: (Setting numbers)

In that case on the last side of right of abacus first the number 764 and on the last side of left of abacus the number 589 in to be bellowed by the rule. 764 since there are three digits so first 4 in the other words set the position the number of single place then 6 in the other words set the position the number of decade place and last 7 in the other words set the position the number of hundred place. 589 since there are three digits so last side of the left first 5, second 8, and third 9 in the other words set the position the number of hundred, decade and single place.

2nd Step: (The process of Subtraction)

<u>Draft</u>
764 - 589 =?
-5+0+0
-1+2+0
-1+1
<u>7 6 4</u>
1 7 5

After setting the number 764 and 589 in the room of a unit is to subtracting 9 to 4.

Whereas doesn't subtraction 9 to 4. So in that case off the 4 single valuation beads from near bar setting 5 valuation the beads under the bar off single valuation bead the left sight from in the room of decade. In the other words $\{-9 = (-4, + 5) -1 \text{ decade}\}$. After subtracting in the room of a unit get 5.

This time 8 will subtract from in the room of decade. In this case whereas doesn't subtraction 8 to 5. For this two single valuable beads in the room of decade set near the bar of the left side in the other words from in the room of hundred single valuable bead remove near the bar. In the other words $(-8 = +2, -1 \text{ decade})$. After subtracting in the room of a decade get 7.

After that 5 will subtract from in the room of hundred. In this case whereas in the room of hundred has $6 = (1 + 5)$. So very much comfortably remove 5 valuable beads under of the bar subtract 5. After subtracting in the room of hundred get 1.

Thus subtracting the number 589 to 764 was subtracted 175.

So the determining subtraction result is 175.

Example (2): 879 - 456 =?

We have to follow two steps in abacus in case of subtraction 456 to 879.

1st Step: (Setting numbers)

In that case on the last side of right of abacus first the number 879 and on the last side of left of abacus the number 456 in to be bellowed by the rule. 879 since there are three digits so first 9 in the other words set the position the number of single place, then 7 in the other words set the position the number of decade place and last 8 in the other words set the position the number of hundred place. 456 since there are three digits so last side of the left first 4, second 5, and third 6 in the other words set the position the number of hundred, decade and single place.

2nd Step: (The process of Subtraction)

<u>Draft</u>
879 - 456 =?
(-5+1)
-4-5-6
<u>8 7 9</u>
4 2 3

After setting the number 879 and 456 in the room of a unit is to subtracting 6 to 9. In this time whereas $9 = (4+5)$. So very much comfortably remove 1 valuable single bead near of the bar and 5 valuable beads under of the bar subtract 6. In the other words $(-1-5 = -6)$. After subtracting in the room of a unit get 3.

This time in the room of decade is to subtracting 5 to 7. In this time whereas in the room of decade has $7 = (2+5)$. So very much comfortably remove 5 valuable beads under of the bar subtract 5. In the other words (-5) . After subtracting in the room of decade get 2.

After that in the room of hundred is to subtracting 4 to 8. In this time whereas in the room of hundred has $8 = (3+5)$ but doesn't the 4 single beads. So remove 5 valuable beads under of the bar and set 1 single valuable bead near on the bar subtract 4. In the other words $(-5 + 1 = -4)$.

After subtracting in the room of hundred get 4.

Thus subtracting the number 456 to 879 was subtracted 423.

So the determining subtraction result is 423.

[2012, Sight savers & CDD in Bangladesh]

9.10.3.3. Multiplication:

Example (1) $34 \times 7 = ?$

Multiplication in order to incase in abacus first will practice multiplication table a bit new process.

For example:

$7 \times 1 = 0/7, 7 \times 2 = 1/4, 7 \times 3 = 2/1, 7 \times 4 = 2/8, 7 \times 5 = 3/5, \dots\dots\dots, 7 \times 9 = 6/3.$

We have to follow three steps in abacus incase of multiplication unto 34 by 7.

1st Step: (Setting numbers)

In that case from the last side of left of abacus at first set small number (Multiplier), keeping 1 room empty (0) for multiplication sign then set the big number (Multiplicand).

Scilicet last side of left of abacus at first set 7 number then keeping 1 room empty (0) set 34 number right side of number set moving comma on the bar.

As like:

$$7 \times 34 = \quad \boxed{7034 \blacklozenge 00000}$$

Figure-1: Establish number

2nd Step: (Removals comma)

Before began multiplication of big number (34) placed right side the comma to follow a rule have to be set remove on the right side.

In that case being rules are:

- (a) If there is 1 mathematic characteristic number remains left side (Multiplier) then comma will place 2 room of the right.
- (b) If there is 2 mathematic characteristic number remain left side (Multiplier) then comma will place 3 room of the right. In the other words at the left side will write much as mathematic characteristic number than its taken with excess 1 room the comma will set remove right side from own place. In that case whereas the number of 7 is one mathematic characteristic, In that case the comma so $1 + 1 = 2$ rooms on the right has to move.

As like:

$$\boxed{703400 \blacklozenge 000}$$

Figure-2: Removals comma

3rd Step: (The process of Multiplication)

Draft	Figure No
$34 \times 7 = ?$	(3) $703428 \blacklozenge 000$
$7 \times 34 = ?$	(4) $703028 \blacklozenge 000$
$7 \times 4 = 28$	+1
$7 \times 3 = \underline{210}$	(5) $703228 \blacklozenge 000$
238	(6) $700238 \blacklozenge 000$

At this time will multiply 2 steps unto 34 by 7. In this case rules are, at first have to multiply unto last right number by last left number. Last left number and last right number are 7 and 4. So have to multiply unto 4 by 7. In the other words $7 \times 4 = 2/8$. Product for write forefinger and thumb are to keep in empty (0) room of right side of big number. In that case product 2/8 write of time are set at first the number of 2 and empty (0) room of right the number of 8.

As like:

$$7 \times 4 = 2/8, \quad \boxed{703428 \blacklozenge 000}$$

Figure-3

Product 2/8 in the other words 28 after write whereas with 4 of 7 become multiply. So remove unto that 4 from near the bar set up after product for write forefinger and thump are to keep that empty (0) room.

As like:

$$\boxed{703028 \blacklozenge 000}$$

Figure-4

At this time last left of number and last right of number are 7 and 3. So have to multiply unto 3 by 7. In the other words $7 \times 3 = 2/1$. For this at first 2 and next at room of right side is to adding 1.

As like:

$$7 \times 3 = 2/1, \quad \begin{array}{c} +1 \\ \boxed{703228 \blacklozenge 000} \end{array}$$

Figure-5

At this time finish the work of 3 remove unto 3.

$$\boxed{700238 \blacklozenge 000}$$

Figure-6

As like:



Figure-4

At this time last left of number and last right of number are 12 and 5. So have to multiply unto 5 by 12. In the other words $12 \times 5 = 6/0$. For this at first 6 and next at room of right side is to adding 0.

As like:

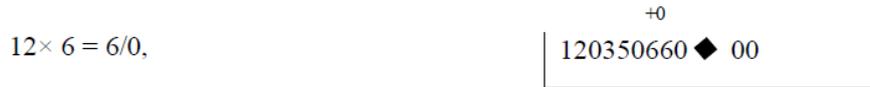


Figure-5

Product 6/0 in the other words 60 after write whereas with 5 of 12 become multiply. So remove unto that 5 from near the bar set up after product for write forefinger and thump are to keep that empty (0) room.

As like:



Figure-6

At this time last left of number and last right of number are 12 and 3. So have to multiply unto 3 by 12. In the other words $12 \times 3 = 3/6$. In that case time of write 3/6 at first 3 and next at room of right side is to adding 6. Bead doesn't keep for adding 6 so subtract 4 add 1 decade in the other words $(-4 + 1 \text{ decade} = 6)$. Bead doesn't keep for subtracting 4 so add 1 subtract 5 valuable beads. In the other words $(+1, -5 = -4)$.

As like:



Figure-7

As like:



Figure-8

Product 3/6 in the other words 36 after write whereas with 3 of 12 become multiply. So finish the work of 3 remove unto 3.

As like:

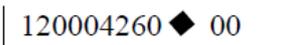


Figure-9

Thus multiply unto 355 by 12 multiplication result get 4260. So the determining multiplication result is 4260.

9.10.3.4 Division:

Example (1) 184 ÷ 8=?

Division in order to incase in abacus first will practice multiplication table a bit new process.

For example:

$8 \times 1 = 0/8, 8 \times 2 = 1/6, 8 \times 3 = 2/4, 8 \times 4 = 3/2, 8 \times 5 = 4/0, \dots, 8 \times 9 = 7/2.$

We have to follow three steps in abacus incase of division unto 184 by 8.

1st Step: (Setting numbers)

In that case from the last side of left of abacus at first set small number (Divisor), keeping 3 room empty (0) for quotient of write then set the big number (Dividend). Scilicet last side of left of abacus at first set 8 number then keeping 3 room empty (0) set 184 number right side of number set moving comma on the bar.

As like:



Figure-1: Establish number

2nd Step: (Removals comma)

Before began division of big number (184) placed right side the comma to follow a rule have to be set remove on the left side.

In that case being rules are:

- (a) If there is 1 mathematic characteristic number remains left side (Divisor) then comma will place 2 room of the left.
- (b) If there is 2 mathematic characteristic number remain left side (Divisor) then comma will place 3 room of the left. In the other words at the left side will write much as mathematic characteristic number than its taken with excess 1 room the comma will set remove left side from own place. In that case whereas the number of 8 is one mathematic characteristic, In that case the comma so $1 + 1 = 2$ rooms on the right has to move.

As like:

$$\begin{array}{|l} 80001 \blacklozenge 8400 \end{array}$$

Figure-2: Removals comma

3rd Step: (The process of Division)

Draft	Figure No
$184 \div 8 = ?$	(1) 8000184 \blacklozenge 00
$184 \div 8 = 23$	(2) 80001 \blacklozenge 8400
$\begin{array}{r} 16 \\ \underline{24} \\ 24 \\ \underline{24} \\ 0 \end{array}$	(3) 80021 \blacklozenge 8400 $\begin{array}{r} (-) 16 \\ \hline 80020 \blacklozenge 2400 \end{array}$
	(4) 80023 \blacklozenge 2400 $\begin{array}{r} (-) 24 \\ \hline 0 \end{array}$

After removing the comma have to begin of division work. For this at first have to see first the number big, equal or small of dividend than divisor. In that case if it is big or equal then after divisor that's the 3 rooms blank for quotient of write its right from middle room has to start write quotient. And if it is small then last room in the other words have to start quotient of write work from room of left side of divisor. In that case whereas first number of dividend is small than divisor. For this at blank room of correct left side of dividend to keep forefinger and thumb would read multiplication table. In that case have to see how much tally 8 (divisor) and 18 (dividend) of between. Multiplication table of 8 to read that see $8 \times 2 = 1/6$. Therefore in the writing room of quotient at writing 2 have to subtract 16 from dividend 18.

As like:

$$8 \times 2 = 1/6, \quad \begin{array}{|l} 80021 \blacklozenge 8400 \\ (-) 16 \end{array}$$

$$80020 \blacklozenge 2400$$

Figure-3

In that case subtract 16 to 18 get 2. This time have to divide remaining unto 24 by 8. In the other words $8 \times 3 = 2/4$. In that case before that room have been written quotient its right side at vacant room to write 3 have to subtract 24 to 24 (Dividend).

As like:

$$\begin{array}{|l} 80023 \blacklozenge 2400 \\ (-) 24 \\ \hline 0 \end{array}$$

Figure-4

In that case subtract 24 to 24 get 0.

Thus are to divide unto 184 by 8 quotient get 23 and does not any remaining. In the other words divisible.

So the determining quotient is 23.

Example (2) $1860 \div 12 = ?$

Division in order to incase in abacus first will practice multiplication table a bit new process.

For example:

$$12 \times 1 = 1/2, 12 \times 2 = 2/4, 12 \times 3 = 3/6, 12 \times 4 = 4/8, 12 \times 5 = 6/0, \dots, 12 \times 9 = 1/0/8.$$

We have to follow three steps in abacus incase of division unto 1860 by 12.

1st Step: (Setting numbers)

In that case from the last side of left of abacus at first set small number (Divisor), keeping 3 room empty (0) for quotient of write then set the big number (Dividend).

Scilicet last side of left of abacus at first set 12 number then keeping 3 room empty (0) set 1860 number right side of number set moving comma on the bar.

As like:

$$1860 \div 12 =$$

$$120001860 \blacklozenge 00$$

Figure-1: Establish number

2nd Step: (Removals comma)

Before began division of big number (1860) placed right side the comma to follow a rule have to be set remove on the left side. In that case being rules are:

- (a) If there is 1 mathematic characteristic number remains left side (Divisor) then comma will place 2 room of the left.
- (b) If there are 2 mathematic characteristic number remains left side (Divisor) then comma will place 3 room of the left. In the other words at the left side will write much as mathematic characteristic number than its taken with excess 1 room the comma will set remove left side from own place. In that case whereas the number of 12 is two mathematic characteristic, In that case the comma so $1 + 1 + 1 = 3$ rooms on the left have to move.

As like:

$$120001 \blacklozenge 86000$$

Figure-2: Removals comma

3rd Step: (The process of Division)

Draft	Figure No
$1860 \div 12 = ?$	(1) $120001860 \blacklozenge 00$
$1860 \div 12 = 155$	(2) $120001 \blacklozenge 86000$
$\begin{array}{r} 12 \\ 66 \\ \hline 60 \\ 60 \\ \hline 60 \\ 0 \end{array}$	(3) $\begin{array}{r} 120101 \blacklozenge 86000 \\ \hline (-) \quad 1 \quad 2 \\ \hline 120100 \blacklozenge 66000 \end{array}$
	(4) $\begin{array}{r} 120150 \blacklozenge 66000 \\ \hline (-) \quad 60 \\ \hline 120150 \blacklozenge 06000 \end{array}$
	(5) $\begin{array}{r} 120155 \blacklozenge 06000 \\ \hline (-) \quad 60 \\ \hline 0 \end{array}$

After removing the comma have to begin of division work. For this at first have to see first the number big, equal or small of dividend than divisor. In that case if it is big or equal then after divisor that's the 3 rooms blank for quotient of write its right from middle room has to start write quotient. And if it is small then last room in the other words have to start quotient of write work from room of left side of divisor. In that case whereas first number of dividend is small than divisor. For this at blank room of correct left side of dividend to keep forefinger and thumb would read multiplication table. In that case have to see how much tally 12 (divisor) and 18 (dividend) of between. Multiplication table of 12 to read that see $12 \times 1 = 12$.

Therefore in the writing room of quotient at writing 1 have to subtract 12 from dividend 18. As like:

$$12 \times 1 = 12,$$

$$\begin{array}{r} 120101 \blacklozenge 86000 \\ \hline (-) \quad 1 \quad 2 \\ \hline \end{array}$$

$$120100 \blacklozenge 66000$$

Figure-3

In that case subtract 12 to 18 get 6. This time have to divide remaining unto 66 by 12. In the other words $12 \times 5 = 60$. In that case before that room have been written quotient its right side at vacant room to write 5 have to subtract 60 to 66 (Dividend).

As like:

$$12 \times 5 = 60,$$

$$\begin{array}{r} 120150 \blacklozenge 66000 \\ \hline (-) \quad 60 \\ \hline \end{array}$$

$$120150 \blacklozenge 06000$$

Figure-4

In that case subtract 60 to 66 get 6. This time have to divide remaining unto 60 by 12. In the other words $12 \times 5 = 60$. In that case before that room have been written quotient its right side at vacant room to write 5 have to subtract 60 to 60 (Dividend).

As like:

$$12 \times 5 = 60,$$

120155 ◆ 060000
(-) 60

0

Figure-5

In that case subtract 60 to 60 get 0.

Thus are to divide unto 1860 by 12 quotient get 155 and does not any remaining. In the other words divisible.

So the determining quotient is 155

10. Statistical Analysis

The data were analyzed using suitable statistical techniques. Mean and standard deviation were calculated for special and integrated schools administering adjustment scale. Scores were tabulated separately for each setting in the form of overall adjustment; adjustment in home; school and the personal area. ‘t’ test was applied to test the significance of difference between the mean scores of the special and integrated school groups, i.e. overall adjustment, adjustment of home area; school area and the personal area were compared.

11. Results and Discussion

The result and their respective discussion are given below in a tabular form-

Objective-1: To compare education for the visually impaired students on special and integrated school of Thought in Bangladesh.

The corresponding null hypothesis formulated is as follows-

“There is no significant difference in adjustment of visually impaired students in special and integrated school in Bangladesh”

To test this hypothesis t-test of significance of Mean difference was applied and t-value along with Mean and SD of integrated and special school in Bangladesh have been given in table below (Table-1,2 & 3).

Table-1, 2 & 3: Mean, SD and value for the adjustment of VI students on integrated and special school in Bangladesh.

Table-1: Visually Impaired Students data of Integrated School:

37, 33, 27, 32, 50, 55, 27, 28, 68, 49, 40, 27, 44, 48, 52, 64, 42, 38, 45, 26, 33, 48, 42, 30, 58, 38, 45, 62, 29, 57.

1	2	3	4	5	6 = 3 × 5	7 = 4 - M ₁	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X - M ₁	{f × (X - M ₁)}	{f × (X - M ₁) ² }
70-66	I	1	68	+4	4	25.67	25.67	658.95
65-61	II	2	63	+3	6	20.67	41.34	1708.99
60-56	II	2	58	+2	4	15.67	31.34	982.19
55-51	II	2	53	+1	2	10.67	21.34	455.39
50-46	IIII	4	48	0	0	5.67	22.68	514.38
45-41	IIIIII	5	43	-1	-5	0.67	3.35	11.22
40-36	IIII	4	38	-2	-8	-4.33	-17.32	299.98
35-31	IIII	3	33	-3	-9	-9.33	-27.99	783.44
30-26	IIIIIIII	7	28	-4	-28	-14.33	-100.31	10062.09
		N=30			∑fd = -34			∑{f(X - M ₁) ² } = 15476.63

$$\begin{aligned} \text{Mean, } M_1 &= A.M + \frac{\sum fd}{N} \times i \\ &= 48 + \frac{-34}{30} \times 5 \\ &= 42.33 \end{aligned}$$

$$\begin{aligned} \text{Standard Deviation, } \sigma_1 &= \sqrt{\frac{\sum \{f(X - M_1)^2\}}{N}} \\ &= \sqrt{\frac{15476.63}{30}} \\ &= 22.71 \end{aligned}$$

Table-2: Visually Impaired Students data of Special School:

38, 25, 18, 13, 42, 27, 22, 9, 14, 29, 40, 20, 33, 48, 28, 34, 18, 10, 34, 44, 26, 17, 43, 49, 21, 7, 39, 30, 45, 28.

1	2	3	4	5	6 = 3 × 5	7 = 4 - M ₂	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X - M ₂	{f × (X - M ₂)}	{f × (X - M ₂) ² }
50-46	II	2	48	+4	8	20	40	1600
45-41	III	4	43	+3	12	15	60	3600
40-36	III	3	38	+2	6	10	30	900
35-31	III	3	33	+1	3	5	15	225
30-26	IIII	6	28	0	0	0	0	0
25-21	III	3	23	-1	-3	-5	-15	225
20-16	IIII	4	18	-2	-8	-10	-40	1600
15-11	II	2	13	-3	-6	-15	-30	900
10-6	III	3	8	-4	-12	-20	-60	3600
		N=30			Σ fd = 0			Σ {f(X - M ₂) ² } = 12650

$$\text{Mean, } M_2 = A.M + \frac{\sum fd}{N} \times i$$

$$= 28 + \frac{0}{30} \times 5$$

$$= 28$$

$$\text{Standard Deviation, } \sigma_2 = \sqrt{\frac{\sum \{f(X - M_2)\}^2}{N}}$$

$$= \sqrt{\frac{12650}{30}}$$

$$= 20.53$$

$$\text{T value, } t = \frac{M_1 - M_2}{\text{SED}}$$

$$= \frac{42.33 - 28}{5.88}$$

$$= 2.43$$

$$\text{Where, } \text{SED} = \sqrt{\left(\frac{S_1^2}{N} + \frac{S_2^2}{N}\right)}$$

$$= \sqrt{\left(\frac{22.71^2}{30} + \frac{20.53^2}{30}\right)}$$

$$= 5.88$$

Table-3: Mean, SD and value for the adjustment of VI students on integrated and special school in Bangladesh.

S.N.	VI Students in	N	Mean	SD	t-value
1	Integrated	30	42.33	22.71	2.43
2	Special	30	28	20.53	

*Significant at 0.05 levels

Table-1, 2 & 3 Shows that t-value of 2.43 is significant at 0.05 levels. Thus, the null hypothesis that there is no significant difference in adjustment of VI students in special and integrated school is rejected. It means there is significant difference between adjustment of VI students in special and integrated school. Probable reason for this result may be due to the integrated school having varieties of exposure compared to that of special school which, in turn, provide better social and personal interaction. These healthy inter-personal experiences boost up their morale fetching good result in term of proper adjustment either at school, home or a personal area.

Objective-2: To assimilate the home area education for the visually impaired integrated and special school of thought in Bangladesh. The corresponding null hypothesis formulated is as follow-

“There is no significant difference in home area adjustment of visually impaired students on special and integrated school in Bangladesh.”

To test this hypothesis t-test of significance of Mean difference was applied and t-value along with Mean and SD of integrated and special school in Bangladesh have been given in table below (Table-4,5 & 6).

Table-4, 5 & 6: Mean SD and value for the home area adjustment of VI students on integrated and special school in Bangladesh.

Table-4: Visually Impaired Students data of Integrated School:

31, 41, 45, 48, 42, 43, 37, 44, 14, 23, 22, 27, 14, 21, 37, 54, 52, 11, 30, 19, 14, 18, 28, 32, 24, 37, 51, 40, 39, 49.

1	2	3	4	5	6 = 3 × 5	7 = 4 - M ₁	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X - M ₁	{f × (X - M ₁)}	{f × (X - M ₁) ² }
51-55	III	3	53	+4	12	20	60	3600
46-50	II	2	48	+3	6	15	30	900
41-45	IIII	5	43	+2	10	10	50	2500
36-40	IIII	5	38	+1	5	5	25	625
31-35	II	2	33	0	0	0	0	0
26-30	III	3	28	-1	-3	-5	-15	225
21-25	IIII	4	23	-2	-8	-10	-40	1600
16-20	II	2	18	-3	-6	-15	-30	900
11-15	IIII	4	13	-4	-16	-20	-80	6400
		N=30	N=30		Σfd=0			Σ{f(X - M ₁) ² } = 16750

$$\text{Mean, } M_1 = A.M + \frac{\sum fd}{N} \times i$$

$$= 33 + \frac{0}{30} \times 5$$

$$= 33$$

$$\text{Standard Deviation, } \sigma_1 = \sqrt{\frac{\sum \{f(X - M_1)\}^2}{N}}$$

$$= \sqrt{\frac{16750}{30}}$$

$$= 23.62$$

Table-5: Visually Impaired Students data of Special School:

23, 13, 8, 16, 23, 16, 23, 14, 29, 3, 32, 41, 5, 8, 42, 29, 33, 44, 37, 18, 15, 42, 13, 22, 27, 33, 10, 19, 39, 20.

1	2	3	4	5	6 = 3 × 5	7 = 4 - M ₂	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X - M ₂	{f × (X - M ₂)}	{f × (X - M ₂) ² }
41-45	IIII	4	43	+4	16	20.33	81.32	6612.94
36-40	II	2	38	+3	6	15.33	30.66	940.03
31-35	III	3	33	+2	6	10.33	30.99	960.38
26-30	III	3	28	+1	3	5.33	15.99	255.68
21-25	III	3	23	0	0	0.33	0.99	0.98
16-20	IIII	5	18	-1	-5	-4.67	-23.35	545.22
11-15	IIII	4	13	-2	-8	-9.67	-38.68	1496.14
6-10	IIII	4	8	-3	-12	-14.67	-58.68	3443.34
1-5	II	2	3	-4	-8	-19.67	-39.34	1547.63
		N=30			Σfd = -2			Σ{f(X - M ₂) ² } = 15802.34

$$\text{Mean, } M_2 = A.M + \frac{\sum fd}{N} \times i$$

$$= 23 + \frac{-2}{30} \times 5$$

$$= 22.67$$

$$\text{Standard Deviation, } \sigma_2 = \sqrt{\frac{\sum \{f(X - M_2)\}^2}{N}}$$

$$= \sqrt{\frac{15802.34}{30}}$$

$$= 22.95$$

$$\text{T value, } t = \frac{M_1 - M_2}{\text{SED}}$$

$$= \frac{33 - 22.67}{6.02}$$

$$= 1.71$$

$$\text{Where, } \text{SE}_D = \sqrt{\left(\frac{S_1^2}{N} + \frac{S_2^2}{N}\right)}$$

$$= \sqrt{\left(\frac{23.62^2}{30} + \frac{22.95^2}{30}\right)}$$

$$= 6.02$$

Table- 6: Mean SD and value for the adjustment of VI students on integrated and special school in Bangladesh.

S.N.	VI Students in	N	Mean	SD	t-value
1	Integrated	30	33	23.62	1.71
2	Special	30	22.67	22.95	

*Significant at 0.05 levels

Table-4, 5 & 6 Shows that t-value of 1.71 which is significant at 0.05 levels. Thus, the null hypothesis that there is no significant difference in home area adjustment of VI students in special and integrated school is rejected. It means there exists a significant difference between home area adjustment of VI students in special and integrated school in Bangladesh. Probable reason for this result may be due to the indifference of home area adjustment of VI students in special and integrated school.

Objective-3: To explore the comparison the school area education for the visually impaired students on special and integrated school of thought in Bangladesh.

The corresponding null hypothesis formulated is as follow-

“There is no significant difference in school area adjustment of visually impaired students on integrated and special school in Bangladesh.” To test this hypothesis t-test of significance of Mean difference was applied and t-value along with Mean and SD of integrated and special school in Bangladesh have been given in table below (Table-7, 8 & 9).

Table-7, 8 & 9: Mean SD and value for the school area adjustment of VI students on integrated and special school in Bangladesh.

Table-7: Visually Impaired Students data of Integrated School:

7, 12, 32, 25, 18, 36, 42, 45, 15, 20, 9, 13, 19, 24, 29, 36, 33, 13, 18, 22, 21, 10, 40, 32, 17, 27, 25, 33, 14, 26.

1	2	3	4	5	6 = 3 × 5	7 = 4 - M ₁	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X - M ₁	{f × (X - M ₁)}	{f × (X - M ₁) ² }
5-9	II	2	7	+4	8	-23.17	-46.33	2146.84
10-14	IIII	5	12	+3	15	-18.17	-90.83	8250.99
15-19	IIII	5	17	+2	10	-13.17	-65.83	4334.25
20-24	IIII	4	22	+1	4	-8.17	-32.67	1067.19
25-29	IIII	5	27	0	0	-3.17	-15.83	250.75
30-34	IIII	4	32	-1	-4	1.83	7.33	53.76
35-39	II	2	37	-2	-4	6.83	13.67	186.76
40-44	II	2	42	-3	-6	11.83	23.67	560.79
45-49	I	1	47	-4	-4	16.83	16.83	283.25
		N=30			∑fd=19			∑{f(X - M ₁) ² } = 17134.58

$$\begin{aligned} \text{Mean, } M_1 &= A.M + \frac{\sum fd}{N} \times i \\ &= 27 + \frac{19}{30} \times 5 \\ &= 30.17 \end{aligned}$$

$$\begin{aligned} \text{Standard Deviation, } \sigma_1 &= \sqrt{\frac{\sum \{f(X - M_1)\}^2}{N}} \\ &= \sqrt{\frac{17134.58}{30}} \\ &= 23.89 \end{aligned}$$

Table-8: Visually Impaired Students data of Special School:

26, 11, 31, 22, 7, 33, 9, 20, 12, 37, 43, 29, 14, 6, 16, 21, 33, 42, 44, 46, 12, 18, 27, 10, 30, 21, 5, 17, 25, 49.

1	2	3	4	5	6 = 3 × 5	7 = 4 - M ₂	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X - M₂	{f × (X - M₂)}	{f × (X - M₂)²}
5-9	IIII	4	7	+4	16	-23	-92	8464
10-14	IIII	5	12	+3	15	-18	-90	8100
15-19	III	3	17	+2	6	-13	-39	1521
20-24	IIII	4	22	+1	4	-8	-32	1024
25-29	IIII	4	27	0	0	-3	-12	144
30-34	IIII	4	32	-1	-4	2	8	64
35-39	I	1	37	-2	-2	7	7	149
40-44	III	3	42	-3	-9	12	36	1296
45-49	II	2	47	-4	-8	17	34	1156
		N=30			∑fd = 18			∑{f(X - M ₂) ² } = 21918

$$\text{Mean, } M_2 = A.M + \frac{\sum fd}{N} \times i$$

$$= 27 + \frac{18}{30} \times 5$$

$$= 30$$

$$\text{T value, } t = \frac{M_1 - M_2}{SEd}$$

$$= \frac{30.17 - 30}{6.59}$$

$$= 0.025$$

$$\text{Standard Deviation, } \sigma_2 = \sqrt{\frac{\sum \{f(X - M_2)\}^2}{N}}$$

$$= \sqrt{\frac{21918}{30}}$$

$$= 27.03$$

$$\text{Where, } SE_D = \sqrt{\left(\frac{S_1^2}{N} + \frac{S_2^2}{N}\right)}$$

$$= \sqrt{\left(\frac{23.89^2}{30} + \frac{27.03^2}{30}\right)}$$

$$= 6.59$$

Table-9: Mean SD and value for the adjustment of VI students on integrated and special school in Bangladesh.

S.N.	VI Students in	N	Mean	SD	t-value
1	Integrated	30	30.17	23.89	0.025
2	Special	30	30	27.03	

*Significant at 0.05 levels

Table-7, 8 & 9 Shows that t-value of 0.02 which is significant at 0.05 levels. Thus, the null hypothesis that there is no significant difference in school area adjustment of VI students in special and integrated school is rejected. It means there exists a significant difference between school area adjustment of VI students in special and integrated school. Probable reason for this result may be due to the indifference of school area adjustment of VI students in special and integrated school. This may be due to reason that VI adolescents in special setup, having restricted exposure hamper the self-confidence, and self-concept reduce problem solving ability and affect the adjustment process. As he investigated that that integrated and special schools offer different opportunities for social interaction and social experiences. The visual child who is placed in an integrated school enjoys greater social interactions and experiences as compared to the child in the special school.

Objective-4: To compare the personal area education for the visually impaired students on special and integrated school of thought in Bangladesh.

The corresponding null hypothesis formulated is as follow-

“There is no significant difference in personal area adjustment of visually impaired students on special and integrated school in Bangladesh.” To test this hypothesis t-test of significance of Mean difference was applied and t-value along with Mean and SD of integrated and special school in Bangladesh have been given in table bellow (Table-10, 11 & 12).

Table-10, 11 & 12 Mean, SD and value for the personal area adjustment of VI students on integrated and special school in Bangladesh.

Table-10: Visually Impaired Students data of Integrated School:

33, 25, 18, 47, 13, 8, 20, 32, 41, 16, 9, 35, 24, 48, 14, 33, 22, 10, 38, 43, 22, 14, 7, 18, 46, 42, 30, 12, 32, 12.

1	2	3	4	5	6 = 3 × 5	7 = 4- M ₁	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X- M ₁	{f × (X- M ₁)}	{f × (X- M ₁) ² }
46-50	III	3	48	+4	12	22.5	67.5	4556.25
41-45	III	3	43	+3	9	17.5	52.5	2756.25
36-40	I	1	38	+2	2	12.5	12.5	156.25
31-35	IIII	5	33	+1	5	7.5	37.5	1406.25
26-30	I	1	28	0	0	2.5	2.5	6.25
21-25	IIII	4	23	-1	-4	-2.5	-10	100
16-20	IIII	4	18	-2	-8	-7.5	-30	900
11-15	IIII	5	13	-3	-15	-12.5	-62.5	3906.25
6-10	IIII	4	8	-4	-16	-17.5	-70	4900
		N=30			∑fd= 15			∑{f(X- M ₁) ² } = 18687.5

$$\text{Mean, } M_1 = A.M + \frac{\sum fd}{N} \times i$$

$$= 28 + \frac{-15}{30} \times 5$$

$$= 25.5$$

$$\text{Standard Deviation, } \sigma_1 = \sqrt{\frac{\sum \{f(X-M_1)\}^2}{N}}$$

$$= \sqrt{\frac{18687.5}{30}}$$

$$= 24.96$$

Table-11: Visually Impaired Students data of Special School:

6, 18, 23, 9, 12, 32, 42, 37, 8, 18, 15, 11, 18, 25, 26, 34, 30, 44, 7, 13, 22, 48, 15, 20, 47, 41, 21, 19, 47, 13.

1	2	3	4	5	6 = 3 × 5	7 = 4- M ₂	8 = 3 × 7	9 = 8 ²
Class Interval (CI)	Tally	Frequency (f)	Mid Value (X)	d	f × d	X- M ₂	{f × (X- M ₂)}	{f × (X- M ₂) ² }
46-50	III	3	48	+4	12	23.83	71.49	5110.82
41-45	III	3	43	+3	9	18.83	56.49	3991.12
36-40	I	1	38	+2	2	13.83	13.83	191.27
31-35	II	2	33	+1	2	8.83	17.66	311.98
26-30	II	2	28	0	0	3.83	7.66	58.68
21-25	IIII	4	23	-1	-4	-1.17	-4.68	21.90
16-20	IIII	5	18	-2	-10	-6.17	-30.85	951.72
11-15	IIII	6	13	-3	-18	-11.17	-67.02	4491.68
6-10	IIII	4	8	-4	-16	-16.17	-64.68	4183.50
		N=30			∑fd= -23			∑{f(X- M ₂) ² } = 19312.67

$$\text{Mean, } M_2 = A.M + \frac{\sum fd}{N} \times i$$

$$= 28 + \frac{-23}{30} \times 5$$

$$= 24.17$$

$$\text{Standard Deviation, } \sigma_2 = \sqrt{\frac{\sum \{f(X-M_2)\}^2}{N}}$$

$$= \sqrt{\frac{19312.67}{30}}$$

$$= 25.37$$

$$\text{T value, } t = \frac{M_1 - M_2}{SEd}$$

$$= \frac{25.5 - 24.17}{6.43}$$

$$= 1.33$$

$$\text{Where, } SE_D = \sqrt{\left(\frac{S_1^2}{N} + \frac{S_2^2}{N}\right)}$$

$$= \sqrt{\left(\frac{24.96^2}{30} + \frac{25.37^2}{30}\right)}$$

$$= 6.50$$

Table-12: Mean SD and value for the adjustment of VI students on integrated and special school in Bangladesh.

S.N.	VI Students in	N	Mean	SD	t-value
1	Integrated	30	25.5	24.96	1.33
2	Special	30	24.17	25.37	

*Significant at 0.05 levels

Table-10, 11 & 12 shows that t-value of 1.33 which is significant at 0.05 levels. Thus, the null hypothesis that there is no significant difference in personal area adjustment of VI students in special and integrated school is rejected. It means that VI students in integrated school having conducive environment for interaction; resulting greater exposure strengthen self-confidence in personal area adjustment as compared to that of the special setup. Thus, VI students are better adjusted so far as their personal adjustment is concerned in integrated school. This result is in consonance with the finding of DSS (2019). He investigated that integrated schools offer more opportunities for interaction with other children and a favorable environment for the development of a positive self-concept. The placement of visual children in integrated schools may make them feel that they are not different from unimpaired children-a feeling that may affect their self-concept.

CONCLUSION

The following are the conclusion regarding the study

1. Students in integrated school were found to be better adjusted as compared to that of special school.
2. Students in integrated school were found to be better adjusted in home area compared to those of special school.
3. Students in integrated school were found to be better adjusted in school area compared to those of special school.
4. Students in integrated school were found to be better adjusted in personal area compared to those of special school.

Background in Bangladesh of special education school and integrated education school advantage, disadvantage and according of research information individualizing integrated education program system is advantageous. In the other words integrated education is better education system for the visually impaired students.

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